DELINEATION OF SPILLWAY FLOWS

FOR

SIGNAL BUTTE FLOOD RETARDING STRUCTURE (F.R.S.)

FCD NO. 98-17

A-N WEST NO. 7158-05

MARCH, 1999
REVISED JULY, 1999
REVISED AUGUST, 1999

PREPARED FOR:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 WEST DURANGO STREET
PHOENIX, ARIZONA 85009

Registered Professional Engineer (Civil)
CERTIFICATE NO.
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8/19/98
ARIZONA, U.S.A.

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DELINEATION OF SPILLWAY FLOWS

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FULL SIZE 200 SCALE DELINEATION MAPS (29" X 36") — Under Separate Cover

Gregory E. Schuelke

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Date Signed 8/19/99
ARIZONA, U.S.A.

1.0 INTRODUCTION AND SCOPE OF WORK

On September 14, 1998, A-N West was contracted by the FCDMC to prepare a spillway delineation analysis for Signal Butte F.R.S. The study location is shown on Figure 1 along with the limits of new study mapping.

The limits of inundation were determined using U.S. Army Corps of Engineers HEC-RAS computer model (Version 2.2). The full spillway flows were provided by the Flood Control District of Maricopa County (District).

Final deliverables include this report with data tables showing water surface elevation, depth of flow, flow velocity, and travel time; a set of full size (24" x 36") delineation maps at a scale of 1" = 200' depicting the inundation limits, as well as, a reduced copy at 11" x 17" size and digital GIS coverages consistent with the District's Hydrologic Information System. A copy of the scope of work and contract are included in Appendix A.

2.0 STUDY AREA

The study area involved the area from Signal Butte F.R.S. to approximately 1,000 feet downstream of the Central Arizona Project (C.A.P.) Canal, a length of approximately 2.9 miles.

The Signal Butte F.R.S. uncontrolled emergency spillway is 140 feet in width. It is a concrete baffled block spillway with 9 foot high side walls (See Appendix A for details).

The general slope of the land is 0.9 percent to the southwest.

At the time of this study, the study area was approximately 60 percent developed with mostly residential development involving RV Parks and single-family residential homes. Commercial development also existed primarily along Apache Trail.

The Central Arizona Project (C.A.P.) Canal crosses from northwest to southeast approximately 2.7 miles downstream of the Signal Butte F.R.S.

The C.A.P. Canal has earthen berms above existing ground of approximately 6 to 8 feet height average, but as high as 18 feet. The canal includes cross-drainage structures to pass stormwater across the canal. These cross drainage structures were designed for the 100-year – 6-hour general storm for the local watershed between the C.A.P. and the Signal Butte F.R.S. (See Appendix F, for C.A.P. cross-drainage structure summary).

EXPLANATION

MAPPING LIMITS

456+50 OVERCHUTE & STA.

P PRIMARY FLOWPATH

EMERGENCY SPILLWAY DELINEATION STUDY FOR SIGNAL BUTTE F.R.S.

LOCATION MAP

A-N WEST INC. Consulting Engineers

FCDMC NO.98-17

A-N WEST NO. 7158-05

FIGURE 1

TABLE 1 – Capacity Comparison of CAP Canal Cross-Drainage Structures

CAP Station	Size	Design Discharge (cfs) (1)	HEC-RAS Culvert I.D.	Approx. HEC-RAS Sec. Sta.	HEC-RAS Capacity cfs (2)	HEC #5 Check Capacity cfs (2)	HEC-RAS 2/3 Q Cap; cfs (3)	HEC-RAS 1/3 Q Cap; cfs (4)
427+15	(3) Barrel 72" Dia. overchute	370	5	102 +30	462	465	402	116
429+20	(3) Barrel 72" Dia. overchute	370	4	100+00	454	465	393	109
456+00	(2) Barrel 60" Dia. overchute	130	1	73+00	624	630	632	579
471+03	(3) Barrel 72" Dia. overchute	608	2	58+10	1345	1425	1315	1020
479+00	(5) Barrel 72" Dia. overchute	400	3	49+50	2105	2250	2039	1498
	TOTAL	1878			4990	5235	4781	3322

Note: 1) The CAP Design Discharge from Ref. 3 in Appendix.
2) HEC-RAS computer and check capacity by (HEC #5, Ref. 9) at full spillway discharge = 11,309 cfs with WSEL=1573.56 at CAP Canal. The CAP design discharge would be based on lower WSEL, but this elev. was not known.
3) HEC-RAS Computer Model Capacity for 2/3 Spillway Flow.
4) HEC-RAS Computer Model Capacity for 1/3 Spillway Flow.

Table 1 is a summary of the applicable C.A.P. cross-drainage structures potentially impacted by this spillway delineation study from the Appendix data. Also shown are the peak discharges through these culverts from the HEC-RAS model analysis and a manual check (Ref. 9) at the full spillway flow with water over topping the CAP canal.

3.0 HYDROLOGY / HYDRAULIC ANALYSIS

3.1 Hydrology

The Signal Butte F.R.S. emergency spillway Freeboard Hydrology (FBH) discharge has been identified as 11,309 cfs from Ref. 7. The delineation of flows downstream of the emergency spillway are to be performed for the 1/3, 2/3, and full (FBH) spillway discharge or 3732, 7577 and 11,309 cfs, respectively.

3.2 Hydraulic Analysis

3.21 General

The Corps of Engineers, HEC-RAS, (Ref. 8) computer modeling program was used to analyze the 1/3, 2/3 and full spillway discharges exiting the Signal Butte F.R.S. emergency spillway. Cross-sections were digitized from the 200 scale, 2' C.I. mapping (Ref. 6) at approximately 500 foot intervals. The cross-sections were coded from left to right looking downstream with station 10,000 at the hydraulic baseline.

Section I.D. numbers are in River Miles increasing upstream along the hydraulic baseline with River Mile 5.000, assumed at the upstream cross-section, just upstream of the concrete spillway.

Each of the (3) discharges were modeled by separate HEC-RAS model and project number, rather than as (3) profiles within the same model. This approach was taken because the main low flow channel capacity was in places only 1,000 to 2,000 cfs, relative to the 1/3, 2/3 and full spillway flows, of 3732, 7577, and 11,309 cfs respectively.

The majority of the spillway discharges analyzed were found to breakout of the main low flow channel into the left overbank.

By utilizing (3) separate models, the ineffective area and/or blocked flow option of the HEC-RAS model was used to attempt to restrict effective flows for the (3) different discharges within the overbanks.

The overbanks are approximately 60 percent developed by a range of residential development involving RV Parks, single family homes, and commercial developments with screen walls. Streets and some secondary small channels provide some continuous flow paths for overbank flow.

Because some of these secondary channels were not considered effective for the 1/3 or 2/3 spillway flows, the ineffective flow or blocked flow option of HEC-RAS was used to block flow from these areas.

For the full spillway flow, the majority of the mapped area was considered effective flow.

Some HEC-RAS cross-sections were noted by the model to have been extended vertically for the computer water surface elevation at the left and/or right edges for some or all discharges. In most cases, the depth of flow at these open edges of the cross-sections was a maximum of 1 or 2 feet and it was not considered that significant effective flow or flooding occurred beyond these limits.

The horizontal varied (N) value option of HEC-RAS was utilized to attempt to model the high resistance to flow through the different densities of development. Per the Appendix B, (N) Value Estimation Section, N values as high as 0.15 were used for high density development, with 0.10 for moderate density development.

The mixed flow regime option of HEC-RAS was used to model each of the (3) profiles. The normal depth or slope-area method was used at the downstream end with slope = 0.011 ft/ft for starting water surface elevations. Critical depth was used for the starting water surface at the upstream end.

Five sets of culverts were modeled by HEC-RAS across the CAP canal. The Table 1 shows the original CAP design discharges along with the HEC-RAS computed capacities for the full spillway discharge profile as well as a manual check by HEC #5 (Ref. 9).

The full spillway discharge (= 11,309 cfs) water surface elevation was 1,573.56 at the CAP canal and involved overtopping of the canal berms. As such, the culvert capacities were larger than the design discharges, which were based on some lower (and unknown) ponding water surface elevation.

Three of the five sets of culverts across the CAP canal had relatively little downstream backwater effects from other structures. These CAP structures are steel pipes with modeled N values of 0.012.

However, CAP sta. 427+15 and 429+20 structures have similar sized and numbers of corrugated metal pipe (CMP) culverts (N=0.024) downstream which create backwater and thus reduce the CAP structure capacities. To model the above (2) sets of structures, the CAP culvert N values was raised from 0.012 to 0.024 to attempt to model the effect of these downstream CMP's. The total capacity of these (6) 72-inch diameter drainage structures across the CAP near the low flow channel was computed at 916 cfs, for the full spillway discharge (See Table 1, HEC-RAS Culvert ID's 4 and 5).

The flow distribution was evaluated during the analysis for each discharge. The widely varying terrain and development type and density along with the impact of the CAP canal structures create a difficult situation for uniform flow distribution. In general, for the full spillway discharge, flow begins to break into the left overbank (looking downstream) immediately downstream of the spillway channel. More flow continues to break into the left overbank proceeding downstream until at the CAP canal, the majority of flow is in the left overbank.

For the 1/3 and 2/3 spillway flows breakout begins further downstream, near the Adobe Road alignment and Brown Road, respectively. However, again flow continues to break into the left overbank, proceeding downstream.

3.22 Breakout To East At CAP Canal

At the east side of the study upstream of the CAP canal, ponding flow was noted to breakout beyond the detailed study and mapping limits.

In order to further evaluate this breakout flow, additional 200 scale 2 foot C.I. mapping was obtained from Michael Baker Jr. Inc. from their study of the Apache Junction F.R.S. spillway for the FCDMC (see Plates 1 and 2).

Based on the Bureau of Reclamations C.A.P. Hydrology Summary (Ref. 3), 3 sets of 5 barrel 72-inch diameter overchutes were noted on Plates 1 and 2. As shown in Appendix F, the set just west of Signal Butte Road had a capacity of approximately 1900 cfs total at a highwater elevation of 1,573.6 (Full Spillway Ponding Elev.).

As shown by Plate 1, the low road elev. of 1,571.3 on Signal Butte Road contains the 1/3 spillway flow ponding elev. of 1,570.4 from flowing further east.

It was further noted that overflow over the CAP Canal can occur for ponded water above approx. elev. 1,572.5±.

East of Signal Butte Road, the CAP Canal bank seemed high enough that only overchutes would convey flow across the CAP within the supplemental mapping limits.

To estimate the maximum amount of flow that could flow east over Signal Butte Road, a normal depth flow calculation was made using the Haestad Methods hydraulic software (see page F-31). Per page F-31, for 2,600 CFS, the energy grade elev. is 1,573.1 upstream of Signal Butte Road or equal to the 2/3 flow ponding elev.

The two sets of 5 barrel 72-inch pipes east of Signal Butte Road were evaluated to determine the ponding elev. to pass this 2,600 cfs. Per p. F-30, the ponded highwater elev. of 1,570.0 will pass the 2,600 cfs flow proceeding east of Signal Butte Road for the 2/3 flow condition.

To evaluate the full spillway flow condition, it was noted that the 2 sets of 5 barrel 72-inch pipes east of Signal Butte Road could convey approx. 3,750 cfs at a highwater elev. of 1,573.6 or the full spillway max. ponded elev. Going back to the Haestad software the ponding at the Signal Butte Road, for this 3,750 cfs resulted in a ponded upstream water surface elev. of 1,573.45 or approximately the same ponded elev. as for the full spillway condition.

Therefore, the ponding elev. east of the Signal Butte Road was estimated at elev. 1,573.6.

4.0 REFERENCES

1. Estimated Manning's Roughness Coefficients For Stream Channels and Floodplains in Maricopa County, Arizona, Prepared by U.S. Geological Survey, Water Resources Division, By B.M. Thomson and H. W. Hjalmarson, Prepared For Flood Control District of Maricopa County, April 1991.

2. Signal Butte Floodwater Retarding Structure Construction Plans, Project No. 83010-AZ-CH. Prepared For The FCDMC, Board of Supervisors of Pinal County and the East Maricopa Natural Resources Conservation District (E.M.K.R:C.D.) By The Soil Conservation District U.S. Dept. of Agriculture, FCDMC Approval Date: 1/23/85, E.M.N.R:C.D. Approval Date 1/23/85.

3. Central Arizona Project, Salt-Gila Aqueduct, Reach 1, Protective Works and Hydrology Data Summarizes, 5 pages, Received 10/1/98 From Bureau of Reclamation, U.S. Dept. of Interior, 23636 N. 7th Street, Phoenix, Arizona 85024, Ph 670-2333.

4. Aerial Photography at Scale: 1"= 333'±, Flown, December 2, 1996 From FCDMC, HIS Database.

5. Open-Channel Hydraulics, By Ven Te Chow, Ph. D., McGraw-Hill Book Co., 1959.

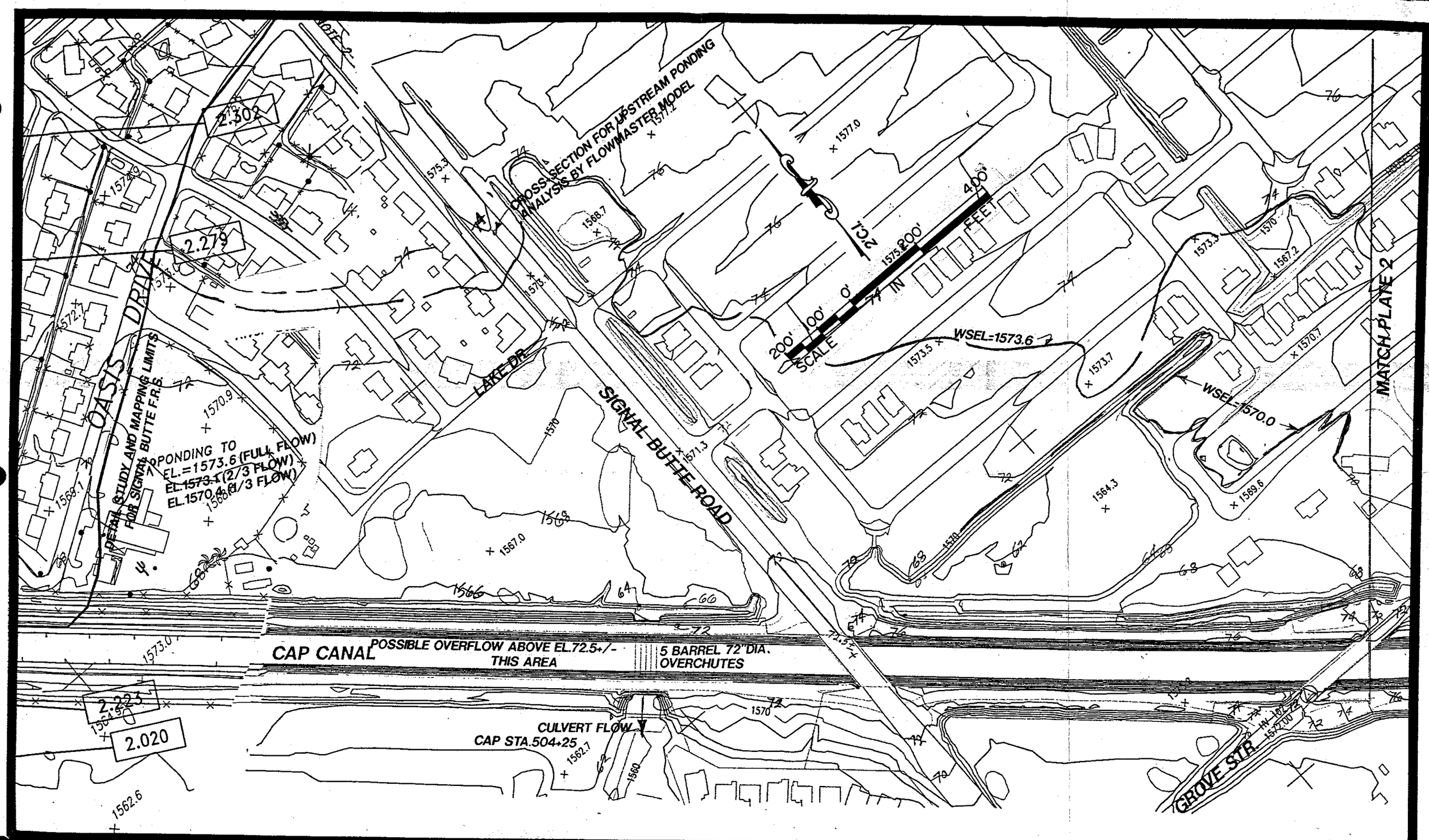
6. Aerial Photography For 200 scale, 2 Foot Contour Interval Mapping of Project, Flown 10/15/98 By Cooper Aerial of Phoenix, Inc.

7. "Hydrologic Investigation, Emergency Action Plan, Signal Butte F.R.S., Buckhorn-Mesa, Watershed," FCD Library (A304.701), Dated August 28, 1984, By U.S.D.A., Soil Conservation Service (SCS).

8. HEC-RAS, River Analysis System, Version 2.2, September 1998 version, U.S. Army Corps of Engineers, Hydrologic Engineering Center.

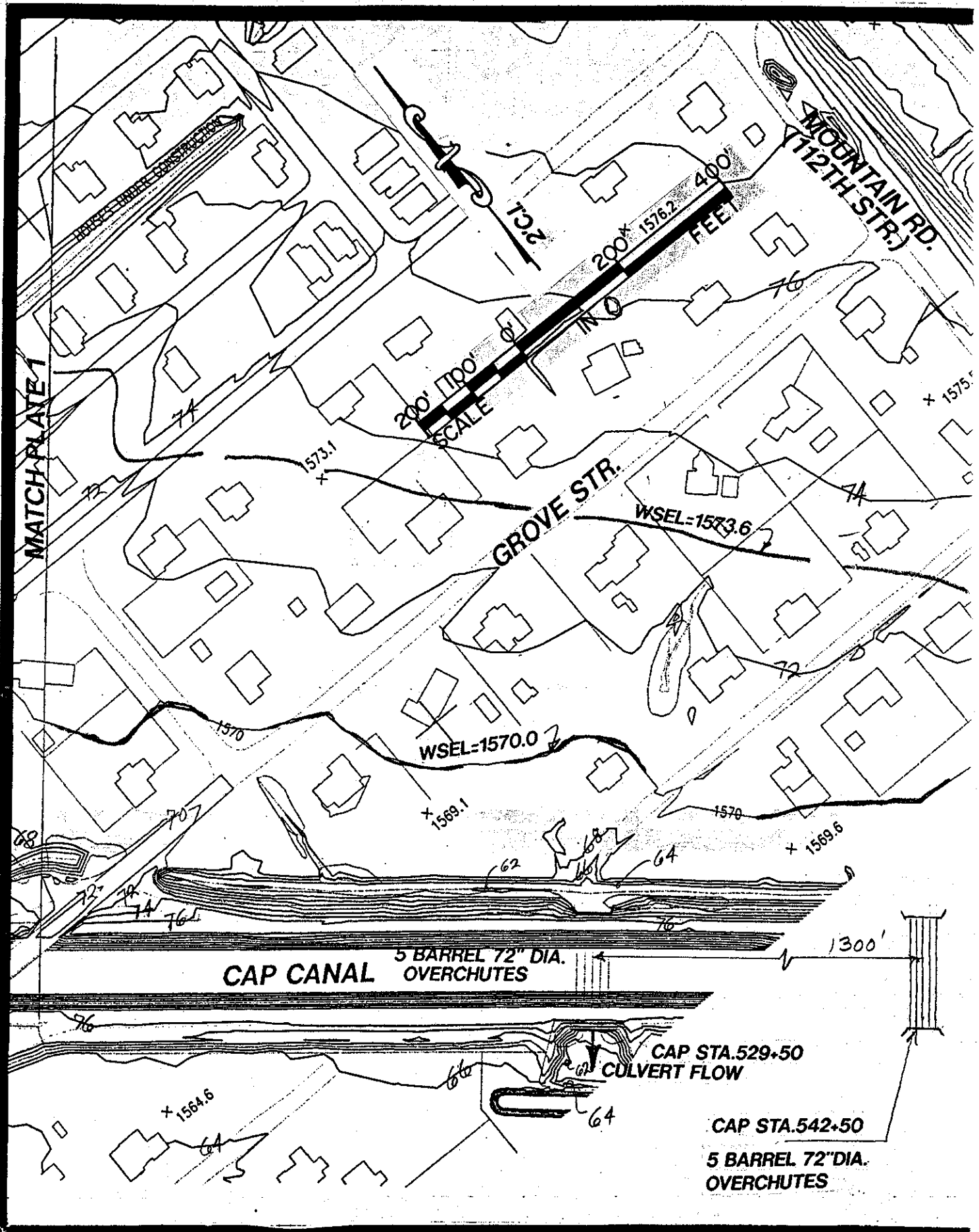
9. Hydraulic Charts for the Selection of Highway Culverts, Hydraulic Engineering Circular No. 5 (HEC #5), By Hydraulics Branch, Bridge Division, Federal Highway Administration, Washington D.C. 20590, Dec., 1965.

10. Flowmaster Version 4.1 Hydraulic Analysis Software by Haestad Methods, Inc. Waterbury Ct. 06708, Ph. (203) 755-1666.



A·N WEST INC.
Consulting Engineers

SIGNAL BUTTE F.R.S. FCD #98-17
SUPPLEMENTAL TOPO. FROM APACHE JUNCTION F.R.S.
SPILLWAY STUDY BY MICHAEL BAKER JR.,INC. FOR FCDMC
PLATE 1



SIGNAL BUTTE F.R.S. FCD #98-17
SUPPLEMENTAL TOPO. FROM APACHE JUNCTION F.R.S.
SPILLWAY STUDY BY MICHAEL BAKER JR.,INC. FOR FCDMC

A-N WEST INC.
Consulting Engineers

A-N WEST NO. 7158-05

PLATE 2

EXHIBIT A

SCOPE OF WORK

FCD 98-17
Delineation of Spillway Flows for
Signal Butte Flood Retarding Structure

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
SCOPE OF WORK
DELINEATION OF SPILLWAY FLOWS FOR
SIGNAL BUTTE FLOOD RETARDING STRUCTURE
FCD 98-17

GENERAL

The purpose of this study is to delineate the inundation limits of the 1/3, 2/3, and full discharge values of flows from the emergency spillway of the Signal Butte FRS. In order to accomplish this, the consultant will have to develop the topographic mapping and perform all the necessary hydraulic modeling. The upstream limit of the study is the Signal Butte FRS emergency spillway and the downstream limit is the Central Arizona Project Canal, the study limits are also depicted on exhibit A. The length of the study is approximately 3 linear miles. The consultant will determine the inundation limits using the U.S. Army Corps of Engineers HEC-RAS computer model. The consultant must use sound engineering judgement in the development of the inundation limits. The results of the HEC-RAS model must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results.

All work must be completed within 270 days from Notice to Proceed, which includes a minimum of 90 days for District reviews.

COORDINATION

The consultant will submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope during the proposal stage. The consultant shall update and resubmit this project schedule whenever changes in the schedule occur.

The consultant shall submit a quarterly estimation of the projected billing within 14 days of Notice To Proceed. Thereafter, this estimation will be updated and submitted to the District's Project Manager at least 10 days prior to the end of each quarter.

The consultant will obtain any necessary Rights of Entry. The consultant will furnish the District with a list of all property owners notified and a sample Right of Entry letter.

The consultant shall meet with officials from Maricopa County and the City of Mesa. The purpose of this meeting is to notify them about the study and obtain information on current or planned public works projects in the study area.

DATA COLLECTION

The Consultant will have to obtain the survey data along with the topographic mapping needed to perform this study. A Digital Terrain Model shall be used to develop the topographic mapping for this study, the horizontal scale will be 1" = 200' and the contour interval will be two-feet. The vertical datum for the topographic mapping will be NGVD 1929, and the horizontal datum will be NAD83. The consultant will develop a conversion factor to allow conversion of NGVD29 elevations to NAVD88. The conversion factor and documentation on how it was derived will be included in the Final Report for the study. All topographic mapping and survey work will meet or exceed the Federal Emergency Management Agency's (FEMA) minimum criteria as defined in FEMA 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, *January 1995.* Digital contour and

planimetric data for this study will be developed and delivered according the District's current specifications for the Hydrologic Information System (HIS).

The District will supply the 3 discharge values to be modeled. These values are from the spillway rating curves.

The consultant will conduct a field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimation of Manning's "n" values, photographic documentation of floodplain characteristics, determination of channel bank stations, observation of possible overflow and split flow areas. The field reconnaissance findings will be included in the Final Report for the study. A draft version of the field reconnaissance section of the Final Report will be submitted to the District prior to beginning the HEC-RAS modeling. This section will present the determination of channel and overbank "n" values along with color photographs (or color photocopies) of these areas. Photo locations, structures and "n" values will be displayed on reduced (usually 11" x 17") scale mapping and included in the Final Report.

HYDRAULIC ANALYSIS

This analysis will be preformed using the latest U.S. Army Corps of Engineers HEC-RAS River Analysis System computer model.

The HEC-RAS models will usually be developed for subcritical flow. However, in some cases supercritical flow may be experienced and have to be modeled. The HEC-RAS model should be started far enough downstream to eliminate the affects of the starting conditions on the downstream limit of the study area, and reflect a minimized hazard from spillway flows. A rating curve should be used to determine the starting water surface elevation at the downstream and upstream ends of the study.

The initial location and alignment of cross sections and channel centerline will be submitted for the District's review and approval prior to the initial digitizing of the cross section. Cross section stationing will be from left to right looking downstream with the thalweg at station 10,000. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate closer spacing, and will extend the full width of the inundated area. The orientation of the cross sections may need to be altered after running the HEC-RAS model to ensure that cross sections are perpendicular to flow. Also, to ensure good hydraulic modeling of the spillway discharges, additional cross sections may need to be added, or the existing cross sections may need to be moved. Interpolated cross sections will not be used in the HEC-RAS model.

Manning's "n" values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991.

Prior to the completion of the final hydraulic models all of the input data must be reviewed to ensure that it agrees with HEC-RAS model results. This includes: the location of the channel centerline, reach lengths, Manning's "n" values, ineffective flow limits, discharge values, etc...

For braided channels, each branch should be modeled with its highest anticipated discharge value. This might require more then one HEC-RAS model to delineate the inundation limits in these areas. A rating curve must be determined and the discharge contained within the channel. The percentage of discharge in each overbank and the main channel must be closely assessed within the split flow area, as well as upstream and downstream of it.

The consultant is to setup the HEC-RAS models so that the cross sections are broken into as many segments as practical for determining the maximum depth and velocity along the cross section. The consultant will need to calculate the time it takes for flows to travel from the spillway to each cross section.

Cross sections shall be plotted showing, computed water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing, and other pertinent information. The consultant is to make refinements to the HEC-RAS model based on review of the model by the District and other interested Agencies. Adjustments to the input parameters for obtaining the most realistic results are considered normal to the scope of work.

FINAL PRODUCTS

Use the HEC-RAS model results and the topographic mapping data to develop the inundation limit exhibits at a horizontal scale of 1" = 200'. This exhibit (full size) will be on standard size sheets with a maximum dimension on one side of 36 inches. This exhibit will use the District's standard border, title block, and legend format. Shown on this exhibit will be the inundation limits for the three discharges, cross section locations, thalweg location, supplied topographic data, consultant developed topographic data or revisions, major and appropriate minor road names, and elevation reference marks. This exhibit will be plotted at the same scale as the originally supplied topographic data. A table must be included on this exhibit showing the computed water surface elevation of each cross section for each discharge modeled, and other pertinent information such as maximum depth, velocity, and travel time from the spillway to each cross section. In the case of split or braided flow the maximum inundation limit should be shown and the maximum water surface elevation for each portion of the cross section listed. At the end of the study one complete set of inundation limit exhibits will be submitted on non-erasable mylar (3 mil or thicker), and will be sealed by the engineer. No sticky backs or other types of tape products shall be applied to the mylars.

An overall Final Report for the study will be developed. This report will include, a narrative description of the purpose of this study, what steps were undertaken to complete this study, any assumptions made, minutes of meetings with officials from the County and the City of Mesa, the field reconnaissance report, and a copy of the inundation limit exhibits. Included as appendixes to this report should be printouts of the HEC-RAS models, plot of the cross sections, supporting calculations for any other hydraulic analysis done, and a copy of any supplemental survey work performed.

The results of this study will also be submitted in a digital format for use in the District's Hydrologic Information System (HIS). The digital data will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 3.1 for the following themes:

1. NDXPRJ
2. PRJ
3. DQ
4. SPWBLN
5. SPWXSEC
6. SPWZN

In addition to the above, the topographic digital data will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 3.1 for the following themes:

1. CARTO
2. CORNERS
3. CTRL
4. STRCT
5. PRJ.REL
6. BRIDGE
7. CNL
8. CULVERT
9. FLTY
10. STRTDTL
11. ELV
12. RIVER
13. FPCTLFCD

The consultant is to completely fill out every item called for in the HIS specifications on the above layers. The HIS data submitted by the consultant will be subject to a rigorous quality control (QC) check by District staff.

The District makes use of a checklist and a computer program to document and automate the QC process. A copy of the checklist will be provided to the consultant. The consultant must use the checklist to review each HIS data submittal compliance, and deliver a completed copy of the checklist to the District along with the data submittal.

DELIVERABLES

1. One set of the inundation limit exhibits (full size) on mylar sealed by the engineer.

2. 4 copies of the Final Report sealed by the engineer, inundation limit exhibits, and copies of the HEC-RAS models (input and output files) on diskette.

3. All of the HIS data called for in the Final Products Section.

Subject:	Kick-off Meeting at FCDMC
Date:	9/16/98
FCDMC No.	98-17
A-N West No.	7158-05
Project Name:	Delineation of Spillway Flows For Signal Butte F.R.S.

Initial Data Needs From FCDMC:

1) Signal Butte F.R.S. Spillway / Outlet Structure Plans / As-Builts

2) C.A.P. Plans / As-Builts, from Sta. 414 + 15± to Sta. 504 + 25± or at Point approximately 1200 feet north of Apache Trail to Point 1200 feet south of Broadway Road.

3) Spillway Outflow Hydrology.

4) Key to C.A.P. and/or Signal Butte F.R.S. Structure Security Gates or Contact Names for Access By Surveyors.

5) Sample Technical Data Notebooks for Example Format for Project.

6) Two Copies of Version 3.1 GIS / HIS specs.

7) Survey Elevation Benchmarks and Horizontal Control in Area or FCD Contact Name For Surveyor to Coordinate.

FCD 98-17
Delineation of Spillway Flows for Signal Butte FRS

Some General Guidelines for the Study

September 16, 1998

1. All submittals should include a copy of the HEC-RAS model on diskette. The diskette should include the input and output files, and the generated report.

2. Use the project description and cross section description features of HEC-RAS. The project description should include the study name, contract number, consultants name, consultant contact, purpose of the study, general assumptions, source of the study data (topographic mapping (flight date), hydrology, n-values, etc...). The cross section description (if necessary) might include a comment on the specific modeling approach, or a comment about the relationship of the cross section to roads or other significant features.

3. When printing out the HEC-RAS model results make use of headers and/or footers. All output pages should be numbered and dated, it can be helpful to have the study name and contract number included on the pages. If the three discharges are modeled separately, then that should be included in the footer.

4. The hydraulic results summary table should really be on the same page as the cross sections it pertains to. The intent is to have some of the pertinent results on the same page with the cross sections. We don't want to have a separate page for the hydraulic results summary table.

5. The final HEC-RAS model should only include the final results. This means that usually there is only one plan, one geometry file, and one hydrology file. Any intermediate files (usually different geometry files for different approaches to a problem area) should not be included. The only exception to this is if the three discharges are modeled separately.

6. Items that are preliminary or draft should be identified as such. Dating the items can also help in this matter.

7. The Manning's n Value Report and the Data Collection Report are not intended to be stand-alone reports. They are supposed to be sections of the main report.

8. In the main report headers and/or footers should be included (similar to item number 3).

A-N WEST INC.
Consulting Engineers

September 16, 1998

Aztec Engineering
4515 North 16th Street
Suite 202
Phoenix, AZ 85016-5363

Re: Notice to Proceed For Survey on
FCD No. 98-17, Signal Butte Flood Retarding Structure
A-N West No. 7158-05

Attn: Mr. Norman L. Smith, R.L.S., V.P. Survey

Dear Mr. Smith:

We write to inform you of your immediate Notice to Proceed on the referenced project. We are transmitting:

a) An executed proposal for the 2 foot C.I. mapping option.

b) Eleven sheets of Design Plans for the Signal Butte F.R.S. CAP.

c) Proposed schedule.

Cooper Aerial Mapping (Jeff Cooper, Ph. 678-5111) will be performing the aerial mapping for the project. Please coordinate with Cooper on panel layout and flight schedule. Joe Tram of the FCD will be contacting the Bureau of Reclamation concerning CAP access and will also notify us concerning the F.R.S. structure access through the F.C.D. A-N West will contact Martha Dent at F.C.D. to obtain benchmark and control data.

Should you have other questions, please call.

Sincerely,

A-N WEST, INC.

Greg Schuelke

Gregory A. Schuelke, P.E., R.L.S.
Vice President
Project Manager

GAS/hr

A8

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

A-N WEST INC.
Consulting Engineers

September 18, 1998

Cooper Aerial of Phoenix, Inc.
11402 North Cave Creek Road
Phoenix, AZ 85020

Re: Notice to Proceed For Aerial Topography and HIS Translation on
FCD No. 98-17, Signal Butte Flood Retarding Structure
A-N West No. 7158-05

Attn: Mr. Jeff Cooper

Dear Mr. Cooper:

We write to inform you of your immediate Notice to Proceed effective 9/14/98 on the referenced project.

The 2 foot C.I. mapping proposal option has been selected from your earlier proposal (attached). However, the digital photo overlay option will not be included. Your resultant fee is understood to be $ 12,942.00.

Aztec Engineering (Mr. Norm Smith Ph: 263-9640) will be performing the field survey for the project. Please coordinate with Aztec Engineering on the flight schedule.

Should you have other questions, please call.

Sincerely,

A-N WEST, INC.

Greg Schuelke

Gregory A. Schuelke, P.E., R.L.S.
Vice President
Project Manager

GAS/hr

A-9

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

FAX MEMO

Date: 9/23/98
To: Martha Dent, GIS/HIS Dept.
FCDMC Fax No. 506-4601
Project: Signal Butte F.R.S. Spillway Delineation Study
FCD. No. 98-17
A-N West No. 7158-05
From: Mr. Greg Schuelke, PE, RLS.
Phone: 861-2200
Fax: 943-1989

Re: Horizontal and Vertical Control Data In Area of Study and Request For 1,000 Scale Aerial Photo of Site.

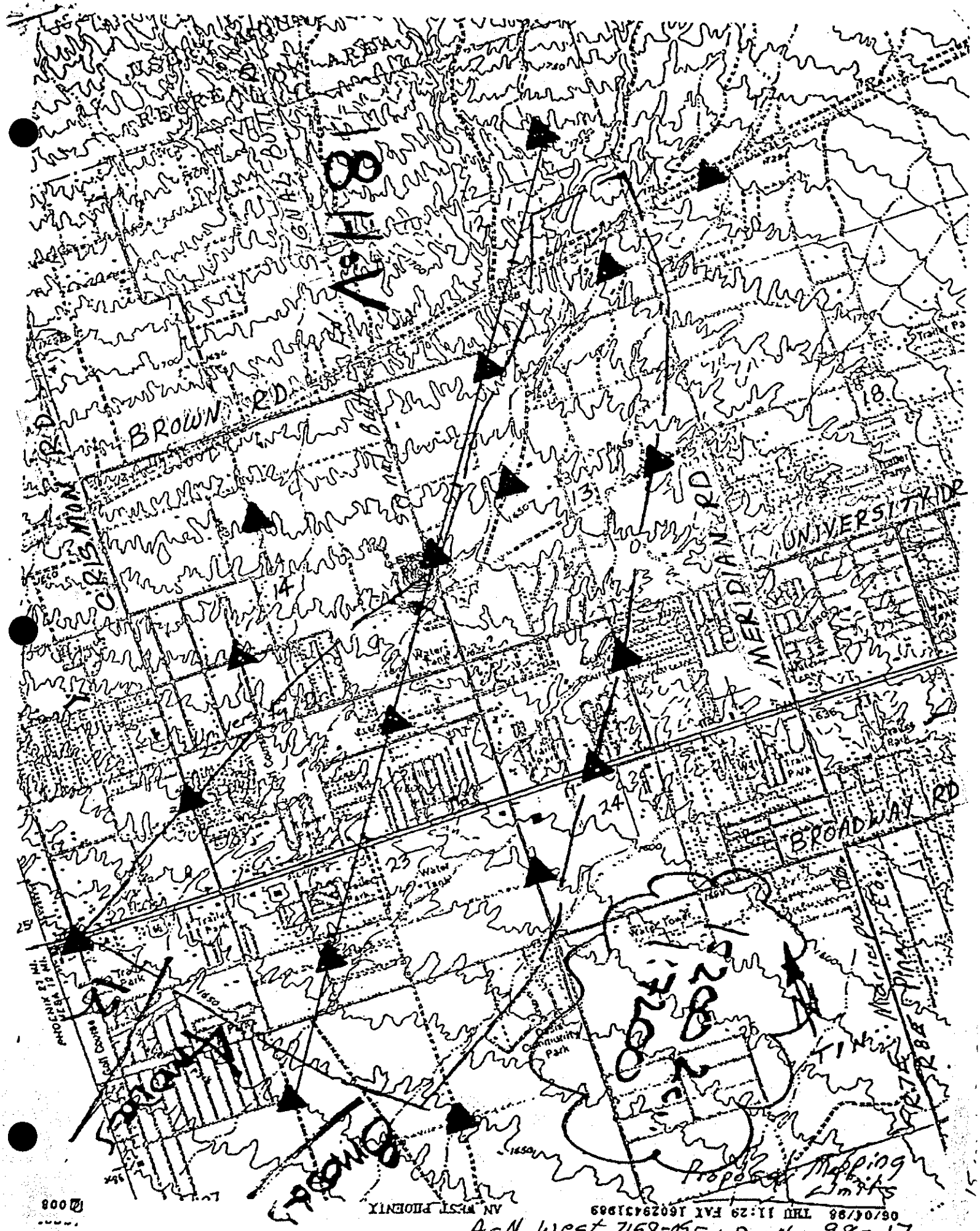
Dear Ms. Dent:

A-N West is performing a spillway delineation study in the area shown on the attached Exhibit for the F.C.D.M.C.

We are requesting a printout of horizontal and vertical control benchmarks in this study area and within (1) mile beyond for our survey subconsultant, Aztec Engineering, to coordinate with.

We also write to request a 1,000 scale photo from your data base of the study area and the area ½ mile beyond for use as a study aid.

Thank You.



A-N West 7158-05 FCD No 98-17
A-11
1470 Ac 2.3 mi²

A-N WEST INC.
Consulting Engineers

September 23, 1998

FCDMC
2801 West Durango Street
Phoenix, AZ 85009-6399

Attn: Mr. Joe Tram, Project Manager

Re: FCD No. 98-17
Signal Butte F.R.S. Spillway Delineation
A-N West No. 7158-05

Dear Mr. Tram:

Attached is a proposed schedule and estimate of projected billing by quarter for the referenced project as requested.

Sincerely,

A-N WEST, INC.

Greg Schuelke

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-12

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

A-N West No. 7158-05
Notice to Proceed: 9/14/98
Completion Date: 6/11/99 (270 Days)

DELINEATION OF SPILLWAY SLOWS FOR SIGNAL BUTTE, F.R.S.
FCD NO. 98-17
PROPOSED SCHEUDLE

Number of Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
	9/14/98	9/21	9/28	10/5	10/12	10/19	10/26	11/2	11/9	11/16	11/23	11/30	12/7	12/14	12/21	12	1/4/99	1/11	1/18	1/25	2/1	2/9	2/15	2/22	3/1	3/8	3/15	3/22	3/29	4/5	4/12	4/19	4/26	5/3	5/10	5/17	5/24	6/7	5/11	Completion
Notice to Proceed 9/14/98																																							
1. PROJECT COORDINATION	(K)								(P)									(P)				(P)							(P)							(P)			
2. DATA COLLECTION																																							
a. Field Survey																																							
b. Aerial Photo/2' C.I. Mapping																																							
c. Field Reconnaissance Report										<	R	>																											
3. HYDRAULIC ANALYSIS																																							
a. Cross-Section Generation																			<	R	>																		
b. HEC-RAS Analysis																							<		R		>			<		R		>					
4. HIS TRANSLATION																							<		R		>						<	R	>				
5. DELIVERABLES									(1)					(2)				(3)				(4)	(5)						(6)		(7)					(8)			

Legend:
(1) = Draft Reconn. Report
(2) = Draft Mapping with Proposed Cross-Section Locations
(3) = Cross-Section Plots
(4) = Draft HEC-RAS Analysis and Delineation
(5) = Draft HIS Submittal of Mapping (Non-Delination) Items
(6) = Draft T.D.N. and HEC-RAS Delineation
(7) = HIS Submittal of All Data
(8) = Final Documents Submitted.
(K) = Kickoff Meeting
(P) = Progress Meeting

A-13

ESTIMATE OF PROJECTED BILLING

PROJECT NAME: Signal Butte F.R.S. Spillway Delineation
PROJECT NO.: FCD 98-17
A-N WEST NO.: 7158-05
NOTICE TO PROCEED: 9/14/98
COMPLETION DATE: 6/11/99 (270 Days)

Task	July - Sept	Oct - Dec	Jan - Mar	Apr - Jun	Subtotal
1. PROJECT COORDINATION	937.86	937.86	937.86	937.86	$3,751.44
2. DATA COLLECTION					
a. Field Survey		9,198.00			$9,198.00
b. Aerial Photo/2' C.I. Mapping		8,973.00			$8,973.00
c. Field Reconn. Report		4,847.38			$4,847.38
3. HYDRAULIC ANALYSIS					
a. Cross-Section Generation		4,966.10	2,483.05		$7,449.15
b. HEC-RAS Analysis			12,415.24	4,966.10	$17,381.34
4. HIS TRANSLATION					
a. A-N West			1,478.46	1,478.46	$2,956.92
b. Cooper Aerial			1,787.40	1,787.40	$3,574.80
5. DELIVERABLES/EXPENSES	500.00	500.00	500.00	3,463.85	$4,963.85
6. RETENTION			3,505.32	3,505.32	$7,010.64
Subtotal	$1,437.86	$29,422.34	$23,107.33	$16,138.99	$70,106.52
TOTAL					**$70,106.52**

TRANSMITTAL FORM

[ ] Record of a Telephone Conversation [ ] Letter Of Transmittal

Cooper Aerial of Phoenix, Inc.
11402 N. Cave Creek Road
Phoenix, Arizona 85020
(602) 678-5111
Fax (602) 678-5228

to: A-N West
address: 3860 Frontage Rd Ste #20
city: Bullhead City, AZ 86442
attention:

date 10/19/98 job no. 1040-091898 re. Signal Butte F.R.S

we are sending you: [ ] attached via UPS the following:

[ ] contact prints [ ] enlargments [ ] digital data [ ] mapping [ ] samples

[ ] copy of letter [ ] change order [ ] specifications [ ] check plots

[ ] other

Note: If parcel is damaged in transit, please notify us at once.

items discussed / comments or action *required:*

1 - Set of Contact Prints

signed: Rob Murphy
A-15

If there is any discrepancy between the above statement and the conversant's interpretation of the *conversation, please notify Cooper Aerial of Phoenix, Inc. immediately.*

A-N WEST INC.
Consulting Engineers

October 30, 1998

FCDMC
2801 West Durango Street
Phoenix, AZ 85028

Attn: Mr. Joe Tram

Re: Signal Butte F.R.S. Spillway Delineation
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Tram:

It is A-N West's understanding that the study discharges for the referenced, study are the 1/3, 2/3 and full discharge flows from the emergency spillway for the Signal Butte F.R.S., which were to be provided to A-N West. A-N West was provided a loner copy of the, "Hydrologic Investigation, Emergency Action Plan, Signal Butte F.R.S., Buckhorn-Mesa, Watershed", FCD Library (A304.701), Dated August 28, 1984, as a source of the full spillway flows.

We have enclosed a summary table from the above document, entitled, Signal Butte FRS, ESH, FBH and Breach Analysis For Emergency Action Plan. We interpret the Freeboard Hydrology Discharge (FBH) flow of 11,309 cfs as the Full Discharge for this study. The 1/3 and 2/3 flows, then being 3766 and 7532 cfs, respectively.

We write to request your concurrence on these study flows.

Sincerely,

A-N WEST, INC.

Gregory A. Schuelke, P.E., R.L.S.
Vice President
Project Manager

GAS/hr

A-16

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

SIGNAL BUTTE PAS-

ESH, FBH AND BREACH ANALYSIS FOR EMERGENCY ACTION PLAN

X-Sect	Bankfull Elevation	Emer. Spy Hyd			Freeboard Hyd			Dam Breach			Dam Breach			Dam Breach			Dam Breach		
No.	MSL	Qmax = 2450 (Disc)	(Elev)	V = 1850 (Width)	Qmax = 11309 (Disc)	(Elev)	V = 6514 (Width)	Qmax = 35000 (Disc)	(Elev)	V = 2822 (Width	Qmax = 35000 (Disc)	(Elev)	V = 7930 (Width)	Qmax = 35000 (Disc)	(Elev)	V = 2822 (Width)	Qmax = 35000 (Disc)	(Elev)	V = 7930 (Width)
1	1702	2450	1700.3	620	11309	1702.9	1270	35000	—	2135	35000	—	2135	35000	--	2135	35000	—	2135
2	1660	2441	1658.6	450	11140	1659.9	2370	25000	1660.6	3920	30000	1660.9	3920	36100	1661.2	3920	45300	1661.5	3920
3	1620	2401	1618.8	870	10915	1619.1	4570	19000	1619.5	6100	26200	1619.8	6100	25900	1619.8	6100	38000	1620.3	6100
4	1580	2369	1580.0	1180	10630	1580.5	5390	14800	1580.1	8790	23000	1580.5	8790	19000	1580.3	8790	32500	1580.8	8790

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
Jan Brewer
Fulton Brock
Andrew Kunasek
Don Stapley
Mary Rose Garrido Wilcox

NOV 1998
A-N WEST, INC.
PHOENIX, ARIZONA

A-N West, Inc.
Consulting Engineers
7600 North 15th Street, Suite 200
Phoenix, Arizona 85020-4331

Attn: Mr. Greg Schuelke, P.E.

Re: Letter dated October 30, 1998
FCD 98-17
A-N West No. 7158-05

Dear Mr. Schuelke:

We concur with the flow values to be used for the inundation maps for the subject contract, as defined in your letter of October 30, 1998.

Technical Release No. 60 by the U.S. Department of Agriculture Soil Conservation Service indicates that the Freeboard Hydrograph would be generated from the Probable Maximum Precipitation event, or portions thereof, depending upon the classification of the structure.

I apologize for not furnishing this information to you sooner.

Sincerely,

Joe Tram

Joe Tram, P.E.

Enclosure

Earth Dams and Reservoirs

Technical Release No. 60
210 - VI

Revised Oct. 1985

U.S. Department of Agriculture
Soil Conservation Service
Engineering Division

A-19

TABLE 2-5

MINIMUM EMERGENCY SPILLWAY HYDROLOGIC CRITERIA

Class of Dam	Product of Storage x Effective Height	Existing or Planned Upstream Dams	Precipitation Data for 1/	
			Emergency Spillway Hydrograph	Freeboard Hydrograph
(a) 2/	less than 30,000	none	P_{100}	$P_{100} + 0.12\ (PMP - P_{100})$
	greater than 30,000	none	$P_{100} + 0.06\ (PMP - P_{100})$	$P_{100} + 0.26\ (PMP - P_{100})$
	all	any 3/	$P_{100} + 0.12\ (PMP - P_{100})$	$P_{100} + 0.40\ (PMP - P_{100})$
(b)	all	none or any	$P_{100} + 0.12\ (PMP - P_{100})$	$P_{100} + 0.40\ (PMP - P_{100})$
(c)	all	none or any	$P_{100} + 0.26\ (PMP - P_{100})$	PMP

1/ P_{100} = Precipitation for 100-year return period. PMP = Probable maximum precipitation.

2/ Dams involving industrial or municipal water are to use minimum criteria equivalent to that of class (b).

3/ Applies when the upstream dam is located so that its failure could endanger the lower dam.

A-N WEST INC.
Consulting Engineers

December 3, 1998

FCDMC
2801 West Durango Street
Phoenix, AZ 85028

Attn: Mr. Joe Tram, PE

Re: Signal Butte F.R.S. Spillway Delineation Study
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Tram:

We herewith transmit one draft of the initial report and Appendix B, Field Reconnaissance and Hydraulic Parameters Estimation for your review and comment.

Sincerely,

A-N WEST, INC.

Greg Schuelke

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-21

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
Jan Brewer
Fulton Brock
Andrew Kunasek
Don Stapley
Mary Rose Garrido Wilcox

December 8, 1998

Gregory A. Schuelke P.E., R.L.S.
A-N West Inc., Consulting Engineers
7600 North 15th Street, Suite 200
Phoenix, Arizona 85020-4331

Subject: Signal Butte F.R.S. Spillway Delineation Study
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Schuelke:

Our review comments are contained within the enclosed copy of your draft initial report and Appendix B, Field Reconnaissance and Hydraulic Parameter Estimation for the subject study.

If any comments are unclear, please contact me at 506-4708.

Sincerely,

Joe Tram

Joe Tram, P.E.

A-N WEST INC.
Consulting Engineers

December 22, 1998

FCDMC
2801 West Durango Street
Phoenix, AZ 85028

Attn: Mr. Joe Tram, PE

Re: Signal Butte F.R.S. Spillway Delineation Study
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Tram:

Our field survey sub consultant has had approximately a 3 week delay in getting final aerial mapping panel control data to the aerial mapping company. This in turn has resulted in a delay for the aerial mapping company in preparing mapping for the project. Due to the holidays, the mapping delay is estimated at 5 weeks.

A-N West's work will also be impacted by these delays. We are submitting the attached revised schedule. We are estimating a (2) week completion delay from our earlier schedule. However, we had estimated completing two weeks ahead of the 270 calendar day completion time, such that this revised schedule still anticipates completion in the 270 day period.

Sincerely,

A-N WEST, INC.

Greg Schuelke

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-23

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

A-N West No. 7156-05
Notice to Proceed: 9/14/98
Completion Date: 6/11/99 (270 Days)
Revised Schedule: 12/21/98

DELINEATION OF SPILLWAY SLOWS FOR SIGNAL BUTTE, F.R.S.
FCD NO. 98-17
PROPOSED SCHEUDLE

Number of Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Notice to Proceed 9/14/98																																							
1. PROJECT COORDINATION	(K)								(P)									(P)				(P)							(P)							(P)			
2. DATA COLLECTION																																							
a. Field Survey								XXXXXXXXXX																															
b. Aerial Photo/2' C.I. Mapping															XXXXXXXXXXXXXXXX																								
c. Field Reconnaissance Report										<	R	>																											
3. HYDRAULIC ANALYSIS																																							
a. Cross-Section Generation																						<	R	>															
b. HEC-RAS Analysis																										<	R		>				<	R	>				
4. HIS TRANSLATION																										<	R		>						<	R	>		
5. DELIVERABLES									(1)					(2)							(3)				(4)	(5)						(6)		(7)				(8)	

1/7/99 Rev'd Mgt.
1/25/99
3/8/99
4/26/99
5/10/99
6/14/99

Legend:
(1) = Draft Reconn. Report
(2) = Draft Mapping with Proposed Cross-Section Locations
(3) = Cross-Section Plots
(4) = Draft HEC-RAS Analysis and Delineation
(5) = Draft HIS Submittal of Mapping (Non-Delination) Items
(6) = Draft T.D.N. and HEC-RAS Delineation
(7) = HIS Submittal of All Data
(8) = Final Documents Submitted.
(K) = Kickoff Meeting
(P) = Progress Meeting
(XXX)=Field Survey Delay

A-24

A-NWEST INC.
Consulting Engineers

7600 NORTH 15TH STREET
SUITE 200
PHOENIX, ARIZONA 85020
(602) 861-2200

Letter of Transmittal

TO: Cooper Aerial
11402 N. Cave Cr. Rd.
Phx. Az. 85020

ATTN: Mr Robert Murphy

FROM: Grey Schuellke

DATE: 1/6/98

JOB TITLE:

JOB NO.: ANW # 7159-05

RE: Signal Butte FRS
FCD No. 98-17

WE ARE SENDING YOU ☒ ATTACHED ☐ UNDER SEPARATE COVER

VIA Delivery

THE FOLLOWING ITEMS:

☐ SPECIFICATIONS ☐ ORIGINALS ☐ COPY OF LETTER
☐ SHOP DRAWINGS ☐ PRINTS ☐ REPORT
☐ PLANS ☐ SAMPLES ☐ OTHER

QUAN.	I.D./DWG. NO.	TITLE/DESCRIPTION
1		Aztec Engr: 12/7/98 transmittal
		with Survey Report, List of coor.
		of control pts., (3) hard copys of
		signed sheets, copy of field notes
		for topo along CAP
1		Floppy Disk - Corners.xls, Ctrl.xls,
		and signal2.xls

THESE ARE TRANSMITTED ☒ FOR REVIEW ☒ FOR YOUR USE ☒ AS REQUESTED
☐ OTHER

REMARKS:

REC'D. BY: DATE:

COPY TO: File ☐ WITH ENCLOSURES

A-25

TRANSMITTAL FORM

[ ] Record of a Telephone Conversation [ ] Letter Of Transmittal

Cooper Aerial of Phoenix, Inc.
11402 N. Cave Creek Road
Phoenix, Arizona 85020
(602) 678-5111
Fax (602) 678-5228

to: A-N WEST

address:

city:

attention:

date 1/6/99 job no. 1040-091898 re. SIGNAL BUTTE F.R.S.

we are sending you: [ ] attached via ROB the following:

[ ] contact prints [ ] enlargments [ ] digital data [ ] mapping [ ] samples

[ ] copy of letter [ ] change order [ ] specifications [ ] check plots

[ ] other

Note: If parcel is damaged in transit, please notify us at once.

items discussed / comments or action required:

1 CHECK PLOT

1 CD

signed: ROB MURPHY

If there is any discrepancy between the above statement and the conversant's interpretation of the conversation, please notify Cooper Aerial of Phoenix, Inc. immediately.

A-26

Cooper Aerial of Phoenix, Inc.

To,
Greg Schuelke, PE
A-N West, Inc
7600 N 15th Street #200
AZ 85020

January 6, 1999

Dear Mr. Schuelke,

Re: **Minutes of the meeting held in conjunction with the Signal Butte Spillway Study Project**

This communication is a minutes of the meeting held this morning at your office premises. Present at the meeting were Mr. Greg Schuelke and members of the CAD team from AN-West and Robert Murphy and Hans Channaraj from Cooper Aerial Surveys Company (CASCO). Henceforth all references to "we" and "us" shall be interpreted as Cooper Aerial Surveys Company.

The following task list with the assigned responsibilities has been received by us for subsequent construction and delivery to the Flood Control District of Maricopa County (henceforth FCD) :

Hydraulics and hydrology related coverages and tables as under:

1. NDXPRJ from AN-West
2. PRJ from AN-West
3. DQ from AN-West
4. SPWBLN from AN-West
5. SPWXSEC from AN-West
6. SPWZN from AN-West

Planimetric and topographic deliverables are indicated as follows:

1. CARTO from AN-West and CASCO
2. CORNERS from AZ Tech Engg
3. CTRL from AZ Tech Engg
4. STRCT from CASCO
5. PRJ.REL from AN-West
6. BRIDGE from AN-West and CASCO
7. CNL from CASCO
8. CULVERT from AN-West and CASCO
9. FLTY from AN-West and CASCO

10. STRTDTL from CASCO
11. ELV from CASCO
12. RIVER from CASCO
13. FPCTLFCD from AZ Tech Engg

Furthermore, it has been indicated to the CAD technical personnel this morning that we shall insist on receiving the incoming AutoCAD data in a manner that will be consistent with the CAD specs specified in the HIS standards.

The responsibilities indicated on the sheet have been duly noted.

Exceptions
However, we are given to understand that (in the instance of the planimetric and topographic deliverables as above) item #13 will be elements that will be identified and made know to us from the survey control points delivered by AZ Tech. We understand that even though the list indicates AZ Tech, the final identifications of the ERMs shall come from AN-West.

It is herein noted that only the above indicated coverages and tables shall be prepared.

We note that the UTLTY(utilities) coverage has not been indicated in the above list. Normally it has been our experience to find elements that belong to this coverage. You may wish to consider this item as being a possible candidate in the above topo list.

HIS specification version
We are given to understand that all the database information will be generated to conform to the FCD's 3.1 revision of their specification for the Hydrologic Information System.

CAD specific
The following will recapitulate the highlights of the CAD requirements that we discussed this morning with AN-West :
1. Put associated geometric features (e.g. base lines) into it's own layer. Chances are they will be revisions and comments and always ensure that these modifications go where they belong.

2. DO NOT put unassociated geometric features on the same layer (e.g. baselines and spillway boundary delineations). If there is associated text (text only!) it is okay to put it on the same layer as the geometric feature it goes with.

3. However, if there is linework associated with callouts (e.g. callouts for cross sections) then all this callout geometric and text information should be put on its own layer (different than the cross sections).

4. In the instance of the NDXPRJ: this refers to the inner border of the map sheet. This is the border which is closest to the topo, hydraulics, etc. And this border should be real coordinate space. Make sure that these border polygons are all closed. .

5. PRJ refers to the encompassing boundary of the study area. This is a polygon which encloses the entire study area as closely as possible. This polygon should close on itself.

6. Feel free to use AS MANY layers as you wish to use. When in doubt put the item on a different layer.

7. In regard to SPWZN, each individual designation goes on its own layer. (e.g. 1/3 flow delineation of the zone goes to its layer, 2/3 to a different layer, etc). Make sure that each of these polygons is closed.

HEC-RAS specific

1. The following indicates the requirements expected for the HEC-RAS output runs: All HEC-RAS runs will be made using the same revision. Do not mix and match revisions of the HEC-RAS program. Please check also with FCD whether it would be appropriate to use your anticipated revision in your project. We recommend that you check with Mark Brewer, Database Administrator at FCD.

2. Furthermore, we are given to understand by the FCD that they outline certain specs how to run the HEC-RAS program to obtain a consistent output format. Once again we direct you to check with Mark Brewer, Database Administrator at FCD.

3. It was indicated to us that there would be a possibility of split flow scenarios. This may involve additional quantum of effort and may impact our schedules. We need to be informed in advance if such a development should actually occur.

4. Do not edit by hand any of the values in the output HEC-RAS files. This may invalidate some of the assumptions made in our processing programs.

General

It would be to our mutual benefit to set up interim meetings to gauge the accuracy and acceptability of the work. We recommend atleast two check points in this regard: One that would indicate the broad layout of the effort and the next at about half way through the effort.

Please check with us if you have any questions regarding this transmission. Furthermore, please make a copy of this transmission available to your CAD team.

Sincerely Yours,

Hans Channaraj

A-N WEST INC.
Consulting Engineers

January 19, 1999

Mr. Joe Tram
FCDMC
2801 West Durango Street
Phoenix, AZ 85028

Re: Signal Butte F.R.S. Spillway Delineation Study
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Tram:

We received mapping from Cooper Aerial for this project on January 6, 1999. We herewith transmit a one-sheet 300 scale print of this mapping with a draft mark-up of hydraulic baseline and cross-sections for your review and comment.

The primary channel along the hydraulic baseline does not appear to have the capacity to convey even the lowest of the three (3) design discharges of 3766, 7532 and 11,309 cfs. This is based on preliminary depth and capacity estimates noted in pencil near each cross-section.

The five (5) sets of CAP cross-drainage culverts have a capacity of approximately 1878 cfs, again below the lowest of the three design discharges. A yellow line was highlighted on the mapping showing the ponding elevation of 1573, the elevation at which overtopping of the CAP canal will occur.

This submitted cross-section layout is based on a single HEC-RAS model, wherein flow is assumed to be spreading evenly across the sections.

If this is not found to be reasonable, a second separate model may be involved wherein the cross-sections to the east of the main wash are part of a separate model. The green ridge line immediately to the east of the hydraulic baseline would form the break between models and cross-sections.

Sincerely,

A-N WEST, INC.

Gregory A. Schuelke

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-30

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

A-N WEST INC.
Consulting Engineers

April 8, 1999

Mr. Joe Tram
FCDMC
2801 West Durango Street
Phoenix, AZ 85029

Re: Signal Butte F.R.S. – Spillway Delineation Study
FCD No. 98-17
ANW No. 7158-05

Dear Mr. Tram:

We herewith transmit (2) sets of the draft final reports for the referenced project for your review and comment, including (25) 11" x 17" delineation maps as part of the report and (25) 24" x 36" 200 scale delineation maps.

Per earlier discussion and because the effective floodplain gets wider from the 1/3 to full spillway flows, this analysis and delineation maps reflect separate HEC-RAS models and exhibits for each of the (3) discharges modeled.

Sincerely,

A-N WEST, INC.

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-31

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5897

BOARD OF DIRECTORS
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Fulton Brock
Andrew Kunasek
Don Stapley
Mary Rose Garrido Wilcox

April 27, 1999

MAY 1999
A-N WEST, INC.
PHOENIX, ARIZONA

A-N West, Inc.
Consulting Engineers
7600 North 15th Street, Suite 200
Phoenix, Arizona 85020-4331

Attn: Mr. Greg Schuelke, P.E.

Subject: FCD 98-17 --- A-N West No. 7158-05
Review of Signal Butte Spillway Arc/Info Deliverables

Dear Mr. Schuelke:

The coverages supplied to the Flood Control District for the subject contract have been reviewed. The enclosed four pages contain the review comments. If there are questions concerning the comments, please contact Mr. Mark Brewer, G.I.S. Database Administrator at (602) 506-2953.

In addition, we are requesting the DTM for the subject study to also be delivered.

As previously discussed, we are still reviewing the draft delineations of the subject study and plan to have the review completed within two weeks.

Sincerely,

Joe Tram

Joe Tram, P.E.
Special Projects Branch Manager

Enclosure

April 26, 1999

The Flood Control District of
Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

HIS, Revision 3.1, database review of the Signal Butte Spillway Arc/Info deliverables.
Reviewed by: Mark Brewer, G.I.S. Database Administrator

This memo is for the review of the GIS coverages supplied to the Flood Control District of Maricopa County. The PRJ_RID for this project is 1066.

The following coverages were reviewed as follows:

[ ] need to be addressed.
[x] passed the review.
[f] were corrected by FCD in order to be accepted.

Please enclose a letter upon the next submittal stating what actions were taken for each comment, number by number, so that we know that the comment has been looked at and addressed. DO NOT resubmit approved coverages with the next submittal.

Some of the check items may fail due to any of the following errors:

1. The table is missing,
2. The item name and/or definition is incorrect or
3. No records in table.

So if a check item has an error and it appears to be fine, then look for any of the previous errors causing the problem. To avoid this situation, it is recommended that the District's automated review program be run before making a submittal. The program will point out these situations. The program is provided free of charge.

All of the required files have not yet been submitted for review. The following is a review of what has been submitted to this point.

Submitted: April 16, 1999

BRIDGE

7.[ ] Item PRJ_RID in table BRIDGE.AAT has some numbers that aren't your assigned number.
8.[ ] Item PRJ_RID in table BRIDGE.AXP has some numbers that aren't your assigned number.
11.[ ] Check items 11, 17-19 and 21-23 need to be populated if any of the bridges were used in the HEC/RAS analysis.
12.[ ] Coverage has dangle errors that can be eliminated.

CARTO

8.[ ] Item PRJ_RID in table CARTO.AAT has some numbers that aren't your assigned number.
9.[ ] Item PRJ_RID in table CARTO.AXP has some numbers that aren't your assigned number.
13.[ ] Item PRJ_RID in table CARTO.PAT has some numbers that aren't your assigned number.
14.[ ] Item PRJ_RID in table CARTO.XXP has some numbers that aren't your

assigned number.

25.[ ] Blocks/cells in the CADD environment get their entities translated for coverage CARTO, not their insertion points. See the H.I.S. specifications page 1-9, section 4.5.6. Examples of features in this study are saguaros, fence line "x", transformer towers, manholes, etc. This should eliminate almost all of the points from this coverage.

26.[ ] Any miscellaneous features from the spillway analysis portion of the study will need to be placed here.

CNL

7.[ ] Item PRJ_RID in table CNL.AAT has some numbers that aren't your assigned number.

8.[ ] Item PRJ_RID in table CNL.AXP has some numbers that aren't your assigned number.

20.[ ] The line in this coverage does not appear to be a canal. Please move it to coverage CARTO.

21.[ ] The lines representing the Central Arizona Project Canal need to be placed here.

CORNERS

7.[ ] Item PRJ_RID in table CORNERS.PAT has some numbers that aren't your assigned number.

8.[ ] Item PRJ_RID in table CORNERS.XXP has some numbers that aren't your assigned number.

11.[ ] Please verify and/or correct the following error(s) for item CTLTYP_LID:
Record(s) appear to be coded with wrong values.

19.[ ] Please verify and/or correct the following error(s) for item CNRNAME:
Record(s) appear to be coded incorrectly, ie: SCORNE instead of SCOR NE. This makes a difference during database searches. See the example in the H.I.S. specifications.

25.[ ] Please verify and/or correct the following error(s) for item DESC:
Some descriptions contain miscellaneous double quotes, ".

30.[ ] Most of these points appear to be the same points as depicted on the hard copy maps. These points are 200' +/- away from there corresponding point on the map. Please verify. If these points are off, then coverage CTRL may also need to be corrected and resubmitted.

CTRL

Coverage is tentatively accepted at this time based on the following changes made by FCD. Final acceptance is awaiting the outcome of coverage CORNERS.

7.[f] Item PRJ_RID in table CTRL.PAT has some numbers that aren't your assigned number.

8.[f] Item PRJ_RID in table CTRL.XXP has some numbers that aren't your assigned number.

20.[f] Please verify and/or correct the following error(s) for item DESC:
Some descriptions contain miscellaneous double quotes, ".
Most distances are missing either ' or ft. to specify the distance.

CULVERT

7.[ ] Item PRJ_RID in table CULVERT.AAT has some numbers that aren't your assigned number.
8.[ ] Item PRJ_RID in table CULVERT.AXP has some numbers that aren't your assigned number.
11.[ ] Check items 11,12 and 18-25 need to be populated if any of the culverts were used in the HEC/RAS analysis.
28.[ ] Some of the linework does not appear to be culverts. Please move it to whatever coverage it pertains to.

ELV

Coverage is tentatively accepted at this time based on the following changes made by FCD. Final acceptance is based on a comparison with the DTM files when they are delivered.

8.[f] Item PRJ_RID in table ELV.AAT has some numbers that aren't your assigned number.
9.[f] Item PRJ_RID in table ELV.AXP has some numbers that aren't your assigned number.
12.[f] Item PRJ_RID in table ELV.PAT has some numbers that aren't your assigned number.
13.[f] Item PRJ_RID in table ELV.XXP has some numbers that aren't your assigned number.
27.[f] Item CNTR_LID in table ELV.AXP has index contours coded incorrectly based on the elevation.
28.[f] Item CNTR_LID in table ELV.AXP has intermediate contours coded incorrectly based on the elevation.
31.[f] Some pseudo nodes can be removed. This error occurs after correcting the error in comment number 34.
34.[f] Coverage has node intersect errors.

FPCTLFCD

2.[ ] Annotation from the hard copy maps should be placed here.
7.[ ] Item PRJ_RID in table FPCTLFCD.PAT has some numbers that aren't your assigned number.
8.[ ] Item PRJ_RID in table FPCTLFCD.XXP has some numbers that aren't your assigned number.
18.[ ] Please verify and/or correct the following error(s) for item RMNUM:
All 3 ERMs are coded the same.
The ERM ids should contain the verbiage "ERM" with the id, ie: ERM135.
24.[ ] The hard copy maps contain 8 ERMs, but only 3 were delivered.
25.[ ] The points delivered are approximately 254943' away from the study area.

RIVER

7.[ ] Item PRJ_RID in table RIVER.AAT has some numbers that aren't your assigned number.
8.[ ] Item PRJ_RID in table RIVER.AXP has some numbers that aren't your assigned number.
19.[ ] The linework representing the water line in the Central Arizona Project Canal should be moved to coverage CARTO.

STRCT

7.[ ] Item PRJ_RID in table STRCT.AAT has some numbers that aren't your assigned number.

8.[ ] Item PRJ_RID in table STRCT.AXP has some numbers that aren't your assigned number.

11.[ ] Please verify and/or correct the following error(s) for item SCTTYP_LID:
Coding appears to be inconsistent, ie: one feature is coded with something other than 999, but all the similar features around it are coded as 999. How is it determined what features get a code other than 999?

12.[ ] Coverage has many dangle errors that can be eliminated.

19.[ ] There are portions of duplicate lines over existing lines.

STRTDTL

Coverage is accepted at this time based on the following changes made by FCD.

7.[f] Item PRJ_RID in table STRTDTL.AAT has some numbers that aren't your assigned number.

8.[f] Item PRJ_RID in table STRTDTL.AXP has some numbers that aren't your assigned number.

UTLTY

2.[ ] The annotation for the manholes should be moved to coverage CARTO.

13.[ ] Item PRJ_RID in table UTLTY.PAT has some numbers that aren't your assigned number.

14.[ ] Item PRJ_RID in table UTLTY.XXP has some numbers that aren't your assigned number.

18.[ ] Please verify and/or correct the following error(s) for item UTYTYP_LID in table UTLTY.XXP:
The points coded as manholes should be moved to coverage CARTO. Remember to convert the "symbolized" entity and not the insertion point if this is a block. See note 25 of coverage CARTO.

25.[ ] Please verify and/or correct the following error(s) for item STRUC_NM in table UTLTY.XXP:
Record(s) appear to be coded with wrong values. If the structure names are not known, leave this item blank and submit a letter with the submittal stating that the features left blank are not known.

DQ.TBL

Table is accepted at this time based on the following changes made by FCD.

6.[f] Item PRJ_RID should be your assigned number.

10.[f] Item TOPO_DT should reflect the date of topography capture. The date submitted was 3/20/97 and the hard copy maps have 10/15/98.

PRJDAT.TBL

Table is accepted at this time based on the following changes made by FCD.

4.[f] Item PRJ_RID should be your assigned number.

tmm
/fcdbase/signalbutte1
\\fcdmain\users\mrb\word\signalbutte1.doc

Cooper Aerial Surveys Co.

MAY 1999
A-N WEST, INC.
PHOENIX, ARIZONA

To,
Greg Schuelke, PE
A-N West, Inc
7600 N 15th Street #200
AZ 85020

May 3, 1999

Dear Mr. Schuelke,

Re: **Comments received for the interim submittal to FCD regarding topo**

Summary
We have reviewed the comments forwarded to us this morning. Of the 42 errors reported on the comment sheet, we have already addressed 20 of the errors which relate to an inappropriate project id (which took under 10 seconds to address – I merely updated the project id input into our programs).

Of the remaining 22 errors:
3 are actually comments regarding "future" submittals.
4 errors relate to issues that need to be addressed by AZ Tech (??).
5 items that will be fixed internally by the edit department (mostly relayering issues).
I have addressed 3 errors relating to survey data relating to data formatting issues which leaves me with 7 errors to fix from my end of the contribution.

In all Cooper Aerial has 12 errors left to address which can be done in short order.

Comments relating to survey data
The following are our comments regarding submittal received from AZ Tech:

For the CORNERS coverage:
The CTLTYP_LID column has been incorrectly coded.
The CNRNAME column has inconsistent coding: Please refer to FCD's remark for CORNERS comment #19.
The points depicted in this coverage appear to be 200' feet away from those represented on the map. We verified this item against the control points that we received from AZ Tech and we confirm that the GIS submittal for control points is different than that used in the mapping process. We have included the two sets of points along with this communication. Please verify with Rob Murphy regarding this particular item.

11402 N. Cave Creek Road Phoenix AZ 85020
Phone (602) 678-5111 Fax (602) 678-5228
1-800-229-2279

1692 W. Grant Road Tucson, AZ 85745
Phone (520) 884-7580 Fax (520) 623-7952
1-888-884-7580

For the FPCTLFCD coverage:
For comments 18,24, and 25: We had inadvertently used test values while debugging our program and did not update the data to reflect the actual conditions. The comments (after de-obfuscation) should actually be interpreted as:
Comment 24 indicates that AZ Tech still needs to submit 8 points for the ERMs. Their submittal after verification contains only two points.

Finis
We shall address all the above issues after we have received the final form of the hydraulics data from AN-West.

Please check with us if you have any questions regarding this transmission.

Thank you for your time and submittal.

Sincerely Yours,

Hans Channaraj

Encl: As above

A-38

A-N WEST INC.
Consulting Engineers

June 17, 1999

FLOOD CONTROL DISTRICT
RECEIVED
JUN 21 1999

	CHENG		P & PM
	PIO		REG
	ADMIN		PWLMGT
	FINANCE		CONTRACT
	O & M		FILE
✓	ENGR		
REMARKS			

Mr. Joe Tram
FCDMC
2801 West Durango Street
Phoenix, AZ 85009-6399

Re: Signal Butte F.R.S. Spillway Delineation
FCD No. 98-17
A-N West No. 7158-05

Dear Mr. Tram:

We write to respectfully request a time extension for the referenced project, which had a completion date of 6/11/99.

We have attached a revised schedule and we request a time extension of 70 calendar days to August 20, 1999.

Sincerely,

A-N WEST, INC.

Gregory A. Schuelke P.E., R.L.S.
Vice President
Project Manager

GS/hr

A-39

7600 North 15th Street, Suite 200 • Phoenix, Arizona 85020-4331 • Fax (602) 943-1989 • (602) 861-2200

A-N West No. 7158-05
Notice to Proceed: 9/14/98
Completion Date: 6/11/99 (270 Days)
Revised Completion Date: 8/20/99 (340 Days)
Revised Schedule: 12/21/98
Revised Schedule: 6/17/99

DELINEATION OF SPILLWAY SLOWS FOR SIGNAL BUTTE, F.R.S.
FCD NO. 98-17
PROPOSED SCHEUDLE

Number of Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
Notice to Proceed 9/14/98																																																	
1. PROJECT COORDINATION	(K)								(P)									(P)				(P)							(P)							(P)													
2. DATA COLLECTION																																																	
a. Field Survey								XXXXXXXXX																																									
b. Aerial Photo/Z C.I. Mapping															XXXXXXXXXXXXXXX																																		
c. Field Reconnaissance Report										<	R	>																																					
3. HYDRAULIC ANALYSIS																																																	
a. Cross-Section Generation																						<	R	>						<			R			>													
b. HEC-RAS Analysis																															<			R		>							<		R		>			
4. HIS TRANSLATION																																												<	R	>			
5. DELIVERABLES									(1)					(2)							(3)									(4)	(5/6)											(7)	(8)					(9)	

6/14/99 7/5/99 8/20/99

Legend:
(1) = Draft Reconn. Report
(2) = Draft Mapping with Proposed Cross-Section Locations
(3) = Cross-Section Plots
(4) = Draft HEC-RAS Analysis and Delineation
(5) = Draft HIS Submittal of Mapping (Non-Delination) Items
(6) = Draft T.D.N. and HEC-RAS Delineation
(7) = Resubmit T.D.N./HEC-RAS Delineation and HIS Data
(8) = HIS Submittal of All Data
(9) = Final Documents Submitted.
(K) = Kickoff Meeting
(P) = Progress Meeting
(XXX)=Field Survey Delay

A-40

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009-6399
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BOARD OF DIRECTORS
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Mary Rose Garrido Wilcox

June
~~July~~ 25, 1999

JUL 1999
A-N WEST, INC.
PHOENIX, ARIZONA

A-N West, Inc.
7600 North 15th Street, Suite 200
Phoenix, Arizona 85020

Attn: Gregory A. Schuelke, P.E., R.L.S.
Vice President

Re: Contract No. FCD 98-17, Delineation of Spillway Flows for
Signal Butte F.R.S. Spillway Delineation
Letter of Forbearance

The Flood Control District must advise A-N West, Inc. that the completion date of June 6, 1999, for the subject contract, can not be contractually waived. Your letter of June 17, 1999 with its revised schedule requests a 70-day extension for submittal of the technical work to which we agree. However, the District will forbear the contract completion date to November 1, 1999, to allow for final invoice payments, certification of completion, and other contract close out procedures.

The District reserves and retains all contractual rights and remedies under the subject contract. A-N West, Inc. shall pursue all aspects of this extended schedule to ensure the successful completion of the subject contract.

This forbearance letter establishes a new completion date only and shall not increase the contract price. By affixing a signature in the space provided below and returning to the undersigned, A-N West, Inc. acknowledges receipt and acceptance of this forbearance letter.

Very truly yours,

Michael S. Ellegood, P.E.
Chief Engineer and Genral Manager

A-N West, Inc.

By: Gary A Schuelke

Title: Vice President

Date: 7/6/99

A-N WEST INC.
Consulting Engineers

July 15, 1999

Mr. Joe Tram
Flood Control District
Of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

RE: Signal Butte F.R.S. – Spillway Delineation Study
FCD No.: 98-17
A-N West No.: 7158-05

Dear Mr. Tram:

We herewith transmit for your review and comments:

a. Four (4) sets of the revised draft final reports with diskettes of HEC-RAS models for the referenced project, including twenty-five (25) 11" x 17" delineation maps as part of the report and twenty-five (25) 24" x 36" 200-scale delineation maps.
b. Flood Control District mark-ups of the text and 24" x 36" maps
c. Review comment response by A-N West to Flood Control District comments.

These revised reports and plans have been revised to address review comments received May 19, 1999 as we understood them. The following response attempts to summarize our understanding of the review comments and response.

Sincerely,

A-N WEST, INC.

Gregory A. Schuelke, P.E., R.L.S.
Vice President
Project Manager

GAS/hr

Enclosures

A-42

7600 North 15th Street • Suite 200 • Phoenix, Arizona 85020-4331 • (602) 861-2200 • Fax (602) 943-1989

A-N WEST'S RESPONSE
TO
FLOOD CONTROL DISTRICT COMMENTS

Report Comments

Comment: Table of Contents Heading 3.0 differed slightly from Text Section 3.0 Heading.
Response: This was corrected.

Comment: Mapping Limit Line on Figure 1 should be bolder.
Response: This was done.

Comment: Table 1 referred to note(1) in columns 6 and 7, which seemed like it should have been referred to note(2).
Response: This was correct comment and was corrected.

Comment: Table 1 referred to HEC-5 method. Recommend HEC #5.
Response: This was done and also in referenced.

Comment: Table 1, column 7, rows 1 and 2 show 155 cfs each, per HEC #5 method versus 462 and 454 by HEC-RAS model, a 3-fold difference.
Response: The 155 cfs was computed in Appendix F, page F-27 and F-28, as per pipe discharge. The total for the three (3) pipes was 465 cfs. This was corrected in Table 1 and thus compares well with the HEC-RAS model.

General Comments

Comment: The hydraulic base line should be a lighter weight line and dashed.
Response: This was done.
Comment: Add version of HEC-RAS in description.
Response: The description was revised on all three (3) models to add "HEC-RAS Computer Model, Version 2.2, September 1998".

Comment: At Section 3.674 and 3.747 it was noted that channel bank stations did not encompass the hydraulic baseline.
Response: On all three (3) models the Lt. and Rt. bank station at Section 3.674 was revised to 9769.8 and 10010.9, respectively. At Section 3.747 all three (3) models) the Rt. bank station was revised to Sta. 10060.91.

Comment (A-N West): Street names to be added to mapping.
Response: The names of streets were added at approximately ¼ mile streets throughout mapping.

Comment: Due to uncertainty of where the CAP might breach during overtopping, the downstream limits of the detailed study should be the upstream edge of the CAP.
Response: This was done. Cross-sections downstream were left.

Full Spillway Model/Maps

Comment: At Section 4.914, it was noted that there was no end station or containment within the section on the left side. It was recommended that at the next downstream Section 4.902,

where the left end station was shown as 9750, that the flow be plotted at 9550± to account for breakout flow in this area along Meridian Road.
Response: The left side of Section 4.914 extends into an entering tributary wash. The area to the left of the Meridian Road is considered ineffective flow. The delineation was extended into this tributary to address this backwater potential. Also at Section 4.902, on the left side delineating was continued along the east side of Meridian Road to account for potential shallow flow at this location.

Comment: At Section 4.776, Rt. Side potential breakout to right was noted with recommendation of extending the delineation to right into the adjacent wash.
Response: The delineation was extended to right of right ends of Sections 4.620 – 4.776 to show this potential breakout. This added delineation was not considered totally effective flow because of the shallow overtopping depth (0.5 feet) near Section 4.776. Sections 4.697 and 4.620 were contained within the right end station. The delineation within this wash was limited to Elevation 1686, the average elevation of the wash outlet between Sections 4.575 – 4.620.

Comment: Between Section 3.674 and Section 4.101 on Lt. Side, the irregular delineation was questions as appropriate.
Response: Upon further review, the delineation seemed reasonable and contained between Section 3.885 and 4.101, Lt. Side. However, the delineation was widened to the left into a retention area between Sections 3.603 and 3.817.

Comment: Between Sections 3.674 and 3.885, Rt. Side of the delineation was questions as possible needing to be widened to the right due to possible break out at Section 3.885.
Response: Upon further review of this area, we believe this flow does not breakout further into the right overbank. In fact, a reduction in width at Section 3.885 was considered appropriate with a blocked out area in the right end of Section 3.885.

Comment: At Section 3.532, left side, the delineation was recommended to be widened to the left.
Response: This was done and the delineation only extended into the street an additional 100 feet.

Comment: Between Sections 3.006 and 3.310, left side, it was recommended that a not be added indicating possible shallow flooding in streets in this area.
Response: This was done.

Comment: Sheet 6 of 25, Sections 2.554 and 2.643 were not containing flow at right side. It was recommended that delineation be extended further to right.
Response: This was done and it was observed that the additional delineation area involved flow depths of (1) ft. or less on average that would not involve serious flooding hazard.

Comment: At upstream side of CAP North of Apache Trail, it seemed that the Apache Trail Road embankment would cause ponding to potential elevation 1577 or higher than ponding elevations along upstream side of CAP to South of Apache Trail.
Response: A note was added to mapping reflecting this.

Comment: It was recommended that to identify potential flow downstream of CAP, that culvert flow across CAP be identified, as well as potential overflow locations.
Response: An overflow arrow with (OF) letter I.D. and culvert flow arrow with (CF) letter I.D. was added on mapping and in mapping legend to address this comment.

Comment: On sheet 7, Section. 2.378 to 2.643, left side, it was suggested left side delineation be further left.
Response: On further review, it was not considered appropriate to move the delineation further left as existing ground appears to block this flow. A note on shallow street flooding was added where appropriate.

2/3 Spillway Model/Maps

Comment: At Section 4.914, left side, an ineffective flow station was recommended.
Response: This option was applied and the delineation was expanded into the ineffective tributary at this area.

Comment: Between Sections 4.575 and 4.776 there was some question of whether flow could break out to left as far as shown.
Response: The model was adjusted to block out further flow in the left overbank at ridges. However, it was still considered possible for flow to spread out into this left overbank as originally shown at Section 4.697. At Sections 4.575 and 4.620 some reduction in left side delineation was made.

Comment: At this 1/3 flow level a comment was made regarding appropriateness of reach lengths in left overbank between Sections 4.518 and 4.902.
Response: At the 2/3 flow this commend was reviewed and several reach lengths were revised for shorter overbank flow lengths.

Comment: Between Sections 3.603 and 4.101, right side, it was questions whether the right side delineation should be further to the right.
Response: The model was reviewed and the delineation was revised to move it further to the right.

Comment: On left side, between Sections 3.817 and 3.958, the delineation was questioned as to whether flow could get this for left.
Response: The model was reviewed and it was believed that the delineation could go further to the left and enter the retention basin. A note for shallow flow in streets was added in this area as for the full discharge condition.

Comment: Sections 3.006 to 3.310, left side, seemed that delineation could be moved further left.
Response: This was done, plus shallow flooding note was also added.

Comment: Sections 3.006 to 3.235, right side. Can delineation spread further to right?
Response: The delineation was moved further to right.

Comment: Sections 2.261 to 2.857, right side. Can delineation be moved further to right?
Response: The delineation was moved further to the right.

Comment: A CAP Canal, Section 2.261 right side. Can higher ponding area be shown due to Apache Trail road embankment?
Response: This was done with same note as full spillway flow. Also, culvert flow (CF) and overflow (OF) arrows were added and labeled at the potential flow crossing points along CAP.

The limit of study was also noted per the full spillway study along upstream edge of CAP with no delineation downstream of CAP.

1/3 Flow Model and Mapping

Comment: Between Section 4.575 and Section 4.914, it was noted that some Lt. Bank Reach lengths should be adjusted, that an ineffective flow option should be used at Section 4.914 and a blocked flow option should be used at Section 4.852.
Response: This was done.

Comment: Between Section 4.026 and 4.367, Lt. Side, it was recommended that the left side flood plain be moved further to left, with blocked area option used.
Response: This was done.
Comment: Between Section 3.603 and 4.026, it was recommended that the right side floodplain be moved further to right.
Response: This was done.

Comment: Between Section 3.006 and 3.310, right side, it was questioned whether flow could spread further to right.
Response: On further review, it was not considered reasonable that any significant breakout further to right would occur. Intermediate water surface elevations between sections appeared contained by the existing ground.

Comment: Between Section 2.793 and 3.747, left side, it was questioned whether the left delineation might be either further left or noted as having shallow flooding.
Response: The left side delineation was moved further left.

Comment: At the CAP, similar comments were made regarding the potential higher ponding north of Apache Trail and upstream of CAP. Also, comments were made that the detailed study limits should be the upstream edge of the CAP.
Response: These changes were made.

APPENDIX B

FIELD RECONNAISSANCE AND HYDRAULIC PARAMETERS ESTIMATION

TABLE OF CONTENTS

B1.0 INTRODUCTION	B-1
B2.0 METHODOLOGY	B-1
B3.0 FIELD PHOTOS	B-3 – B-11
B4.0 DETERMINATION OF 'N' VALUE FORMS	B-12 – B-13

FIGURES

FIGURE B-1 – PHOTO LOCATION MAP	Follows p. B-1
FIGURE B-2 – 'N' VALUE MAP	Follows p. B-2

Registered Professional Engineer (Civil)
CERTIFICATE NO.
15290
GREGORY A.
SCHUELKE
Date Signed 12/12/98
ARIZONA, U.S.A.

B1.0 INTRODUCTION

On October 9, 1998, A-N West made a reconnaissance field trip to the Signal Butte F.R.S. to photograph and evaluate Manning's 'n' values. The study reach proceeded from the north of Brown Road, just west of Meridian Road downstream to the C.A.P. Canal. Figure B-1, shows the locations of photos taken as part of the trip, relative to the study mapping limits. The photos were taken along the primary flow path from the F.R.S. to the C.A.P. Photos of each of the five inlets of the C.A.P. overchutes, potentially impacted were also taken.

B2.0 METHODOLOGY

Manning's 'n' values were estimated using two references, Reference 1, Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona," by the U.S.G.S., Water Resources Division by B.W. Thompson and H.W. Hjalmarson for the FCDMC and Reference 5, "Open Channel Hydraulics," By Ven Te Chow, Ph. D., McGraw-Hill Book Co., 1959.

Field visit observations of vegetation and channel and overbank 'n' value characteristics were noted and representative photographs were taken. The photos included in this report are captioned and referenced with orientation of photo to streets looking upstream or downstream, etc.

Using the 'n' value references, discussed above, with field photos, aerial photography and site observations, Manning's 'n' values were estimated for the site.

Because of the large amount of residential and commercial development, it was considered appropriate to identify surface areas of varying development density and 'n' values. As shown on Figure B-2, 'n' value map, the overbank areas, where moderate or heavy development was identified have been shown as two separate shaded areas with an estimated 'n' value of 0.10 and 0.15, respectively. The remaining unshaded overbank area is either light residential or natural desert with an estimated 'n' value of 0.068. The primary wash channel was estimated to have a 'n' value 0.045. The main channel immediately downstream of the spillway was estimated to have an 'n' value of 0.035.

The Determination of Manning's Roughness Coefficient Forms are included in the back of this Appendix which show the derivation of the above discussed 'n' values.

In the moderate to heavy development areas the effects of obstruction component of the 'n' value was considered the most significant. This component would involve houses, commercial buildings, mobile homes, RV's and the associated screen walls of wood or concrete masonary block.

EXPLANATION

— — MAPPING LIMITS

456+50 OVERCHUTE & STA.

← P20 PHOTO I.D.

EMERGENCY SPILLWAY DELINEATION STUDY FOR SIGNAL BUTTE F.R.S.

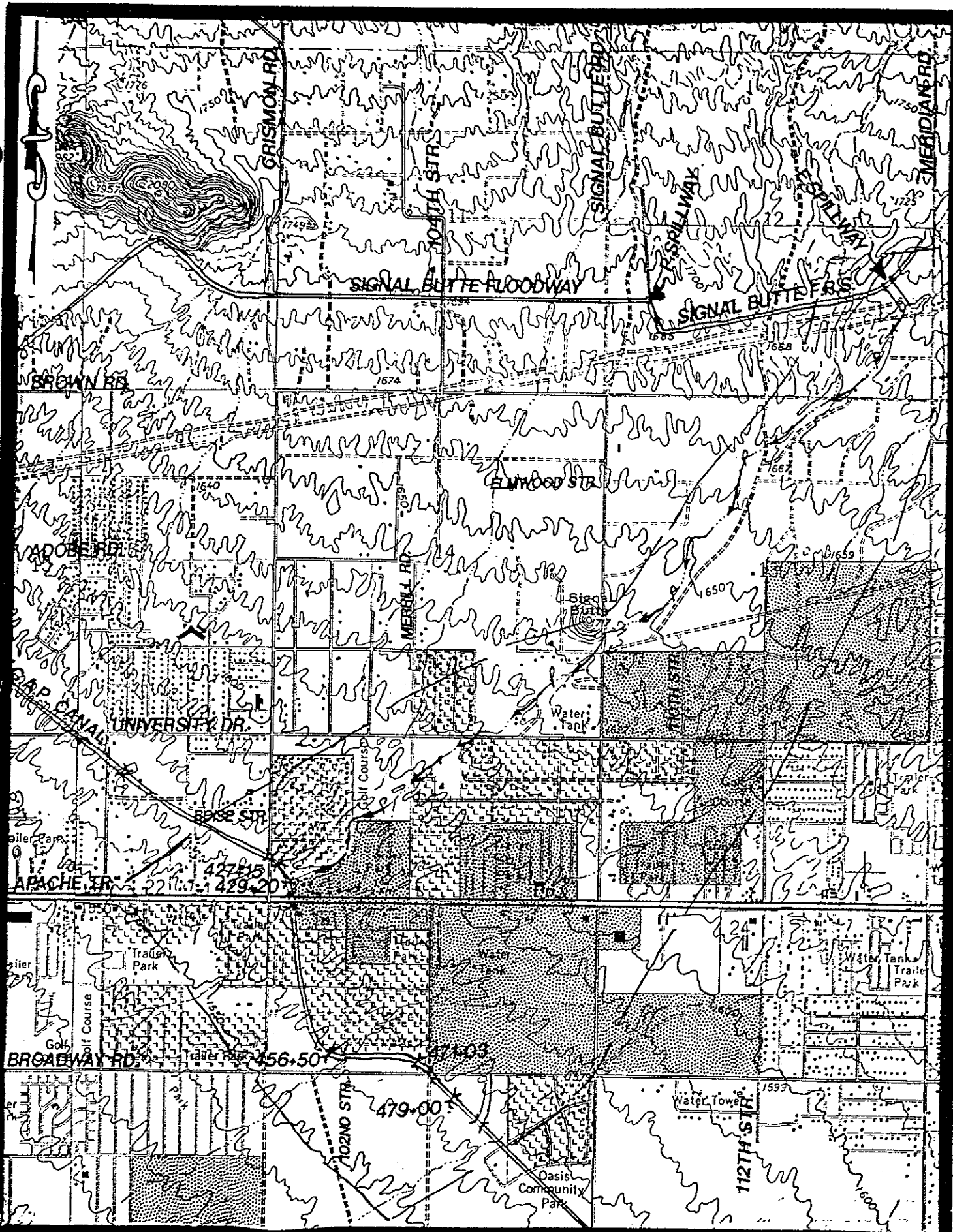
PHOTO LOCATION MAP

A-N WEST INC. Consulting Engineers

FCDMC NO.98-17

A-N WEST NO. 7158-05

FIGURE B1



HEAVY DENSITY DEV. (N=0.15)

MODERATE DEN.DEV.(N=0.10)

EXPLANATION

MAPPING LIMITS

456+50 OVERCHUTE & STA.

P PRIMARY FLOWPATH

EMERGENCY SPILLWAY DELINEATION STUDY FOR SIGNAL BUTTE F.R.S.

'N' VALUE MAP

A-N WEST INC. Consulting Engineers

FCDMC NO.98-17

A-N WEST NO. 7158-05

FIGURE B2

It was assumed that some of these screen walls would break down where water ponded against them in any significant depth (2± feet). Floodwaters could then flow along internal subdivision streets and/or commercial parking lots and between buildings.

B3.0 FIELD PHOTOS

The location of the following site visit field photos are shown on Figure B-1. The photos attempt to document conditions on the ground along the primary flowpath. The small hill, Signal Butte allowed for an elevated panoramic view of the study area. On these panoramic photos P10 and P11, the Signal Butte F.R.S. Emergency Spillway was identified on the photos with the approximate primary flow path.

Most road crossings were dip sections with no culverts. The Brown Road crossing has 3-30 inch dia. CMP culverts of relatively insignificant capacity.

B4.0 DETERMINATION OF 'N' VALUE FORMS

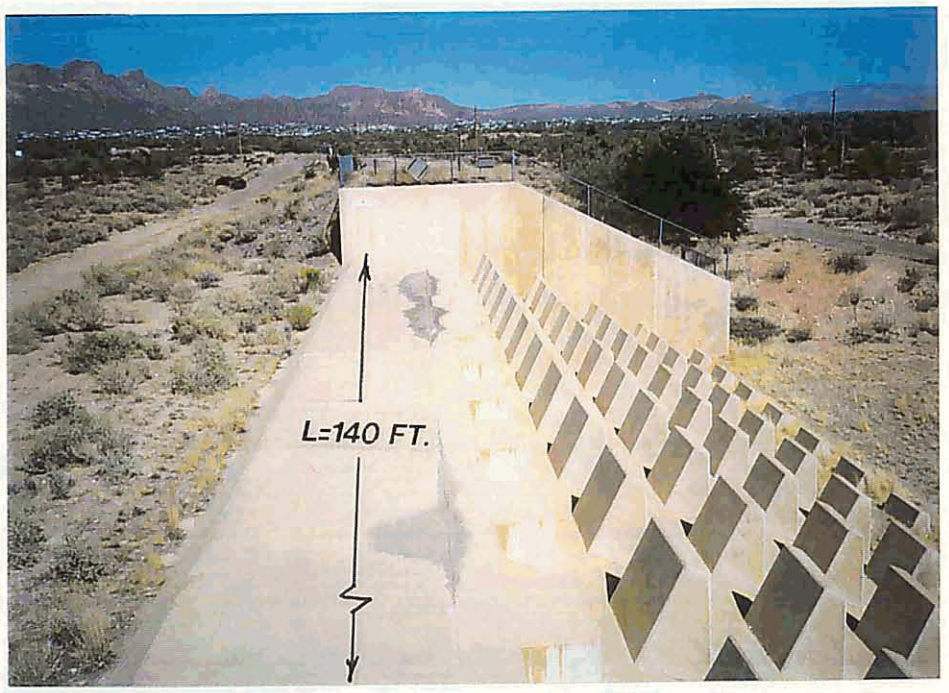
The determination of 'n' value forms are included in the back of this Appendix as discussed earlier.

P1
Looking downstream from emergency spillway of bermed channel.

N=.03

P2
Looking downstream from end of bermed channel, 450± from spillway

N=.068 (OVERBANK)
N=.045 (CHANNEL)



P3
Looking N.E. at N.E. end of emergency spillway

N=.15 (BAFFLED BLOCKS)

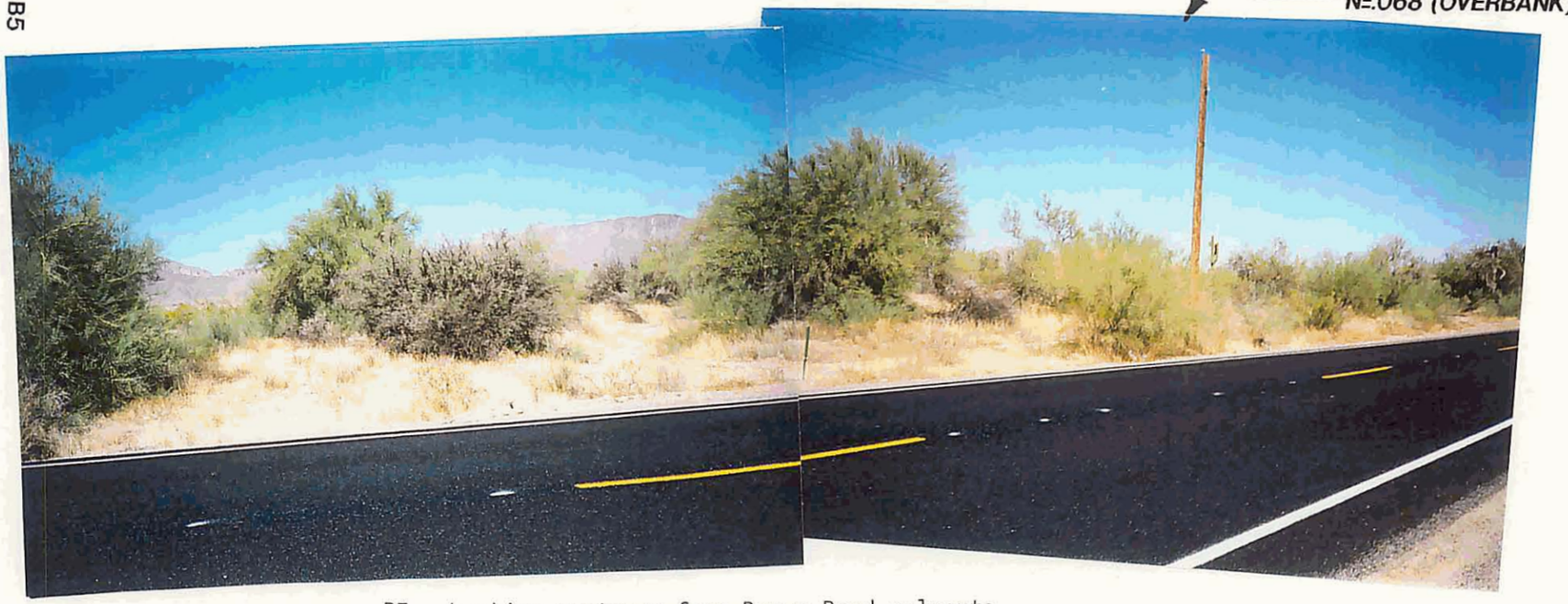
N=.013 (CONCRETE SILL)

P4
Looking S.W. at S.W. end of emergency spillway length (L) = 140', Breadth (B) = 11'
Wall Height = 9'

P5
Looking N.E. at N.E. end of emergency spillway.

P6 - Looking downstream at Brown Road culverts (3-30" CMP's)

N=.045 (CHANNEL)
N=.068 (OVERBANK)



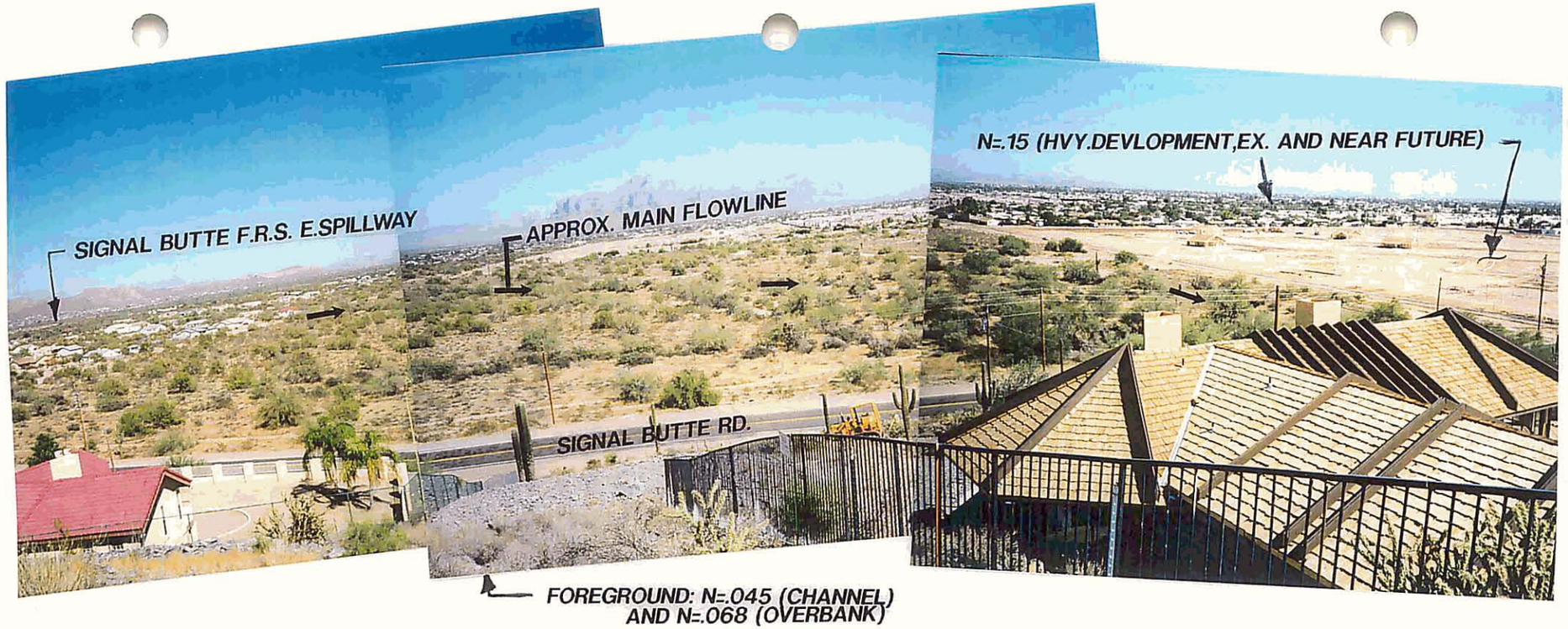
P7 - Looking upstream from Brown Road culverts.

P8
Looking upstream (north) near Adobe Rd. and 110th Place alignments.

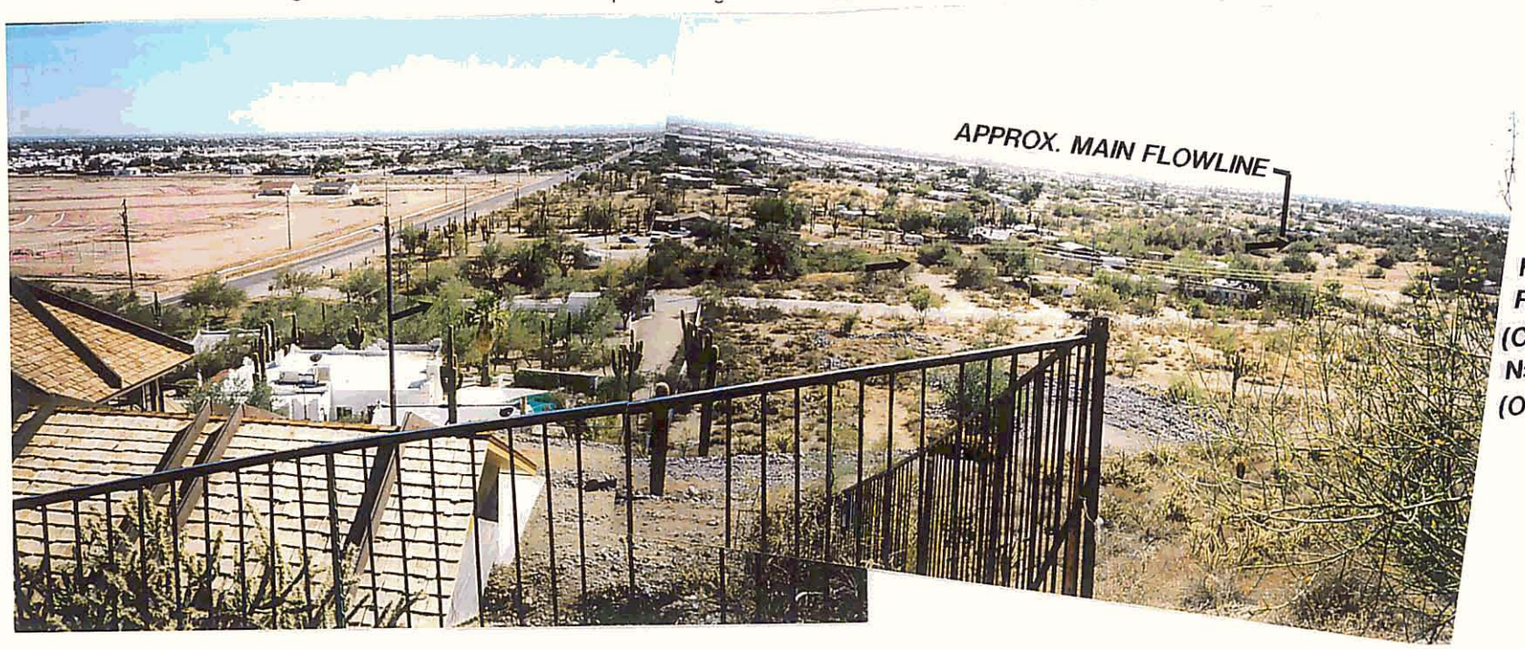
N=.068 (OVERBANK)

N=.045 (CHANNEL),THIS N IS HIGH FOR PHOTOED COND. BUT HEAVIER VEG. GROWTH OCCURS UPSTREAM AND DOWNSTREAM,PLUS FURTHER REVEG. OF PHOTOED SECTION ANTICIPATED.

P9
Looking downstream (west) near Adobe Road and 110th Place alignments.



P10 - Looking N.E. to S.E. from top of Signal Butte



P12
Looking S.W. (downstream) from top of Signal Butte

N=.15 (HVY.DEVELOPMENT) TO N=.10 (MODERATE DEVELOPMENT) IN BACKGROUND, IN FOREGROUND, N=.068 (OVERBANK) AND N=.045 (CHANNEL)

P13 (above)
Looking downstream (west) from Merrill Road

N=.068 (OVERBANK)
N=.045 (CHANNEL)

P14 (left)
Looking upstream (east) from Merrill Road

P15
Looking downstream (S.W.)
near Boise and 102nd Street
alignments.

N=.045 (CHANNEL)

P16
Looking upstream (N.E.) near
Boise and 102nd Street
alignments.

N=.045 (CHANNEL)

P17
Looking downstream (south) at
channel between M.H. Parks near
Boise and 102nd Street alignment:

N=.15 HVY.DEVELOPMENT)

P18
Looking downstream at CAP
Sta. 427+15 inlet - (3) 72" Pipes

P19
Looking downstream of CAP Sta.
429+50 Inlet - (3) 72" Pipes

STEEL PIPES,SMOOTH (N=.012), HOWEVER USE PIPE N=.024 (TO MODEL EFFECT OF DOWNSTREAM CMP'S OF SAME SIZE AND NO.) AND Ke=.9 TO FURTHER MODEL DOWNSTREAM IMPACT OF CMP'S

P20
Looking upstream from CAP
Sta. 429+50

P21
Looking downstream at CAP
Sta. 456+50 - (2) 60" Pipes

P22
Looking downstream at CAP
Sta. 471+03 - (3) 72" Pipes

ENTRANCE Ke=0.9 (FOR TRASH RACK EFFECT)
N=.012 (STEEL PIPES,SMOOTH)

P23
Looking downstream at CAP
Sta. 479+00 - (5) 72" Pipes

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD

Project: Delineation of Spillway Flows for Signal Butte Flood Retarding Structures (FCD 98-17)
Location: Reach-1 (R1) -- Between Spillway to 450' Downstream
Photo No: Photo 1
A-N West No. 7158-05, Date: 12/1/98

Channel Conditions		Manning's n Alignment		Left Overbank (East	Channel	Right Overbank (West)
Channel Material	Concrete	n_b	.012-.018			
	Firm Soil		.025-.032			
	Coarse Sand		.026-.035			
	Gravel		.028-.035	N/A	0.03	N/A
	Cobble		.030-.050			
	Boulder		.040-.070			
Degree of Irregularity	Smooth	n_1	0	0	0	0
	Minor		.001-.005			
	Moderate		.006-.010			
	Severe		.011-.020			
Effects of Obstruction	Negligible	n_2	.000-.004	0	0	0
	Minor		.005-.015			
	Appreciate		.020-.030			
	Severe		.040-.060			0.05
Vegetation	Small	n_3	.002-.010	0	0	0
	Medium		.010-.025			
	Large		.025-.050			
	Very Large		.050-.100			
Variations in Channel Cross section	Gradual	n_4	0	0	0	0
	Occ. Alt.		.001-.005			
	Freq. Alt.		.010-.015			
				0	0.035	0
Degree of Meandering	Minor	m	1	1	1	1
	Appreciable		1.15			
	Severe		1.3			
$n = (n_b+n_1+n_2+n_3+n_4)m$				N/A	0.030	N/A

DETERMINATION OF MANNING'S ROUGHNESS COEFFICIENTS BY FCDMC METHOD

Project: Delineation of Spillway Flows for Signal Butte Flood Retarding Structures (FCD 98-17)
Location: Reach-2 (R2) - 450' Below Spillway to CAP
Photo No: Photos 2, 6 – 17
A-N West No. 7158-05, Date: 12/1/98

Channel Conditions		Manning's n Alignment		Channel	Light Dev. Density or Natural Overbank	Moderate Dev. Density	Heavy Dev. Density
Channel Material	Concrete	n_b	.012-.018				
	Firm Soil		.025-.032				
	Coarse Sand		.026-.035				
	Gravel		.028-.035	0.028	0.028	0.028	0.028
	Cobble		.030-.050				
	Boulder		.040-.070				
Degree of Irregularity	Smooth	n_1	0				
	Minor		.001-.005	0.005			
	Moderate		.006-.010		0.01		
	Severe		.011-.020			0.02	0.02
Effects of Obstruction	Negligible	n_2	.000-.004				
	Minor		.005-.015				
	Appreciate		.020-.030		0.02		
	Severe		.040-.060			0.05	0.09
Vegetation	Small	n_3	.002-.010			.002	.002
	Medium		.010-.025	0.012	0.01		
	Large		.025-.050				
	Very Large		.050-.100				
Variations in Channel Cross section	Gradual	n_4	0	0	0	0	
	Occ. Alt.		.001-.005				
	Freq. Alt.		.010-.015				0.01
				0.045	0.068	0.10	0.150
Degree of Meandering	Minor	m	1	1	1	1	1
	Appreciable		1.15				
	Severe		1.3				
$n = (n_b+n_1+n_2+n_3+n_4)m$				0.045	0.068	0.10	0.150

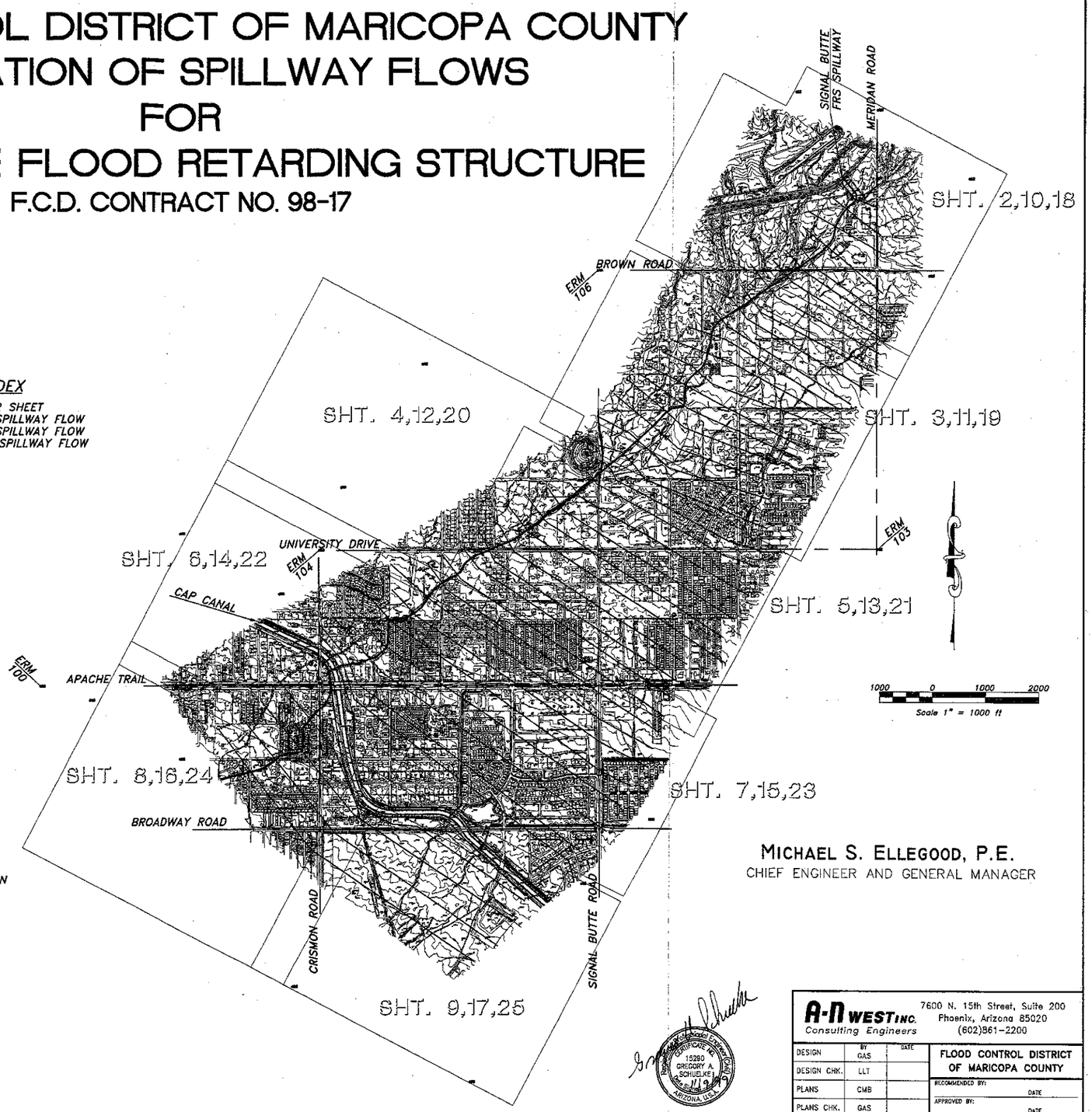
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DELINEATION OF SPILLWAY FLOWS
FOR
SIGNAL BUTTE FLOOD RETARDING STRUCTURE

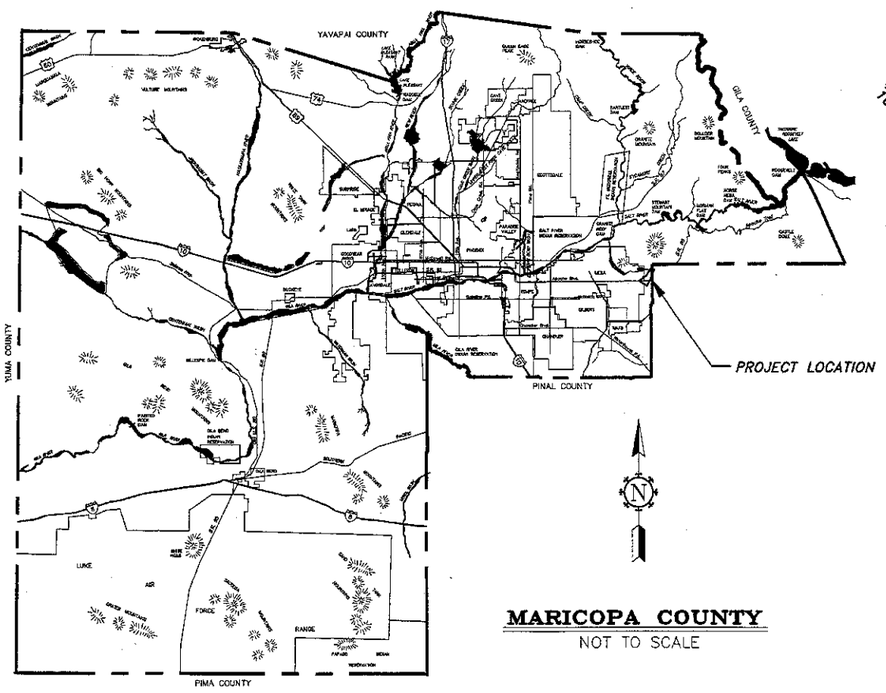
F.C.D. CONTRACT NO. 98-17

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SHEET INDEX

1	COVER SHEET
2-9	1/3 SPILLWAY FLOW
10-17	2/3 SPILLWAY FLOW
18-25	FULL SPILLWAY FLOW





MARICOPA COUNTY
NOT TO SCALE

MICHAEL S. ELLEGOOD, P.E.
CHIEF ENGINEER AND GENERAL MANAGER

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 25

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
5.000	1716.78	2.30	7.78	0.00
4.994	1715.30	9.55	3.15	0.00
4.991	1714.70	11.04	3.25	0.00
4.986	1698.51	18.25	2.14	0.00
4.968	1701.87	3.92	5.94	0.01
4.929	1701.49	5.03	5.52	0.02
4.914	1701.44	4.56	5.46	0.02
4.902	1700.71	7.30	5.51	0.03
4.852	1698.73	6.83	6.03	0.04
4.776	1694.61	8.75	6.59	0.05
4.697	1690.81	6.03	4.91	0.07
4.620	1685.96	8.88	3.87	0.08
4.575	1683.67	5.64	3.98	0.09
4.518	1681.21	6.79	6.33	0.10
4.443	1678.03	7.53	5.93	0.12
4.367	1674.36	8.51	7.14	0.13

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS

HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9

CROSS SECTION — RIVER MILE ID. 22.304

ELEVATION REFERENCE MARK — ERM3 X

ZONE DESIGNATIONS — ZONE A

CORPORATE LIMITS

COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

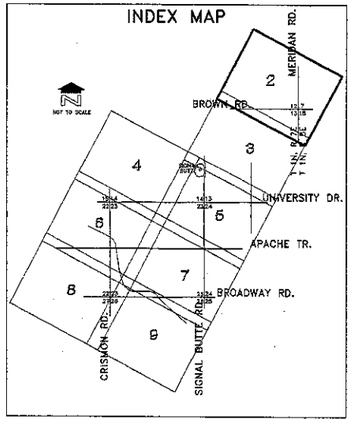
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF BROWN RD. & SIGNAL BUTTE RD.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE Date Signed 11/19/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7126-93 / 7126S3SFIG.DWG / REV07180CMBSTR, 7126S3SFIG
CMB / 11/8/99

1/3 SPILLWAY DISCHARGES = 3.732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
4.443	1678.03	7.53	5.93	0.12
4.367	1674.36	8.51	7.14	0.13
4.311	1671.12	7.77	3.58	0.14
4.239	1668.04	5.77	5.30	0.16
4.171	1665.55	6.84	5.88	0.18
4.101	1662.42	8.47	6.08	0.19
4.026	1658.53	6.99	4.56	0.20
3.956	1654.98	6.55	4.17	0.22
3.885	1652.18	4.75	4.08	0.24
3.817	1649.56	5.46	3.45	0.26
3.747	1646.18	3.04	3.13	0.28
3.674	1642.48	2.10	3.31	0.32
3.603	1638.44	2.85	4.52	0.36

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

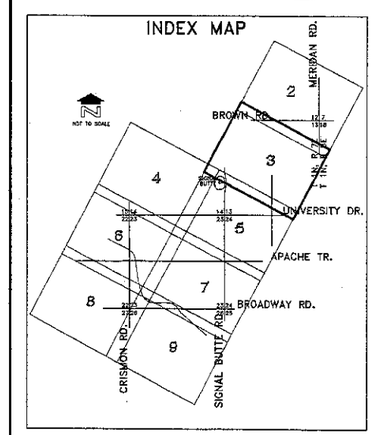
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
212	1651.61	FOUND CITY OF MESA BRASS CAP IN HANDHOLE 0.47' BELOW RIM AT THE INTERSECTION OF CLANCY & DECATOR
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF BROWN RD. & SIGNAL BUTTE RD.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE Expires 12/31/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
3.235	1621.19	4.55	2.30	0.49
3.161	1617.54	5.00	3.04	0.51
3.082	1613.49	2.49	5.19	0.54
3.006	1609.88	1.72	3.08	0.60
2.933	1607.33	4.08	3.23	0.63
2.857	1604.13	4.32	3.43	0.66
2.793	1601.25	4.62	3.14	0.68
2.720	1597.00	7.69	4.18	0.70

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104*	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

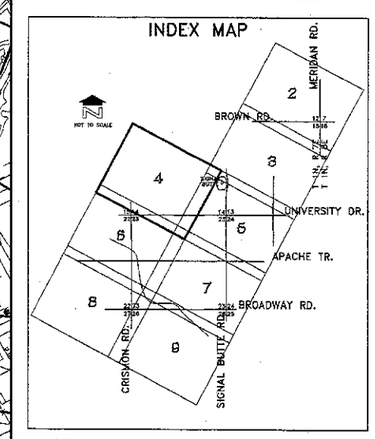
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 4 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
3.603	1638.44	2.85	4.52	0.36
3.532	1634.93	1.95	3.40	0.41
3.462	1632.04	5.93	4.79	0.43
3.386	1628.66	6.40	6.24	0.45
3.310	1624.81	5.62	4.04	0.47
3.235	1621.19	4.55	2.30	0.49
3.161	1617.54	5.00	3.04	0.51
3.082	1613.49	2.49	5.19	0.54
3.006	1609.88	1.72	3.08	0.60
2.933	1607.33	4.08	3.23	0.63
2.857	1604.13	4.32	3.43	0.66

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17
1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS
HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9
CROSS SECTION — RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK — ERM3 X
ZONE DESIGNATIONS — ZONE A
CORPORATE LIMITS
COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

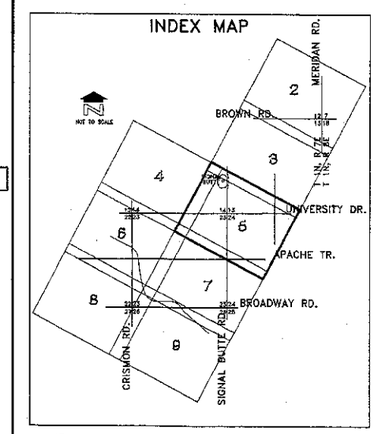
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
105	1620.83	FOUND MCDOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF UNIVERSITY DR. & SIGNAL BUTTE RD.
103*	1651.54	FOUND MCDOT BRASS CAP IN HANDHOLE AT THE INTERSECTION OF MERDIAN RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE ARIZONA U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
2.720	1597.00	7.69	4.18	0.70
2.643	1593.45	5.27	3.81	0.71
2.554	1589.74	6.73	4.19	0.74
2.454	1585.59	4.81	7.28	0.76
2.378	1581.19	6.52	6.37	0.78
2.302	1576.57	6.53	6.14	0.80
2.279	1572.58	10.96	5.27	0.80
2.261	1570.36	0.04	12.96	0.81

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F. →
OVERFLOW LOCATIONS ACROSS CAP	O.F. →

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

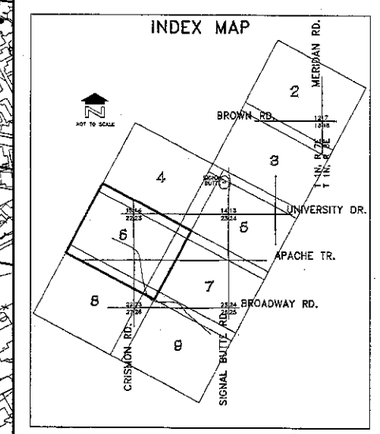
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
3. POTENTIAL PONDING TO EL. 1577 UPSTREAM AND NORTH OF APACHE TRAIL DUE TO APACHE TRAIL ROAD EMBANKMENT

Registered Professional Engineer (Civil) 15290 GREGORY A. SCHUELKE 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 6 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S. F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

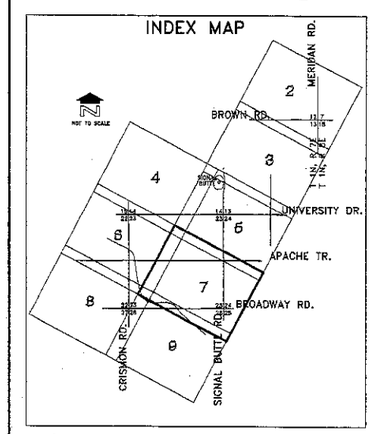
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1581.30	FOUND MCDOT BRASS CAP IN HANDHOLE 0.25' BELOW RIM AT THE INTERSECTION OF SIGNAL BUTTE RD. & BROADWAY

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400+ FEET AT EL.1570.0 AND 1573.6, RESPECTIVELY.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUENKE 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
2.857	1604.17	4.56	3.43	0.68
2.793	1601.27	4.51	3.14	0.68
2.720	1597.24	7.97	4.18	0.70
2.643	1593.78	5.51	3.81	0.71
2.554	1590.00	7.21	4.19	0.74
2.454	1585.81	5.06	7.28	0.76
2.378	1581.28	6.52	5.37	0.78
2.302	1576.57	6.53	6.14	0.80
2.279	1572.58	10.96	5.27	0.80
2.261	1570.36	0.04	12.96	0.81

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 7 OF 25

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
2.261	1570.38	0.04	12.96	0.81

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.—
OVERFLOW LOCATIONS ACROSS CAP	O.F.—

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

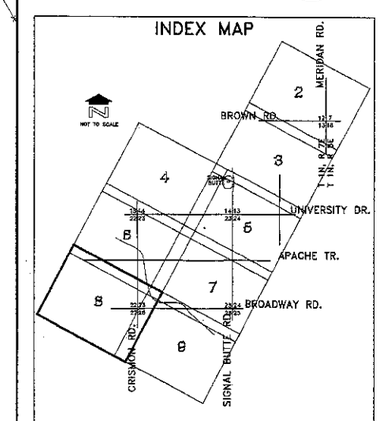
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.
100*	1527.21	FOUND ADOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF ELLSWORTH RD. & APACHE TRAIL

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUENKE Expires 12/31/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

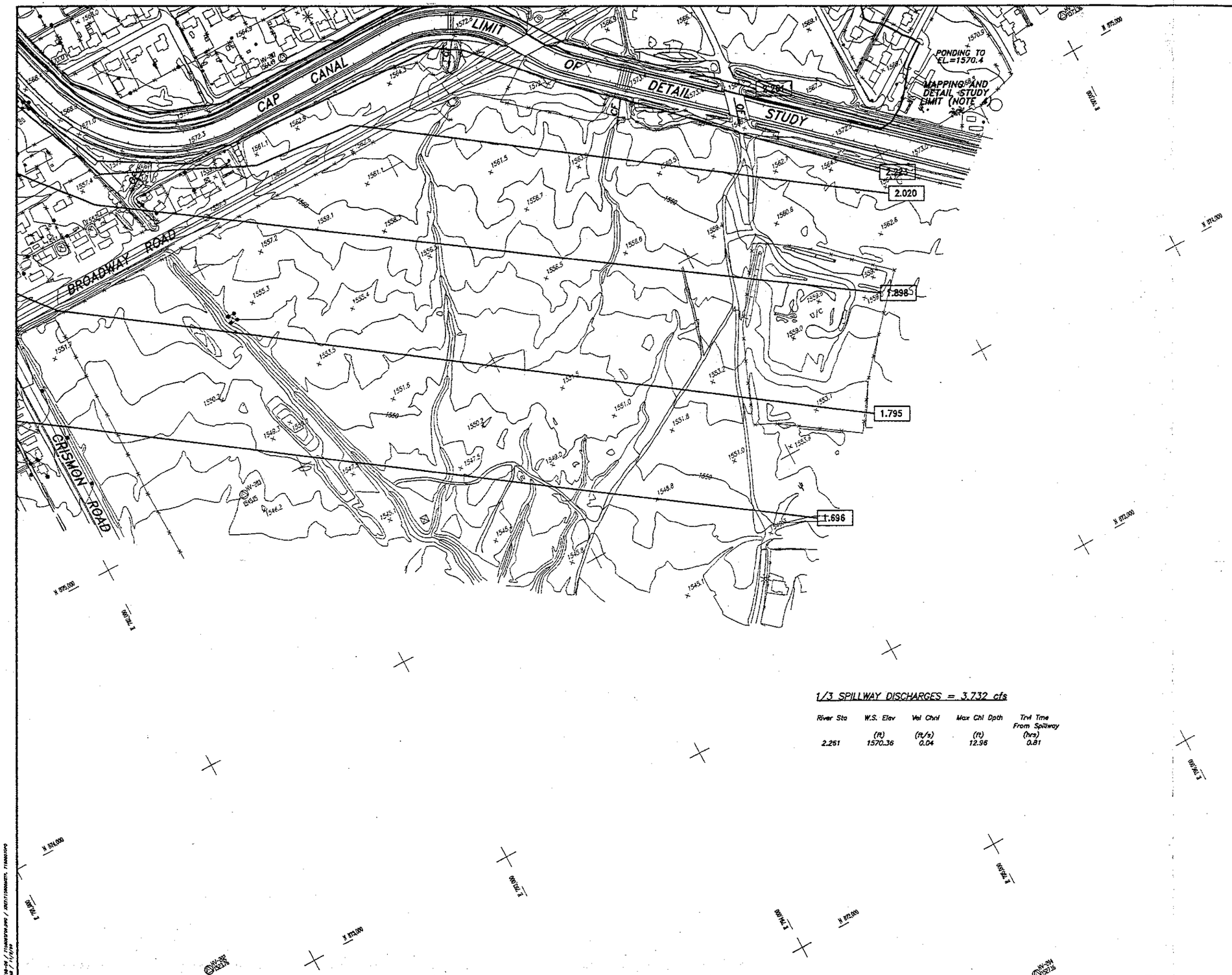
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 8 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7152-06 / 7152SSFCLB.DWG / MAPC7152SSMASTR, 7152SSTBAR
GAS / 11/9/99



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

1/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE NO. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101*	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400+ FEET AT EL.1570.0 AND 1573.6, RESPECTIVELY.

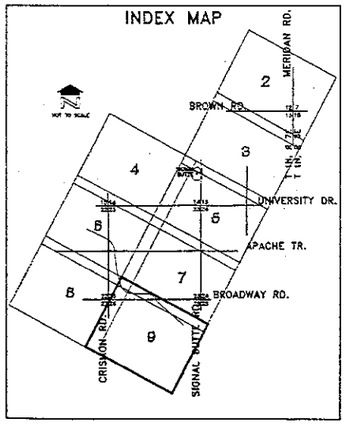
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

1/3 SPILLWAY DISCHARGES = 3,732 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
2.261	1570.36	0.04	12.96	0.81

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

HEC-RAS September 1998 Version 2.2
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
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PROJECT DATA
Project Title: SIGNAL BUTTE FRS STUDY (1/3)
Project File : SIGBUT4.prj
Run Date and Time: 7/6/99 8:17:08 AM

Project in English units

Project Description:
DELINEATE SPILLWAY FLOWS FROM SIGNAL BUTTE FRS DOWNSTREAM TO CAP CANAL
FCD NO.
98-17
PREPARED BY A-N WEST, INC. JOB. NO. 7158-05
EXISTING CONDITIONS .
1/3 SPILLWAY FLOW= 3732 CFS. PROFILE 1
TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL MAPPING OF PHOENIX.
PHOTO
DATE:10/15/98
FIELD SURVEY BY AZTEC ENGINEERING , PHX. AZ.
STARTING D/S WATER
SURFACE ELEV. BASED ON NORMAL DEPTH (S=0.011 FT/FT.)
STARTING U/S WSEL BASED
ON CRITICAL DEPTH.
COMPUTATIONAL FLOW REGIME: MIXED FLOW
MANNIN'GS (N) VALUE
RANGE; 0.013 (CONCRETE SPILLWAY), .030 (TRAP. CHANN. D/S SPILLWAY), .045 (MAIN
CHANN.),.068 (LT.DEV. OVERBANK), 0.10(MOD. DEV. O.B.,0.15 (HVY. DEV.)
FOR
THE 1/3 SPILLWAY FLOW DELINEATION, A NARROWER BAND OF EFFECTIVE FLOW WAS
USED THAN FOR FULL SPILLWAY FLOWS .

PLAN DATA

```
Plan Title: Imported Plan 01
Plan File : C:\HEC\RAS\SIGBUT4.p01

          Geometry Title: Imported Geom 02
          Geometry File : C:\HEC\RAS\SIGBUT4.g02

          Flow Title    : Imported Flow 01
          Flow File     : C:\HEC\RAS\SIGBUT4.f01

Plan Summary Information:
Number of:  Cross Sections =   51    Mulitple Openings =    0
            Culverts       =    1    Inline Weirs      =    0
            Bridges        =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
    Maximum number of interations       =  20
    Maximum difference tolerance        =  0.3
    Flow tolerance factor               =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Mixed Flow
```

FLOW DATA

Flow Title: Imported Flow 01

Flow File : C:\HEC\RAS\SIGBUT4.f01

Flow Data (cfs)

River	Reach	RS	PF 1
SIGNAL BUTTE	SPILLWAY	5.000	3732

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
SIGNAL BUTTE	SPILLWAY	PF 1	Critical	Normal S = .011

GEOMETRY DATA

Geometry Title: Imported Geom 02
Geometry File : C:\HEC\RAS\SIGBUT4.g02

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 5.000**

INPUT
Description: RM.5.000. UPSTREAM END OF STUDY. 33.7 FT. UPSTREAM OF UPSTREAM EDGE OF CONCRETE SPILLWAY OF SIGNAL BUTTE F.R.S. STARTING WSEL BASED ON CRITICAL DEPTH FOR SUPERCRITICAL PROFILE OF MIXED FLOW COMPUTATIONS.

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9843.98	1720.6	9854.85	1718.12	9869.02	1715.08	9878.36	1713.22	9886.06	1710.36
9886.09	1710.4	9895.58	1710.17	9900.94	1710.04	9907.81	1710.17	9923.66	1710.11
9939.71	1710.1	9952.09	1709.99	9962.03	1710.08	9965.76	1709.93	9976.08	1710.13
9986.97	1710.1	10005.07	1709.78	10022.06	1709.59	10035.71	1709.38	10040.68	1709.3
10045.28	1709	10065.44	1709.39	10070.11	1710.31	10072.32	1710.23	10073.01	1710.22
10073.67	1710.2	10075.2	1710.92	10084.32	1710.73	10097.23	1711.25	10101.65	1711.24
10107.98	1711.3	10110.12	1711.37	10142.51	1721.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9843.98	.03	9843.98	.03	10142.51	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9843.98	10142.51	33.7	33.7	33.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1716.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.030	
W.S. Elev (ft)	1716.78	Reach Len. (ft)	33.70	33.70	33.70
Crit W.S. (ft)	1712.09	Flow Area (sq ft)		1624.36	
E.G. Slope (ft/ft)	0.000195	Area (sq ft)		1624.36	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	266.04	Top Width (ft)		266.04	
Vel Total (ft/s)	2.30	Avg. Vel. (ft/s)		2.30	
Max Chl Dpth (ft)	7.78	Hydr. Depth (ft)		6.11	
Conv. Total (cfs)	267406.3	Conv. (cfs)		267406.3	
Length Wtd. (ft)	33.70	Wetted Per. (ft)		268.08	
Min Ch El (ft)	1709.00	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	730.10	75.36	87.06
C & E Loss (ft)	0.13	Cum SA (acres)	576.64	29.53	80.53

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta	Right Sta	Flow	Area	W.P.	% Conv.	Hydr D.	Velocity
(ft)	(ft)	(cfs)	(sq ft)	(ft)		(ft)	(ft/s)
LB 9843.98	RB 10142.51	3732.00	1624.36	268.08	100.00	6.11	2.30

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.994

INPUT
Description: RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE. DECREASE N VALUE TO 0.013 FOR TOP OF CONC. SPILLWAY.

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9917.72	1721.7	9918.28	1721.71	9919.94	1721.57	9921.53	1715.89	9922.08	1712.15
9922.98	1712.2	9923.3	1712.21	9923.63	1712.21	10058.64	1712.76	10059.41	1712.75
10060.03	1712.7	10060.35	1712.75	10061.14	1716.14	10062.05	1721.18	10062.48	1722.14
10062.99	1722.2	10064.47	1721.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9917.72	.013	9917.72	.013	10062.48	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9917.72	10062.48	12.96	12.96	12.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1716.72	Element			
Vel Head (ft)	1.42	Wt. n-Val.		0.013	
W.S. Elev (ft)	1715.30	Reach Len. (ft)	12.96	12.96	12.96
Crit W.S. (ft)	1715.30	Flow Area (sq ft)		390.87	
E.G. Slope (ft/ft)	0.001844	Area (sq ft)		390.87	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	139.33	Top Width (ft)		139.33	
Vel Total (ft/s)	9.55	Avg. Vel. (ft/s)		9.55	
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)		2.81	
Conv. Total (cfs)	86902.7	Conv. (cfs)		86902.7	
Length Wtd. (ft)	12.96	Wetted Per. (ft)		144.08	
Min Ch El (ft)	1712.15	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.98	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	730.10	74.58	87.06
C & E Loss (ft)	0.01	Cum SA (acres)	576.64	29.37	80.53

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9917.72	RB 10062.48	3732.00	390.87	144.08	100.00	2.81	9.55

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.991

INPUT
Description: RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/ EDGE. MANNING'S N VALUE INCREASED FOR THIS REACH TO 0.15 TO ACCOUNT FOR BAFFLED BLOCK ENERGY DISSIPATOR BLOCKS.

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9915.58	1721.9	9918.01	1721.2	9920.69	1720.98	9921.31	1718.78	9924.8	1715.45
9942.18	1712.6	9944.25	1711.45	9944.71	1711.45	9959.07	1711.6	9959.23	1711.6
9976.87	1711.5	9977.34	1711.47	10000.77	1711.67	10001.66	1711.69	10034.46	1711.52
10035.44	1711.5	10039.72	1713.76	10058.59	1713.02	10062.68	1722.13	10064.47	1722.16

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9915.58	.013	9915.58	.151	10064.47	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9915.58	10064.47	27.8	27.8	27.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1716.59	Element			
Vel Head (ft)	1.89	Wt. n-Val.		0.150	
W.S. Elev (ft)	1714.70	Reach Len. (ft)	27.80	27.80	27.80
Crit W.S. (ft)	1715.04	Flow Area (sq ft)		338.00	
E.G. Slope (ft/ft)	0.354917	Area (sq ft)		338.00	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	129.94	Top Width (ft)		129.94	
Vel Total (ft/s)	11.04	Avg. Vel. (ft/s)		11.04	
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	6264.4	Conv. (cfs)		6264.4	
Length Wtd. (ft)	27.80	Wetted Per. (ft)		132.07	
Min Ch El (ft)	1711.45	Shear (lb/sq ft)		56.70	
Alpha	1.00	Stream Power (lb/ft s)		626.10	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	730.10	74.47	87.06
C & E Loss (ft)	0.05	Cum SA (acres)	576.64	29.33	80.53

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.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9915.58	RB 10064.47	3732.00	338.00	132.07	100.00	2.60	11.04

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.986

INPUT
Description: RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE SPILLWAY. INCREASE N VALUE TO 0.09 TO PROVIDE AVE. N VALUE BETWEEN FULL BAFFLED BLOCK SEGMENT AND TRAP. CHANN. SEGMENT.

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.12	1711.2	9918.76	1711.48	9920.17	1711.46	9921.79	1711.04	9924.61	1696.66
9928.91	1696.4	9929.02	1696.37	9957	1696.48	9957.18	1696.48	9970.7	1696.64
9971.09	1696.6	9985.17	1696.44	9985.42	1696.45	10013.17	1697.05	10014.95	1697.04
10037.37	1697.41	10039.25	1698.39	10058.26	1699.27	10061.28	1698.69	10063.52	1712.95
10066.66	1712.6								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.12	.03	9921.79	.09	10063.52	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9921.79	10063.52	92.6	92.6	92.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1703.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.17	Wt. n-Val.		0.090	
W.S. Elev (ft)	1698.51	Reach Len. (ft)	92.60	92.60	92.60
Crit W.S. (ft)	1699.90	Flow Area (sq ft)		204.55	
E.G. Slope (ft/ft)	0.594989	Area (sq ft)		204.55	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	117.49	Top Width (ft)		117.49	
Vel Total (ft/s)	18.25	Avg. Vel. (ft/s)		18.25	
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	4838.2	Conv. (cfs)		4838.2	
Length Wtd. (ft)	92.60	Wetted Per. (ft)		119.28	
Min Ch El (ft)	1696.37	Shear (lb/sq ft)		63.70	
Alpha	1.00	Stream Power (lb/ft s)		1162.17	
Frctn Loss (ft)	12.58	Cum Volume (acre-ft)	730.10	74.30	87.06
C & E Loss (ft)	0.33	Cum SA (acres)	576.64	29.25	80.53

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9921.79	RB 10063.52	3732.00	204.55	119.28	100.00	1.74	18.25

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.968

INPUT
Description: RM. 4.968.

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9888.2	1706.9	9909.13	1699.23	9911.27	1698.48	9922.54	1697.93	9925.09	1696.5
9930.97	1696.1	9946.22	1695.93	9988.32	1696.32	9996.02	1696.31	0027.28	1696.26
10045.55	1696.21	0068.23	1696.45	10074.45	1697.95	10081.83	1698.83	10087.66	1699.76
10101.66	1706.41	0105.26	1708.17	10108.82	1708.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9888.2	.03	9888.2	.03	10108.82	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9888.21	10108.82	208.34	208.34	208.34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1702.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	1701.87	Reach Len. (ft)	208.34	208.34	208.34
Crit W.S. (ft)	1698.94	Flow Area (sq ft)		952.93	
E.G. Slope (ft/ft)	0.000738	Area (sq ft)		952.93	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	190.16	Top Width (ft)		190.16	
Vel Total (ft/s)	3.92	Avg. Vel. (ft/s)		3.92	
Max Chl Dpth (ft)	5.94	Hydr. Depth (ft)		5.01	
Conv. Total (cfs)	137362.9	Conv. (cfs)		137362.9	
Length Wtd. (ft)	208.34	Wetted Per. (ft)		191.94	
Min Ch El (ft)	1695.93	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		0.90	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	730.10	73.07	87.06
C & E Loss (ft)	0.02	Cum SA (acres)	576.64	28.93	80.53

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9888.20	RB 10108.82	3732.00	952.93	191.94	100.00	5.01	3.92

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.929

INPUT
Description: RM. 4.929.

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.26	1705.3	9926.18	1699.6	9933.33	1696.42	9941.32	1696.42	9954.96	1696.34
10009.41	1696.31	10059.24	1696.03	10061.29	1695.98	10082.37	1703.29	10096.95	1708.19
10103.33	1708.51	10105.48	1708.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.26	.03	9911.26	.03	10105.48	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9911.26	10105.48	125	76.23	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1701.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	1701.49	Reach Len. (ft)	125.00	76.23	25.00
Crit W.S. (ft)		Flow Area (sq ft)		742.41	
E.G. Slope (ft/ft)	0.001308	Area (sq ft)		742.41	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	155.97	Top Width (ft)		155.97	
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)		5.03	
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)		4.76	
Conv. Total (cfs)	103191.4	Conv. (cfs)		103191.4	
Length Wtd. (ft)	76.23	Wetted Per. (ft)		157.93	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)		0.38	
Alpha	1.00	Stream Power (lb/ft s)		1.93	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	730.10	69.01	87.06
C & E Loss (ft)	0.02	Cum SA (acres)	576.64	28.10	80.53

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9911.26	RB 10105.48	3732.00	742.41	157.93	100.00	4.76	5.03

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.914**

INPUT
Description: RM. 4.914 INEFF. FLOW OPTION USED TO LT. OF STA. 9865.1.

Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9599.38	1703.6	9605.27	1703.57	9613.73	1703.21	9628.26	1702.74	9640.01	1702.4
9659.34	1702.1	9689.85	1701.75	9709.87	1701.47	9716.11	1701.37	9720.11	1701.34
9733.65	1699.9	9747.41	1698.56	9755.78	1697.4	9770.71	1698.13	9804.49	1699.6
9812.95	1699.8	9814.27	1699.83	9816.7	1699.69	9818.67	1699.73	9829.2	1699.73
9830.45	1699.8	9835.71	1699.72	9841.92	1699.66	9843.24	1699.65	9858.76	1700.1
9865.1	1700.3	9873.59	1699.65	9881.28	1699.58	9890.9	1698.86	9894.92	1698.82
9896.1	1698.8	9921.75	1697.32	9931.45	1696.61	9934.31	1696.62	9961.9	1696.57
10034.86	1696.2	10039.04	1696.12	10046.37	1695.98	10052.89	1697.97	10061.87	1700.92
10085.54	1708.2	10085.62	1708.19	10087.97	1708.33				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9599.38	.068	9865.1	.031	10087.97	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9865.1	10087.97	120	67.17	25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9599.38	9865.01	1703

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1701.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.000	0.030	
W.S. Elev (ft)	1701.44	Reach Len. (ft)	120.00	67.17	25.00
Crit W.S. (ft)	1699.36	Flow Area (sq ft)	0.10	817.61	
E.G. Slope (ft/ft)	0.001294	Area (sq ft)	312.09	817.61	
Q Total (cfs)	3732.00	Flow (cfs)	0.09	3731.91	
Top Width (ft)	352.08	Top Width (ft)	153.61	198.47	
Vel Total (ft/s)	4.56	Avg. Vel. (ft/s)	0.86	4.56	
Max Chl Dpth (ft)	5.46	Hydr. Depth (ft)	1.15	4.12	
Conv. Total (cfs)	103732.4	Conv. (cfs)	2.5	103729.9	
Length Wtd. (ft)	67.17	Wetted Per. (ft)	0.09	199.45	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)	0.09	0.33	
Alpha	1.00	Stream Power (lb/ft s)	0.08	1.51	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	729.65	67.65	87.06
C & E Loss (ft)	0.05	Cum SA (acres)	576.42	27.79	80.53

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9798.67	9865.10	0.09	0.10	0.09	0.00	1.15	0.86
LB 9865.10	RB 10087.97	3731.91	817.61	199.45	100.00	4.12	4.56

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.902**

INPUT
Description: RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S/ OF SPILLWAY.

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9569.3	1703.6	9570.24	1703.63	9582.02	1703.52	9587.21	1703.65	9594.87	1703.72
9600.67	1703.8	9611.08	1704.08	9613.59	1704.14	9656.3	1704.32	9698.56	1703.91
9707.61	1703.9	9710.56	1703.9	9728.44	1703.7	9770.15	1703.09	9771.24	1703.06
9772.19	1703	9790.71	1702.51	9796.64	1702.45	9807.42	1702.69	9819.3	1702.85
9824.23	1702.8	9840.04	1702.79	9843.47	1702.72	9853.18	1702.76	9855.36	1702.77
9859.69	1702.8	9864.04	1702.78	9864.74	1702.98	9866.98	1702.74	9871.07	1702.7
9877.7	1702.6	9884.14	1702.17	9890.93	1701.86	9906.82	1700.9	9910.86	1699.84
9926.61	1699.1	9927.39	1699.04	9955.71	1696.03	9957.81	1695.76	9958.84	1695.64
9964.99	1695.2	9982.12	1695.62	9987.28	1695.81	10018.22	1695.96	10022.17	1696.08
10027.92	1696.3	10030.31	1696.44	10039.31	1699.44	10042.31	1699.71	10043.42	1699.91
10056.21	1703	10058.82	1703.84	10066.78	1705.59	10086.97	1707.91	10087.92	1707.83

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9569.3	.068	9906.82	.045	10086.97	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9906.82	10086.97	280	261.94	230	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1701.54	Element			
Vel Head (ft)	0.83	Wt. n-Val.		0.045	
W.S. Elev (ft)	1700.71	Reach Len. (ft)	280.00	261.94	230.00
Crit W.S. (ft)		Flow Area (sq ft)		511.06	
E.G. Slope (ft/ft)	0.008712	Area (sq ft)		511.06	
Q Total (cfs)	3732.00	Flow (cfs)		3732.00	
Top Width (ft)	139.17	Top Width (ft)		139.17	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.51	Hydr. Depth (ft)		3.67	
Conv. Total (cfs)	39982.9	Conv. (cfs)		39982.9	
Length Wtd. (ft)	262.79	Wetted Per. (ft)		140.13	
Min Ch El (ft)	1695.20	Shear (lb/sq ft)		1.98	
Alpha	1.00	Stream Power (lb/ft s)		14.49	
Frctn Loss (ft)	2.11	Cum Volume (acre-ft)	729.22	66.62	87.06
C & E Loss (ft)	0.06	Cum SA (acres)	576.21	27.53	80.53

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9906.82	RB 10086.97	3732.00	511.06	140.13	100.00	3.67	7.30

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.852

INPUT
Description: RM. 4.852. AREA BLOCKED OUT TO LT OF STA. 9790

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9176.68	1700.2	9216.75	1700.39	9216.84	1700.39	9216.88	1700.39	9216.93	1700.38
9223.8	1698.7	9231.22	1698.72	9238.57	1698.73	9239.83	1698.72	9243.73	1698.83
9271.54	1698.7	9273.68	1698.71	9276.37	1698.68	9278.04	1698.65	9282.14	1698.64
9301.81	1698.8	9305.89	1698.34	9314.94	1698.4	9316.21	1698.52	9330.57	1700.06
9339.65	1699.8	9353.73	1700.26	9355.44	1700.25	9357.73	1700.25	9361.39	1700.27
9368.81	1700.4	9401.21	1701.02	9410.55	1700.94	9424.54	1700.83	9426.6	1700.82
9429.18	1700.7	9433.95	1700.52	9446.91	1700.1	9481.8	1698.93	9523.95	1699.49
9549.43	1700.1	9603.66	1700.33	9685.19	1700.08	9697.82	1700.06	9699.23	1700.07
9736.8	1700.4	9786.05	1700.49	9790.13	1700.6	9807.56	1700.41	9811.08	1700.25
9817.32	1699.8	9821.17	1699.28	9823.8	1698.97	9844.24	1697.92	9862.69	1697.21
9922.92	1695.9	9925.6	1695.82	9928.41	1695.78	9929.54	1695.77	9936.64	1695.75
9983.39	1695.8	9998.01	1694.31	10025	1692.71	10022.77	1693.31	10033.68	1693.91
10036.17	1694.41	10051.93	1697.35	10052.2	1697.34	10071.29	1697.95	10071.49	1697.94
10071.83	1698	10087.16	1698.16	10095.74	1698.48	10109.44	1699.35	10114.9	1699.58
10125.72	1699.71	10163.22	1700.26	10196.01	1700.39	10205.48	1700.58	10221.91	1700.89
10232.4	1701.11	10240.12	1701.27	10268.65	1701.21	10306.9	1701.62	10318.47	1701.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9176.68	.068	9925.6	.045	10051.93	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9925.61	10051.93	390	402.55	425	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9176.68	9790.43	1700.6

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1699.37	Element			
Vel Head (ft)	0.64	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1698.73	Reach Len. (ft)	390.00	402.55	425.00
Crit W.S. (ft)		Flow Area (sq ft)	166.51	472.46	35.45
E.G. Slope (ft/ft)	0.007419	Area (sq ft)	166.51	472.46	35.45
Q Total (cfs)	3732.00	Flow (cfs)	448.79	3228.52	54.69
Top Width (ft)	271.18	Top Width (ft)	97.12	126.33	47.74
Vel Total (ft/s)	5.53	Avg. Vel. (ft/s)	2.70	6.83	1.54
Max Chl Dpth (ft)	6.03	Hydr. Depth (ft)	1.71	3.74	0.74

Conv. Total (cfs)	43328.6	Conv. (cfs)	5210.5	37483.2	634.9
Length Wtd. (ft)	403.51	Wetted Per. (ft)	97.17	126.86	47.77
Min Ch El (ft)	1692.70	Shear (lb/sq ft)	0.79	1.72	0.34
Alpha	1.35	Stream Power (lb/ft s)	2.14	11.79	0.53
Frctn Loss (ft)	3.72	Cum Volume (acre-ft)	728.69	63.66	86.96
C & E Loss (ft)	0.04	Cum SA (acres)	575.90	26.73	80.41

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9738.37	9925.60	448.79	166.51	97.17	12.03	1.71	2.70
LB 9925.60	RB 10051.93	3228.52	472.46	126.86	86.51	3.74	6.83
10051.93	10318.47	54.69	35.45	47.77	1.47	0.74	1.54

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.776

INPUT
Description: RM. 4.776. FLOW BLOCKED OUT TO RT. OF STA.10270.89 DUE TO RIDGE.

Station Elevation Data num= 114

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8935.41	1698	8940.48	1697.99	8945.99	1698	8960.41	1697.63	8969.15	1697.36
8978.82	1697.2	9013.48	1696.67	9018.78	1696.39	9024.13	1696.23	9039.09	1696.43
9074.04	1697.1	9089.48	1696.99	9102.18	1697	9114.78	1696.64	9117.41	1696.54
9125.2	1696.3	9139.09	1696.32	9140.5	1696.43	9143.78	1696.28	9189.59	1696.03
9210.18	1695.9	9244.85	1695.96	9294.39	1695.81	9359.47	1695.58	9382.81	1695.54
9429.66	1695.8	9437.31	1695.76	9442.33	1695.74	9446.46	1695.71	9449.71	1695.66
9509.16	1696.3	9513.47	1696.34	9573.45	1696.39	9586.58	1696.4	9587.04	1696.4
9587.41	1696.4	9587.7	1696.4	9588.72	1696.4	9639.28	1695.49	9661.72	1695.55
9664.15	1695.6	9686.93	1695.74	9699.19	1695.89	9702	1695.91	9715.09	1696
9721.28	1696	9731.73	1696.07	9734.45	1696.06	9791.49	1695.5	9793.31	1695.48
9813.49	1695.3	9815.93	1695.87	9823.49	1695.48	9831.94	1695.4	9850.43	1695.27
9858.68	1695.2	9863.38	1695.2	9865.41	1695.15	9874.84	1695.02	9877.74	1694.96
9885.97	1694.8	9910.84	1694.22	9912.71	1694.14	9914.29	1694.11	9919.29	1693.94
9923.48	1693.6	9933.65	1693.02	9939.13	1692.74	9942.88	1692.39	9951.71	1691.58
9954.46	1691.4	9963.23	1690.86	9967.34	1691.1	9976.35	1691.51	9980.62	1689.91
9986.34	1689.5	9988.05	1689.61	9996.11	1688.46	9999.98	1688.02	10006.86	1689.3
10031.84	1693.7	10033.97	1693.61	0047.09	1693.61	0125.05	1693.41	10143.11	1692.75
10158.57	1692.7	10171.85	1693.21	10180.16	1693.51	0187.75	1693.61	0190.27	1693.64
10194.77	1693.7	10196.69	1693.75	10221.59	1694.21	0233.77	1694.22	10270.89	1694.57
10324.27	1693.7	10336.35	1693.57	10351.89	1693.41	0366.67	1692.31	10378.34	1691.68
10385.75	1692.5	10396.02	1693.56	10398.28	1694	10410.54	1694.33	10423.79	1694.61
10449.46	1694.7	10467.86	1694.62	10483.13	1694.45	10514.16	1695.01	10537.72	1695.52
10561.03	1695.9	10563.38	1695.92	10564.33	1695.94	10580.38	1695.93		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8935.41	.068	9939.13	.045	10031.84	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9939.1	10031.84	420	418.55	365	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10270.8	910580.38	1694.7

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1695.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.00	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1694.61	Reach Len. (ft)	420.00	418.55	365.00
Crit W.S. (ft)	1694.61	Flow Area (sq ft)	33.84	355.94	235.06
E.G. Slope (ft/ft)	0.011838	Area (sq ft)	33.84	355.94	235.06
Q Total (cfs)	3732.00	Flow (cfs)	66.62	3112.88	552.51
Top Width (ft)	376.65	Top Width (ft)	44.89	92.71	239.05
Vel Total (ft/s)	5.97	Avg. Vel. (ft/s)	1.97	8.75	2.35
Max Chl Dpth (ft)	6.59	Hydr. Depth (ft)	0.75	3.84	0.98
Conv. Total (cfs)	34300.2	Conv. (cfs)	612.3	28609.9	5078.0
Length Wtd. (ft)	407.90	Wetted Per. (ft)	44.93	93.72	239.12
Min Ch El (ft)	1688.02	Shear (lb/sq ft)	0.56	2.81	0.73
Alpha	1.81	Stream Power (lb/ft s)	1.10	24.55	1.71
Frctn Loss (ft)	3.34	Cum Volume (acre-ft)	727.79	59.84	85.64
C & E Loss (ft)	0.17	Cum SA (acres)	575.26	25.72	79.01

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9688.20	9939.13	66.62	33.84	44.93	1.78	0.75	1.97
LB 9939.13	RB 10031.84	3112.88	355.94	93.72	83.41	3.84	8.75
10031.84	10580.38	552.51	235.06	239.12	14.80	0.98	2.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.697**

INPUT
Description: RM. 4.697. AREA BLOCKED OUT TO LT. OF STA. 9797.52 AND TO RT. OF STA 10289.2 DUE TO RIDGES.

Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8615.35	1691.7	8621.19	1691.78	8628.32	1691.89	8647.84	1691.45	8681.66	1690.65
8685.98	1690.7	8711.81	1690.71	8713.45	1690.66	8742.34	1690.04	8747.69	1689.95
8775.29	1689.5	8785.04	1689.85	8822.44	1689.74	8835.79	1689.79	8849.3	1690.18
8855.86	1690.3	8900.66	1690.06	8902.91	1690.08	8903.54	1690.07	8904.13	1690.06
8905.54	1690.1	8906.72	1690.07	8935.66	1690.55	8968.19	1691.08	9007.95	1690.98
9027.69	1691.6	9045.3	1691.68	9084.5	1691.15	9109.44	1690.8	9130.16	1690.73
9155.24	1690.6	9181.66	1690.38	9188.41	1690.37	9210.31	1690.54	9213.33	1690.82
9243.78	1690.7	9245.88	1690.77	9269.01	1692.21	9276.84	1692.22	9298.69	1692.14
9313.27	1692.1	9323.7	1690.92	9324.25	1690.89	9350.46	1689.83	9368.99	1689.87
9376.02	1689.9	9436.31	1689.86	9453.1	1689.98	9473.97	1690.13	9488.68	1690.11
9503.3	1690.1	9513.87	1689.93	9519.01	1689.84	9527.01	1689.96	9536.07	1690
9581.7	1689.6	9625.31	1689.63	9646.29	1689.66	9647.75	1689.68	9690.82	1690.91
9691.3	1690.9	9716.92	1691.15	9797.52	1691.52	9835.95	1691.4	9847.69	1691.41
9926.16	1690.9	9951.62	1690.65	9955.39	1689.85	9965.75	1687.96	9974.68	1686.96
9994.63	1687.4	9997.15	1687.31	0003.25	1686.84	10007.88	1686.48	10010.81	1686.27
10023.5	1687.11	0030.84	1687.52	10039.46	1686.61	10044.28	1686.21	10057.73	1685.92
10060.31	1685.91	0061.45	1686.07	10074.94	1688.01	10079.14	1688.23	10083.15	1688.16
10096.94	1688	10097.71	1688.01	10104.94	1688.01	10117.41	1688.77	10144.83	1689.93
10158.77	1689.41	0159.88	1689.41	10160.08	1689.41	0160.12	1689.41	10171.33	1690.25
10175.55	1690.41	0191.19	1690.34	10220.07	1687.61	10228.82	1687.04	10235.53	1687.63
10236.59	1687.71	0237.85	1687.76	10253.54	1688.95	10273.02	1690.21	0283.18	1690.19
10289.59	1690.21	0298.19	1690.13	10326.9	1690.11	0352.34	1689.91	0368.46	1689.44
10373.51	1688.81	0390.43	1685.37	10402.6	1687.14	10408.58	1687.54	10422.6	1689.22
10423.13	1689.21	0424.95	1689.25	10453.45	1689.58	10463.49	1689.69	10466.12	1689.39
10468.63	1689.41	0472.04	1689.24	10482.12	1688.67	10486.1	1688.44	10489.9	1688.83
10499.44	1689.61	0504.93	1689.88	10520.08	1690.37	10521.74	1690.41	10522.63	1690.44
10535.38	1691	10562.52	1691.16	10586.08	1691.47				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8615.35	.068	9951.62	.045	10079.14	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9951.62	10079.14	425	406.56	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8615.35	9797.52	1691.52	10289.2	10586.08	1690.2

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1691.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1690.81	Reach Len. (ft)	425.00	406.56	380.00
Crit W.S. (ft)	1689.74	Flow Area (sq ft)	1.37	464.12	510.03
E.G. Slope (ft/ft)	0.005989	Area (sq ft)	1.37	464.12	510.03
Q Total (cfs)	3732.00	Flow (cfs)	0.44	2797.25	934.31
Top Width (ft)	596.27	Top Width (ft)	16.73	127.52	452.01

Vel Total (ft/s)	3.83	Avg. Vel. (ft/s)	0.32	6.03	1.83
Max Chl Dpth (ft)	4.91	Hydr. Depth (ft)	0.08	3.64	1.13
Conv. Total (cfs)	48223.0	Conv. (cfs)	5.7	36144.7	12072.7
Length Wtd. (ft)	400.66	Wetted Per. (ft)	16.73	128.14	452.38
Min Ch El (ft)	1685.90	Shear (lb/sq ft)	0.03	1.35	0.42
Alpha	1.92	Stream Power (lb/ft s)	0.01	8.16	0.77
Frctn Loss (ft)	4.17	Cum Volume (acre-ft)	727.62	55.90	82.52
C & E Loss (ft)	0.06	Cum SA (acres)	574.96	24.66	76.11

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9617.55	9951.62	0.44	1.37	16.73	0.01	0.08	0.32
LB 9951.62	RB 10079.14	2797.25	464.12	128.14	74.95	3.64	6.03
10079.14	10586.08	934.31	510.03	452.38	25.04	1.13	1.83

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.620

INPUT
Description: RM. 4.620. AREA BLOCKED OUT TO LT. OF STA. 9720.21 DUE TO RIDGE.

Station Elevation Data num= 138

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8183.54	1687.4	8184.89	1687.38	8186.81	1687.38	8189.78	1687.38	8190.4	1687.39
8191.61	1687.4	8192.65	1687.33	8193.42	1687.29	8247.72	1686.25	8252.69	1685.9
8276.3	1685.7	8282.47	1685.64	8286.78	1685.66	8297.37	1685.93	8298.63	1685.97
8298.72	1686	8299.28	1685.95	8313.34	1686.05	8316.75	1686.05	8325.87	1686.06
8333.25	1686.2	8338.01	1686.07	8342.44	1686.06	8347.31	1685.9	8381.53	1686.4
8402.32	1686.4	8418.07	1686.44	8418.12	1686.44	8487.43	1686.52	8523.15	1687.04
8527.12	1687	8544.28	1686.39	8548.4	1686.26	8563.44	1687	8572.28	1687.42
8619.36	1687.5	8629.86	1687.56	8631.08	1687.54	8646.85	1687.24	8683.07	1686.1
8693.85	1686.6	8697.03	1686.86	8713.67	1686.94	8736.22	1686.92	8743.7	1686.74
8753.78	1686.3	8764.15	1685.96	8796.52	1684.77	8806.21	1685.17	8832.47	1686.21
8885.89	1686.3	8893.28	1686.23	8915.42	1686.3	8944.62	1686.07	8997.14	1685.73
8999.1	1685.7	9012.34	1684.96	9018.78	1685.59	9025.58	1685.96	9035.59	1685.68
9040.14	1685.6	9041.36	1685.62	9071.61	1685.7	9156.97	1686.1	9229.09	1686.29
9238.36	1686.2	9240.57	1685.73	9246.15	1684.98	9250.97	1685.33	9254.36	1685.51
9259.12	1685.6	9275.26	1686.34	9281.03	1686.5	9293.86	1685.82	9301.28	1685.29
9308.97	1685.3	9319.63	1685.36	9327.79	1685.61	9331.55	1685.76	9346.55	1685.71
9373.18	1685.6	9390.49	1685.57	9398.52	1685.33	9410.53	1685.39	9428.27	1685.12

9482.54	1684.5	9519.3	1684.51	9551.85	1685	9552.27	1685.02	9552.65	1684.98
9563.28	1684	9573.01	1685.04	9575.03	1685.27	9610.37	1685.38	9623.76	1685.28
9628.21	1685.3	9646.82	1685.91	9664.39	1686.72	9691.62	1686.21	9691.93	1686.22
9720.21	1687.7	9725.38	1687.61	9747.48	1687.26	9762.48	1687.02	9771.94	1686.13
9778.52	1685.8	9782.17	1685.72	9787.44	1685.7	9817.59	1685.49	9907.42	1686.28
9918.29	1686.2	9919.18	1686.16	9933.7	1685.33	9942.43	1684.3	9962.7	1682.19
9974.77	1683.1	9981.07	1683.57	10031.53	1682.62	10038.88	1682.45	10056.07	1685.36
10065.59	1687.11	10066.81	1687.02	10080.47	1687.05	10150.42	1687.13	10154.68	1687.35
10162.53	1687.91	10187.11	1687.05	10213.74	1686.28	10220.07	1685.75	10223.62	1685.27
10239.74	1683	10247.89	1682.54	10251.65	1682.09	10261.52	1682.91	10287.46	1686.29
10291.34	1686.8	10301.97	1687.12	10322.59	1687.44				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8183.54	.068	9907.42	.045	10065.59	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9907.42	10065.59	220	235.25	230	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
8183.54	9720.21	1687.7

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1687.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1685.96	Reach Len. (ft)	220.00	235.25	230.00
Crit W.S. (ft)	1685.96	Flow Area (sq ft)	26.19	331.57	141.06
E.G. Slope (ft/ft)	0.022346	Area (sq ft)	26.19	331.57	141.06
Q Total (cfs)	3732.00	Flow (cfs)	35.95	2945.91	750.14
Top Width (ft)	300.34	Top Width (ft)	96.15	136.75	67.43
Vel Total (ft/s)	7.48	Avg. Vel. (ft/s)	1.37	8.88	5.32
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)	0.27	2.42	2.09
Conv. Total (cfs)	24965.6	Conv. (cfs)	240.5	19707.0	5018.1
Length Wtd. (ft)		Wetted Per. (ft)	96.16	137.30	67.90
Min Ch El (ft)	1682.19	Shear (lb/sq ft)	0.38	3.37	2.90
Alpha	1.22	Stream Power (lb/ft s)	0.52	29.93	15.41
Frctn Loss (ft)		Cum Volume (acre-ft)	727.49	52.18	79.68
C & E Loss (ft)		Cum SA (acres)	574.41	23.43	73.85

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9476.45	9907.42	35.95	26.19	96.16	0.96	0.27	1.37
LB 9907.42	RB 10065.59	2945.91	331.57	137.30	78.94	2.42	8.88
10065.59	10322.59	750.14	141.06	67.90	20.10	2.09	5.32

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.575**

INPUT
Description: RM. 4.575. HYDRAULIC BASELINE CROSSES NEAR BROWN RD. AREA BLOCKED OUT TO LT. OF STA. 9814.63 DUE TO RIDGE.

Station Elevation Data num= 171

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7923.93	1686.1	7960.09	1685.85	8002	1685.62	8008.75	1685.59	8016.89	1685.2
8050.52	1685.7	8106.94	1685.43	8119.67	1685.33	8123.23	1685.35	8137.89	1684.25
8138.41	1684.3	8138.47	1684.26	8139.96	1684.21	8156.81	1684.63	8172.24	1683.92
8217.4	1684	8225.67	1683.96	8227.17	1683.93	8227.87	1683.89	8228.9	1683.83
8240.8	1683.4	8249.59	1683.63	8256.19	1683.88	8283.98	1685.07	8289.58	1685.1
8303.89	1685.2	8308.58	1685.25	8313.54	1685.27	8323.14	1685.43	8331.75	1685.45
8339.52	1685.5	8349.44	1685.32	8364.12	1685.2	8370.51	1684.97	8398.85	1684.74
8403.21	1684.8	8406.19	1684.7	8413.43	1684.63	8429.31	1684.69	8466.64	1684.76
8483.97	1684.8	8489.46	1684.58	8497.76	1684.28	8508.08	1684.09	8518.73	1683.9
8524.11	1684.1	8539.21	1684.48	8541.98	1684.52	8565.21	1684.89	8584.77	1685.17
8586.76	1685.1	8614.69	1684.2	8619.02	1684.28	8636.13	1684.69	8660.9	1684.88
8673.38	1684.8	8698	1683.95	8731.34	1683.69	8744.69	1683.94	8748.3	1683.73
8771.66	1682.3	8785.39	1682.96	8799.62	1683.95	8834.03	1683.79	8852.1	1683.76
8855.18	1683.7	8860.54	1683.74	8868.72	1683.71	8938.05	1683.77	8992.59	1683.05
8993.65	1683.1	8995.46	1683.19	9010.69	1684.54	9077.51	1684.04	9077.55	1684.04
9077.56	1684	9077.56	1684.04	9094.76	1683.72	9180.42	1683.98	9214.52	1684.13
9234.85	1684.3	9258.67	1684.78	9264.52	1684.87	9265.9	1684.64	9275.25	1682.96
9286.73	1683.6	9288.55	1683.71	9289.19	1683.69	9295.86	1683.68	9310.73	1683.43
9333.12	1683.7	9337.56	1683.73	9413.89	1683.23	9442.38	1683.04	9444.41	1683.4
9448.35	1683	9453.93	1682.49	9455.79	1682.63	9465.08	1683.44	9511.99	1683.13
9549.89	1682.8	9567.04	1683.14	9583.58	1683.35	9604.27	1684.13	9616.12	1684.53
9641.09	1684.8	9661.78	1684.45	9706.1	1683.97	9712.25	1683.92	9755.92	1683.69
9762.95	1683.6	9763.73	1683.64	9765.05	1683.63	9773.66	1683.91	9794.63	1684.57
9796.09	1684.5	9814.63	1684.65	9824.21	1684.48	9835.53	1684.51	9842.2	1684.45
9865.35	1683.5	9881.7	1682.95	9884.55	1682.95	9885.59	1682.9	9892.12	1682.44
9892.46	1682.4	9928.77	1682.05	9929.75	1682.04	9929.97	1682.03	9941.46	1681.28
9944.9	1680.9	9955.78	1680.18	9980.17	1679.69	9989.32	1680.46	10003.63	1680.74
10004.64	1680.7	10011.8	1680.22	10022.14	1681.61	10038.51	1683.36	10053.4	1683.49
10059.79	1683.61	0103.52	1683.99	10105.17	1683.98	10107.82	1683.51	0123.59	1679.81
10132.72	1680.61	0139.55	1681.06	10149.23	1680.78	10161.04	1680.47	10169.43	1680.14
10179.27	1679.7	10179.5	1679.71	0194.39	1680.62	10198.6	1680.96	10203.21	1680.9
10236.99	1680.71	0250.48	1680.81	0260.03	1681.18	10263.63	1681.35	10275.86	1681.21
10294.34	1682.51	0295.24	1682.57	10296.02	1682.62	10297.17	1682.63	10297.71	1682.64
10311.59	1682.71	0325.74	1683.48	10338.84	1684.03	10351.91	1684.46	10387.5	1685.44
10397.97	1686								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7923.93	.068	9929.97	.045	10038.51	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9929.97	10038.51	275	300.41	290	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7923.93	9814.63	1684.65

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1683.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1683.67	Reach Len. (ft)	275.00	300.41	290.00
Crit W.S. (ft)	1682.62	Flow Area (sq ft)	71.68	307.62	552.22
E.G. Slope (ft/ft)	0.007307	Area (sq ft)	71.68	307.62	552.22
Q Total (cfs)	3732.00	Flow (cfs)	137.68	1735.59	1858.73
Top Width (ft)	429.46	Top Width (ft)	68.71	108.54	252.21
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	1.92	5.64	3.37
Max Chl Dpth (ft)	3.98	Hydr. Depth (ft)	1.04	2.83	2.19
Conv. Total (cfs)	43659.0	Conv. (cfs)	1610.6	20303.9	21744.4
Length Wtd. (ft)	296.21	Wetted Per. (ft)	68.74	108.85	252.86
Min Ch El (ft)	1679.69	Shear (lb/sq ft)	0.48	1.29	1.00
Alpha	1.28	Stream Power (lb/ft s)	0.91	7.27	3.35
Frctn Loss (ft)	2.09	Cum Volume (acre-ft)	727.24	50.46	77.85
C & E Loss (ft)	0.03	Cum SA (acres)	574.00	22.76	73.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9428.46	9929.97	137.68	71.68	68.74	3.69	1.04	1.92
LB 9929.97	RB 10038.51	1735.59	307.62	108.85	46.51	2.83	5.64
10038.51	10397.97	1858.73	552.22	252.86	49.81	2.19	3.37

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.518

INPUT
Description: RM.4.518. AREA BLOCKED OUT TO LT OF STA. 9849.9 DUE TO RIDGE.

Station Elevation Data num= 172

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7858.44	1682.4	7875.51	1682.05	7893.45	1682.55	7898.24	1682.13	7900.03	1682.09
7901.6	1682	7907.08	1682.38	7907.23	1682.38	7909.91	1682.43	7911.42	1682.5
7918.29	1682.3	7945.58	1682.3	7949.33	1682.28	7954.62	1682.27	7966.73	1682.29

7971.32	1682.3	8012.96	1682.42	8015.09	1682.07	8035.62	1682.08	8088.3	1681.84
8089.65	1681.8	8091.37	1681.83	8095.28	1681.82	8103.15	1681.8	8119.04	1681.83
8153.28	1681.9	8215.31	1682.89	8215.64	1682.89	8215.81	1682.89	8216.06	1682.89
8274.73	1682.3	8287.52	1681.99	8291.98	1681.91	8304.85	1681.49	8322.25	1680.86
8360.21	1682	8372.12	1682.39	8377.87	1682.4	8388.86	1681.97	8406.36	1681.6
8447.34	1681.2	8465.27	1681.07	8490.5	1681.1	8507.46	1681.08	8508.64	1681.09
8540.61	1681.2	8575.54	1681.35	8628.96	1682.36	8635.15	1682.39	8640.67	1682.57
8667.21	1681.5	8683.6	1680.54	8690.59	1680.66	8699.54	1680.8	8705.15	1680.89
8722.62	1680.8	8723.24	1680.81	8747.23	1679.4	8782.16	1680.24	8800.96	1681
8802.56	1681.4	8815.18	1681.33	8920.79	1680.58	8976.21	1680.62	9038.37	1680.66
9080.02	1681	9089.93	1681.08	9150.75	1681.08	9154.6	1681.07	9157.56	1681.06
9159.01	1681.1	9166.33	1681	9245.87	1680.82	9252.91	1680.44	9273.53	1680.39
9356.44	1680.4	9372.13	1680.59	9374.35	1680.38	9378.99	1680.58	9445.8	1679.34
9454.33	1679.2	9460.22	1679.24	9477	1679.49	9481.25	1679.53	9485.24	1679.66
9508.69	1680.6	9546.55	1680.93	9597.4	1681.41	9615.96	1681.71	9626.23	1681.84
9730.41	1682.7	9734.76	1682.77	9737.36	1682.8	9739.66	1682.82	9740.3	1682.83
9743.85	1682.8	9745.9	1682.85	9749.95	1682.85	9766.31	1682.85	9836.83	1682.89
9844.88	1682.9	9849.9	1682.93	9854.11	1682.86	9861.3	1682.7	9870.34	1682.51
9895.22	1681.8	9901.77	1681.58	9909.64	1681.1	9924.21	1680.31	9930.51	1679.92
9942.25	1679.4	9960.98	1677.95	9973.63	1679.13	9974.99	1679.26	9976.43	1679.25
9981.76	1679.3	9986.79	1679.21	9992.36	1677.7	9996.21	1676.47	9998.9	1675.71
10005.98	1676.4	10012.73	1676.95	10017.17	1676.64	10025.01	1675.75	10025.37	1674.88
10034.07	1676.4	10038.11	1677.75	10041.5	1678.16	10045.02	1678.4	10050.35	1678.92
10051.19	1678.8	10054.37	1678.67	10056.76	1678.25	10063.45	1677.25	10072.1	1675.35
10073.21	1675.1	10091.6	1677.77	10098.79	1678.86	10104.72	1680.3	10111.42	1680.62
10136.11	1680.9	10148.25	1680.92	10157.83	1680.5	10166.07	1680.12	10174.13	1680.11
10190.21	1682.3	10191.29	1682.74	10194.46	1682.43	10196.43	1682.24	10197.04	1682.09
10201.22	1682.1	10219.41	1682.01	10221.15	1682.09	10227.64	1682.29	10240.27	1681.9
10242.54	1681.8	10253.12	1682.77	10253.19	1682.78	10253.23	1682.78	10262.69	1681.78
10264.87	1682.3	10267.11	1682.75	10281.9	1681.81	10290.25	1681.15	10302.03	1681.99
10317.1	1682.8	10328.54	1682.24	10341.52	1682.14	10349.64	1682.09	10360.19	1682.52
10380.36	1683.2	10388.39	1682.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7858.44	.068	9974.99	.045	10098.79	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9974.99	10098.79	370	394.81	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7858.44	9849.9	1682.93

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1681.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1681.21	Reach Len. (ft)	370.00	394.81	390.00
Crit W.S. (ft)		Flow Area (sq ft)	116.54	493.50	54.95
E.G. Slope (ft/ft)	0.006860	Area (sq ft)	116.54	493.50	54.95
Q Total (cfs)	3732.00	Flow (cfs)	304.09	3352.88	75.03
Top Width (ft)	275.96	Top Width (ft)	67.15	123.80	85.01
Vel Total (ft/s)	5.61	Avg. Vel. (ft/s)	2.61	6.79	1.37
Max Chl Dpth (ft)	6.33	Hydr. Depth (ft)	1.74	3.99	0.65
Conv. Total (cfs)	45059.7	Conv. (cfs)	3671.5	40482.3	905.9
Length Wtd. (ft)	392.05	Wetted Per. (ft)	67.32	126.04	85.29

Min Ch El (ft)	1674.88	Shear (lb/sq ft)	0.74	1.68	0.28
Alpha	1.34	Stream Power (lb/ft s)	1.93	11.39	0.38
Frctn Loss (ft)	3.23	Cum Volume (acre-ft)	726.64	47.70	75.83
C & E Loss (ft)	0.02	Cum SA (acres)	573.57	21.96	71.88

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9445.85	9974.99	304.09	116.54	67.32	8.15	1.74	2.61
LB 9974.99	RB 10098.79	3352.88	493.50	126.04	89.84	3.99	6.79
10098.79	10388.39	75.03	54.95	85.29	2.01	0.65	1.37

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.443

INPUT
Description: RM.4.443. AREA BLOCKED OUT TO LT. OF STA. 9918.63 DUE TO RIDGE.

Station Elevation Data num= 191

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7526.67	1680	7545.06	1679.91	7568.71	1679.82	7572.74	1679.82	7577.15	1679.83
7603.68	1680	7619.7	1679.72	7633.68	1679.57	7744.86	1679.23	7746.82	1679.23
7746.97	1679.2	7747.58	1679.21	7747.95	1679.21	7748.38	1679.21	7748.65	1679.21
7749.35	1679.2	7753.99	1679.21	7787.77	1679.2	7791.96	1678	7797.46	1675.19
7804.11	1678.3	7806.25	1679.47	7825.23	1679.28	7839.84	1679.15	7881.83	1679.05
7885.55	1678	7887.72	1676.97	7890.5	1678.15	7892.69	1678.82	7931.27	1679.01
7968.53	1679.3	7968.93	1679.31	7969.67	1679.3	7976.45	1678.94	7986.76	1678.87
8012.87	1678.5	8059.4	1677.76	8071.6	1677.74	8075.81	1677.7	8084.49	1677.66
8094.39	1677.6	8109.81	1677.47	8127.2	1677.54	8130.64	1677.63	8138.35	1677.93
8141.37	1677.9	8146.18	1677.83	8181.53	1676.95	8190.17	1676.84	8208.19	1677.67
8222.33	1678.3	8254.79	1677.92	8276.28	1677.7	8285.67	1677.58	8311.73	1677.38
8321.81	1677.5	8337.73	1677.73	8342.4	1677.73	8353.48	1677.95	8372.5	1678.26
8399.06	1677.6	8416.09	1677.1	8420.04	1676.97	8452	1676.73	8452.96	1676.73
8454.52	1676.7	8456.71	1676.8	8518.47	1677.26	8520.45	1677.17	8526.38	1676.92
8541.61	1676.3	8545.35	1676.32	8562.74	1676.87	8583.66	1677.89	8587.46	1677.91
8612.15	1677.9	8659.71	1677.65	8758.69	1677.31	8773.71	1677.26	8786.13	1677.25
8887.72	1677.1	8965.45	1677.21	8998.52	1677.27	8999.59	1677.05	9006.19	1676.42
9011.36	1676.4	9014.22	1676.72	9020.73	1677.34	9027.22	1677.15	9066.24	1676.55
9066.75	1676.5	9066.86	1676.54	9067	1676.54	9079.9	1676.43	9100.22	1676.6
9101.84	1676.6	9105.36	1676.66	9106.53	1676.65	9109.54	1676.68	9114.08	1676.62
9115.46	1676.6	9131.63	1676.12	9139.36	1676.41	9153.08	1677.21	9157.08	1676.75
9164.32	1676	9171.85	1676.78	9173.07	1676.92	9178.23	1676.91	9209.52	1676.94
9213.9	1676.9	9223.13	1677.02	9229.72	1677.01	9288.05	1677.93	9337.3	1678.58
9361.98	1677.6	9373.36	1677.11	9378.9	1677.31	9394.09	1677.91	9406.32	1678.29
9422.64	1678.1	9432.6	1678.03	9457.73	1677.9	9514.38	1678.21	9571.73	1678.66
9609.4	1678.6	9642.91	1678.53	9664.84	1678.46	9670.22	1678.6	9685.74	1679.3
9757.61	1679.1	9770.07	1679.11	9800.24	1678.84	9819.54	1678.76	9825.27	1678.81

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 9843.39  1678.6 9844.88 1678.62 9862.63 1678.65 9867.47  1678.6 9871.41  1678.6
 9882.14  1678.7 9894.57 1678.82 9918.63 1679.26 9950.13 1675.18 9952.59  1674.8
 9960.91  1675.6  9964.4 1675.78 9997.47 1675.2910003.22 1675.2410007.44 1674.25
10017.36  1672.110028.41 1673.4710044.95 1675.4410055.41 1676.2410141.09 1678.87
10158.77    167910174.95 1679.2810196.72 1678.9610203.25  1678.610224.22 1674.05
10226.21  1673.610235.26 1675.1910237.53 1675.5810241.09 1675.51 10280.4 1674.78
10283.74  1674.710291.73 1674.6710304.14 1675.5310307.07 1675.7910319.81  1676.5
 10329.1  1677.210337.65 1677.5810355.62 1677.6810356.35 1677.6710358.92  1677.7
10367.15  1678.310382.08 1679.2810386.46 1679.6210388.16 1679.61 10393.5  1679.6
10422.34  1679.610429.46 1679.2210438.66  1678.810440.84 1678.7710447.94 1679.16
10458.16  1679.610466.36 1679.7610499.02 1680.3710526.88 1680.5110544.74 1680.75
10564.34    1681

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 7526.67    .068  9964.4   .04510044.95    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9964.410044.95              380  401.96     390            .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 7526.67 9918.63 1679.26

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1678.61   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.57   Wt. n-Val.                0.068      0.045      0.068
  W.S. Elev (ft)            1678.03   Reach Len. (ft)          380.00     401.96     390.00
  Crit W.S. (ft)                      Flow Area (sq ft)         70.69     277.85     412.59
  E.G. Slope (ft/ft)       0.010070   Area (sq ft)              70.69     277.85     412.59
  Q Total (cfs)             3732.00   Flow (cfs)               240.60    2092.34    1399.07
  Top Width (ft)             343.41   Top Width (ft)            36.31      80.55     226.55
  Vel Total (ft/s)             4.90   Avg. Vel. (ft/s)           3.40       7.53       3.39
  Max Chl Dpth (ft)            5.93   Hydr. Depth (ft)           1.95       3.45       1.82
  Conv. Total (cfs)         37189.5   Conv. (cfs)              2397.6    20850.2    13941.7
  Length Wtd. (ft)           394.85   Wetted Per. (ft)          36.56      81.10     227.37
  Min Ch El (ft)            1672.10   Shear (lb/sq ft)           1.22       2.15       1.14
  Alpha                        1.53   Stream Power (lb/ft s)     4.14      16.22       3.87
  Frctn Loss (ft)              3.66   Cum Volume (acre-ft)     725.85      44.20      73.74
  C & E Loss (ft)              0.00   Cum SA (acres)           573.13      21.04      70.48

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta       Flow       Area       W.P.     % Conv.   Hydr D.   Velocity
  (ft)         (ft)            (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  9354.97      9964.40        240.60      70.69     36.56       6.45      1.95       3.40
  LB 9964.40   RB 10044.95   2092.34     277.85     81.10      56.06      3.45       7.53
  10044.95     10564.34      1399.07     412.59    227.37      37.49      1.82       3.39

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.367**

INPUT
Description: RM.4.367. AREA BLOCKED OUT TO LT. OF STA. 9551.85 DUE TO RIDGE.

Station Elevation Data num= 195

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7222.98	1676	7240.22	1676	7264.11	1675.81	7274.4	1675.74	7276.63	1675.73
7291.99	1675.8	7340.6	1675.66	7387.23	1675.43	7433.77	1675.3	7441.29	1674.88
7442.63	1674.9	7443.13	1674.94	7450.4	1674.99	7454.44	1675.11	7496.11	1675.97
7502.18	1676	7577.58	1676.13	7580.59	1676.14	7588.15	1676.14	7589.52	1676.12
7604.22	1676.1	7701.39	1675.57	7811.64	1674.01	7814.64	1673.98	7815.92	1674
7816.36	1674	7824	1674.25	7828.7	1672.46	7831.59	1671.49	7842.06	1673.93
7845.87	1674.8	7850.77	1674.77	7852.33	1674.76	7918.48	1673.95	7922.02	1673.98
7934.44	1673.9	7937.73	1673.89	7944.65	1673.73	7964.02	1673.71	7972.4	1673.79
7973.17	1673.8	8026.98	1673.14	8034.06	1673.17	8035.17	1673.14	8040.43	1673.05
8040.8	1673	8041.26	1673.03	8042.37	1673	8109.51	1671.39	8115.51	1671.46
8156.54	1671.7	8171.99	1672.18	8225.95	1672.83	8228.48	1672.88	8229.62	1672.92
8247.78	1673.1	8252.21	1673.15	8260.07	1673.53	8261.68	1673.52	8267.63	1673.4
8292.66	1673.4	8324.74	1673.64	8361.56	1673.55	8380.88	1673.58	8456.49	1673.18
8480.27	1673	8486.09	1672.92	8491.39	1672.89	8499.02	1672.79	8517.81	1672.76
8558.79	1672.5	8575.57	1672.51	8583.57	1672.55	8590.06	1672.46	8595.51	1672.39
8613.16	1672.1	8628.57	1672	8630.35	1671.98	8633.59	1671.97	8640.39	1672.12
8644.87	1672.2	8655.57	1672.37	8658.01	1672.37	8660.29	1672.34	8666.64	1672.28
8667.7	1672.3	8669.98	1672.23	8681.23	1672.16	8696.74	1671.9	8702.12	1671.98
8713.08	1672.1	8732.95	1672.68	8733.3	1672.66	8742.15	1671.82	8750.56	1673.07
8750.81	1673.1	8751.38	1673.11	8753.07	1673.11	8846.43	1672.9	8855.89	1673.13
8857.82	1673.2	8867.55	1672.66	8871.32	1672.47	8888.7	1673.16	8889.87	1673.19
8893.54	1673.2	8899.29	1673.14	8939.82	1672.87	8943.3	1672.08	8964.31	1673.07
8979.79	1673.1	8994.85	1673.21	9000.34	1672.86	9008.41	1672.43	9018.75	1673.06
9021.54	1673.2	9023.81	1673.27	9060.37	1673.71	9093.93	1673.7	9125.17	1673.66
9138.8	1673.6	9159.57	1673.36	9161.7	1673.34	9164.79	1673.36	9205.35	1673.62
9241.57	1673.9	9265.12	1674.1	9286.86	1673.46	9288.38	1673.41	9289.91	1673.44
9321.41	1674.2	9327.8	1674.13	9352.49	1674.02	9426.69	1673.85	9431.69	1673.83
9432.92	1673.8	9445.25	1674.78	9447.58	1674.92	9477.62	1674.55	9488.87	1674.46
9507.62	1674.7	9517.99	1674.83	9537.36	1674.89	9551.85	1674.92	9578.38	1674.73
9626.61	1674.7	9645.81	1674.69	9690.78	1674.1	9693.2	1674.1	9706.61	1674.14
9721.24	1673.7	9735.17	1673.13	9736.31	1673.15	9741.44	1673.12	9754.18	1673.16
9786.45	1673.3	9825.29	1673.5	9827.18	1673.55	9844.28	1673.45	9869.58	1673.53
9893.45	1673.2	9901.85	1673.01	9916.31	1672.25	9921.77	1672.06	9928.56	1672.05
9961.3	1671.7	9969.05	1669.86	9981.82	1667.22	10003.8	1672.26	10004.3	1672.4
10006.33	1672.4	10079.89	1673.07	10092.16	1673.23	10093.19	1673.04	10099.96	1673.04
10131.86	1673.2	10137.88	1671.64	10143.22	1670.05	10149.63	1671.42	10153.91	1672.03
10171.82	1671.9	10176.93	1672.01	10185.27	1672.02	10193.86	1672.02	10204.76	1672.24
10213.41	1672.4	10214.25	1672.44	10217.94	1672.6	10236.4	1673.28	10240.68	1673.56
10262.37	167	10275.61	1675.65	10281.06	1675.88	10292.26	1676.03	10311.16	1676.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7222.98	.068	9961.3	.045	10004.3	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9961.3	10004.3	280	294.8	290	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7222.98	9551.87	1674.92

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1674.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1674.36	Reach Len. (ft)	280.00	294.80	290.00
Crit W.S. (ft)	1674.28	Flow Area (sq ft)	329.39	204.59	433.13
E.G. Slope (ft/ft)	0.008570	Area (sq ft)	329.39	204.59	433.13
Q Total (cfs)	3732.00	Flow (cfs)	724.83	1740.29	1266.88
Top Width (ft)	581.69	Top Width (ft)	290.27	43.00	248.42
Vel Total (ft/s)	3.86	Avg. Vel. (ft/s)	2.20	8.51	2.92
Max Chl Dpth (ft)	7.14	Hydr. Depth (ft)	1.13	4.76	1.74
Conv. Total (cfs)	40314.3	Conv. (cfs)	7829.9	18799.1	13685.3
Length Wtd. (ft)	290.97	Wetted Per. (ft)	290.33	44.08	249.12
Min Ch El (ft)	1667.22	Shear (lb/sq ft)	0.61	2.48	0.93
Alpha	2.52	Stream Power (lb/ft s)	1.34	21.12	2.72
Frctn Loss (ft)	3.05	Cum Volume (acre-ft)	724.10	41.97	69.95
C & E Loss (ft)	0.02	Cum SA (acres)	571.70	20.47	68.36

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9276.72	9961.30	724.83	329.39	290.33	19.42	1.13	2.20
LB 9961.30	RB 10004.30	1740.29	204.59	44.08	46.63	4.76	8.51
10004.30	10311.16	1266.88	433.13	249.12	33.95	1.74	2.92

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.311

INPUT
Description: RM. 4.311. HYDRAULIC BASELINE CROSSES NEAR 112TH STR. AREA BLOCKED OUT TO LEFT OF STA. 9365.82 AND TO RIGHT OF STA. 10230 DUE TO RIDGES.

Station Elevation Data num= 232

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7118.23	1672	7150.91	1671.91	7182.25	1671.46	7191.26	1671.42	7195.81	1670.57
7199.34	1670	7200.25	1669.87	7206.14	1669.81	7210.43	1669.7	7220.54	1669.63
7230.71	1669.6	7237.19	1669.58	7243.62	1669.45	7245.81	1669.39	7248.07	1669.62
7259.42	1670.8	7262.1	1671.14	7291.58	1671.17	7357.92	1671.15	7384.06	1671.12
7428.69	1670.9	7439.37	1671.62	7457.81	1671.74	7460.38	1671.76	7460.53	1671.76
7467.92	1671.7	7488.05	1671.87	7494.52	1671.83	7500.63	1671.84	7518.16	1671.83
7617.21	1671.7	7683.48	1671.56	7714.93	1671.32	7733.78	1671.38	7808.95	1671.02
7850.35	1670.8	7878.05	1670.64	7920.91	1670.51	7931.1	1670.41	7948.08	1670.22
7956.13	1669.8	7960.76	1669.49	7976.13	1668.58	7983.82	1667.87	7988.37	1668.22
8003.74	1669.8	8005.47	1669.81	8005.67	1669.81	8006.33	1669.77	8006.49	1669.75
8021.59	1669.3	8048.43	1669.23	8081.92	1668.72	8083.92	1669.13	8116.44	1669.52

8126.8	1669.7	8134.39	1669.68	8200.08	1669.9	8267.2	1670.27	8298.12	1670.45
8316.65	1670.6	8390.54	1670.1	8433.2	1669.89	8461.75	1669.82	8510.02	1669.87
8515.06	1669.7	8524.06	1669.68	8526.52	1669.66	8533.24	1669.19	8536.24	1668.9
8540.52	1668.3	8549.14	1668.94	8554.1	1669.66	8571.11	1669.73	8588.27	1669.67
8589.46	1669.5	8599.39	1668.71	8599.67	1668.71	8601.54	1668.6	8611.29	1669.07
8611.74	1669.1	8612.1	1669.11	8616.02	1669.13	8648.77	1669.35	8657.75	1669.44
8660.28	1669.5	8666.38	1669.5	8676.35	1669.5	8682.67	1669.52	8705.42	1669.58
8707.32	1669.3	8713.56	1668.5	8715.62	1668.85	8721.63	1669.69	8731.05	1669.71
8738.45	1669.8	8746.72	1669.79	8758.52	1669.84	8760.08	1669.84	8792.35	1670.18
8795.25	1670.2	8819.78	1669.63	8821.49	1669.62	8833.71	1670.25	8835.85	1670.35
8840.95	1670.1	8844.56	1669.91	8852.68	1669.99	8860.91	1670.11	8868.86	1670.16
8869.59	1670.2	8871.08	1670.2	8880.85	1670.27	8902.93	1670.53	8934.59	1670.86
8939.68	1670.9	8952.3	1670.98	8969.55	1670.92	8983.69	1670.6	9001.33	1670.41
9007.29	1669.8	9011.4	1669.48	9018.06	1670.4	9024.58	1671.57	9032.85	1671.63
9045.06	1671.5	9074.16	1670.68	9103.36	1670.63	9132.67	1670.51	9169.29	1671.02
9176.19	1671	9183.93	1670.97	9187.4	1670.93	9199.18	1671.03	9236.64	1671.8
9244.69	1671.9	9246.37	1671.97	9248.97	1672	9249.25	1672	9262.96	1672.1
9365.82	1672.7	9449.83	1672.39	9450.76	1672.38	9451.2	1672.39	9451.37	1672.38
9522.37	1671.1	9533.27	1670.8	9536.47	1670.92	9539.68	1671.08	9547.08	1671.38
9563.88	1671.4	9587.16	1671	9615.37	1670.68	9620.61	1670.76	9630.03	1670.91
9647.92	1671.2	9657.32	1671.29	9699.72	1671.75	9705.04	1671.82	9707.72	1671.8
9752.39	1670.9	9798.88	1670.31	9819.47	1669.79	9871.93	1669.49	9881.28	1669.11
9886.65	1669	9917.67	1669.18	9935.43	1668.96	9959.76	1668.11	9962.55	1668.05
9965.05	1667.9	9989.41	1667.54	9994.89	1667.69	10007.36	1667.86	10030.1	1668.12
10035.78	1668.2	10040.26	1668.4	10061.18	1669.41	10082.13	1670.16	10086.51	1670.73
10090.99	1671.2	10091.3	1671.17	10093.86	1671.29	10105.85	1671.49	10110.6	1671.54
10121.45	167	10140.94	1672.35	10146.27	1672.34	10149.1	1672.35	10175.24	1672.59
10180.23	1672.6	10184.42	1672.68	10188.5	1672.72	10206.84	1672.82	10219.26	1672.87
10222.08	1672.9	10222.73	1672.85	10229.18	1672.92	10235.64	1672.92	10237.88	1672.9
10252.16	1672.8	10266.28	1672.66	10279.99	1672.31	10301.85	1671.79	10319.1	1671.7
10329.8	1669.4	10337.11	1667.87	10350.45	1670.11	10354.45	1670.84	10357.99	1670.42
10363.59	1669.8	10381.22	1668.01	10385.35	1667.6	10393.38	1668.48	10404.35	1669.66
10414.53	1670.1	10431.25	1670.72	10437.67	1670.93	10447.62	1671.81	10453.62	1672
10459.02	1672.2	10474.84	1673.38	10484.03	1673.9	10491.75	1674.33	10507.36	1674.95
10508.96	1675.1	10515.19	1675.17	10516.99	1675.23	10530.24	1675.35	10533.99	1675.48
10548.66	1675.6	10565.27	1683.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7118.23	.068	9935.43	.045	10061.18	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9935.43	10061.18	320	379.86	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7118.23	9365.82	1672.71	10229.18	10565.27	1672.92

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1671.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1671.12	Reach Len. (ft)	320.00	379.86	380.00
Crit W.S. (ft)		Flow Area (sq ft)	270.43	370.20	31.71
E.G. Slope (ft/ft)	0.013138	Area (sq ft)	270.43	370.20	31.71
Q Total (cfs)	3732.00	Flow (cfs)	770.76	2877.22	84.03
Top Width (ft)	431.51	Top Width (ft)	276.69	125.75	29.07

Vel Total (ft/s)	5.55	Avg. Vel. (ft/s)	2.85	7.77	2.6
Max Chl Dpth (ft)	3.58	Hydr. Depth (ft)	0.98	2.94	1.09
Conv. Total (cfs)	32559.6	Conv. (cfs)	6724.4	25102.1	733.1
Length Wtd. (ft)	363.83	Wetted Per. (ft)	276.74	125.81	29.14
Min Ch El (ft)	1667.54	Shear (lb/sq ft)	0.80	2.41	0.89
Alpha	1.57	Stream Power (lb/ft s)	2.28	18.76	2.37
Frctn Loss (ft)	3.44	Cum Volume (acre-ft)	722.18	40.03	68.41
C & E Loss (ft)	0.15	Cum SA (acres)	569.88	19.90	67.43

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 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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9231.13	9935.43	770.76	270.43	276.74	20.65	0.98	2.85
LB 9935.43	RB 10061.18	2877.22	370.20	125.81	77.10	2.94	7.77
10061.18	10565.27	84.03	31.71	29.14	2.25	1.09	2.65

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 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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.239**

INPUT
Description: RM. 4.239. AREA BLOCKED OUT TO LEFT OF STA. 9258.77 DUE TO RIDGE.

Station Elevation Data num= 165

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7075.61	1668	7119.41	1667.82	7177.14	1667.45	7189.35	1667.15	7210.08	1667.45
7221.45	1667.5	7224.37	1667.41	7237.86	1667.17	7315.02	1667.95	7356.3	1668.24
7377.59	1668.4	7387.38	1668.44	7431.74	1668.19	7444.43	1668.03	7474.75	1667.76
7537.56	1667.1	7566.64	1667.14	7593.2	1667.03	7604.41	1666.99	7616.17	1666.97
7680.56	1666.9	7682.13	1666.95	7711.65	1666.91	7753.22	1666.65	7830.1	1665.88
7867.17	1665.8	7873.44	1665.74	7879.45	1664.09	7882.83	1663.13	7885.6	1663.87
7891.87	1665.2	7895.1	1665.92	7910.8	1665.68	7916.32	1665.53	7929.81	1664.82
7934.74	1664.7	7945.75	1665.54	7954.61	1665.64	7973.63	1665.83	7986.08	1665.9
8066.99	1665.8	8126.39	1665.44	8162.51	1665.35	8185.44	1665.32	8288.1	1665.83
8303.89	1665.9	8312.97	1665.9	8422.34	1665.1	8499.56	1665.32	8524	1665.52
8540.79	1665.6	8597.23	1665.85	8652.46	1666.39	8667.79	1666.44	8668.83	1666.44
8705.75	1666.4	8777.68	1666.42	8810.33	1666.82	8826.07	1666.91	8829.82	1666.99
8842.87	1667.3	8846.6	1667.24	8857.2	1666.91	8880.23	1666.26	8885.34	1666.12
8904.41	1666.2	8928.74	1666.52	8931.29	1666.45	8934.94	1666.22	8939.31	1666.8
8942.88	1667.5	8944.35	1667.7	8945.7	1667.78	8946.82	1667.71	8947.55	1667.63
8956.94	1667.4	8959.97	1667.49	8970.99	1667.58	8977.32	1667.61	8985.31	1667.75
9023.01	1667.9	9024.64	1668.29	9035.64	1668.57	9050.43	1668.85	9070.29	1668.53
9102.4	1667.8	9109.99	1667.93	9118.32	1668.1	9147.36	1668.16	9165.72	1668.27
9172.28	1668.3	9175.79	1668.33	9189.78	1668.06	9213.21	1667.83	9213.83	1668.14

9215.02	1668	9215.66	1667.84	9247.77	1667.84	9250.97	1667.89	9256.36	1668.23
9257.79	1668.2	9258.47	1669.77	9263.49	1669.49	9270.01	1668.77	9271.75	1668.37
9274.21	1667.8	9277.14	1667.91	9280.65	1667.95	9369.93	1667.55	9432.48	1667.58
9488.37	1667.5	9546.29	1667.27	9573.59	1667.94	9576.31	1667.95	9580.91	1667.91
9611.83	1667.2	9625.17	1667.33	9636.6	1667.33	9663.75	1667.26	9743.58	1665.57
9744.87	1665.6	9746.8	1665.52	9758.68	1666.75	9766.66	1667.55	9767.99	1667.64
9770.01	1667.6	9772.43	1667.64	9786.03	1667.43	9814.78	1667.24	9823.53	1667.06
9840.46	1666.7	9844.15	1666.64	9849.21	1666.61	9850.12	1666.6	9871.06	1666.38
9882.61	1666.1	9897.87	1664.77	9907.13	1664.65	9923.83	1665.25	9954.67	1666.06
9980.06	1665.9	9986.91	1665.88	9988.64	1665.88	9990.94	1665.54	10009.96	1662.74
10020.47	1664.2	10031.52	1665.96	10042.69	1665.91	10062.27	1665.28	10077.9	1664.95
10096.65	1665.3	10114.99	1665.67	10131.91	1664.54	10137.15	1664.23	10140.52	1664.53
10144.03	166	10156.54	1666.45	10163.57	1666.71	10200.04	1667.29	10205.1	1667.32
10320.69	167	10321.62	1669.96	10323.86	1669.98	10324.68	1669.99	10329.3	1670.07

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7075.61	.068	9954.67	.045	10031.52	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9954.67	10031.52	230	363.96	440	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7075.61	9258.47	1669.77

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1668.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1668.04	Reach Len. (ft)	230.00	363.96	440.00
Crit W.S. (ft)		Flow Area (sq ft)	673.83	230.82	402.88
E.G. Slope (ft/ft)	0.007117	Area (sq ft)	673.83	230.82	402.88
Q Total (cfs)	3732.00	Flow (cfs)	1232.57	1333.11	1166.32
Top Width (ft)	962.84	Top Width (ft)	681.48	76.85	204.51
Vel Total (ft/s)	2.85	Avg. Vel. (ft/s)	1.83	5.78	2.89
Max Chl Dpth (ft)	5.30	Hydr. Depth (ft)	0.99	3.00	1.97
Conv. Total (cfs)	44236.5	Conv. (cfs)	14610.0	15801.7	13824.8
Length Wtd. (ft)	323.61	Wetted Per. (ft)	681.75	77.32	204.73
Min Ch El (ft)	1662.74	Shear (lb/sq ft)	0.44	1.33	0.87
Alpha	1.92	Stream Power (lb/ft s)	0.80	7.66	2.53
Frctn Loss (ft)	2.30	Cum Volume (acre-ft)	718.71	37.41	66.51
C & E Loss (ft)	0.02	Cum SA (acres)	566.36	19.01	66.42

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9234.91	9954.67	1232.57	673.83	681.75	33.03	0.99	1.83
LB 9954.67	RB 10031.52	1333.11	230.82	77.32	35.72	3.00	5.78
10031.52	10329.30	1166.32	402.88	204.73	31.25	1.97	2.89

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.171**

INPUT
Description: RM. 4.171 AREA BLOCKED OUT TO LEFT OF STA.9095.98 DUE TO CONTAINMENT BY RIDGE. AND ALSO BETWEEN STA 10187.48 AND 10480.19 DUE TO CONTAINMT. BY RIDGE.

Station Elevation Data num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7230.69	1663.4	7231.21	1663.3	7233.09	1663.1	7235.4	1662.86	7258.65	1664.47
7262.05	1664.7	7270.15	1664.86	7309.93	1665.57	7330.14	1665.76	7363.27	1665.92
7447.86	1666.2	7499.45	1666	7549.7	1665.73	7561.99	1665.86	7577.77	1665.59
7591.74	1665.3	7610.41	1665.06	7632.71	1664.65	7680.26	1664.43	7682.94	1664.4
7684.23	1664.4	7688.96	1664.37	7801.03	1664.26	7878.48	1664.22	7903.97	1664.87
7909.32	1664.9	7918.34	1662.15	7920.27	1661.86	7924.3	1662.72	7936.25	1664.79
7936.38	1664.8	7937.3	1664.81	7977.71	1664.53	7998.2	1664.39	8036.48	1664.05
8067.99	1663.7	8154.2	1663.09	8202.07	1663.46	8219.59	1663.93	8249.15	1663.78
8263.3	1663.7	8271.92	1663.7	8339.01	1663.97	8389.64	1663.65	8411.63	1663.71
8447.02	1663.9	8507.36	1664.16	8606.31	1663.68	8625.09	1663.56	8628.07	1663.58
8628.89	1663.6	8630.32	1663.57	8642.61	1663.64	8672.89	1663.76	8685.66	1663.94
8686.75	1664	8691.19	1664.03	8708.67	1664.26	8714.87	1664.61	8723.91	1665.08
8740.32	1665.2	8759.38	1665.45	8786.64	1664.88	8796.77	1664.65	8809.27	1664.64
8830.29	1664.6	8850.26	1664.59	8855.02	1664.63	8855.56	1664.42	8860.54	1663.14
8869.2	1664.3	8873.39	1664.77	8895.34	1664.58	8945.23	1664.28	8954.7	1665
8960.76	1665.5	8971.08	1665.27	8979.44	1665.17	8980.6	1665.43	8991.42	1665.32
8991.48	1665.3	8991.79	1665.32	9025.37	1665.66	9049.92	1666.06	9095.98	1666.34
9205.08	1665.6	9208.26	1665.53	9213.7	1665.5	9227.83	1665.51	9331.42	1665.44
9365.48	1665.4	9384.66	1665.42	9417.04	1665.2	9417.17	1665.2	9459.46	1665.17
9462.16	1665.2	9465.83	1665.16	9484.99	1665.03	9566.87	1665.23	9584.11	1665.27
9646.09	1665.5	9684.59	1665.47	9711.86	1666.13	9719.68	1666.33	9724.38	1666.32
9780.37	1663.6	9798.24	1662.94	9801.53	1662.67	9801.91	1662.64	9805.56	1662.68
9817.2	1662.8	9818.59	1662.8	9826.97	1662.58	9842.88	1662.66	9872.4	1663
9897.74	1663.1	9966.5	1663.04	9969.64	1663.04	9991.53	1660.49	9997.3	1659.67
9998.69	1659.9	10017.15	1661.76	10038.55	1663.89	10062.83	1664.26	10078.73	1664.55
10107.97	1665	10117.15	1665.26	10123.68	1665.4	10128.13	1665.52	10148.43	1666.34
10163.68	1666.7	10183.2	1667.04	10187.48	1667.06	10221.7	1666.71	10224.49	1666.67
10277.57	1666.2	10295.65	1666.07	10304.54	1665.33	10313.37	1664.59	10336.94	1665.78
10340.66	1665.9	10393.34	1666.41	10424.52	1666.78	10435.88	1666.69	10480.19	1666.04

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7230.69	.068	9969.64	.045	10038.55	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9969.64	10038.55	350	364.78	370	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7230.69	9095.98	1666.34	10187.48	10480.19	1667.06

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1665.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1665.55	Reach Len. (ft)	350.00	364.78	370.00
Crit W.S. (ft)		Flow Area (sq ft)	629.35	267.60	82.02
E.G. Slope (ft/ft)	0.007077	Area (sq ft)	629.35	267.60	82.02

Q Total (cfs)	3732.00	Flow (cfs)	1761.49	1829.03	141.48
Top Width (ft)	868.66	Top Width (ft)	709.53	68.91	90.22
Vel Total (ft/s)	3.81	Avg. Vel. (ft/s)	2.80	6.83	1.72
Max Chl Dpth (ft)	5.88	Hydr. Depth (ft)	0.89	3.88	0.91
Conv. Total (cfs)	44362.8	Conv. (cfs)	20939.0	21741.9	1681.8
Length Wtd. (ft)	358.46	Wetted Per. (ft)	709.61	69.33	90.24
Min Ch El (ft)	1659.67	Shear (lb/sq ft)	0.39	1.71	0.40
Alpha	1.84	Stream Power (lb/ft s)	1.10	11.66	0.69
Frctn Loss (ft)	3.00	Cum Volume (acre-ft)	715.27	35.33	64.06
C & E Loss (ft)	0.01	Cum SA (acres)	562.69	18.40	64.93

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8600.17	9284.90	1.51	3.91	77.37	0.04	0.05	0.39
9284.90	9969.64	1759.97	625.44	632.24	47.16	0.99	2.81
LB 9969.64	RB 10038.55	1829.03	267.60	69.33	49.01	3.88	6.83
10038.55	10480.19	141.48	82.02	90.24	3.79	0.91	1.72

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.101

INPUT
Description: RM.4.101 AREA BLOCKED OUT TO LT. OF STA.9207.63 AND TO RT. OF STA. 10207.91 DUE TO RIDGE.

Station Elevation Data num= 197

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7362.74	1665.2	7391.29	1664.77	7425.1	1664.4	7431.92	1664.35	7441.38	1664.32
7451.45	1664.2	7467.65	1664.06	7521.78	1663.72	7541.24	1663.61	7576.1	1663.42
7578.82	1663.4	7580.64	1663.39	7584.98	1663.35	7602.25	1663.21	7625.04	1663.01
7626.66	1662.7	7629.62	1661.81	7635.05	1661.83	7641.41	1661.86	7654.04	1661.91
7670.7	1662	7675.45	1662.23	7690.41	1662.96	7700.72	1661.91	7719.18	1660.22
7723.11	1660.6	7726.05	1660.87	7736.84	1662	7746.98	1662.99	7773.26	1662.84
7785.13	1662.8	7792.41	1662.77	7805.33	1662.61	7894.96	1662.12	8005.26	1662.04
8009.17	1662	8011.46	1662.06	8016.32	1662.16	8040.99	1662.66	8053.39	1660.26
8053.46	1660.2	8053.54	1660.26	8065.81	1662.63	8067.85	1662.62	8123.38	1661.93
8219.36	1661.3	8237.58	1661.16	8245.59	1661.22	8270.81	1661.04	8299.85	1660.93
8310.01	1661.1	8370.7	1661.99	8373.7	1660.92	8376.55	1660.05	8382.97	1660.87
8386.76	1661.3	8415.12	1661.48	8434.87	1661.58	8445.99	1661.63	8466	1661.71
8471.07	1661.7	8472.16	1661.72	8539.87	1661.28	8546.24	1661.29	8554.37	1661.35
8576.18	1661.5	8576.37	1661.51	8577.73	1661.51	8577.99	1661.5	8585.91	1660.99
8588.17	1660.8	8589.26	1660.89	8615.95	1662.47	8627.29	1662.38	8696.45	1662.04
8702.52	1661.9	8705.06	1661.88	8757.9	1661.09	8787.79	1661.28	8809.72	1661.32
8813.63	1661.2	8829.22	1661.01	8845.59	1661.01	8879.61	1660.83	8881.95	1660.84
8886.12	1661	8894.66	1661.21	8898.99	1661.32	8904.57	1661.36	8921.16	1661.58
8930.67	1661.7	8936.22	1661.33	8943.31	1661.02	8964.39	1661.29	9008.98	1662.34

9015.63	1661.9	9017.14	1661.78	9028.08	1662.14	9030.05	1662.21	9036.97	1661.99
9046.08	1662	9047.44	1661.98	9151.25	1662.58	9162.2	1662.5	9172.23	1662.82
9199.28	1663	9207.63	1663.13	9285.59	1662.77	9293.22	1662.78	9314.13	1662.45
9355.79	1661.7	9363.39	1661.73	9392.23	1661.84	9400.67	1661.86	9401.55	1661.86
9402.58	1661.9	9465.37	1662.27	9474.08	1662.3	9479.15	1662.33	9493.87	1662.43
9544.61	1662.3	9563.01	1662.37	9589.47	1662.38	9605.04	1662.47	9633.49	1662.41
9711.19	1662.1	9711.53	1662.11	9711.61	1662.11	9711.98	1662.11	9738.97	1662.02
9741.73	1661.6	9745.38	1660.84	9763	1660.75	9787	1660.71	9818.03	1660.59
9879.77	1660	9924.52	1659.6	9946.63	1659.67	9961.76	1659.75	9976.5	1659.97
9988.62	1658.3	10002.39	1656.34	10019.79	1660.34	10019.8	1660.34	10019.81	1660.34
10026.26	1659.7	10055.66	1660.44	10086.78	1660.8	10102.76	1661.36	10108.32	1661.56
10117.31	1661.6	10125.47	1661.71	10160.34	1662.54	10171.4	1662.7	10207.99	1663.01
10245.4	1662.2	10271.02	1662.27	10271.63	1662.26	10273.59	1662.21	10282.01	1660.64
10286.58	1659.8	10287.43	1659.85	10299.17	1660.64	10305.98	1660.47	10322.99	1661.14
10336.84	1661.9	10344.38	1661.99	10372.33	1662.24	10397.98	1662.36	10418.61	1662.57
10433.06	1662.6	10441.18	1662.61	10457	1662.65	10490.92	1662.49	10563.49	1661.51
10569.19	1661.4	10576.59	1661.33	10585.01	1661.28	10596.69	1661.18	10601.12	1661.28
10615.9	1660.6	10616.15	1660.64	10616.72	1660.66	10635.32	1661.83	10643.47	1661.91
10662.59	1662.2	10665.49	1662.31	10680.21	1662.58	10692.92	1662.77	10705.3	1663.04
10736.03	1663.2	10737.13	1663.24	10741.81	1663.31	10752.45	1663.41	10753.01	1663.45
10754.53	1663.5	10758.02	1663.55						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7362.74	.068	9976.5	.045	10019.79	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9976.5	10019.79	470	400.93	315	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7362.74	9207.63	1663.13	10207.99	10758.02	1663.01

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1662.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1662.42	Reach Len. (ft)	470.00	400.93	315.00
Crit W.S. (ft)	1662.00	Flow Area (sq ft)	617.20	181.21	192.33
E.G. Slope (ft/ft)	0.009962	Area (sq ft)	617.20	181.21	192.33
Q Total (cfs)	3732.00	Flow (cfs)	1668.26	1534.59	529.16
Top Width (ft)	807.11	Top Width (ft)	628.14	43.29	135.68
Vel Total (ft/s)	3.77	Avg. Vel. (ft/s)	2.70	8.47	2.75
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)	0.98	4.19	1.42
Conv. Total (cfs)	37391.4	Conv. (cfs)	16714.5	15375.2	5301.7
Length Wtd. (ft)	423.67	Wetted Per. (ft)	628.27	44.00	135.75
Min Ch El (ft)	1656.34	Shear (lb/sq ft)	0.61	2.56	0.88
Alpha	2.38	Stream Power (lb/ft s)	1.65	21.69	2.42
Frctn Loss (ft)	4.05	Cum Volume (acre-ft)	710.26	33.45	62.90
C & E Loss (ft)	0.07	Cum SA (acres)	557.32	17.93	63.97

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8669.62	9323.06	0.23	0.51	7.50	0.01	0.07	0.45
9323.06	9976.50	1668.03	616.70	620.77	44.70	0.99	2.70
LB 9976.50	RB 10019.79	1534.59	181.21	44.00	41.12	4.19	8.47
10019.79	10758.02	529.16	192.33	135.75	14.18	1.42	2.75

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.026

INPUT
Description: RM. 4.026. HORZ. N VALUES USED. AREA BLOCKED OUT TO LEFT OF STA.8752.37 AND TO RT. OF 10389.33 DUE TO RIDGE.

Station Elevation Data num= 266

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7068.44	1661.9	7081.6	1661.47	7088.09	1661.39	7099.17	1661.83	7123.5	1661.31
7139.3	1661.2	7158.22	1661.18	7174.23	1661.13	7184.9	1660.93	7198.81	1660.8
7204.09	1660.9	7217.93	1660.72	7229.3	1660.65	7256.75	1660.58	7261.92	1660.46
7290.96	1660.4	7291.79	1660.37	7294.84	1660.36	7301.12	1660.31	7311.85	1659.52
7320.01	1658.7	7320.54	1658.76	7328.52	1658.59	7333.33	1658.59	7343.04	1658.35
7345.14	1658.2	7349.53	1658.69	7350.89	1658.84	7353.65	1659.45	7357.06	1659.65
7372.01	1658.8	7374.34	1658.49	7395.73	1657.05	7397.49	1657.03	7397.9	1657.03
7410.38	1657.1	7417.47	1657.08	7426.06	1657.02	7436.22	1656.82	7438.19	1656.8
7446.97	1656.7	7451.42	1656.81	7452.47	1656.85	7454.15	1656.93	7469.66	1657.75
7479.03	1658.2	7482.62	1658.44	7488.26	1658.67	7492.57	1658.84	7494.47	1658.88
7504.78	1658.9	7575.68	1659.54	7598.31	1659.55	7615.69	1659.56	7618.33	1659.57
7622.43	1659.6	7626.73	1659.56	7695.08	1659.64	7714.48	1659.41	7743.37	1659.27
7765.39	1658.9	7778.41	1660.4	7801.55	1662.89	7808.31	1662.77	7837.14	1662.15
7850.6	1661.9	7886.72	1661.4	7930.84	1661.01	7937.56	1660.94	7945.93	1660.92
7957.29	1660.9	8021.68	1660.64	8039.9	1660.54	8062.19	1660.49	8093.85	1660.31
8107.26	1660.2	8132.94	1659.88	8138.09	1659.8	8143.38	1659.7	8161.11	1659.36
8169.33	1659.1	8185.42	1658.71	8186.26	1658.69	8189.49	1658.56	8190.67	1658.55
8204.15	1657.8	8208.31	1657.69	8211.08	1657.25	8219.72	1656.93	8228.09	1656.68
8233.36	1656.6	8236.79	1656.55	8245.15	1656.72	8262.62	1657.3	8270	1658.24
8293.08	1658.8	8296.13	1658.93	8298.34	1658.97	8325.15	1656.81	8327.98	1656.76
8332.62	1656.9	8368.38	1658.24	8372	1658.24	8375.28	1658.41	8376.3	1658.47
8377.23	1658.5	8378.18	1658.39	8379.54	1658.5	8385.21	1658.44	8389.13	1658.47
8391.75	1658.6	8405.28	1658.76	8435.94	1658.62	8471.08	1658.6	8481.04	1658.84
8505.91	1659.2	8527	1659.15	8550.4	1659.16	8600.46	1659.12	8604.37	1659.11
8604.9	1659.1	8611.12	1659.06	8618.39	1659	8619.42	1659	8688.38	1659
8721.21	1659	8752.37	1658.79	8763.16	1658.47	8805.23	1657.8	8843.95	1657.39
8853.35	1657.3	8855.31	1656.96	8864.99	1655.86	8869.45	1656.45	8874.07	1657.14
8884.22	1657.2	8892.9	1657.41	8923.51	1657.64	8941.66	1657.8	8951.65	1658
8997.23	1657.3	9000.92	1657.24	9002.35	1657.24	9007.13	1657.22	9011.75	1657.2
9011.9	1657.2	9013.57	1657.21	9015.79	1657.22	9048.52	1657.44	9059.01	1657.48
9061.81	1657.5	9072.06	1657.62	9075.61	1657.68	9079.83	1657.68	9080.54	1657.67
9081.46	1657.7	9082.65	1657.63	9094.26	1657.32	9094.63	1657.33	9095.02	1657.33
9135.32	1658	9135.75	1657.95	9187.66	1657.46	9202.55	1657.26	9203.08	1657.26
9204.45	1657.3	9214.54	1657.52	9219.24	1657.36	9301.3	1658.15	9316.95	1658.34

9329.78	1658.4	9345.01	1658.45	9365.24	1658.46	9379.77	1658.36	9436.68	1657.97
9518.9	1658.6	9543.58	1658.69	9572.42	1658.59	9592.69	1658.35	9622.89	1658
9626.85	1658	9657.48	1657.92	9661.8	1657.92	9690.81	1657.78	9720.91	1657.61
9722.13	1657.4	9727.7	1656.39	9738.76	1657.82	9738.82	1657.83	9738.93	1657.83
9739.08	1657.8	9780.91	1656.98	9782.49	1657.08	9797.8	1655.59	9801.77	1655.1
9806.78	1655.1	9820.39	1656.87	9824.31	1657.29	9865.88	1657.12	9885.41	1657.07
9906.46	1657.4	9908.89	1657.41	9921.17	1657.35	9924	1657.32	9928.45	1657.2
9941.91	1657.1	9943.91	1656.91	9944.86	1656.96	9948.5	1656.93	9950.42	1657.03
9953.3	1657.1	9960.94	1657.18	9970.51	1655	9979.51	1654.34	9979.95	1654.23
9980.06	1654.2	9980.4	1654.19	9997.05	1653.97	10001.81	1654.93	10016.93	1658.01
10048.86	1657.8	10051.33	1657.77	10052.87	1657.75	10054.68	1657.66	10055.71	1657.61
10062.08	1657.7	10151.7	1658.62	10153.28	1658.57	10170.32	1658.04	10184.36	1657.74
10187.57	1657.7	10202.36	1657.63	10241.5	1657.23	10257.6	1657.14	10267.31	1656.99
10274.88	1656.3	10279.51	1655.77	10288.67	1657.09	10292.18	1657.53	10300.02	1657.75
10320.21	1658.3	10325	1658.44	10340.86	1658.53	10360.77	1658.63	10373.3	1658.66
10375.7	1658.7	10389.33	1658.96	10485.11	1657.71	10490.66	1657.63	10499.5	1657.29
10505.49	1657.1	10505.95	1657.14	10528.01	1658.17	10531.41	1658.32	10535.75	1658.43
10609.26	1659	10616.7	1658.88	10627.72	1658.98	10647.11	1659.07	10694.08	1659.15
10720.28	1659.2	10722.71	1659.34	10724.39	1659.44	10733.24	1659.79	10735.43	1659.88
10736.17	1659.9								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
7068.44	.15	8270	.068	9960.94	.045	10016.93	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9960.94	10016.93	340	365.6	370	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7068.44	8752.37	1659	10389.33	10736.17	1658.96

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1658.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1658.53	Reach Len. (ft)	340.00	365.60	370.00
Crit W.S. (ft)		Flow Area (sq ft)	1006.04	186.64	240.08
E.G. Slope (ft/ft)	0.009140	Area (sq ft)	1006.04	186.64	240.08
Q Total (cfs)	3732.00	Flow (cfs)	1990.08	1303.98	437.95
Top Width (ft)	1501.09	Top Width (ft)	1132.40	55.99	312.71
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)	1.98	6.99	1.82
Max Chl Dpth (ft)	4.56	Hydr. Depth (ft)	0.89	3.33	0.77
Conv. Total (cfs)	39036.4	Conv. (cfs)	20816.0	13639.5	4580.9
Length Wtd. (ft)	353.25	Wetted Per. (ft)	1133.12	56.68	312.93
Min Ch El (ft)	1653.97	Shear (lb/sq ft)	0.51	1.88	0.44
Alpha	2.88	Stream Power (lb/ft s)	1.00	13.13	0.80
Frctn Loss (ft)	3.60	Cum Volume (acre-ft)	701.50	31.75	61.33
C & E Loss (ft)	0.02	Cum SA (acres)	547.82	17.48	62.35

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8514.69	9237.82	981.24	466.80	476.95	26.29	0.98	2.10
9237.82	9960.94	1008.84	539.23	656.16	27.03	0.82	1.87
LB 9960.94	RB 10016.93	1303.98	186.64	56.68	34.94	3.33	6.99
10016.93	10736.17	437.95	240.08	312.93	11.73	0.77	1.82

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.956

INPUT
Description: RM. 3.956. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 8679.01 AND TO RT. OF 10569.25 DUE TO RIDGE.

Station Elevation Data num= 245

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7493.42	1656.4	7504.43	1656.32	7509.71	1656.26	7526.4	1656.09	7548.6	1655.99
7568.56	1655.9	7575.56	1655.76	7581.54	1655.64	7592.25	1655.54	7598.62	1655.54
7629.82	1655.3	7651.88	1655.28	7653.28	1655.29	7654.2	1655.28	7665.94	1655.22
7686.14	1654.4	7705.61	1653.95	7714.07	1653.7	7729.29	1653.32	7739.01	1653.24
7752.15	1653.2	7768.01	1653.09	7771.6	1653.08	7773.76	1653.09	7776.42	1653.07
7780.23	1653	7783.19	1652.9	7790.75	1652.91	7807.06	1652.91	7811.43	1652.93
7822.46	1653	7836.24	1652.84	7836.98	1652.83	7838.32	1653.12	7847.93	1655.07
7853.85	1654.9	7862.33	1654.61	7888.82	1654.3	7920.16	1653.97	7951.23	1653.69
7956.12	1652.6	7968.32	1649.85	7979.65	1649.81	7985.56	1649.8	7999.27	1653.69
8004.41	1655.2	8023.45	1655.21	8030.56	1655.02	8064.03	1654.59	8066.49	1654.57
8069.28	1654.6	8089.89	1656.16	8094.93	1656.61	8101.49	1656.42	8123.66	1656.57
8149.85	1656.5	8160.78	1656.5	8184.95	1655.82	8201.57	1655.74	8224.63	1655.6
8235.45	1655.9	8246.5	1655.77	8275.89	1655.33	8279.92	1655.22	8297.29	1655.08
8303.08	1654.5	8306.64	1654.06	8317.18	1654.27	8333.95	1654.03	8361.7	1653.75
8365.22	1653.6	8371.53	1653.52	8397.97	1652.97	8419.49	1652.54	8425.83	1652.61
8431.95	1652.7	8445.55	1653	8462.25	1653.27	8469.5	1653.75	8472.9	1654.09
8484.1	1654.2	8485.6	1654.15	8537.8	1653.9	8538.9	1653.91	8540.92	1653.93
8545.17	1654	8597.86	1654.58	8616.34	1654.63	8626.95	1654.48	8641.04	1654.37
8655.02	1654.3	8670.28	1655.57	8679.01	1656.31	8688.96	1656.21	8747.17	1655.67
8760.26	1655.7	8762.69	1655.66	8765.8	1655.66	8787.55	1655.58	8826.3	1655.45
8830.77	1654.3	8836.99	1653.02	8844.51	1653.11	8847.75	1653.24	8859.68	1653.1
8898.85	1652.8	8911.66	1653.14	8923.61	1653.47	8930.14	1653.61	8933.62	1653.69
8936.32	1653.8	8939.6	1653.76	8950.99	1653.45	8969.85	1652.76	8974.27	1652.79
8981.84	1652.7	8985.45	1652.8	8999.96	1652.98	9002.95	1653.03	9003.7	1653.05
9045.59	1653.9	9053.02	1654.03	9059.81	1654.15	9065.91	1654.17	9076.78	1654.38
9086.49	1654.5	9099.82	1654.59	9101.32	1654.61	9104.5	1654.64	9108.51	1654.7
9119.58	1654.9	9131.31	1655.04	9132.68	1655.05	9141.68	1655.05	9158.54	1655.28
9174.98	1655.6	9192.27	1655.86	9206.28	1655.82	9218.28	1655.24	9267.03	1655.21
9331.41	1655.2	9388.72	1655.31	9444.54	1655.4	9497.12	1654.89	9497.75	1654.89
9498.65	1654.9	9515.86	1654.52	9523.68	1654.87	9533.61	1655.24	9545.74	1655.17
9557.67	1655.2	9602.57	1655.39	9664.08	1655.65	9683.41	1655.58	9685.95	1655.58
9688.94	1655.7	9697.24	1656.08	9723.76	1655.88	9763.18	1655.57	9783.93	1655.38
9816.42	1655.5	9866.39	1655.75	9877.97	1655.65	9887.44	1655.5	9909.16	1654.92
9925.33	1654.6	9930.08	1653.93	9932.66	1653.52	9938.22	1652.56	9944.59	1651.22

9955.97	1652	9961.1	1652.51	9967.72	1652.5	9981.96	1652.62	9994.75	1653.12		
10003.68	1651.81	10019.19	1650.81	10012.05	1651.03	10025.9	1652.98	10034.22	1654.2		
10037.46	1654.61	10041.76	1654.42	10050.54	1653.97	10062.62	1653.73	10065.78	1653.67		
10068.44	1653.61	10072.86	1653.64	10119.96	1653.71	10146.25	1653.81	10158.45	1651.68		
10158.54	1651.71	10158.61	1651.68	10170.76	1653.81	10181.49	1654.11	10184.22	1654.08		
10197.63	1654.31	10212.11	1654.54	10220.56	1654.63	10228.08	1654.71	10260.47	1654.9		
10268.49	1654.91	10292.33	1654.64	10328.47	1654.27	10331.12	1654.25	10332.17	1654.24		
10360.89	1653.61	10363.55	1653.51	10378.78	1653.21	10384.75	1653.11	10390.02	1653.12		
10394.22	1653.11	10403.27	1652.93	10405.9	1652.81	10414.43	1652.82	10425.56	1653.18		
10434.89	1653.51	10439.91	1653.79	10447.04	1653.91	10454	1653.55	10461.14	1653.49		
10464.67	1653.71	10478.45	1654.66	10493.76	1655.02	10496.54	1655.11	10504.46	1655.17		
10567.89	1655.51	10569.25	1655.58	10573.01	1655.57	10575.29	1655.55	10597.79	1653.87		
10602.02	1653.91	10616.91	1654.55	10673.62	1654.83	10679.78	1654.9	10683.1	1654.86		
10688.98	1654.91	10695.89	1654.99	10708.67	1655.17	10733.56	1655.48	10738.39	1655.92		
10753.96	1657.11	10760.65	1657.08	10802.11	1657.17	10837.12	1657.27	10854.37	1657.04		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
7493.42	.15	8836.99	.068	9994.75	.045	10037.46	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9994.75	10037.46	310	377.63	300	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7493.42	8679.01	1656.31	10569.25	10854.37	1655.58

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1654.98	Reach Len. (ft)	310.00	377.63	300.00
Crit W.S. (ft)		Flow Area (sq ft)	603.77	108.51	473.57
E.G. Slope (ft/ft)	0.011497	Area (sq ft)	603.77	108.51	473.57
Q Total (cfs)	3732.00	Flow (cfs)	1881.92	710.47	1139.61
Top Width (ft)	921.24	Top Width (ft)	424.06	42.71	454.48
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)	3.12	6.55	2.41
Max Chl Dpth (ft)	4.17	Hydr. Depth (ft)	1.42	2.54	1.04
Conv. Total (cfs)	34806.0	Conv. (cfs)	17551.5	6626.1	10628.4
Length Wtd. (ft)	316.62	Wetted Per. (ft)	424.71	43.14	454.97
Min Ch El (ft)	1650.81	Shear (lb/sq ft)	1.02	1.81	0.75
Alpha	1.50	Stream Power (lb/ft s)	3.18	11.82	1.80
Frctn Loss (ft)	2.88	Cum Volume (acre-ft)	695.22	30.52	58.30
C & E Loss (ft)	0.03	Cum SA (acres)	541.74	17.06	59.09

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8744.08	9369.42	1327.39	425.65	298.18	35.57	1.43	3.12
9369.42	9994.75	554.53	178.12	126.53	14.86	1.41	3.11
LB 9994.75	RB 10037.46	710.47	108.51	43.14	19.04	2.54	6.55
10037.46	10854.37	1139.61	473.57	454.97	30.54	1.04	2.41

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.885**

INPUT
Description: RM. 3.885. HORZ. N VALUES USED. AREA LT. OF STA . 8799.74 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 248

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7650.82	1653.2	7653.74	1653.19	7667.17	1653.14	7678.49	1653.1	7690.69	1653.03
7701.42	1652.9	7725.19	1652.69	7729.9	1652.57	7757.63	1652.33	7760.65	1652.28
7763.22	1652.3	7793.94	1651.75	7795.32	1651.74	7808.63	1651.67	7827.81	1651.63
7832.36	1651.6	7862.74	1651.48	7877.13	1651.3	7881.39	1651.29	7884.24	1651.25
7887.74	1651.2	7890.56	1651.08	7894.44	1650.97	7897.39	1650.84	7900.75	1650.87
7935.24	1651.1	7943.41	1651.33	7949.82	1651.47	7953.22	1651.55	7955.94	1651.99
7963.87	1653.2	7973	1653.11	8021.72	1652.52	8064.33	1651.89	8081.12	1647.69
8081.42	1647.6	8081.54	1647.58	8082.39	1647.6	8099.75	1648.03	8114.4	1653.39
8115.69	1653.9	8117.1	1653.84	8117.5	1653.84	8118.1	1653.84	8119.39	1653.83
8154.63	1653.6	8173	1653.38	8184.3	1653.39	8191.97	1653.43	8217.96	1653.41
8222.41	1653.4	8251.82	1653.41	8255.55	1653.42	8284.94	1652.85	8290.38	1652.88
8296.4	1652.8	8311.1	1652.68	8322.26	1652.62	8333.8	1651.39	8340.01	1650.9
8355.36	1650.8	8364.93	1650.67	8378.63	1650.53	8390.75	1650.42	8406.35	1650.32
8416.04	1650.3	8435.07	1650.15	8461	1649.85	8462.61	1649.83	8465.54	1649.81
8493.41	1650.4	8510.45	1650.7	8520.17	1651.16	8523.74	1651.66	8525.16	1651.72
8528.48	1651.5	8548.18	1651.41	8561.78	1651.18	8579.03	1651.97	8579.4	1652.11
8579.7	1652.1	8598.16	1653.55	8607.74	1653.98	8611.88	1654.08	8613.36	1653.74
8613.97	1653.5	8618.94	1651.23	8625.29	1650.96	8627.02	1650.85	8628.64	1650.34
8630.73	1649.9	8634.09	1649.75	8636.61	1649.58	8642.76	1649.32	8668.32	1648.36
8669.58	1648.4	8688.69	1649.05	8694.39	1650.7	8697	1651.56	8709.35	1651.71
8751.59	1652.1	8760.19	1652.03	8799.74	1651.95	8809.73	1651.17	8817.79	1650.83
8833.08	1650.9	8866.81	1650.97	8869.12	1650.95	8874.71	1650.92	8933.14	1651.53
8975.42	1651.4	8998.8	1651.36	9010.54	1651.09	9044.9	1650.39	9059.86	1650.04
9063.96	1649.7	9082.86	1648.64	9086.19	1648.99	9092.38	1649.74	9095.48	1650.14
9107.14	1650.4	9122.35	1650.69	9134.51	1650.61	9142.59	1650.6	9155.78	1650.44
9159.33	1650.6	9212.88	1651.46	9232.59	1651.82	9269.23	1652.47	9282.12	1652.58
9286.08	1652.6	9332.57	1652.39	9396.84	1652.31	9493.73	1652.02	9506.01	1651.98
9510.42	1652	9510.86	1651.96	9521.78	1651.92	9631.9	1651.85	9634.5	1651.9
9639.27	1651.9	9641.22	1651.9	9651.83	1651.95	9652.75	1651.95	9656.71	1651.91
9658.54	1651.9	9660.07	1651.86	9664.38	1651.81	9674.29	1651.79	9680.96	1651.85
9696.71	1652.1	9724.35	1652.52	9740.86	1652.5	9746.58	1652.58	9763.9	1652.6
9795.26	1652.6	9805.18	1652.72	9826.11	1652.85	9833.45	1653.02	9847.46	1653
9856.84	1653	9862.61	1653.07	9866.22	1653.1	9879.58	1653.13	9893.79	1653.29
9908.29	1653.5	9925.91	1653.78	9941.93	1653.38	9944.86	1653.22	9946.02	1653.31
9948.66	1653.1	9963.68	1652.72	9970.61	1652.52	9973.59	1651.83	9983.3	1649.72
9990.87	1648.1	9999.98	1649.32	10014.84	1651.28	10018.65	1651.33	10067.18	1651.4
10081.08	1651.2	10092.4	1651.29	10127.86	1651.36	10163.66	1650.85	10197.84	1650.39
10267.67	1650.4	10278.71	1650.38	10287.99	1650.34	10295.41	1649.82	10315.86	1648.48
10318.39	1648.6	10319.99	1648.64	10320.99	1648.65	10333.32	1648.78	10343.52	1649.63
10359.68	1650.9	10378.43	1652.7	10388.98	1652.56	10410.39	1652.48	10419.49	1652.23
10429.95	1651.9	10436.73	1651.74	10442.86	1651.54	10449.34	1651.7	10463.86	1652.02
10484.87	1652.5	10530.6	1650.76	10530.89	1650.75	10531.1	1650.71	10537.4	1649.69
10541.46	1649	10551	1650.75	10552.02	1650.95	10563.06	1650.98	10618.28	1651.14

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10623.83  1650.710632.81    165010638.59 1649.5410641.61 1649.8810652.24 1650.77
10678.12  1651.310680.11  1651.710684.13 1652.0810691.76 1652.5710707.86 1652.38
10763.73  1652.210788.33 1652.0810791.92 1652.2110812.87 1652.8710830.61 1652.95
10858.54  1653.210881.94 1653.4610887.34 1653.5210903.28 1653.7110928.27 1653.26
10930.87  1653.410931.37 1653.3410932.55 1653.29 10934.2 1653.2610965.53  1653.6
10981.26  1652.910993.38 1652.38 11006.5  1652.5 11019.5 1652.6211025.27 1653.22
11029.81  1653.211031.96 1653.1411038.59 1654.26

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7650.82     .15 8809.73    .068 9948.66    .04510018.65    .068

Bank Sta: Left   Right    Lengths: Left Channel  Right     Coeff Contr.   Expan.
       9948.6610018.65              320  359.41     280             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R   Elev
 7650.82 8799.74  1652.5
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1652.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1652.18	Reach Len. (ft)	320.00	359.41	280.00
Crit W.S. (ft)		Flow Area (sq ft)	627.49	101.54	817.77
E.G. Slope (ft/ft)	0.007441	Area (sq ft)	627.49	101.54	817.77
Q Total (cfs)	3732.00	Flow (cfs)	1281.66	481.82	1968.52
Top Width (ft)	1381.08	Top Width (ft)	714.75	46.57	619.76
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	2.04	4.75	2.41
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)	0.88	2.18	1.32
Conv. Total (cfs)	43264.3	Conv. (cfs)	14858.0	5585.7	22820.6
Length Wtd. (ft)	318.14	Wetted Per. (ft)	715.20	47.22	620.54
Min Ch El (ft)	1648.10	Shear (lb/sq ft)	0.41	1.00	0.61
Alpha	1.27	Stream Power (lb/ft s)	0.83	4.74	1.47
Frctn Loss (ft)	2.49	Cum Volume (acre-ft)	690.84	29.60	53.85
C & E Loss (ft)	0.01	Cum SA (acres)	537.69	16.68	55.39

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8799.74	9374.20	1237.98	566.39	453.58	33.17	1.25	2.19
9374.20	9948.66	43.68	61.10	261.62	1.17	0.23	0.71
LB 9948.66	RB 10018.65	481.82	101.54	47.22	12.91	2.18	4.75
10018.65	11038.59	1968.52	817.77	620.54	52.75	1.32	2.41

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.817**

INPUT
Description: RM. 3.817. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR ADOBE RD. ALIGN. AREA BLOCKED OUT TO LT. OF STA.8363.65 AND TOOF STA. 10673.07 DUE TO RIDGE.

Station Elevation Data num= 251

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7682.24	1650.9	7684.74	1650.88	7686.56	1650.84	7688.54	1650.84	7691.14	1650.86
7693.03	1650.9	7695.72	1650.98	7710.05	1650.95	7712.7	1650.96	7716.44	1650.97
7721.29	1651	7737.77	1650.86	7751.66	1650.96	7758.06	1650.88	7806.42	1650.43
7807.72	1650.4	7810.96	1650.4	7812.58	1650.05	7815.81	1649.32	7824.87	1647.49
7827.78	1646.6	7828.14	1646.76	7831.32	1646.57	7844.72	1646.52	7854.7	1648.76
7863.2	1650.4	7877.88	1650.96	7896.01	1651.88	7900.19	1651.96	7901.21	1651.92
7903.35	1652	7904.32	1651.99	7907.18	1651.98	7914.16	1651.97	7928.25	1651.97
7955.26	1651.9	7965.1	1651.68	7970.81	1651.32	7994.41	1649.42	7997.45	1649.37
7998.83	1649.4	8001.42	1649.33	8038.43	1649.2	8058.74	1648.78	8069.11	1648.36
8071.8	1648.3	8074.11	1648.25	8120.15	1647.63	8129.34	1647.63	8142.86	1647.91
8144.5	1647.9	8146.04	1647.91	8164.4	1647.59	8190.85	1647.9	8209.23	1647.98
8218	1648.2	8223.35	1648.49	8229.41	1648.57	8234.51	1648.55	8235.23	1648.53
8236.43	1648.4	8238.69	1648.28	8242.49	1647.81	8243.43	1647.7	8244.33	1647.53
8246.68	1647.4	8249.39	1647.2	8269.99	1647.06	8285.76	1647.02	8300.85	1648.17
8302.69	1648.3	8310.75	1648.72	8315.37	1649.08	8331.96	1648.72	8331.99	1648.72
8332.01	1648.7	8334.16	1649.34	8335.75	1649.58	8341.63	1650.33	8345.56	1650.32
8350.01	1649.3	8355.76	1649.42	8357.41	1649.06	8363.65	1649.97	8373.18	1648.88
8416.94	1648.9	8426.17	1648.44	8429.19	1648.31	8457.36	1649.04	8465.7	1648.97
8479.28	1648.4	8511.77	1647.93	8515.75	1647.88	8520.03	1647.93	8523.54	1647.94
8561.58	1648.4	8589.65	1648.65	8592.56	1648.71	8594.48	1648.73	8596.12	1648.78
8735.49	1649	8754.96	1648.94	8770.76	1648.89	8777.77	1648.91	8794.96	1648.9
8889.33	1649.2	8918.99	1648.99	8935.59	1648.89	8938.32	1648.91	8977.87	1649.17
8980.94	1648.4	8989.87	1646.77	8994.96	1646.89	9000.12	1648.34	9004.8	1649.02
9025.15	1649.1	9076.26	1649.17	9079.37	1649.2	9116.09	1648.95	9118.87	1648.9
9125.71	1648.8	9171.92	1648.11	9172.92	1648.14	9178.35	1648.42	9181.65	1648.6
9182.42	1648.6	9183.21	1648.61	9209.01	1648.79	9303.25	1648.88	9310.94	1648.99
9318.95	1648.8	9330.65	1648.7	9335.85	1648.81	9343.1	1648.94	9351.29	1648.7
9368.24	1648.9	9378.4	1649.42	9383.35	1649.56	9390.93	1649.98	9399.63	1649.96
9422.08	1650	9438.08	1650.02	9458.97	1650.04	9462.97	1650.2	9469.33	1650.47
9471.78	1650.5	9480.67	1650.63	9539.72	1651.06	9546.61	1650.97	9546.84	1650.97
9556.57	1650.9	9590.82	1650.61	9601.71	1650.51	9655.94	1650.14	9697.48	1649.98
9718.44	1649.7	9724.7	1649.7	9757.44	1648.89	9775.14	1648.46	9785.75	1649.14
9787.55	1649.3	9799.87	1649.43	9835.62	1649.89	9854.86	1648.86	9868.28	1648.05
9892.93	1648.3	9908.45	1648.44	9910.77	1648.5	9915.98	1647.76	9919.25	1647.24
9922.27	1647.4	9929.04	1648.41	9934.06	1648.04	9971.21	1646.11	9973.14	1646.19
9974.93	1646.2	9984.49	1646.52	9993.52	1646.61	10015.5	1647.11	10019.5	1647.3
10033.7	1647.7	10034.27	1647.72	10034.6	1647.72	10044.46	1647.8	10051.6	1647.87
10056.5	1647.9	10060.88	1647.99	10091.51	1649.04	10098.19	1649.38	10099.04	1649.44
10101.34	1649.5	10103.18	1650.51	10103.88	1650.58	10106.81	1651.17	10109.82	1650.67
10112.11	1649.8	10115.76	1649.92	10118.34	1650.15	10118.93	1650.28	10168.11	1649.51
10183.95	1649.1	10185.66	1649.14	10187.66	1649.15	10313.01	1649.33	10326.94	1649.45
10333	1649.4	10340.41	1649.28	10343.15	1649.26	10346.69	1649.18	10367.43	1648.43
10384.62	1649	10396.42	1649.63	10430.58	1648.41	10440.44	1648.11	10443.88	1647.55
10451.12	1646.4	10459.39	1647.51	10465.45	1648.34	10470.62	1648.37	10496.61	1648.48
10502.34	1648.6	10522.06	1648.65	10575.84	1649.15	10631.22	1649.93	10649.6	1650.41
10673.07	1650.8	10686.55	1650.12	10688.07	1650.05	10693.34	1650.14	10702.44	1650.29
10706.31	1650.4	10730.96	1650.52	10758.11	1650.25	10774.38	1650.11	10784.5	1650.05
10793.85	1650	10800.83	1649.91	10825.07	1649.66	10839.99	1649.48	10844.06	1649.05

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10857.02  1648.410859.16  1648.310860.14 1648.2310871.76 1649.5610876.98 1650.05
10900.64  1650.310945.61 1651.0310960.78 1651.1910968.12 1651.8910969.99  1651.9
10987.53  1651.5

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7682.24     .15 8429.19    .068 9934.06    .04510060.88    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9934.0610060.88              400  370.17     365             .1        .3

Blocked Obstructions      num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 7682.24 8363.65 1649.9710673.0710987.53  1650.8

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1649.79   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.23   Wt. n-Val.                0.070      0.045      0.068
  W.S. Elev (ft)            1649.56   Reach Len. (ft)          400.00     370.17     365.00
  Crit W.S. (ft)                      Flow Area (sq ft)        920.68     307.16     307.75
  E.G. Slope (ft/ft)       0.008405   Area (sq ft)             920.68     307.16     307.75
  Q Total (cfs)             3732.00   Flow (cfs)              1551.37    1676.36     504.27
  Top Width (ft)            1790.92   Top Width (ft)          1187.39     126.82     476.71
  Vel Total (ft/s)             2.43   Avg. Vel. (ft/s)           1.69       5.46       1.64
  Max Chl Dpth (ft)            3.45   Hydr. Depth (ft)           0.78       2.42       0.65
  Conv. Total (cfs)        40706.6    Conv. (cfs)             16921.4    18284.8     5500.3
  Length Wtd. (ft)          383.53    Wetted Per. (ft)        1188.29    .126.90     477.10
  Min Ch El (ft)            1646.11   Shear (lb/sq ft)           0.41       1.27       0.34
  Alpha                        2.53   Stream Power (lb/ft s)     0.69       6.93       0.55
  Frctn Loss (ft)              3.47   Cum Volume (acre-ft)     685.15      27.92      50.24
  C & E Loss (ft)              0.04   Cum SA (acres)           530.70      15.96      51.87

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                 (ft)      (ft/s)
  8245.20       8808.15         647.85     374.58     440.97     17.36      0.85       1.73
  8808.15       9371.10         631.36     394.12     563.48     16.92      0.70       1.60
  9371.10       9934.06         272.16     151.98     183.84      7.29      0.83       1.79
  LB 9934.06    RB 10060.88    1676.36     307.16     126.90     44.92      2.42       5.46
  10060.88      10987.53        504.27     307.75     477.10     13.51      0.65       1.64

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.

CROSS SECTION          RIVER: SIGNAL BUTTE
REACH: SPILLWAY           RS: 3.747
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INPUT
Description: RM. 3.747. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 8095 AND RIGHT OF 10487 DUE TO RIDGE

Station Elevation Data num= 290

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7545.9	1647.4	7574.93	1647.01	7613.05	1645.95	7622.49	1646.29	7633.4	1646.53
7640.58	1644.3	7643.04	1643.44	7644.6	1643.55	7647.71	1643.69	7650.74	1644.26
7653.17	1644.7	7661.31	1646.25	7662.38	1646.45	7662.8	1646.53	7677.94	1646.81
7689.54	1646.7	7697.36	1647.03	7725.07	1647.09	7743.98	1647.26	7763.21	1647.03
7791.34	1647.2	7793.77	1647.17	7807.28	1647.26	7831.13	1646.8	7858.09	1647.48
7867.31	1647.4	7884.4	1647.53	7884.62	1647.51	7884.66	1647.51	7891.05	1647.36
7903.22	1647.4	7904.88	1647.48	7908.86	1647.31	7935.61	1646.46	7935.93	1646.48
7945.86	1646.4	7966.59	1646.23	7971.29	1646.2	7975.03	1646.34	7998.03	1647.59
8002.15	1647.8	8042.01	1647.77	8071.95	1647.72	8094.78	1648.13	8095.18	1648.05
8106.64	1646	8108.16	1645.86	8114.38	1644.93	8144.87	1644.94	8150.49	1644.97
8164.08	1645.1	8174.11	1645.12	8179.67	1645.27	8192.14	1645.57	8192.25	1645.55
8198.42	1645	8199.52	1644.86	8203.91	1644.55	8210.83	1644.34	8212.85	1644.26
8226	1644.7	8227.8	1644.79	8230.82	1644.98	8240.49	1645.37	8255.95	1645.23
8264.51	1645.1	8298.71	1644.86	8314.29	1645.21	8349.65	1646.35	8360.74	1646.58
8390.81	1647.1	8408.27	1647.55	8416.28	1646.23	8421.2	1646	8423.08	1645.94
8447.72	1646.4	8454.47	1645.87	8466.69	1644.99	8468.26	1644.91	8475.12	1644.72
8479.22	1644.6	8486.16	1644.64	8489.92	1644.8	8492.4	1645.06	8497.74	1646.36
8502.98	1646.5	8507.76	1646.53	8514.26	1646.51	8530.87	1646.72	8538.89	1646.74
8573.55	1646.9	8644.68	1646.83	8657.09	1646.91	8659.89	1646.48	8664.84	1645.52
8693.41	1645.9	8709.07	1646.06	8727.21	1643.35	8727.35	1643.34	8729.03	1643.49
8747.14	1645.3	8767.83	1645.3	8774.08	1645.24	8777	1645.21	8785.67	1645.17
8808.01	1644.8	8815.22	1644.61	8845.55	1644.08	8851.98	1644.05	8853.38	1644.01
8858.62	1643.9	8861.43	1643.89	8874.95	1643.76	8878.46	1643.77	8880.05	1643.87
8881.57	1643.9	8889.33	1643.84	8904.97	1644.3	8912.76	1644.49	8918.08	1644.68
8933.61	1645	8936.96	1644.95	8941.01	1645.2	8943.19	1645.23	8961.27	1645.59
8988.77	1645.4	9014.31	1645.6	9030.2	1645.57	9034.98	1645.79	9042	1645.62
9045.7	1645.7	9055.66	1646.04	9086.89	1645.44	9098.55	1645.4	9113.72	1645.42
9113.77	1645.4	9128	1645.2	9129.85	1645.16	9133.8	1645.34	9147.31	1645.7
9153.82	1645.9	9156.95	1645.93	9162.4	1646.04	9167.25	1646.03	9176.52	1646
9184.87	1646	9196.46	1645.96	9200.5	1645.94	9233.35	1646.22	9241.25	1646.26
9278.64	1646.5	9280.62	1646.54	9283.37	1646.55	9287.45	1646.6	9289.14	1646.61
9299.03	1646.8	9311.58	1647.02	9331.89	1647.2	9341.55	1646.9	9344.43	1646.75
9344.52	1646.7	9353.28	1646.75	9365.36	1647.11	9373.31	1646.99	9411.37	1646.79
9440.7	1646.9	9484.63	1646.34	9487.36	1646.3	9545.87	1645.05	9551.9	1644.93
9552.29	1644.9	9558.52	1645.09	9579.03	1645.47	9587.63	1645.65	9590.94	1645.68
9629.81	1645.9	9644.33	1646.01	9666.9	1646.01	9671.58	1646.02	9697.26	1645.71
9708.76	1645.1	9710.05	1644.99	9713.27	1645.52	9716.86	1646.11	9717.22	1646.17
9720.55	1646.1	9764.21	1646.02	9775.15	1646.57	9775.35	1646.59	9776.68	1646.57
9786.79	1646.4	9792.14	1645.74	9810.55	1643.34	9815.75	1643.44	9827.83	1643.75
9827.99	1644.1	9834.89	1644.62	9858.49	1645.71	9864.92	1645.51	9876.69	1645.06
9896.62	1644.8	9907.62	1645	9966.94	1645.01	9969.96	1645.04	9971.36	1645.19
9978.88	1645.9	9988.14	1645.23	9992.09	1644.94	9994.17	1644.83	9998.98	1645.06
10006.1	1645.4	10016.2	1645.14	10060.91	1645.09	10064.55	1645.27	10076.54	1646.14
10086.69	1646.9	10097.57	1647.21	10144.33	1647.91	10159.29	1648.14	10169.33	1647.95
10205.58	1647	10221.6	1646.63	10230.88	1646.38	10237.31	1646.36	10239.11	1646.36
10282.35	1644.7	10282.72	1644.66	10283	1644.65	10283.14	1644.65	10302.14	1645.22
10314.54	1644.7	10322.86	1644.91	10332.37	1644.89	10344.08	1644.72	10368.5	1644.49
10369.08	1644.51	10369.52	1644.39	10375.31	1643.45	10378.17	1643.05	10382.99	1643.96
10385.95	1644.51	10404.15	1644.14	10409.63	1644.13	10422.26	1644.79	10433.9	1645.38
10447.54	1645.81	10453.24	1645.87	10458.95	1646.09	10462.71	1646.15	10468.59	1646.33
10472.46	1646.41	10486.29	1646.91	10486.45	1646.93	10487.49	1647.05	10487.81	1647.08

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10494.22  1646.810505.56 1646.8610517.27 1646.8210575.13 1647.14 10586.9 1647.18
10594.83  1647.310601.63  1647.210607.31 1647.1110669.92 1647.1710715.02 1647.43
10727.21  1646.6 10740.1 1646.2710740.28 1646.2610741.14 1646.2510761.52 1647.18
10770.27  1646.110770.34 1646.1110770.62 1646.1210784.33 1646.5810791.73  1646.5
10798.49  1646.710802.33 1645.8610806.61 1645.3210813.48 1647.0510815.62  1647.7
10875.94  1647.610887.87 1647.5210890.94 1647.5710891.43 1647.5810892.94  1647.6
10893.28  1647.610894.19 1647.6210896.19 1647.6510899.98 1647.7410942.18  1648.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
  7545.9     .15 8108.16    .068 9775.35    .045 9858.49    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9775.3510060.91              390  385.69     400             .1       .3

Blocked Obstructions      num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
  7545.9 8094.78 1648.1310487.8110942.18 1647.08

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1646.28   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                0.068      0.056      0.068
  W.S. Elev (ft)            1646.18   Reach Len. (ft)          390.00     385.69     400.00
  Crit W.S. (ft)                      Flow Area (sq ft)        977.16     329.70     289.99
  E.G. Slope (ft/ft)       0.009820   Area (sq ft)             977.16     329.70     289.99
  Q Total (cfs)             3732.00   Flow (cfs)              2003.30    1001.12     727.58
  Top Width (ft)            1655.66   Top Width (ft)          1146.90     272.37     236.38
  Vel Total (ft/s)             2.34   Avg. Vel. (ft/s)           2.05       3.04       2.51
  Max Chl Dpth (ft)            3.13   Hydr. Depth (ft)           0.85       1.21       1.23
  Conv. Total (cfs)         37660.3   Conv. (cfs)             20215.6    10102.5     7342.1
  Length Wtd. (ft)           391.42   Wetted Per. (ft)        1147.90     272.94     236.78
  Min Ch El (ft)            1643.34   Shear (lb/sq ft)           0.52       0.74       0.75
  Alpha                        1.09   Stream Power (lb/ft s)     1.07       2.25       1.88
  Frctn Loss (ft)              3.73   Cum Volume (acre-ft)     676.44      25.21      47.73
  C & E Loss (ft)              0.01   Cum SA (acres)           519.99      14.26      48.88

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                 (ft)      (ft/s)
  8103.26       8660.63         677.92     308.06    304.80      18.16      1.01       2.20
  8660.63       9217.99        1171.40     545.44    557.03      31.39      0.98       2.15
  9217.99       9775.35         153.99     123.67    286.08       4.13      0.43       1.25
  LB 9775.35    RB 10060.91    1001.12     329.70    272.94      26.83      1.21       3.04
  10060.91      10942.18        727.58     289.99    236.78      19.50      1.23       2.51

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.674**

INPUT
Description: RM. 3.674. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.7670.78 DUE TO RIDGE.

Station Elevation Data num= 279

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7200.95	1645.1	7211.54	1645.19	7219.61	1645.19	7260.08	1644.48	7279.15	1644.19
7288.35	1644.1	7297.92	1644.02	7316.08	1643.86	7321.27	1643.93	7353.04	1643.92
7353.15	1643.9	7353.19	1643.9	7361.78	1640.66	7363.34	1641.04	7372.98	1643.75
7408.7	1643.5	7412.99	1643.42	7415.02	1643.39	7416.03	1643.38	7416.24	1643.38
7425.15	1643.4	7499.77	1644.11	7509.93	1644.13	7521.83	1644.22	7538.53	1644.3
7584.48	1643.6	7604.7	1643.56	7607.01	1643.45	7614.4	1642.44	7630.9	1642.46
7636.43	1642.6	7648.39	1642.49	7664.91	1643.7	7670.78	1644.23	7705.96	1643.92
7729.2	1643.7	7736.07	1643.61	7742.72	1643.57	7776.43	1643.13	7787.33	1641.73
7794.09	1640.9	7797.5	1641.33	7798.06	1641.42	7798.28	1641.43	7800.99	1641.48
7839.99	1641.9	7846.9	1641.85	7854.88	1643.02	7860.26	1643.63	7878.75	1643.66
7894.43	1643.7	7903.51	1643.36	7908.51	1643.26	7917.13	1643.18	7920.3	1643.1
7922.82	1643.1	7938.39	1642.95	8043.21	1642.02	8102.41	1641.51	8141.02	1641.26
8145.75	1641.2	8152.14	1641.2	8160.16	1641.19	8235.28	1641.29	8235.49	1641.29
8235.63	1641.3	8235.81	1641.25	8236.53	1640.94	8239.63	1639.72	8240.59	1639.93
8246.33	1640.9	8296.29	1640.5	8325.73	1640.58	8332.34	1641.15	8337.05	1641.66
8348.82	1641.2	8366.1	1640.88	8368.86	1640.74	8381.74	1639.96	8389.42	1639.74
8398.31	1639.3	8401.93	1639.3	8438.27	1639.81	8455.2	1640.09	8481.07	1640.34
8495.56	1640.4	8514.78	1640.69	8533.24	1640.84	8540.73	1641.1	8549.92	1641.38
8564.28	1641.3	8572.39	1641.24	8574.85	1641.15	8576.46	1641.13	8579.65	1641.06
8586.82	1640.9	8595.78	1640.77	8604.56	1640.75	8615.97	1640.88	8623.73	1640.95
8627.11	1641	8636.05	1641.17	8672.32	1641.86	8672.58	1641.86	8672.79	1641.86
8696.12	1641.8	8706.82	1641.74	8717.09	1641.77	8723.15	1641.92	8733.09	1642.13
8736.02	1642.2	8774.54	1641.92	8776.05	1641.92	8776.61	1641.92	8843.88	1641.97
8860.6	1641.8	8864.64	1641.82	8886.75	1641.16	8909.19	1640.94	8913.39	1640.86
8925.82	1640.8	8929.16	1640.91	8935.25	1641	8950.89	1641.39	8957.4	1641.43
8967.2	1641.6	8976.69	1641.74	8981.82	1641.79	8996.76	1641.86	9030.15	1642.4
9043.95	1642.6	9047	1642.64	9047.84	1642.65	9082.39	1642.34	9090.1	1642.38
9091.86	1642.4	9118.29	1642.34	9185.68	1642.34	9190.98	1642.34	9195.01	1642.32
9200.15	1642.3	9212.28	1642.09	9215.05	1642.08	9258.42	1642.18	9262.34	1642.18
9271.16	1642.2	9283.31	1641.24	9286.46	1641.02	9294.34	1641.34	9303.36	1641.65
9321.3	1641.5	9321.8	1641.49	9322.43	1641.47	9332.21	1640.9	9336.26	1640.89
9360.74	1640.7	9381.89	1641.08	9392.94	1641.27	9408.74	1641.94	9419.61	1642.3
9420.73	1642.3	9456.15	1642.33	9457.21	1642.32	9457.67	1642.32	9481.42	1642.22
9495.1	1642.3	9501.74	1642.24	9523.77	1641.71	9526.63	1641.7	9533.03	1641.82
9557.36	1642.2	9561.39	1642.24	9590.96	1642.25	9605.38	1642.39	9609.42	1642.36
9614.59	1642.4	9623.2	1642.33	9623.65	1642.3	9627.17	1642.33	9631.91	1642.21
9648.03	1642.6	9651.84	1642.61	9651.96	1642.61	9661.95	1642.56	9662.28	1642.56
9662.68	1642.5	9667.82	1642.42	9691.93	1641.62	9693.89	1641.75	9706.54	1642.52
9718.37	1642.7	9719.73	1642.66	9719.86	1642.66	9724.18	1642.69	9737.54	1642.85
9739.12	1642.9	9740.58	1642.76	9747.41	1642.76	9769.8	1642.79	9774.62	1642.8
9774.69	1641.4	9778.6	1641.03	9782.95	1640.96	9790.92	1641.31	9798.17	1640.73
9816.29	1641.4	9844.6	1642.36	9856.09	1642.21	9868.37	1642.09	9927.35	1642.1
9963.5	1642.1	9978.34	1642.01	9979.37	1641.98	9980.55	1642.02	9981.8	1642.01
10010.89	1643	10027.78	1643.5	10028.34	1643.56	10059.89	1643.36	10072.58	1643.28
10128.88	1643.1	10195.84	1643.22	10208.75	1643.25	10220.61	1643.24	10235.16	1643.1
10246.39	1642.5	10249.89	1642.2	10251.56	1641.58	10266.45	1641.28	10267.72	1641.34
10268.86	1641.3	10272.1	1641.17	10291.03	1641.55	10310.4	1641.27	10310.54	1641.26
10310.71	1641.3	10311.14	1641.25	10334.08	1640.51	10339.72	1639.72	10343.64	1639.17

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10345.88  1639.510355.55  1640.710357.51 1640.7310367.73 1640.8810381.69 1641.09
10394.01  1641.310407.73 1641.4910415.38 1641.6510437.33 1642.1510437.94 1642.17
10440.61  1642.210452.14 1641.7810471.36    164110473.02 1641.0210474.33 1641.11
10491.31  1641.210491.46 1641.2310524.79 1641.8510530.54 1640.2810532.57 1639.86
10539.89  1641.810540.48 1641.91 10543.3 1641.9110621.25 1642.1110639.75 1642.22
10648.07  1642.110653.59 1642.3710671.06 1642.6410695.13 1642.4610741.29 1643.32
10790.61  1643.810791.58 1643.9410795.23 1643.85 10817.1 1643.2410829.08 1643.34
10843.59  1643.610864.34  1644.810873.18 1645.2610877.77 1645.39

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7200.95     .15  8455.2    .068 9790.92    .045  9844.6    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9790.9210010.89              430  372.11     425             .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 7200.95 7670.78 1644.23

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1642.53   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.05   Wt. n-Val.                  0.095      0.051      0.068
  W.S. Elev (ft)            1642.48   Reach Len. (ft)            430.00     372.11     425.00
  Crit W.S. (ft)                      Flow Area (sq ft)         1662.95     107.75     411.70
  E.G. Slope (ft/ft)       0.009248   Area (sq ft)              1662.95     107.75     411.70
  Q Total (cfs)             3732.00   Flow (cfs)                2645.42     226.51     860.07
  Top Width (ft)            2373.13   Top Width (ft)            1749.75     204.78     418.61
  Vel Total (ft/s)             1.71   Avg. Vel. (ft/s)             1.59       2.10       2.09
  Max Chl Dpth (ft)            3.31   Hydr. Depth (ft)             0.95       0.53       0.98
  Conv. Total (cfs)        38807.6    Conv. (cfs)               27508.7     2355.4     8943.5
  Length Wtd. (ft)          426.58    Wetted Per. (ft)          1751.74     204.84     419.53
  Min Ch El (ft)            1640.73   Shear (lb/sq ft)             0.55       0.30       0.57
  Alpha                        1.05   Stream Power (lb/ft s)       0.87       0.64       1.18
  Frctn Loss (ft)              4.05   Cum Volume (acre-ft)       664.62      23.28      44.51
  C & E Loss (ft)              0.00   Cum SA (acres)             507.02      12.15      45.87

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.   Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  7200.95       7848.44          44.99      54.33      67.13      1.21      0.81       0.83
  7848.44       8495.94        1147.42     766.97     508.23     30.75      1.51       1.50
  8495.94       9143.43        1015.38     532.57     616.96     27.21      0.86       1.91
  9143.43       9790.92         437.64     309.07     559.42     11.73      0.55       1.42
  LB 9790.92    RB 10010.89     226.51     107.75     204.84      6.07      0.53       2.10
  10010.89      10877.77        860.07     411.70     419.53     23.05      0.98       2.09

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.603**

INPUT
Description: RM. 3.603. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 7080.82 . AND TO RT. OF STA. 10414.43

Station Elevation Data num= 263

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6861.52	1640.1	6901.54	1639.9	6918.66	1639.7	6924.99	1639.64	6945.38	1639.76
6964.26	1639.7	6972.39	1638.97	6982.46	1638.23	6986.7	1638.01	6992.08	1637.97
7020.87	1637.5	7040.23	1638.88	7049.92	1639.57	7080.83	1639.55	7151.28	1639.44
7155.26	1639.4	7163.61	1637.22	7176.7	1633.93	7211.21	1633.92	7243.5	1634.1
7254.81	1636.7	7267.71	1639.12	7275.68	1639.16	7287.8	1638.82	7288.53	1638.52
7296.3	1638.7	7296.77	1638.76	7299.65	1638.75	7303.11	1638.74	7339.26	1638.58
7343.5	1637.5	7350.75	1635.84	7358.66	1635.7	7365.4	1635.63	7369.87	1635.59
7379.89	1637.1	7389.19	1638.89	7402.65	1638.45	7427.37	1638.12	7460.96	1638.75
7475.8	1638.7	7477.15	1638.7	7477.36	1638.69	7477.91	1638.73	7478.79	1638.77
7496.87	1639.7	7519.93	1639.57	7577.49	1639.11	7609.75	1638.82	7634.15	1638.61
7662.34	1638.4	7667.65	1638.37	7669.95	1638.42	7685.93	1638.59	7700.97	1638.73
7702.66	1638.7	7711.72	1638.45	7717.11	1638.13	7719.7	1638.14	7751.74	1639.05
7793.58	1639.6	7816.04	1639.55	7828.8	1639.53	7846.25	1638.03	7853.88	1637.9
7875.49	1637.54	7875.5	1637.54	7875.53	1637.54	7891.72	1637.97	7971.17	1636.7
7995.1	1636.37	8003.09	1636.27	8008.46	1636.34	8028.24	1636.41	8044.65	1636.4
8108.91	1636.24	8120.91	1636.41	8138.65	1636.65	8140.16	1636.61	8150.6	1636.1
8167.71	1636	8180.97	1636.05	8200.69	1637.74	8205.42	1638.09	8231.78	1637.9
8271.22	1637.82	8308.37	1637.63	8309.76	1637.8	8366.14	1638.32	8414.89	1638.3
8425.12	1637.86	8431.56	1637.61	8451.64	1637.58	8459.77	1637.6	8471.29	1637.5
8472.42	1637.52	8479.83	1637.71	8480.25	1637.71	8484.55	1637.71	8485.09	1637.7
8491.96	1637.56	8503.41	1637.56	8536.42	1637.77	8539.99	1637.81	8540.1	1637.8
8540.33	1637.81	8551.04	1637.89	8554.25	1637.87	8563.91	1637.88	8567.32	1637.8
8579.6	1637.99	8585.84	1637.98	8599.08	1638.13	8600.19	1638.13	8603.31	1638.1
8606.45	1638.19	8610.64	1638.21	8611.27	1638.24	8612.53	1638.26	8619.01	1638.5
8625.37	1638.77	8627.32	1638.85	8646.21	1638.46	8728.15	1637.17	8745.05	1637.1
8781.22	1637.26	8792.82	1637.34	8839.98	1637.58	8842.1	1637.45	8846.64	1637.5
8855.18	1636.89	8860.99	1636.6	8877.28	1636.72	8893.71	1636.95	8901.88	1637.1
8908.32	1637.38	8918.41	1637.7	8923.49	1637.79	8926.29	1637.85	8959.38	1637.9
9002.63	1637.87	9014.05	1637.91	9033.63	1638.12	9048.76	1638	9055.01	1637.8
9057.14	1637.81	9058.65	1637.82	9060.44	1637.79	9078.33	1637.59	9080.09	1637.6
9126.43	1637.85	9163.23	1637.31	9170.85	1637.26	9186.12	1637.18	9211.86	1637.1
9230.09	1637.2	9244.22	1636.99	9271.35	1636.67	9294.25	1636.66	9295.03	1636.6
9296.94	1636.63	9322.51	1636.39	9332.81	1636.31	9347.65	1636.24	9363.32	1636.2
9369.57	1636.18	9377.64	1636.15	9378.03	1636.15	9378.44	1636.15	9389.17	1638.8
9391.8	1639.37	9400.41	1637.75	9405.47	1636.68	9431.66	1637.15	9452.49	1637.5
9487.08	1637.94	9505.28	1637.64	9559	1638.2	9578.1	1638.37	9580.82	1638.4
9581.81	1638.31	9593.35	1637.58	9603.08	1637.88	9637.2	1638.03	9655.84	1638.3
9672.14	1638.8	9719.2	1639.35	9734	1639.48	9752.16	1639.83	9758.36	1640.1
9762.22	1640.22	9767.8	1640.5	9769.87	1640.59	9771.67	1640.24	9776.52	1639.3
9784.24	1637.71	9791.91	1638.19	9801.54	1638.67	9812.39	1639.22	9843.18	1640.1
9859.25	1640.33	9864.07	1639.38	9871.47	1637.89	9884.39	1637.9	9885.31	1637.9
9888.64	1637.99	9913.29	1638.69	9938.22	1639.23	9954.79	1638.02	9955.6	1638
9960.87	1638.01	9972.7	1638.16	9976.41	1638.06	9979.55	1637.88	9986.21	1637.5
9992.78	1636.96	9993.74	1636.88	9994.27	1636.85	10007.58	1637.87	10012.22	1638.1
10020.33	1638.17	10022.16	1638.11	10036.98	1639.52	10043.62	1640.48	10055.28	1640.3
10068.42	1640.03	10089.93	1639.85	10090.08	1639.84	10106.37	1639.12	10112.53	1638.8
10117.08	1638.68	10120.53	1638.54	10151.76	1637.11	10153.41	1637.11	10154.24	1637.1
10169.4	1637.43	10179.39	1637.58	10182.39	1637.67	10185.38	1637.61	10199.71	1636.5

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10206.93 1637.6710209.52 1638.0610236.19 1637.8110246.88 1637.7110255.19  1637.5
10304.59 1637.6110359.23  1637.610379.67 1637.6910386.83 1637.7310401.85  1638.8
10411.54  1639.510414.43 1639.7410434.12 1638.8210443.35  1638.410443.78  1638.4
 10449.6 1638.1610450.36 1638.1110462.38  1637.510464.09 1637.3610465.25  1637.4
 10480.9 1637.9310487.76 1638.1710508.76  1642.1

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 6861.52     .15 9347.65    .068 9976.41    .04510020.33    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9976.4110020.33              375  374.47     300             .1       .3

Blocked Obstructions      num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 6861.52 7080.82 1639.5610414.4310508.76 1639.74
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1638.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.135	0.045	0.068
W.S. Elev (ft)	1638.44	Reach Len. (ft)	375.00	374.47	300.00
Crit W.S. (ft)		Flow Area (sq ft)	2324.97	35.78	229.62
E.G. Slope (ft/ft)	0.009786	Area (sq ft)	2324.97	35.78	229.62
Q Total (cfs)	3732.00	Flow (cfs)	3192.23	101.83	437.94
Top Width (ft)	2410.73	Top Width (ft)	2087.24	43.92	279.58
Vel Total (ft/s)	1.44	Avg. Vel. (ft/s)	1.37	2.85	1.91
Max Chl Dpth (ft)	4.52	Hydr. Depth (ft)	1.11	0.81	0.82
Conv. Total (cfs)	37726.7	Conv. (cfs)	32270.2	1029.4	4427.1
Length Wtd. (ft)	369.97	Wetted Per. (ft)	2089.78	44.01	279.83
Min Ch El (ft)	1636.85	Shear (lb/sq ft)	0.68	0.50	0.50
Alpha	1.09	Stream Power (lb/ft s)	0.93	1.41	0.96
Frctn Loss (ft)	3.53	Cum Volume (acre-ft)	644.94	22.66	41.38
C & E Loss (ft)	0.00	Cum SA (acres)	488.08	11.09	42.46

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6861.52	7640.24	923.87	481.41	195.17	24.76	2.49	1.92
7640.24	8418.96	784.68	689.28	611.62	21.03	1.13	1.14
8418.96	9197.69	571.99	618.30	748.96	15.33	0.83	0.93
9197.69	9976.41	911.69	535.99	534.03	24.43	1.00	1.70
LB 9976.41	RB 10020.33	101.83	35.78	44.01	2.73	0.81	2.85
10020.33	10508.76	437.94	229.62	279.83	11.73	0.82	1.91

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.532**

INPUT
Description: RM. 3.532. HORZ. N VALUES USED.

Station Elevation Data num= 281

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6596.9	1635.6	6605.07	1635.21	6644.47	1635.08	6668.86	1634.95	6695.67	1634.65
6725.09	1633.8	6728.54	1633.76	6729.66	1633.73	6773.42	1633.87	6774.39	1633.86
6774.76	1633.9	6835.11	1632.74	6851.67	1632.86	6906.54	1632.39	6915.68	1632.44
6918.01	1632.5	6926.76	1632.69	6931.88	1632.73	6981.27	1633.65	7006.17	1633.71
7010.35	1633.8	7015.83	1633.69	7018.74	1633.81	7021.11	1633.9	7024.87	1633.86
7029.1	1633.8	7037.5	1633.55	7040.83	1633.49	7042.18	1633.45	7045.22	1633.35
7048.96	1633.2	7066.22	1633.58	7089.25	1633.95	7097.23	1633.55	7115.28	1634.89
7120.78	1635.2	7162.52	1634.84	7172.83	1634.77	7191.45	1634.8	7239.87	1635.15
7263.79	1635.3	7298.02	1635.58	7303.33	1635.69	7364.58	1635.03	7392.2	1634.58
7412.24	1634.7	7418.88	1634.8	7423.21	1634.43	7432.31	1633.52	7461.41	1633.56
7462.29	1633.6	7462.5	1633.58	7462.79	1633.6	7479.92	1634.81	7481.99	1634.78
7526.14	1634.7	7558.69	1634.68	7580.31	1634.37	7630.72	1634.34	7632.37	1634.33
7632.53	1634.3	7633.63	1634.32	7697.16	1634.01	7702.8	1633.15	7709.09	1632.29
7714.87	1632.3	7738.92	1632.41	7750.9	1634.28	7751.96	1634.36	7753.27	1634.33
7811.97	1634	7846.9	1634.3	7867.36	1634.24	7924.03	1634.19	7954.67	1634.17
7969.13	1634.1	7971.43	1634.16	7974.46	1633.5	7984.36	1631.53	7990.27	1632.3
7994.03	1632.8	7994.06	1632.79	8018.6	1632.77	8080.89	1632.46	8087.09	1632.74
8097.25	1632.3	8102.82	1632.15	8111.13	1632.21	8112.69	1632.21	8115.57	1632.23
8140.33	1632.2	8142.04	1632.23	8146.19	1632.18	8149.01	1632.15	8150.82	1632.15
8155.94	1632.2	8162.1	1632.26	8196.76	1632.74	8198.49	1632.76	8201.93	1632.83
8211.62	1633	8232.35	1633.59	8244.54	1633.84	8255.56	1634.11	8273.49	1634.56
8274.85	1634.6	8276.54	1634.64	8293.58	1634.72	8304.49	1634.83	8311.37	1634.97
8362.48	1635.2	8372.76	1635.3	8381.95	1635.4	8405.04	1635.12	8433.15	1634.59
8438.83	1634.5	8439.8	1634.47	8442.33	1634.43	8507.68	1633.96	8520.08	1633.87
8520.95	1633.9	8521.23	1633.85	8540.28	1632.96	8544.04	1633	8565.14	1632.69
8572.28	1632.7	8583.25	1632.51	8599.27	1633.44	8609.42	1633.95	8614.21	1634.83
8615.39	1635	8654.77	1634.65	8659.3	1634.58	8680.73	1634.55	8721.04	1634.59
8725.15	1633.2	8725.54	1633.05	8756.13	1633.1	8783	1633.2	8802.63	1633.26
8821.78	1633.3	8837.2	1632.29	8845.95	1631.92	8857.39	1632.05	8879.22	1632.03
8886.46	1632.1	8889.27	1632.04	8892.91	1633.4	8893.58	1633.75	8894.66	1633.75
8896.58	1633.8	8903.91	1633.8	8913.63	1633.83	8923.88	1633.77	8939.84	1634.01
8987.35	1634.2	9005.28	1634.27	9014.14	1634.27	9042.42	1633.97	9075.3	1633.92
9080.22	1633.9	9094.32	1633.75	9101.12	1633.84	9107.95	1633.39	9116.55	1632.32
9122.12	1632.2	9127.44	1632.18	9164.54	1632.2	9167.88	1632.29	9173.94	1632.56
9181.02	1632.8	9186.29	1633.13	9211.66	1633.25	9230.93	1633.38	9240.88	1633.47
9257.59	1633.6	9269.65	1633.02	9271.91	1633.06	9283.23	1632.27	9286.56	1633.33
9291.8	1634.3	9297.86	1634.17	9311.27	1633.66	9322.66	1633.05	9328.69	1633.32
9331.42	1633.3	9361.95	1633.99	9366.65	1634.25	9374.71	1634.65	9379.44	1634.87
9382.85	1635.1	9389.15	1635.19	9393.83	1635.21	9435.85	1635.46	9454.62	1635.46
9458.47	1635.5	9480.68	1635.36	9480.81	1635.37	9481	1635.38	9483.47	1635.36
9490.94	1635.9	9493.5	1635.93	9494.64	1635.94	9496.41	1635.82	9497.85	1635.67
9501.4	1635.4	9503.73	1635.46	9506.08	1635.44	9518.12	1635.58	9532.19	1635.57
9572.97	1635.6	9577.39	1635.66	9586.36	1635.62	9593.54	1635.56	9599.16	1635.96
9605.16	1635.7	9606.85	1635.08	9613.56	1635	9651.71	1634.64	9655.15	1634.61
9660.51	1634.6	9662.19	1634.52	9680.36	1633.21	9681.25	1633.17	9686.52	1633.23
9693.08	1633.4	9694.81	1633.37	9705.17	1633.11	9719.19	1636.77	9719.89	1636.96
9720.5	1636.9	9727.11	1636	9733.3	1635.01	9754.18	1635.62	9776.15	1636.41
9776.38	1636.4	9783.04	1635.59	9784.85	1635.37	9835.89	1636.29	9839.85	1636.34
9851.14	1634.7	9855.79	1634.06	9856.34	1634.13	9858.51	1634.38	9871.02	1635.79

9877.79	1636.5	9888.4	1636.44	9906.83	1636.3	9916.41	1636.27	9925.37	1636.12
9938.02	1635.8	9938.48	1635.79	9938.58	1635.78	9938.79	1635.76	9947.15	1635.05
9951.96	1634.5	9963.14	1634.39	9973.21	1634.56	9983.27	1635.23	9996.84	1635.42
10014.05	1635.4	10019.88	1634.77	10033.01	1633.73	10046.05	1634.82	10051.24	1635.04
10057.73	1635.7	10057.87	1635.72	10058.73	1635.72	10078.09	1635.65	10091.32	1635.66
10095.68	1635.6	10095.96	1635.56	10101.99	1634.31	10108.59	1634.53	10122.33	1634.86
10136.83	1634.6	10149.01	1634.04	10158.5	1633.16	10161.75	1632.89	10166.91	1635.14
10179.06	1640.9								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6596.9	.15	9694.81	.068	9938.79	.045	10057.73	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9938.79	10057.73	260	371.74	350	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1634.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.148	0.045	0.068
W.S. Elev (ft)	1634.92	Reach Len. (ft)	260.00	371.74	350.00
Crit W.S. (ft)		Flow Area (sq ft)	3146.77	29.25	41.08
E.G. Slope (ft/ft)	0.009264	Area (sq ft)	3146.77	29.25	41.08
Q Total (cfs)	3732.00	Flow (cfs)	3613.06	57.17	61.77
Top Width (ft)	2626.96	Top Width (ft)	2499.06	60.51	67.39
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)	1.15	1.95	1.50
Max Chl Dpth (ft)	3.39	Hydr. Depth (ft)	1.26	0.48	0.61
Conv. Total (cfs)	38773.5	Conv. (cfs)	37537.8	594.0	641.7
Length Wtd. (ft)	280.78	Wetted Per. (ft)	2501.64	60.65	67.95
Min Ch El (ft)	1633.73	Shear (lb/sq ft)	0.73	0.28	0.35
Alpha	1.02	Stream Power (lb/ft s)	0.84	0.55	0.53
Frctn Loss (ft)	2.69	Cum Volume (acre-ft)	621.38	22.38	40.45
C & E Loss (ft)	0.02	Cum SA (acres)	468.34	10.64	41.27

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6596.90	7432.37	731.61	670.14	562.29	19.60	1.19	1.09
7432.37	8267.84	1254.17	1085.29	836.19	33.61	1.30	1.16
8267.84	9103.32	889.27	832.17	721.03	23.83	1.16	1.07
9103.32	9938.79	738.01	559.17	382.12	19.78	1.47	1.32
LB 9938.79	RB 10057.73	57.17	29.25	60.65	1.53	0.48	1.95
10057.73	10179.06	61.77	41.08	67.95	1.66	0.61	1.50

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.462**

INPUT
Description: RM.3.462. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR SIGNAL BUTTE RD.

Station Elevation Data num= 268

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6404.21	1633.9	6418.29	1634.05	6426.22	1633.99	6435.65	1633.85	6456.77	1633.66
6466.46	1633.6	6483.24	1633.1	6489.29	1633.06	6493.32	1633.37	6496.1	1632.72
6501.79	1632.6	6511.26	1632.77	6518.61	1632.99	6522.99	1633.01	6538.14	1632.91
6544.98	1632.8	6572.22	1632.31	6576.07	1632.29	6626.13	1632.44	6632.21	1632.5
6642.48	1632.3	6700.68	1631.44	6711.26	1631.4	6729	1631.31	6737.54	1631.66
6780.36	1632	6800.54	1631.66	6807.39	1632.21	6815.99	1630.23	6819.01	1629.57
6819.59	1629.6	6822.95	1629.94	6825.1	1630.13	6844.59	1629.89	6846.73	1629.85
6847.41	1629.8	6849.82	1630.08	6863.59	1631.94	6895.68	1631.53	6912.25	1631.34
6925.63	1631.3	6948.21	1631.31	6983.31	1631.33	7053.54	1631.5	7110.79	1631.78
7115.27	1631.8	7163.13	1631.88	7163.34	1631.88	7163.45	1631.88	7163.58	1631.88
7164.14	1631.9	7205.11	1631.59	7231.79	1631.53	7246.9	1631.4	7267.24	1631.41
7288.4	1631.5	7299.99	1631.46	7335.99	1631.52	7339.81	1631.53	7379.14	1631.25
7404.45	1631.2	7416.91	1631.29	7453.01	1630.97	7491.86	1631.44	7520.16	1631.54
7537.29	1631.3	7565.05	1630.52	7565.74	1630.52	7571.59	1630.53	7593.21	1630.57
7596.72	1630.6	7598.53	1630.66	7610.01	1631.18	7613.12	1631.17	7615.83	1631.37
7678.18	1631.5	7737.93	1631.52	7780.99	1631.33	7818.56	1630.95	7850.35	1630.88
7864.79	1630.5	7889.38	1630.29	7894.05	1629.16	7898.23	1628.59	7906.89	1629.83
7908.26	1630	7957.42	1629.83	7971.76	1629.8	7976.6	1629.89	8007.48	1630.55
8008.83	1630.6	8011.14	1630.49	8020.1	1630.17	8037.7	1630.52	8051.65	1630.77
8062.81	1631.1	8069	1631.28	8073.79	1631.39	8091.14	1631.68	8107.81	1631.91
8160.24	1632.2	8171.11	1632.34	8192.38	1631.92	8193.4	1631.89	8211.05	1631.94
8284.95	1632.1	8294.58	1631.04	8300.31	1630.53	8301.89	1630.56	8336.73	1630.95
8341.11	1630.9	8342.32	1631.1	8343.49	1631.15	8345	1631.23	8354.85	1631.88
8376.24	1632	8387.05	1632.1	8403.77	1632.27	8412.43	1632.32	8423.38	1632.39
8445.87	1632	8473.67	1632.25	8480.66	1632.24	8480.98	1632.12	8487.56	1630.21
8488.71	1630.2	8491.12	1630.22	8560.27	1630.42	8590.31	1630.21	8594.04	1630.19
8596.63	1630.1	8606.51	1629.24	8606.96	1629.23	8635.13	1629.42	8639.06	1628.89
8640.65	1628.9	8642.14	1628.96	8646.52	1629.56	8677.75	1629.81	8681.23	1630.16
8688.42	1631.3	8690.31	1631.34	8695.63	1631.37	8700.63	1631.38	8703.24	1631.37
8744.8	1631.7	8759.95	1631.65	8774.1	1631.69	8778.76	1631.68	8807.14	1631.49
8820.34	1631.4	8851.88	1631.26	8855.04	1631.25	8864.13	1631.12	8872.58	1630.23
8875.87	1629.9	8886.1	1629.87	8891.03	1629.89	8896.65	1629.96	8920.22	1629.87
8923.43	1629.9	8940.81	1630.1	8944.45	1630.14	8945.68	1630.16	8948.2	1630.23
8988.99	1630.3	8997.55	1630.23	9013.63	1630.16	9053.58	1629.58	9055.99	1630.14
9059.71	1631.5	9081.41	1631.53	9088.21	1631.67	9111.03	1632.23	9144.49	1631.88
9172.64	1631.6	9180.98	1631.57	9186.06	1630.41	9186.81	1630.29	9189.94	1630.35
9220.96	1631	9222.42	1630.97	9227.47	1631.53	9232.06	1632.08	9250.24	1631.93
9280.64	1631.7	9286.95	1631.63	9316.12	1631.73	9316.14	1631.73	9316.29	1631.74
9316.47	1631.7	9332.8	1631.48	9352.27	1630.96	9354.59	1630.9	9356.06	1630.86
9376.42	1631	9385.31	1631.07	9398.73	1631.36	9403.58	1631.43	9406.84	1631.52
9415.05	1631.5	9415.9	1631.55	9416.3	1631.55	9425.53	1631.68	9426.17	1631.68
9426.74	1631.7	9427.08	1631.68	9427.42	1631.68	9436.46	1631.67	9444.1	1631.65
9455.53	1631.6	9468.68	1631.59	9484.74	1631.37	9488.29	1631.44	9495.1	1631.64
9506.08	1631.9	9513.37	1632.09	9513.75	1632.09	9520.53	1632.12	9523.15	1632.14
9532.7	1632.2	9546.05	1632.25	9554.45	1632.26	9555.86	1632.29	9569.92	1632.7
9576.78	1632.9	9585.46	1632.97	9591.22	1633.01	9630.2	1632.38	9669.99	1633.26
9678.1	1633.2	9705.44	1632.89	9726.82	1632.55	9742.94	1632.52	9745.35	1632.68
9752.31	1633.2	9772.7	1632.22	9785.42	1631.71	9795.56	1631.39	9796.63	1631.21

9806.09	1632	9813.87	1632.52	9816.72	1632.55	9822.61	1632.66	9844.22	1633.05
9868.63	1633.2	9871.69	1633.19	9876.87	1633.01	9878.35	1632.97	9935.39	1633.05
9941.71	1633.1	9966.25	1627.59	9966.51	1627.52	9968	1627.25	9970.19	1627.33
9989.33	1627.6	10007.52	1630.47	10011.41	1631.41	10026.68	1631.82	10041.71	1632.19
10073.3	1633.11	10081.64	1633.36	10091.03	1633.58	10102.65	1633.93	10103.77	1634
10104.34	1634	10106.12	1634.03	10167.53	1638.05				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6404.21	.15	9822.61	.068	9941.71	.045	10073.3	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9941.71	10073.3	400	399.38	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1632.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.150	0.045	
W.S. Elev (ft)	1632.04	Reach Len. (ft)	400.00	399.38	400.00
Crit W.S. (ft)		Flow Area (sq ft)	2422.20	216.39	
E.G. Slope (ft/ft)	0.009969	Area (sq ft)	2422.20	216.39	
Q Total (cfs)	3732.00	Flow (cfs)	2450.80	1281.20	
Top Width (ft)	2754.21	Top Width (ft)	2665.17	89.04	
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	1.01	5.92	
Max Chl Dpth (ft)	4.79	Hydr. Depth (ft)	0.91	2.43	
Conv. Total (cfs)	37377.5	Conv. (cfs)	24545.8	12831.7	
Length Wtd. (ft)	399.80	Wetted Per. (ft)	2667.32	89.91	
Min Ch El (ft)	1627.25	Shear (lb/sq ft)	0.57	1.50	
Alpha	6.35	Stream Power (lb/ft s)	0.57	8.87	
Frctn Loss (ft)	3.38	Cum Volume (acre-ft)	604.76	21.34	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	452.93	10.00	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6404.21	7288.58	237.28	347.55	625.86	6.36	0.56	0.68
7288.58	8172.96	876.30	857.21	842.50	23.48	1.02	1.02
8172.96	9057.33	1173.99	973.68	747.08	31.46	1.30	1.21
9057.33	9941.71	163.23	243.76	451.88	4.37	0.54	0.67
LB 9941.71	RB 10073.30	1281.20	216.39	89.91	34.33	2.43	5.92

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.386**

INPUT
Description: RM. 3.386. BLOCKED INEFF. FLOW AREA USED BELOW EL1626 AND BETWEEN STA.8450 AND 8670 TO BLOCK OUT RET.BASIN. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.6439.84.

Station Elevation Data num= 296

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6177.65	1630.6	6204.47	1630.4	6260.31	1630.17	6315.77	1629.94	6331.51	1629.98
6340.18	1629.9	6363.04	1629.74	6384.72	1629.57	6386.61	1629.44	6396.67	1628.86
6398.19	1629	6405.25	1629.35	6418.88	1629.36	6424.03	1629.49	6439.84	1629.48
6444.11	1629.3	6445.73	1629.35	6466.06	1629.33	6469.69	1629.33	6472.94	1629.32
6488.93	1629.3	6513.31	1629.31	6549.51	1629.09	6552.17	1629.21	6556.68	1628.85
6560.8	1628.5	6564.53	1628.18	6576.77	1628.23	6593.83	1628.29	6599.27	1628.13
6600.28	1628.1	6606.04	1628.12	6644.15	1628.44	6676.2	1628.68	6694.83	1628.53
6697.96	1628.5	6700.59	1628.48	6700.88	1628.48	6701.02	1628.48	6702.66	1628.48
6708.15	1628.5	6742.99	1626.98	6775.67	1626.81	6777.22	1627.07	6784.54	1627.11
6807.17	1627.4	6807.4	1627.39	6810.27	1627.68	6815.41	1628.13	6818.18	1628.14
6880.59	1628.6	6901.75	1628.68	6906.97	1628.68	6911.28	1628.71	6920.24	1628.54
6938.68	1628.3	6972.89	1628.2	6973.53	1628.23	6975.15	1628.31	6979.3	1628.5
6980.9	1628.5	6982.29	1628.48	6984.3	1628.43	6987.91	1628.23	6988.65	1628.23
6991.02	1628.2	6993.33	1628.26	7019.08	1628.54	7020.62	1628.55	7023.28	1628.5
7025.4	1628.4	7027.26	1628.42	7029.37	1628.36	7032.31	1628.34	7048.79	1628.16
7108.89	1627.9	7122.96	1627.92	7127.19	1627.93	7140.2	1627.9	7155.55	1627.9
7190.99	1627.7	7192.62	1627.62	7195.67	1627.4	7199.9	1627.42	7232.49	1627.23
7235.31	1627.2	7237.09	1627.35	7241.73	1627.75	7245.57	1628.08	7250.45	1628
7346.36	1627.1	7363.33	1626.94	7374.54	1626.83	7404.18	1626.63	7406.93	1626.61
7413.29	1626.9	7415.5	1626.98	7416.97	1627.05	7443.77	1626.92	7446.86	1626.88
7448.7	1626.9	7453.8	1626.63	7483.96	1626.74	7534.75	1626.72	7561.67	1626.95
7579.65	1626.9	7585.28	1627.2	7594.97	1626.69	7599.74	1626.46	7608.23	1626.48
7625.04	1626.3	7627.27	1626.31	7630.02	1626.29	7636.12	1626.27	7643.68	1626.27
7648.72	1626.2	7649.38	1626.26	7650.1	1626.28	7651.62	1626.36	7652.53	1626.37
7664.9	1626.8	7665.29	1626.77	7671.62	1626.77	7700.23	1627.13	7767.55	1628.11
7791.94	1628.2	7846.52	1628.41	7849.79	1628.4	7895.45	1628.35	7923.69	1628.44
7926.05	1628.4	7929.13	1628.45	7931.62	1628.43	7932.81	1628.44	7941.2	1628.43
7942.09	1628.4	7978.67	1628.43	7998.02	1628.42	8000.07	1628.67	8001.54	1629.28
8002.1	1629.4	8004.84	1628.95	8005.47	1628.78	8020.09	1628.21	8029.42	1628.41
8034.23	1628.6	8036.79	1628.78	8073.09	1629.01	8091.74	1629.03	8112.78	1629.07
8157.07	1628.2	8159.09	1628.19	8159.95	1628.18	8162.27	1628.11	8217.42	1627.94
8226.28	1627.9	8227.45	1627.93	8236.42	1627.88	8261.2	1627.65	8300.28	1627.2
8308.24	1627.7	8311.77	1627.95	8314.65	1627.9	8319.88	1627.92	8323.54	1628.03
8361.12	1628.3	8367.22	1628.3	8405.92	1628.48	8411.82	1628.23	8426.19	1626.21
8450.12	1622.4	8460.1	1622.57	8470.24	1622.72	8524.36	1623.61	8534.46	1623.76
8573.34	1624	8577.18	1624.01	8598.91	1623.76	8600.83	1623.58	8621.5	1623.18
8631.49	1623	8635.98	1623.8	8649.33	1626.25	8652	1626.26	8672.94	1626.33
8678.95	1626.3	8708.17	1626.28	8713.26	1626.52	8720.27	1626.82	8744.55	1627.47
8746.27	1627.5	8747.66	1627.53	8748.13	1627.53	8750.79	1627.5	8772.03	1627.05
8783.39	1627	8794.1	1626.91	8795.95	1626.9	8806.79	1627.01	8814.11	1627.03
8825.45	1627.1	8834.11	1627.13	8841.84	1627.14	8846.75	1627.1	8872.11	1627.11
8875.97	1627.3	8877.92	1627.41	8890.17	1628.06	8905.85	1628.94	8914.2	1628.94
8917.39	1628.8	8922.98	1628.66	8929.36	1628.37	8948.54	1627.53	8949.37	1627.49
8949.49	1627.5	8949.64	1627.48	8949.77	1627.48	8971.82	1627.54	8984.69	1627.73
8993.18	1628	9003.19	1628.28	9040.1	1628.36	9057.89	1628.47	9073.89	1628.56
9088.7	1628.7	9089.43	1628.6	9107.24	1628.7	9121.77	1628.8	9125.55	1629.72
9128.4	1630.3	9136.86	1630.31	9156.57	1630.36	9162.46	1630.41	9201.12	1630.64
9221.99	1630.3	9230.56	1630.25	9232.3	1629.63	9233.3	1629.29	9234.82	1629.1
9240.54	1628.5	9244.9	1628.63	9251.79	1628.84	9265.18	1629.19	9278.15	1629.49
9312.25	1630.3	9332.4	1630.65	9335.62	1630.62	9362.62	1630.41	9392.11	1630.18
9399.66	1630.4	9415.28	1630.87	9424.84	1630.94	9454.47	1630.35	9465.15	1631.31
9480.83	1631.1	9496.77	1631.21	9523.65	1630.33	9550.56	1630.62	9563.72	1630.29
9585.87	1629.9	9622.89	1629.42	9653.41	1630.15	9658.36	1630.2	9675.32	1629.78
9717.06	1629.8	9727.86	1630.08	9755.6	1630.25	9761.78	1630.28	9762.36	1630.21
9790.85	1629.7	9855.16	1629.63	9880.56	1629.21	9883.25	1629.16	9893.41	1629.24

9902.61	1629.3	9903.09	1629.33	9914.39	1629.69	9920.41	1629.8	9921.82	1629.82
9942.96	1630	9967.41	1630.22	9972.82	1628.41	9987.58	1623.47	9992.37	1623.48
10006.07	1623.41	10015.25	1626.67	10023.32	1629.57	10041.78	1629.53	10047.69	1629.5
10049.35	1629.51	10076.89	1629.73	10129.81	1630.03	10181.45	1629.89	10210.73	1629.93
10228.1	1630.1								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6177.65	.15	9480.83	.068	9967.41	.045	10076.89	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9967.41	10076.89	450	404.63	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
6177.65	6439.84	1629.48	8450	8670	1626

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1628.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.150	0.045	
W.S. Elev (ft)	1628.65	Reach Len. (ft)	450.00	404.63	380.00
Crit W.S. (ft)	1628.04	Flow Area (sq ft)	2681.22	175.11	
E.G. Slope (ft/ft)	0.007164	Area (sq ft)	2681.22	175.11	
Q Total (cfs)	3732.00	Flow (cfs)	2609.95	1122.05	
Top Width (ft)	2434.45	Top Width (ft)	2385.77	48.68	
Vel Total (ft/s)	1.31	Avg. Vel. (ft/s)	0.97	6.41	
Max Chl Dpth (ft)	6.24	Hydr. Depth (ft)	1.12	3.60	
Conv. Total (cfs)	44093.5	Conv. (cfs)	30836.6	13257.0	
Length Wtd. (ft)	436.99	Wetted Per. (ft)	2390.28	50.44	
Min Ch El (ft)	1623.40	Shear (lb/sq ft)	0.50	1.55	
Alpha	7.62	Stream Power (lb/ft s)	0.49	9.95	
Frctn Loss (ft)	3.85	Cum Volume (acre-ft)	581.33	19.54	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	429.74	9.37	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6177.65	7125.09	162.74	292.59	540.41	4.36	0.54	0.56
7125.09	8072.53	972.03	1049.17	901.32	26.05	1.16	0.93
8072.53	9019.97	1471.49	1325.34	867.89	39.43	1.53	1.11
9019.97	9967.41	3.70	14.12	80.65	0.10	0.18	0.26
LB 9967.41	RB 10076.89	1122.05	175.11	50.44	30.07	3.60	6.41

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.310

INPUT
Description: RM. 3.310. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 6297.08

Station Elevation Data num= 254

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6115.85	1625.1	6163.39	1625.02	6222.58	1624.92	6254.16	1624.83	6273.71	1624.88
6273.86	1624.9	6274.38	1624.94	6282.2	1625.7	6289.84	1626.31	6294.82	1626.37
6297.08	1626.4	6305.68	1625.78	6313.85	1624.83	6315.75	1624.79	6335.86	1624.76
6346	1624.9	6357.24	1624.96	6357.43	1624.97	6385.06	1625.02	6434.59	1624.81
6463.77	1624.8	6477.93	1624.64	6521.21	1624.34	6521.41	1624.34	6531.86	1624.32
6545.05	1624.2	6562.22	1624.3	6564.21	1624.37	6565.45	1624.47	6567.33	1624.59
6569.23	1624.7	6577.1	1625.22	6595	1624.93	6671.72	1624.23	6675.85	1624.23
6677.39	1624.2	6684.65	1624.18	6727.29	1624.25	6739.74	1624.11	6744.92	1624.04
6749.5	1623.7	6768.56	1623.42	6769.93	1623.86	6777.98	1624.07	6780.17	1624.04
6785.35	1623.9	6791.23	1624.17	6791.55	1624.17	6793.22	1624.17	6794.1	1624.17
6796.53	1624.2	6822.13	1624.16	6833.62	1624.15	6839.54	1624.19	6844.07	1624.18
6884.4	1623.7	6890.07	1623.66	6892.76	1623.61	6893.87	1623.61	6894.66	1623.6
6895.31	1623.6	6895.74	1623.6	6899.01	1623.56	6899.16	1623.56	6900.51	1623.56
6916.13	1623.5	6958.36	1623.44	6961.04	1623.38	6969.36	1623.16	6978.68	1623.32
7001.12	1623.5	7007.79	1623.81	7013.57	1624.01	7030.17	1623.97	7060.38	1624
7089.57	1623.7	7148.3	1623.53	7165.42	1623.39	7180.11	1623.36	7180.6	1623.3
7188.58	1622.3	7208.27	1622.34	7219.88	1622.48	7227.13	1622.76	7230.1	1622.85
7251.73	1623.2	7258.44	1623.32	7263.33	1623.38	7303.1	1623.61	7384.27	1623.93
7412.28	1623.8	7421.69	1623.7	7427.49	1623.68	7433.65	1623.75	7489.82	1624.15
7496.88	1624.2	7498.5	1624.18	7518.97	1624.46	7539.69	1624.46	7592.31	1624.31
7610.88	1624.3	7615.44	1624.29	7629.44	1624.24	7667.49	1624.17	7685.4	1624.03
7733.46	1623.7	7742.59	1623.71	7757.65	1623.83	7772.01	1623.99	7786.31	1624.05
7796.14	1624.2	7821.12	1624.34	7838.02	1624.4	7859.11	1624.55	7927.05	1623.98
7944.24	1623.9	7978.01	1624.29	7978.15	1624.25	7985.17	1623.26	8022.94	1624.22
8026.69	1624.3	8050.54	1624.18	8096.53	1623.78	8164.93	1623.76	8195.62	1623.89
8215.25	1624	8272.78	1624.26	8276.63	1624.18	8291.77	1623.93	8317.31	1623.52
8333.46	1623.1	8350.5	1623.14	8394.21	1623.22	8410.17	1623.21	8411.51	1623.31
8432.94	1624.1	8437.62	1624.17	8440.78	1624.15	8471.85	1623.74	8473.81	1623.76
8478.82	1623.8	8482.02	1623.66	8542.26	1623.9	8557.17	1623.79	8559.16	1623.73
8561.39	1623.8	8571.07	1623.73	8632.74	1623.52	8689.2	1623.89	8702.66	1623.94
8721.65	1623.9	8791.57	1624.14	8801.64	1624.22	8808.8	1624.17	8832.63	1624.53
8835.66	1624.5	8876.08	1624.64	8876.87	1624.64	8884.9	1624.71	8891.17	1627.27
8891.81	1627.4	8893.69	1626.85	8899.94	1625.05	8902.11	1625.02	8909.46	1624.78
8927.51	1624.6	9022.01	1623.99	9024.96	1623.96	9030.07	1623.58	9038.88	1622.91
9051.26	1623.8	9060.35	1624.66	9063.16	1624.72	9070.01	1624.62	9105.63	1624.87
9107.19	1625	9109.11	1625	9122.21	1625.13	9125.44	1624.81	9131.25	1624.18
9141.29	1624.5	9148.38	1624.75	9164.93	1625.33	9278.35	1626.44	9283.64	1626.48
9290.82	1626.5	9302.33	1626.63	9402.15	1627.32	9415.03	1627.45	9422.46	1627.18
9434.5	1626.8	9448.38	1626.43	9452.69	1626.31	9467.3	1626.77	9474.83	1627
9478.35	1627	9521.06	1626.74	9571.17	1626.81	9639.77	1626.36	9642.6	1626.33
9643.01	1626.3	9643.41	1626.32	9649.5	1626.32	9758.49	1626.17	9790.28	1626.17
9835.07	1626.5	9873.52	1626.68	9878.4	1626.56	9884.11	1626.48	9894.82	1626.29
9897.54	1626.2	9938.09	1625.87	9950.84	1629.16	9951.34	1629.3	9951.9	1629.3
9960.05	1629.3	9973.23	1625.01	9986.23	1620.77	9993.8	1620.89	10012.1	1621.2
10014.66	1622.1	10025.24	1623.87	10026.15	1624.05	10046.39	1626.83	10048.11	1626.85
10070.23	1627	10100.76	1626.95	10119.12	1626.82	10193.19	1625.84	10205	1626.01
10209.65	1626.1	10217.73	1626.27	10223.02	1626.38	10238.65	1626.19	10261.93	1626.04
10268.11	1626.3	10275.8	1626.66	10280.53	1626.87	10298.79	1627.76	10298.91	1627.77
10299.28	1627.8	10299.78	1627.76	10323.66	1627.46	10324.09	1627.46	10325.69	1627.46
10336.34	1627.4	10340.17	1627.44	10346.96	1627.43	10356.13	1627.44	10360.17	1627.53
10368.85	1627.4	10371.49	1627.38	10379.46	1627.77	10383.71	1627.76		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6115.85	.15	7303.1	.1	8571.07	.15	9070.01	.068	9973.23	.045
10046.39	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9973.23	10046.39	380	395.59	410	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
6115.85	6297.08	1626.4

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1625.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.121	0.045	
W.S. Elev (ft)	1624.81	Reach Len. (ft)	380.00	395.59	410.00
Crit W.S. (ft)	1624.70	Flow Area (sq ft)	2256.33	154.35	
E.G. Slope (ft/ft)	0.011001	Area (sq ft)	2256.33	154.35	
Q Total (cfs)	3732.00	Flow (cfs)	2715.42	1016.58	
Top Width (ft)	2709.38	Top Width (ft)	2651.53	57.85	
Vel Total (ft/s)	1.55	Avg. Vel. (ft/s)	1.20	6.59	
Max Chl Dpth (ft)	4.04	Hydr. Depth (ft)	0.85	2.67	
Conv. Total (cfs)	35581.5	Conv. (cfs)	25889.3	9692.3	
Length Wtd. (ft)	382.81	Wetted Per. (ft)	2652.09	58.86	
Min Ch El (ft)	1620.77	Shear (lb/sq ft)	0.58	1.80	
Alpha	5.37	Stream Power (lb/ft s)	0.70	11.86	
Frctn Loss (ft)	3.72	Cum Volume (acre-ft)	555.83	18.01	40.28
C & E Loss (ft)	0.04	Cum SA (acres)	403.72	8.88	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6115.85	7080.20	364.75	447.60	633.41	9.77	0.71	0.81
7080.20	8044.54	1174.35	897.53	964.53	31.47	0.93	1.31
8044.54	9008.89	1113.29	844.31	941.04	29.83	0.90	1.32
9008.89	9973.23	63.03	66.90	113.11	1.69	0.59	0.94
LB 9973.23	RB 10046.39	1016.58	154.35	58.86	27.24	2.67	6.59

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.235

INPUT
Description: RM. 3.235. HORZ. N VALUES USED. AREA TO LT OF STA. 6514.73 BLOCKED OUT, AND TO RT. OF STA. 10048.52.

Station Elevation Data num= 270

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5901.57	1621.9	5921.29	1621.96	5997.74	1621.34	6015.78	1621.24	6023.78	1621.43
6029.98	1621.6	6033.72	1621.62	6036.81	1621.43	6057.18	1621.25	6064.42	1621.14
6065.64	1621.2	6072.28	1621.6	6084.26	1622.31	6105.56	1621.93	6118.31	1621.72
6160.44	1621.3	6198.56	1620.86	6205.85	1620.8	6229	1620.58	6232.43	1620.55
6240.13	1620.7	6250.7	1620.99	6253.67	1621.08	6258.59	1621.04	6264.34	1621.04
6284.14	1621	6284.57	1621.03	6324.09	1620.91	6372.44	1620.72	6406.78	1620.8
6418.67	1621	6423.44	1620.86	6434.87	1621.07	6451.63	1621.52	6460.2	1621.48
6514.73	1621.6	6598.11	1621.6	6621.62	1621.16	6674.16	1620.54	6690.71	1620.3
6704.02	1620.2	6704.17	1620.21	6728.51	1620.35	6754.71	1620.49	6765.55	1620.32
6766.65	1620.4	6775.01	1621.18	6775.09	1621.18	6775.15	1621.18	6776.51	1621.21
6787.78	1621.4	6788.33	1621.41	6788.84	1621.39	6792.08	1621	6798.28	1619.73
6825.23	1619.8	6825.66	1619.95	6826.9	1619.92	6830.64	1619.64	6831.94	1620.05
6835.39	1620.2	6848.24	1620.6	6871.98	1620.37	6893.6	1620.13	6907.02	1620.11
6913.53	1620.1	6940.25	1619.53	6959.27	1619.19	6975.35	1619.67	6996.51	1620.49
6998.21	1620.5	7004.36	1620.65	7013.88	1620.69	7045.23	1621.09	7049.32	1621.14
7081.5	1620.3	7091.26	1620.07	7102.15	1619.89	7132.2	1619.5	7153.56	1619.39
7155.13	1619.4	7181.14	1619.11	7191.84	1619.2	7231.53	1619.43	7235.48	1619.45
7236.17	1619.5	7339.52	1620.48	7356.16	1620.5	7387.54	1619.78	7394.55	1619.63
7395.82	1619.6	7402.51	1620	7406.73	1619.95	7412.61	1619.93	7454.31	1620.07
7454.96	1620	7461.58	1620.02	7467.4	1620.16	7521.92	1620.51	7595.3	1620.38
7704.32	1621.3	7709.22	1621.28	7710.35	1621.26	7712.46	1621.22	7713.94	1621.19
7728.05	1620.9	7755.04	1620.94	7769.15	1620.11	7775.52	1620.18	7784.6	1620.26
7794.36	1620.3	7811.08	1620.27	7821.71	1620.23	7845.33	1620.11	7857.06	1620.15
7886.72	1620.2	7927.37	1620.26	7954.02	1620.51	7980.24	1620.87	7986.96	1620.84
8005.24	1620.9	8066.49	1621.01	8070.12	1621.01	8071.27	1621.01	8073.59	1621.02
8086.67	1620.7	8138.22	1619.48	8150.44	1619.49	8154.64	1619.5	8182.27	1619.55
8190.21	1619.5	8212.48	1619.32	8217.96	1619.15	8251.52	1619.45	8276.13	1619.38
8302.42	1619.5	8309.23	1619.59	8429.25	1619.42	8432.31	1619.42	8432.81	1619.42
8433.92	1619.4	8438.74	1619.43	8562.74	1619.83	8590.46	1620.3	8639.91	1620.75
8645.27	1620.8	8656.61	1620.95	8673.22	1621.61	8685.62	1621.65	8731.18	1621.9
8735.19	1621.9	8757.56	1621.21	8793.05	1620.62	8796.13	1620.59	8801.72	1620.56
8841.23	1620.4	8876.4	1621.37	8936.13	1621.35	8993.97	1621.37	8996.93	1621.35
8997.92	1621.4	8998.54	1621.38	9000.21	1621.38	9002.11	1621.38	9049.22	1621.59
9051.59	1621.6	9057.13	1621.72	9061.02	1621.8	9091.89	1622.75	9109.55	1622.88
9137.11	1623	9147.52	1622.89	9155.03	1622.98	9163.51	1623.09	9269.31	1624.08
9325.02	1624.6	9349.84	1625.07	9349.87	1625.07	9349.97	1625.07	9372.56	1623.91
9373.53	1623.9	9384.46	1624.48	9387.57	1624.75	9393.22	1624.74	9508.46	1623.97
9516.32	1623.9	9528.31	1623.74	9628.03	1622.79	9661.68	1622.6	9710.7	1622.75
9727.9	1622.7	9728.74	1622.72	9729.35	1622.72	9747.6	1622.77	9817.83	1622.73
9867.18	1622.7	9882.34	1622.75	9887.34	1622.83	9903.85	1623.12	9951.2	1624.19
9965.45	1624.4	9972.67	1624.77	9982.97	1621.36	9990.18	1618.99	10000.25	1618.92
10003.15	1618.91	0005.35	1618.89	10014.71	1619.16	10017.03	1619.07	10030.43	1623.81
10035.08	1625.31	0038.45	1625.41	10045.59	1625.53	10048.52	1625.62	10055.12	1624.38
10059.06	1623.21	0071.94	1623.31	0092.29	1623.34	10102.73	1623.31	10115.51	1623.37
10123.62	162	10129.22	1620.95	10142.89	1622.25	10143.04	1622.26	10143.09	1622.26
10151.93	1622.61	0157.18	1622.16	10159.34	1621.61	0160.55	1621.41	0173.88	1622.03
10180.06	1622.41	0183.55	1622.45	10185.94	1622.46	10215.89	1622.22	10231.71	1622.28
10233.9	1622.31	0234.65	1622.29	10240.37	1622.36	10256.79	1622.59	10267.32	1622.5
10276.2	1622.31	0283.62	1622.55	10296.17	1622.71	0303.18	1622.87	10314.95	1623.13
10328.48	1620.81	0329.96	1620.56	10331	1620.71	0336.97	1621.75	10348.87	1623.11
10351.22	1623.51	0359.37	1623.61	0368.35	1623.53	10383.22	1623.47	10390.48	1623.33
10402.36	1623.4	10413.7	1623.59	10419.26	1623.64	10422.95	1623.71	0448.87	1624.46
10453.16	1624.61	0492.73	1624.47	10523.98	1624.18	10525.37	1624.15	10529.62	1624.04
10542.18	1623.71	0546.82	1623.98	10558.72	1624.59	10565.55	1624.66	10573.22	1624.78

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5901.57	.15	6913.53	.068	7794.36	.12	8685.62	.068	9972.67	.045
10035.08	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9972.67	10035.08	375	388.39	390	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5901.57	6514.73	1621.61	10048.52	10573.22	1625.62

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1621.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.093	0.045	
W.S. Elev (ft)	1621.19	Reach Len. (ft)	375.00	388.39	390.00
Crit W.S. (ft)	1620.63	Flow Area (sq ft)	2177.69	72.84	
E.G. Slope (ft/ft)	0.008700	Area (sq ft)	2177.69	72.84	
Q Total (cfs)	3732.00	Flow (cfs)	3398.80	333.20	
Top Width (ft)	2154.48	Top Width (ft)	2114.96	39.52	
Vel Total (ft/s)	1.66	Avg. Vel. (ft/s)	1.56	4.57	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)	1.03	1.84	
Conv. Total (cfs)	40011.4	Conv. (cfs)	36439.1	3572.3	
Length Wtd. (ft)	376.25	Wetted Per. (ft)	2115.44	40.24	
Min Ch El (ft)	1618.89	Shear (lb/sq ft)	0.56	0.98	
Alpha	1.49	Stream Power (lb/ft s)	0.87	4.50	
Frctn Loss (ft)	3.62	Cum Volume (acre-ft)	536.49	16.98	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	382.93	8.43	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5901.57	6919.34	193.50	229.32	284.39	5.18	0.81	0.84
6919.34	7937.12	1942.36	1000.92	994.72	52.05	1.01	1.94
7937.12	8954.89	1262.94	947.45	836.32	33.84	1.13	1.33
8954.89	9972.67						
LB 9972.67	RB 10035.08	333.20	72.84	40.24	8.93	1.84	4.57

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.161**

INPUT
Description: RM. 3.161. HORZ. N VALUES USED. AREA TO LT. OF STA. 6450.49 BLOCKED OUT, AND TO RT. OF STA. 10044.99.

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5468.62	1619.6	5499.49	1618.41	5544.71	1618.19	5577.7	1618.19	5589.85	1618.12
5626.7	1617.9	5640.03	1617.88	5651.59	1617.98	5654.66	1618.05	5657.05	1618.09
5657.95	1618.1	5680.26	1618.26	5687.96	1618.32	5706.25	1618.92	5708.7	1618.99
5712.17	1619	5784.92	1619.05	5788.44	1619.05	5790.06	1619.04	5792.5	1619.03
5821.05	1618.8	5860.47	1618.55	5862.81	1618.54	5877.55	1618.54	5893.38	1618.49
5906.76	1618.3	5908.45	1618.37	5961.35	1618.04	5977.01	1617.88	6002.36	1617.75
6002.78	1617.7	6024.09	1617.41	6024.51	1617.56	6040.49	1617.31	6043.46	1617.29
6045.89	1617.3	6063.18	1617.73	6066.59	1617.84	6072.44	1618.05	6072.48	1618.05
6072.5	1618.1	6072.74	1618.05	6118.98	1617.93	6143.42	1618.01	6149.07	1618.03
6180.18	1618.2	6187.01	1618.29	6198.77	1618.36	6210.74	1618.39	6238.23	1618.51
6257.53	1618.3	6260.78	1618.29	6264.34	1618.35	6283.67	1618.82	6284.11	1618.8
6284.81	1618.8	6295.33	1618.24	6302.3	1618.04	6345.19	1618.05	6352.88	1618.05
6381.78	1618	6396.45	1618	6401.6	1617.63	6406.63	1617.31	6408.51	1617.25
6411.28	1617.3	6441.23	1617.92	6441.94	1617.98	6442.81	1618.05	6450.49	1618.6
6490.21	1618.3	6504.34	1618.15	6507.11	1618.11	6510.7	1618.09	6512.7	1618.08
6605.53	1617.3	6617.99	1617.3	6620.69	1617.38	6626.77	1617.46	6627.94	1617.54
6645.75	1617.3	6660.73	1617.11	6665.59	1617.43	6668.43	1617.56	6684.6	1617.61
6698.64	1617.6	6701.61	1617.48	6721.16	1617.38	6722.75	1617.36	6723.1	1617.36
6724.88	1617.3	6766.64	1617.09	6772.99	1617.03	6806.37	1617.02	6841.54	1616.61
6844.54	1616.6	6857.21	1616.63	6867.34	1616.77	6875.58	1616.77	6920.64	1616.58
6946.3	1616.3	6983.79	1616.34	6996.9	1616.11	7002.22	1615.86	7017.2	1616.77
7022.24	1616.9	7027.82	1616.25	7044.8	1617.37	7057.3	1617.97	7067.11	1617.6
7106.03	1617.2	7143	1616.88	7199.4	1616.43	7221.37	1616.34	7232.38	1616.34
7251.34	1616.6	7260.55	1616.5	7307.88	1616.27	7310.6	1616.39	7346.24	1616.9
7374.77	1617	7417.67	1616.94	7466.34	1616.87	7476.95	1616.6	7570.15	1617.03
7586.44	1617.1	7598.23	1617.12	7706.54	1616.64	7748.66	1615.85	7750.69	1615.84
7772.12	1616.8	7779.03	1617.12	7797.56	1617.24	7810.45	1616.85	7825.03	1616.32
7841.11	1616.4	7946.96	1617.4	7952.27	1617.18	7955.93	1616.67	8035.74	1616.44
8051.57	1616.5	8053.42	1616.41	8082.78	1615.53	8099.84	1615.03	8124.59	1615.06
8134.75	1615.3	8143.76	1615.58	8165.53	1616.39	8183.06	1616.63	8186.82	1616.14
8195.99	1615	8204.96	1615.45	8209.33	1615.58	8224.93	1616.14	8232.29	1616.16
8242.19	1616.2	8279.81	1616.39	8304.25	1615.89	8309.2	1615.69	8310.66	1615.65
8324.17	1616.3	8328.5	1616.64	8341.87	1616.62	8361.05	1616.54	8362.72	1616.38
8379.51	1617	8387.4	1617.19	8425.65	1617.91	8437.5	1617.87	8465.58	1617.64
8488.2	1617.4	8512.74	1617.04	8525.34	1616.9	8547.25	1616.82	8622.77	1616.83
8643.34	1616.7	8643.8	1616.69	8644.71	1616.68	8645.29	1616.63	8668.57	1615.51
8673.56	1616.3	8684.76	1617.65	8692.3	1617.65	8714.41	1618.06	8728.2	1618.04
8740.58	1618	8743.25	1618	8787.45	1618.13	8862.15	1618.66	8907.55	1619.09
8997.74	1620	9027.65	1620.3	9031.45	1620.42	9033.93	1620.45	9040.49	1620.68
9059.96	1621.1	9081.57	1620.92	9147.76	1620.65	9186.67	1620.76	9223.28	1620.97
9243.07	1621.2	9272.53	1621.19	9278.03	1620.96	9280.15	1620.95	9282.53	1621.01
9286.24	1621	9289.93	1621.02	9297.12	1621.21	9308.15	1621.11	9318.25	1621.08
9350.12	1620.7	9390.95	1620.18	9413.59	1620.41	9416.41	1620.39	9416.76	1620.4
9516.31	1620.1	9584.4	1619.39	9613.06	1619.44	9623.35	1619.1	9652.28	1619.11
9748.26	1619.8	9753.61	1619.84	9754.86	1619.82	9756.98	1619.81	9758.86	1619.78
9761.34	1619.8	9763.83	1619.79	9794.75	1619.46	9799.07	1619.49	9802.53	1619.43
9807.61	1619.4	9837.01	1619.51	9868.37	1619.85	9903.21	1620.16	9915.3	1620.18
9934.17	1620.4	9938.15	1620.44	9939.81	1620.4	9944.61	1620.32	9948.32	1620.21
9950.86	1620.1	9956.1	1620.2	9961.1	1619.66	9964.7	1619.56	9964.97	1619.56
9965.69	1619.8	9978.5	1618.89	9981.21	1618.7	9982.06	1618.65	9982.5	1618.55
9992.27	1616.4	10003.2	1615.46	10004.86	1615.35	10007.61	1615.17	10016.1	1614.67
10018.09	1614.5	10021.08	1615.41	10028.53	1617.86	10042.14	1619.32	10044.99	1619.54
10072.26	1619.4	10089.84	1619.26	10092.09	1619.26	10093.98	1619.22	10105.34	1619.51
10110.56	1619.7	10117.86	1618.56	10121.41	1617.96	10122.93	1618.07	10129.96	1619.51
10145.81	1619	10146.38	1618.99	10147.49	1618.81	10148.61	1618.53	10155	1617.35

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 10159.9  1616.310161.76 1616.47 10173.5 1618.0110180.84 1618.2610185.93 1618.44
10196.02  1618.910206.93 1619.1710209.28 1618.28 10212.7 1617.0710220.64 1617.65
10224.12  1617.910245.27 1618.3510315.61 1619.9910318.91 1620.0710319.41 1620.08
10319.66  1620.110320.06 1620.0910320.11 1620.0910325.77 1619.9310373.14 1619.05
10377.17    161910377.52 1618.9510380.35 1619.1110382.12 1619.2310399.43 1619.19
10410.82  1619.310419.85 1619.3610440.19 1619.34 10441.9 1619.3310443.89 1619.33
10449.29  1619.310455.93 1619.5910467.51 1620.3210470.33 1620.5110473.64 1620.63
10486.78  1620.8 10498.7 1620.8310509.24 1620.6810526.95 1620.8410530.65 1620.88
10531.95  1620.910533.31  1620.9 10578.9 1620.4510592.36  1620.610596.89 1619.75
10599.72  1619.2 10605.6 1620.3910608.46 1621.0410613.56 1621.3610618.69 1621.63
10629.54  1621.910635.79 1622.1210640.61 1622.19

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 5468.62     .15  6996.9    .068 9297.12    .068 9965.69    .04510044.99    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9965.6910044.99               425  416.26     375              .1       .3

Blocked Obstructions      num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 5468.62 6450.49  1618.610044.9910640.61 1619.54
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1617.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.073	0.045	
W.S. Elev (ft)	1617.54	Reach Len. (ft)	425.00	416.26	375.00
Crit W.S. (ft)		Flow Area (sq ft)	1713.22	73.02	
E.G. Slope (ft/ft)	0.010648	Area (sq ft)	1713.22	73.02	
Q Total (cfs)	3732.00	Flow (cfs)	3367.15	364.85	
Top Width (ft)	2019.59	Top Width (ft)	1979.15	40.44	
Vel Total (ft/s)	2.09	Avg. Vel. (ft/s)	1.97	5.00	
Max Chl Dpth (ft)	3.04	Hydr. Depth (ft)	0.87	1.81	
Conv. Total (cfs)	36167.0	Conv. (cfs)	32631.2	3535.7	
Length Wtd. (ft)	424.52	Wetted Per. (ft)	1979.82	41.11	
Min Ch El (ft)	1614.50	Shear (lb/sq ft)	0.58	1.18	
Alpha	1.36	Stream Power (lb/ft s)	1.13	5.90	
Frctn Loss (ft)	4.08	Cum Volume (acre-ft)	519.74	16.33	40.28
C & E Loss (ft)	0.02	Cum SA (acres)	365.31	8.08	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5468.62	6592.89	0.17	1.01	15.47	0.00	0.07	0.16
6592.89	7717.16	1138.92	757.21	1066.75	30.52	0.71	1.50
7717.16	8841.42	2228.07	955.01	897.60	59.70	1.06	2.33
8841.42	9965.69						
LB 9965.69	RB 10044.99	364.85	73.02	41.11	9.78	1.81	5.00

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.082**

INPUT
Description: RM. 3.082. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.6302.82 AND TO RT. OF STA.10050.71.

Station Elevation Data num= 300

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5881.19	1615.1	5901.68	1615.27	5925.45	1614.84	5933.13	1614.81	5938.15	1614.79
5940.22	1614.7	5947.18	1614.72	5973.27	1614.4	5992.34	1614.65	6007.68	1614.55
6028.58	1614.7	6051.16	1614.47	6067.04	1614.81	6083.52	1614.6	6111	1614.25
6157.97	1613.4	6158.47	1613.53	6158.93	1613.78	6182.26	1613.77	6190.95	1613.71
6215.87	1613.8	6224.05	1613.88	6235.3	1613.93	6251.26	1613.56	6281.68	1613.98
6286.5	1614.4	6302.82	1614.45	6322.74	1614.32	6375.44	1614.11	6392.62	1613.52
6397.03	1613.4	6405.8	1613.57	6409	1613.6	6431.23	1613.87	6440.74	1613.94
6453.4	1614.1	6462.58	1614.29	6484.49	1613.89	6513.99	1613.65	6535.74	1613.45
6551.73	1613.6	6562.46	1613.52	6571.21	1613.54	6593.96	1613.4	6616.47	1613.33
6626.49	1613.5	6627.66	1613.31	6635.15	1613.27	6636.02	1613.26	6755.64	1612.44
6755.87	1612.4	6762.74	1612.56	6786.4	1613.15	6844.15	1613.01	6847.94	1613.07
6852.85	1613.3	6881.8	1613.15	6891.45	1613.15	6898.36	1612.88	6980.5	1612.11
6989.08	1612.1	6994.7	1612.03	7056	1611.89	7075.62	1611.82	7092.2	1612.38
7096.05	1612.6	7097.77	1612.46	7106.66	1612.55	7140.79	1612.38	7149.86	1612.4
7156.54	1612.4	7217.22	1612.52	7219.04	1612.46	7234.77	1612.29	7254.76	1612.12
7266.18	1612	7282.14	1611.74	7295.65	1611.68	7308.84	1612.01	7319.52	1612.31
7344.99	1612.1	7350.28	1612.08	7358.15	1612.18	7370.58	1612.25	7375.49	1610.67
7379.87	1608.3	7391.26	1612.07	7393.2	1612.83	7396.27	1612.79	7407.64	1612.68
7472.83	1612.2	7494.71	1612.35	7528.1	1612.47	7592.37	1612.34	7639.17	1611.96
7710.64	1612	7711.83	1612.03	7728.34	1612.12	7814.83	1613.56	7822.01	1613.69
7828.17	1613.7	7835.1	1611.9	7835.37	1611.77	7844.45	1612.22	7853.01	1612.18
7877.2	1611.8	7883.97	1611.86	7907.07	1612.15	7919.92	1611.78	7936.05	1611.28
7950.57	1611.1	7957.4	1610.86	7966.92	1610.04	7981.3	1610.7	7981.65	1610.71
7981.85	1610.7	7983.63	1610.73	8017.25	1611.01	8023.64	1610.99	8046.19	1610.86
8071.48	1610.7	8079.67	1610.69	8094.18	1610.66	8101.63	1610.58	8109.36	1610.62
8134.2	1611.3	8161.29	1611.8	8166.61	1611.38	8179.87	1610.26	8192.19	1610.75
8203.38	1611.5	8203.61	1611.55	8203.87	1611.55	8246.32	1611.98	8268.64	1612.39
8296.77	1612.9	8305.39	1613.1	8310.52	1613.12	8348.83	1613.13	8380.06	1613.5
8425.66	1614	8429.27	1613.98	8434.67	1613.99	8492.88	1613.83	8507.27	1613.79
8511.8	1613.8	8511.91	1613.75	8515.59	1613.69	8525.36	1613.81	8586.75	1614.39
8607.58	1614.3	8614.4	1614.34	8619.06	1614.35	8624.18	1614.39	8625.85	1614.4
8626.09	1614.4	8626.78	1614.4	8629.05	1614.4	8631.61	1614.41	8660.33	1614.63
8673.09	1614.7	8679.77	1614.85	8681.5	1614.81	8694.21	1614.66	8710.45	1615.15
8728.07	1615.4	8731.26	1615.46	8731.77	1615.47	8732.52	1615.48	8733.76	1615.52
8783.91	1615.5	8787.85	1615.54	8791.31	1615.5	8796.16	1615.47	8805.86	1615.5
8867.12	1615.7	8907.23	1615.7	8988.4	1615.86	9011.58	1615.96	9026.77	1616.04
9083.82	1616.2	9146.3	1616.68	9152.27	1616.67	9170.93	1616.7	9196.92	1616.67
9257.91	1616.4	9264.83	1616.3	9353.47	1614.75	9379.01	1614.6	9391.58	1614.54
9407.12	1614.4	9422.2	1614.46	9436.54	1614.57	9442.84	1614.43	9445.34	1614.61
9496.83	1614.9	9519.83	1614.97	9534.35	1615.01	9554.28	1615.22	9562.94	1615.22
9576.93	1615.5	9618.22	1616.07	9625.79	1616.08	9634.9	1616.16	9647.47	1616.08
9712.04	1616	9720.67	1615.96	9736.26	1615.97	9737.28	1615.97	9738.48	1615.98
9739.47	1616	9744.42	1616.02	9748.04	1616.05	9759.13	1616.13	9765.97	1616.14
9772.32	1616.2	9774.03	1616.24	9782.42	1616.13	9783.57	1616.11	9785.29	1616.07
9787.81	1616	9791.08	1615.98	9843.16	1615.72	9865.28	1615.75	9877.85	1616.35
9878.64	1616.4	9879.13	1616.37	9914.72	1616.04	9926.54	1615.96	9937.23	1616.67
9944.29	1617.1	9945.94	1617.13	9952.17	1617.02	9989.24	1616.52	9992.75	1616.6
9993.69	1616.1	9997.36	1612.65	10009.9	1612.69	10017.97	1612.71	10026.75	1614.34

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10031.06  1615.110050.71  1615.710059.47 1615.9710068.61 1615.6610096.02    1615
10100.32  1614.910103.34 1614.6910106.85 1614.5210115.46 1615.1110121.56 1615.55
10125.49  1615.610155.56 1615.9810156.33 1615.9910156.55 1615.9510156.86 1615.92
10179.53  1612.910187.76 1613.6110188.86 1613.6810196.86 1614.2310200.18 1614.48
10202.05  1614.6 10203.8 1614.6710212.02 1614.9610228.19 1615.5510232.55 1615.62
10242.35  1615.710253.36 1615.5710275.34  1615.110303.03  1615.110311.42 1615.12
 10313.3  1615.110318.83 1615.5910320.44 1615.6810321.34 1615.6810323.42 1615.69
10367.78  1615.910380.19 1616.1910384.31 1616.3710392.53 1616.5310396.14  1616.3
 10396.6  1616.310397.76 1616.2710406.06 1616.4610411.37 1615.7810418.86 1614.95
10424.53  1615.4 10427.6  1615.810435.65  1614.310437.98 1613.8210438.37 1613.85
10441.66  1614.110461.23 1616.1810462.21 1616.0410471.92 1615.1410473.34 1615.03
10474.97  1614.910477.29 1614.6710482.95 1614.9710501.05    161610503.52 1616.21

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 5881.19     .15 7396.27    .068 7907.07     .12 9791.08    .068 9945.94    .045
10050.71    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9945.9410050.71              370  403.32     390             .1       .3

Blocked Obstructions      num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 5881.19 6302.82 1614.8510050.7110503.52  1615.7

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1613.53   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.04   Wt. n-Val.                0.108      0.045
  W.S. Elev (ft)            1613.49   Reach Len. (ft)          370.00     403.32     390.00
  Crit W.S. (ft)            1612.51   Flow Area (sq ft)       2284.12      18.82
  E.G. Slope (ft/ft)       0.008801   Area (sq ft)            2284.12      18.82
  Q Total (cfs)             3732.00   Flow (cfs)              3685.20      46.80
  Top Width (ft)            1825.09   Top Width (ft)          1799.34      25.75
  Vel Total (ft/s)             1.62   Avg. Vel. (ft/s)           1.61       2.49
  Max Chl Dpth (ft)            5.19   Hydr. Depth (ft)           1.27       0.73
  Conv. Total (cfs)        39781.3    Conv. (cfs)            39282.5      498.8
  Length Wtd. (ft)          370.44    Wetted Per. (ft)        1801.50      26.16
  Min Ch El (ft)            1612.65   Shear (lb/sq ft)           0.70       0.40
  Alpha                        1.01   Stream Power (lb/ft s)     1.12       0.98
  Frctn Loss (ft)              3.56   Cum Volume (acre-ft)     500.24      15.89      40.28
  C & E Loss (ft)              0.00   Cum SA (acres)           346.87       7.76      41.00

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow      Area      W.P.     % Conv.   Hydr D.   Velocity
  (ft)          (ft)             (cfs)   (sq ft)     (ft)                (ft)      (ft/s)
  5881.19       6897.38          77.65    146.79    335.49      2.08      0.44       0.53
  6897.38       7913.57        2039.61   1248.63    999.92     54.65      1.25       1.63
  7913.57       8929.75        1567.94    888.71    466.09     42.01      1.91       1.76
  8929.75       9945.94
  LB 9945.94    RB 10050.71      46.80     18.82     26.16      1.25      0.73       2.49
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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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.006**

INPUT
Description: RM. 3.006. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR UNIVERSITY DR.

Station Elevation Data num= 307

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5622.28	1612.1	5624.12	1612.11	5626.1	1612.08	5639.1	1612.09	5669.38	1611.87
5669.44	1611.9	5669.47	1611.87	5669.48	1611.87	5700.86	1611.88	5706.36	1611.9
5710.94	1611.87	5722.79	1611.76	5779.55	1611.1	5795.49	1611.04	5806.25	1611
5850.72	1610.83	5909.28	1610.66	5943.75	1610.65	5990.95	1610.49	6029.17	1610.2
6031.99	1610.18	6032.07	1610.19	6036.82	1610.62	6079.15	1610.53	6086.59	1610.5
6089.95	1610.54	6101.05	1610.61	6103.22	1610.6	6105.51	1610.62	6134.3	1610.7
6137.74	1610.66	6140.71	1610.68	6184.39	1611.25	6205	1611.66	6226.06	1611.5
6245.17	1611.36	6252.91	1611.23	6266.24	1611.09	6266.82	1610.94	6295.76	1610.8
6299.4	1610.86	6300.53	1610.97	6307.64	1611.03	6310.82	1611.14	6319.22	1611.6
6325.65	1611.5	6328.51	1611.46	6331.06	1611.28	6332.74	1611.26	6381.81	1610.5
6388.86	1610.48	6392.29	1610.47	6394.04	1610.45	6398.81	1610.41	6415.8	1610.3
6494.6	1609.85	6505.59	1609.93	6516.4	1609.45	6516.47	1609.45	6521.03	1611.2
6521.55	1611.45	6546.46	1611.02	6589.03	1610.03	6594.25	1610.06	6610.78	1610.4
6624.58	1610.51	6628.65	1610.47	6686.38	1610.82	6706.65	1610.85	6741.37	1610.3
6753.92	1610.08	6813.69	1609.27	6827.19	1609.31	6840.89	1609.54	6854.56	1609.5
6868.45	1609.77	6938.31	1608.79	6977.61	1607.52	6980.39	1607.43	6999.4	1606.8
6999.95	1606.86	7001.28	1607.12	7007.97	1608.42	7080.62	1608.29	7097.49	1608.2
7105.84	1608.17	7112.88	1608.26	7114.32	1608.27	7118.83	1608.4	7128.82	1608.6
7160.15	1609.49	7163.89	1609.61	7184.2	1609.61	7207.35	1609.74	7240.85	1609.6
7277.44	1609.28	7307.06	1608.6	7338.01	1608.35	7354.7	1609.83	7358.4	1610.2
7360.15	1610.32	7365.62	1610.37	7400.16	1610.69	7417.47	1609.97	7422.23	1609.8
7438.37	1609.3	7445.47	1608.84	7457.97	1608.57	7474.98	1608.15	7476.81	1608.1
7495.34	1608.31	7525.74	1608.65	7570.3	1609.09	7576.56	1609.13	7580.13	1609.1
7589.78	1609.11	7605.87	1609.02	7606.48	1609.08	7663.37	1608.48	7690.06	1607.9
7705.49	1607.57	7761.27	1607.14	7815.71	1607.24	7828.55	1607.34	7850.86	1607.5
7947.51	1608.49	7978.72	1608.77	8025.9	1609.29	8067.4	1609.72	8115.53	1610.1
8119.41	1610.12	8148.29	1609.67	8153.79	1609.57	8160.4	1609.54	8174.56	1609.5
8189.21	1609.6	8193.98	1609.94	8209.76	1610.38	8212.25	1610.47	8218.03	1610.4
8220.32	1610.4	8254.84	1610.27	8289.88	1610.39	8320.06	1610.36	8326.94	1610.4
8333.24	1610.28	8335	1610.2	8354.75	1609.84	8368.18	1609.94	8398.42	1610.7
8402.07	1610.81	8409.36	1610.76	8414.03	1610.74	8430.86	1610.56	8434.84	1610.6
8468.41	1610.79	8527.66	1611.34	8542.04	1611.46	8549.07	1611.52	8553.33	1611.5
8573.02	1611.81	8603.1	1611.98	8623.14	1612.14	8630.1	1612.12	8666.88	1612
8702.31	1611.72	8742.92	1611.48	8775.64	1611.3	8790.61	1611.33	8807.61	1611.4
8832.38	1611.48	8878.32	1611.71	8908.87	1611.83	8915.93	1611.81	8931.4	1611.2
8945.7	1610.76	8960.9	1610.76	8968.55	1610.78	8985.3	1610.76	8998.21	1610.8
9007.25	1610.81	9022.16	1610.88	9044.48	1610.96	9051.69	1611.31	9065.93	1611.5
9116.69	1611.37	9119.88	1611.28	9122.11	1611.23	9124.18	1611.18	9149.01	1611
9154.28	1611	9170.02	1611.21	9176.09	1610.43	9181.22	1609.78	9192.27	1611.2
9193.92	1611.3	9201.05	1611.3	9224.57	1611.29	9238.22	1611.31	9276.52	1611.5
9282.19	1611.3	9304.13	1610.63	9319.1	1610.36	9319.21	1610.36	9334.83	1610.7
9345.66	1610.88	9354.82	1611.01	9366.03	1610.75	9379.3	1610.49	9395.28	1611.1
9416.95	1611.97	9417.13	1611.98	9417.25	1611.98	9417.33	1611.98	9424.75	1611.8
9429.09	1611.28	9437.41	1610.16	9442.62	1610.44	9450.48	1610.93	9470.07	1610.9

9478.84	1611	9480.01	1611.02	9493.57	1611.36	9498.79	1611.49	9513.05	1611.5
9517.15	1611.53	9523.36	1611.52	9541.44	1611.54	9557.4	1611.63	9562.69	1611.7
9574.74	1611.77	9586.65	1611.89	9599.98	1611.84	9602.17	1611.82	9614.25	1611.9
9627.63	1611.87	9639.41	1611.62	9645.18	1611.71	9658.17	1611.36	9662.35	1611.4
9663.96	1611.25	9676.47	1611.63	9683.5	1611.87	9687.85	1612.05	9700.02	1612
9702.59	1612.08	9713.42	1612.17	9716.98	1612.19	9718	1612.21	9730.66	1612.2
9734.03	1612.09	9755.83	1612.03	9759.27	1612.03	9788.19	1611.95	9788.71	1612
9790.54	1612.04	9792.88	1612	9813.24	1611.81	9826.54	1611.45	9828.15	1611.4
9854.48	1611.4	9869.15	1611.44	9880.16	1611.42	9899.58	1611.09	9899.72	1611.1
9920.83	1611.31	9930.46	1611.43	9945.44	1610.81	9948.7	1610.62	9950.34	1610.7
9952.97	1610.45	9959.29	1609.81	9978.76	1609.51	0033.42	1609.41	0033.69	1609.4
10034.13	1609.39	10035.55	1609.47	10047.65	1610.05	10054.55	1611.09	10067.73	1612.6
10080.18	1612.91	0091.81	1613.07	10098.68	1613.23	10106.65	1613.18	10108.67	1613.1
10109.26	1613.16	10113.36	1613.02	10131.26	1612.74	10134.22	1612.63	10139.87	1612.2
10146.19	1612.11	10154.2	1612.04	10155.78	1612.05	10156.55	1612.05	10171.16	1611.8
10241.83	1612.17	10243.24	1612.18	10244.01	1612.19	10245.73	1612.27	10253.63	1612.6
10262	1612.98	10271.24	1613.26	10276.37	1613.26	10292.01	1613.41	0302.36	1613.5
10305.41	1613.51	0317.26	1613.57						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5622.28	.068	6101.05	.15	6854.56	.068	7761.27	.1	9930.46	.045
10067.73	.1								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930.46	10067.73	300	382.27	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1609.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.078	0.045	
W.S. Elev (ft)	1609.88	Reach Len. (ft)	300.00	382.27	400.00
Crit W.S. (ft)		Flow Area (sq ft)	1574.33	30.76	
E.G. Slope (ft/ft)	0.010561	Area (sq ft)	1574.33	30.76	
Q Total (cfs)	3732.00	Flow (cfs)	3679.23	52.77	
Top Width (ft)	1428.62	Top Width (ft)	1343.08	85.54	
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)	2.34	1.72	
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)	1.17	0.36	
Conv. Total (cfs)	36314.6	Conv. (cfs)	35801.2	513.5	
Length Wtd. (ft)	303.98	Wetted Per. (ft)	1343.56	85.56	
Min Ch El (ft)	1609.39	Shear (lb/sq ft)	0.77	0.24	
Alpha	1.00	Stream Power (lb/ft s)	1.81	0.41	
Frctn Loss (ft)	2.56	Cum Volume (acre-ft)	483.85	15.66	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	333.53	7.25	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5622.28	6699.32	0.65	2.52	20.80	0.02	0.12	0.26
6699.32	7776.37	2770.83	1083.69	943.41	74.25	1.15	2.56
7776.37	8853.42	907.73	488.04	377.76	24.32	1.29	1.86
8853.42	9930.46	0.02	0.08	1.60	0.00	0.05	0.21
LB 9930.46	RB 10067.73	52.77	30.76	85.56	1.41	0.36	1.72

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.933**

INPUT
Description: RM. 2.933. HORZ. N VALUES USED. AREA TO LT. OF STA. 6124.39 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5354.28	1609	5361.54	1609.19	5365.08	1609.25	5366.6	1609.34	5370.2	1609.45
5371.55	1609.4	5384.2	1609.86	5394.48	1610.33	5399.42	1610.88	5455.93	1610.14
5473.04	1610.1	5486.59	1610.17	5508.66	1609.89	5545.73	1608.17	5601.97	1608.2
5641.51	1609.5	5658.31	1609.98	5666.07	1610.34	5730.16	1610.17	5732.54	1610.16
5733.6	1610.1	5734.55	1610.05	5737.67	1609.83	5748.01	1609.13	5753.29	1608.71
5758.63	1608.4	5768.44	1607.7	5781.68	1606.33	5782.47	1606.1	5789.29	1606.52
5795.9	1606.9	5810.08	1607.81	5820.51	1608.58	5828.89	1609.08	5833.48	1609.18
5840.83	1609.7	5863.29	1609.56	5908.58	1609.29	5918.56	1608.64	5922.37	1608.15
5930.26	1607.9	5939.45	1606.54	5943.18	1605.48	5949.03	1606.52	5954.39	1607.67
5955.59	1608.1	5956.58	1608.08	5958.11	1608.17	5963.65	1608.29	5986.98	1608.76
5989.17	1608.7	5990.86	1608.77	5993.53	1608.76	5996	1608.76	6095.37	1608.4
6123.28	1608.9	6124.39	1608.92	6151.41	1608.81	6209.4	1608.28	6224.99	1608.2
6253.73	1608.1	6260.22	1608.21	6264.96	1608.15	6273.95	1608.29	6319.19	1607.73
6325.51	1607.8	6361.12	1607.79	6368.72	1607.63	6385.87	1607.52	6391.95	1607.46
6419.39	1607.1	6424.95	1607.11	6435.53	1607.34	6452.34	1607.53	6478.87	1607.5
6482.03	1607.5	6494.79	1607.43	6584.91	1607.36	6588.04	1607.37	6602.74	1607.34
6631.42	1607.8	6667.64	1607.65	6704.5	1607.51	6708.67	1607.52	6717.11	1607.45
6802.39	1606.6	6823.17	1606.44	6838.83	1606.39	6850.65	1606.13	6852.75	1606.02
6856.65	1605.9	6902.74	1604.73	6911.69	1605.82	6922.95	1606.36	6936.4	1606.26
6944.87	1606.3	6951.5	1604.79	6954.8	1604.34	6960.18	1604.93	6970.6	1605.28
6994.33	1605.4	7016.69	1605.48	7028.45	1604.86	7031.37	1604.66	7048.69	1605.48
7050.31	1605.6	7066.17	1605.54	7085.55	1605.63	7134.92	1605.33	7177.44	1605.12
7205.84	1605.3	7206.19	1605.29	7206.74	1605.29	7209.05	1605.32	7326.96	1606.24
7352.31	1606.6	7375.76	1606.66	7376	1606.59	7377.12	1606.37	7380.52	1605.55
7389.59	1604.1	7406.25	1604.95	7409.14	1605.1	7424.31	1604.99	7457.64	1604.86
7481.4	1605	7493.04	1605.06	7517.76	1604.84	7551.33	1604.97	7588.66	1605.55
7603.68	1605.9	7621.35	1605.96	7682.68	1606.27	7695.37	1606.31	7701.17	1605.82
7715.92	1606.2	7751.55	1606.72	7771.67	1606.77	7793.63	1606.82	7798.97	1606.68
7810.77	1606.7	7857.61	1606.8	7870.55	1606.81	7874.1	1606.77	7881.32	1606.83
7902.04	1606.8	7914.35	1606.79	7929.57	1606.26	7974.23	1606.76	7985.72	1606.66
7987.64	1606.7	8013.56	1606.82	8013.95	1606.82	8036.66	1606.87	8061.9	1606.83
8068.42	1606.8	8101.87	1606.95	8143.64	1607.11	8171.88	1607.33	8211.61	1608.11
8222.19	1608.3	8226.68	1608.36	8228.11	1608.96	8229	1609.24	8231.79	1609.26
8242.37	1609.5	8242.64	1609.46	8242.91	1609.4	8245.54	1608.55	8253.8	1608.4
8266.26	1608.2	8272.49	1608.05	8289.31	1607.85	8292.58	1607.83	8297.26	1607.91
8397.61	1608.6	8417.28	1608.69	8424.3	1608.44	8435.5	1608.6	8439.89	1608.52
8457.63	1608.6	8461.25	1608.69	8514.97	1609.03	8538.01	1609.05	8556.6	1609.1
8569.2	1609	8596.34	1608.6	8598.2	1608.56	8598.43	1608.56	8598.49	1608.56
8600.36	1608.5	8643.72	1608.14	8648.87	1608.22	8656.56	1608.29	8674.12	1608.43
8701.28	1608.4	8742.05	1608.32	8765.22	1608.18	8772.62	1608.13	8783.57	1608.15
8785.24	1608.2	8816.13	1608.24	8896.1	1608.44	8994.69	1608.54	9008.86	1608.51
9015.98	1608.4	9029.31	1608.56	9036.39	1608.51	9057.31	1608.5	9063.95	1608.56
9066.33	1608.3	9074.54	1607.13	9075.73	1607.23	9083.01	1607.88	9085.3	1608

9109.44	1607.9	9111.58	1607.83	9111.7	1607.85	9114.65	1607.9	9140.68	1608.22
9143.84	1608.3	9150.69	1607.95	9158.84	1607.84	9161.28	1607.78	9173.68	1607.67
9181.11	1607.4	9184.89	1607.3	9197.78	1607.38	9214.59	1607.54	9217.11	1607.54
9221.81	1607.5	9237.93	1607.31	9248.28	1607.08	9251.17	1607.13	9253.97	1607.13
9256.17	1607.1	9264.01	1607.43	9268.22	1607.58	9270.17	1607.63	9272.29	1607.71
9283.39	1608.4	9283.73	1608.42	9285.08	1608.45	9303.8	1608.49	9304.93	1608.51
9312.94	1608.5	9324.51	1608.31	9335.89	1608.51	9343.49	1608.6	9355.01	1608.75
9363.91	1608.8	9378.61	1608.65	9389.24	1608.74	9394.45	1608.56	9416.16	1608.63
9440.71	1608.8	9449.29	1608.8	9450.46	1608.8	9456.46	1608.75	9462.34	1608.75
9464.06	1608.7	9498.9	1608.47	9505.93	1608.3	9559.17	1608.33	9560.3	1608.34
9569.64	1608.4	9574.34	1608.34	9582.57	1608.96	9611.07	1608.2	9645.16	1607.19
9653.96	1607.8	9654.95	1607.88	9655.34	1607.9	9655.74	1607.89	9662.09	1607.4
9678.3	1607.5	9703.91	1607.92	9721.29	1608.17	9732.09	1608.3	9744.03	1608.34
9756.96	1608.5	9764.27	1608.59	9764.58	1608.59	9777.35	1608.66	9804.71	1608.25
9840.92	1608	9853.75	1608.01	9862.02	1608.13	9903.85	1607.69	9906.94	1607.64
9909.58	1607.5	9921.07	1607	9927.03	1607.32	9931.43	1607.52	9938.93	1607.1
9950.62	1606.2	9957.12	1607.67	9959.94	1608.14	9978.97	1608	9979.02	1607.99
9979.04	1608	9990.74	1604.83	10004.55	1604.71	10007.82	1604.71	10011.42	1605.35
10027.77	1608.21	10055.25	1608.19	10076.39	1608.22	10100.66	1609.05	10101.01	1609.06
10101.15	1609.11	10101.55	1609.06	10120.57	1608.93	10132.24	1608.61	10146.51	1609.17
10149.6	1609.51	10150.26	1609.41	10150.57	1609.36	10192.72	1609.47	10203.29	1609.57
10225.56	1609.71	10234.14	1609.61	10246	1609.72	10253.1	1609.95	10266.09	1610.44
10269.36	1610.61	10289.41	1610.85	10295.46	1610.89				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5354.28	.068	7409.14	.15	8061.9	.1	9611.07	.068	9979.04	.045
10027.77	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9979.04	10027.77	360	404.67	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5354.28	6124.39	1608.92

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.086	0.045	
W.S. Elev (ft)	1607.33	Reach Len. (ft)	360.00	404.67	390.00
Crit W.S. (ft)		Flow Area (sq ft)	1923.57	75.20	
E.G. Slope (ft/ft)	0.007001	Area (sq ft)	1923.57	75.20	
Q Total (cfs)	3732.00	Flow (cfs)	3425.01	306.99	
Top Width (ft)	1596.83	Top Width (ft)	1555.53	41.31	
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.78	4.08	
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)	1.24	1.82	
Conv. Total (cfs)	44601.5	Conv. (cfs)	40932.6	3668.9	
Length Wtd. (ft)	363.98	Wetted Per. (ft)	1556.48	41.87	
Min Ch El (ft)	1604.70	Shear (lb/sq ft)	0.54	0.79	
Alpha	1.23	Stream Power (lb/ft s)	0.96	3.20	
Frctn Loss (ft)	3.22	Cum Volume (acre-ft)	471.81	15.20	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	323.55	6.69	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5354.28	6510.47	2.10	4.53	33.77	0.06	0.13	0.46
6510.47	7666.66	3215.00	1588.93	938.65	86.15	1.69	2.02
7666.66	8822.85	194.50	311.59	505.50	5.21	0.62	0.62
8822.85	9979.04	13.41	18.52	78.57	0.36	0.24	0.72
LB 9979.04	RB 10027.77	306.99	75.20	41.87	8.23	1.82	4.08

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.857

INPUT
Description: RM.2.857 . HORZ. N VALUES USED. AREA TO LT. OF STA. 6325.35 BLOCKED OUT DUE TO RIDGE. AND TO RT. OF STA. 10046.7.

Station Elevation Data num= 329

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5248.42	1604.1	5269.19	1604.52	5274.82	1604.54	5303.67	1604.59	5346.54	1604.71
5403.29	1604.8	5442.77	1604.85	5467.1	1604.97	5581.95	1605.15	5591.59	1605.11
5711.63	1604.5	5725.14	1604.27	5726.98	1604.41	5738.68	1603.43	5744.58	1602.88
5754.99	1604.2	5757.68	1604.58	5781.74	1604.4	5833.2	1604.23	5858.05	1605.06
5868.22	1605.3	5875.77	1605.3	5899.6	1604.86	5907.68	1604.74	5910.38	1604.63
5924.23	1604.3	5926.35	1604.28	5948.87	1604.86	5952.25	1604.97	5953.59	1605.04
5974.99	1605.1	6013.21	1604.91	6026.28	1604.85	6029.33	1604.86	6035.25	1604.86
6056.1	1604.1	6060.22	1604.13	6071.93	1604.2	6108.27	1604.71	6138.69	1604.61
6153.45	1605.6	6176.67	1606.65	6188.6	1606.7	6206.82	1606.62	6240.47	1606.47
6261.24	1606.3	6272.76	1605.46	6282.36	1604.75	6305.86	1606.08	6306.34	1606.11
6306.93	1606.1	6307.74	1606.18	6325.35	1607.14	6342.38	1606.72	6350.28	1606.73
6379.68	1606.1	6401.88	1605.86	6437.98	1605.49	6451.92	1605.5	6470.86	1605.55
6558.03	1605.2	6613.39	1603.97	6672.57	1602.93	6676.6	1603.15	6705.97	1602.91
6729.66	1603	6753.91	1603.17	6766.61	1603.74	6768.51	1603.86	6776.76	1603.28
6780.7	1603	6781.76	1602.96	6794.1	1602.99	6833.87	1604.07	6864.88	1604.79
6869.08	1604.8	6888.22	1604.27	6911.22	1603.16	6911.36	1603.16	6931.64	1603.08
6939.76	1603	6946.99	1603.03	6951.02	1603.07	6980.16	1603.09	6987.12	1603.11
6995.15	1603	7026.82	1602.92	7031.96	1603.38	7042.03	1603.4	7047.56	1602.38
7055.65	1600.7	7069.43	1603.37	7069.45	1603.37	7069.46	1603.37	7069.46	1603.4
7094.86	1603.2	7100.03	1603.23	7101.18	1602.97	7106.2	1602.3	7118.56	1602.1
7122.13	1602.16	7125.29	1602.07	7129.08	1602.03	7133.45	1602.09	7169.72	1602.8
7195.67	1602.72	7200.93	1602.6	7231.17	1602.36	7234.38	1602.36	7240.04	1602.4
7315.25	1602.61	7316.48	1602.6	7338.11	1602.42	7389.24	1601.97	7392.3	1602
7395.9	1601.93	7430.36	1601.45	7430.99	1601.44	7431.08	1601.44	7431.14	1601.4
7431.16	1601.44	7431.23	1601.44	7431.64	1601.44	7501.1	1602.12	7509.95	1602.1
7517.62	1601.85	7538.8	1601.74	7560.18	1602.32	7595.16	1602.64	7612.54	1602.7
7628.25	1602.75	7633.5	1602.75	7665.31	1602.58	7679.69	1602.24	7701.61	1602.1
7717.04	1602.26	7730.66	1602.16	7761.47	1602.39	7763.74	1602.4	7777.34	1602.5
7792.8	1602.64	7818.77	1602.77	7829.59	1602.86	7837.81	1602.92	7857.32	1603
7882.08	1603.27	7885.49	1603.16	7890.7	1603.14	7966.29	1602.94	7969.23	1602.9
7996.13	1603.08	7999.73	1603.11	8027.64	1603.32	8033.06	1603.44	8046.4	1603.5
8079.04	1603.84	8084.38	1603.91	8110.71	1604.08	8147.02	1603.87	8157.23	1603.8

8163.89	1603.79	8171.02	1603.73	8180.18	1603.72	8202.33	1603.64	8247.82	1604
8249.31	1604.01	8250.61	1603.99	8251.38	1603.99	8253.36	1603.99	8258.42	1603.9
8279.17	1603.66	8288.39	1603.71	8328.2	1603.78	8356.36	1603.82	8390.58	1603.9
8439.3	1604.3	8465.11	1604.46	8470.62	1604.47	8489.39	1604.38	8505.82	1604.3
8523.68	1604.43	8539.42	1604.81	8544.26	1604.76	8609.36	1604.67	8609.94	1604.7
8610.54	1604.67	8611.73	1604.65	8682.9	1603.98	8732.53	1603.85	8745.05	1603.9
8753.04	1603.88	8767.04	1603.84	8774.56	1603.69	8783.78	1603.63	8796.22	1603.7
8814.01	1604.4	8831.71	1604.35	8844.19	1604.02	8847.26	1604.06	8870.63	1604.5
8896.11	1604.19	8915.35	1604.04	8934.52	1604.04	8959.16	1603.86	8982.29	1603.5
8990.86	1603.54	8999.38	1603.53	9032.01	1603.22	9048.05	1603.08	9049.13	1603.1
9053.51	1603.21	9063.06	1603.6	9081.05	1603.2	9091.61	1603.49	9091.7	1603.5
9101.45	1603.21	9102.94	1603.15	9119.16	1603.27	9131.92	1603.35	9147.3	1603.4
9148.46	1603.44	9150.33	1603.41	9162.64	1603.14	9183.47	1603.38	9212.74	1603.7
9215.72	1603.76	9216.78	1603.76	9224.07	1603.81	9225.49	1603.82	9228.15	1603.8
9233	1603.84	9237.19	1603.84	9249.53	1604.02	9258.05	1603.91	9270.51	1603.9
9279.4	1603.9	9286.28	1603.95	9303.81	1604.14	9321.87	1604.56	9325.93	1604.6
9332.35	1604.79	9343.68	1604.66	9347.18	1604.71	9362.35	1604.77	9371.03	1604
9375.53	1603.5	9379.01	1603.94	9380.5	1604.07	9383.61	1603.98	9387.82	1603.8
9392.05	1604.01	9412.21	1604.58	9412.76	1604.56	9446.24	1604.38	9482.62	1604
9487.17	1603.86	9490.49	1603.97	9522.39	1603.95	9529.24	1604.02	9534.08	1604
9546.74	1603.81	9570.64	1603.63	9578.04	1603.54	9588.5	1602.6	9589.66	1602.5
9590.4	1602.56	9604.39	1604.39	9615.17	1604.42	9628.69	1604.46	9659.63	1604.5
9677.35	1604.53	9682.87	1604.53	9698.13	1604.28	9709.85	1604.13	9720.63	1604.2
9744.55	1604.38	9746.92	1604.36	9819.82	1604.6	9839.32	1604.57	9843.89	1604.7
9851.55	1604.63	9862.68	1604.54	9875.2	1604.48	9877.47	1604.48	9884.05	1604.4
9912.65	1604.43	9927.31	1604.46	9943.89	1604.42	9946.06	1604.44	9973.71	1604.3
9983.4	1604.29	9984.53	1604.02	9994.89	1601.52	9997.39	1601.54	10009.36	1601.6
10014.27	1602.43	10016.47	1602.88	10026.34	1603.29	10046.72	1604.21	10065.88	1604
10075	1603.87	10082.61	1603.98	10095.68	1604.09	10103.83	1604.11	10115.58	1604.1
10118.17	1604.17	10134.81	1604.31	10165.71	1604.36	10227.15	1604.58	10246.47	1604.6
10265.27	1605.29	10271.62	1605.43	10288.08	1605.31	10292.15	1605.31	10300.5	1605.3
10321.52	1605.31	10347.51	1605.18	10353.26	1605.14	10368.58	1605.28	10391.66	1605.3
10397.25	1605.69	10411.27	1606.22	10421.24	1605.65	10429.35	1605.32	10437.32	1605.5
10445.51	1605.65	10452.06	1605.61	10462.67	1605.59	10467.75	1605.59		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5248.42	.068	7122.13	.15	8544.26	.1	9303.81	.068	9946.06	.045
10046.72	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9946.06	10046.72	320	336.06	320	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5248.42	6325.35	1607.14	10046.72	10467.75	1604.2

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1604.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.119	0.045	
W.S. Elev (ft)	1604.12	Reach Len. (ft)	320.00	336.06	320.00
Crit W.S. (ft)		Flow Area (sq ft)	2374.62	82.76	
E.G. Slope (ft/ft)	0.011501	Area (sq ft)	2374.62	82.76	
Q Total (cfs)	3732.00	Flow (cfs)	3374.34	357.66	
Top Width (ft)	2523.22	Top Width (ft)	2462.28	60.93	
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)	1.42	4.32	

Max Chl Dpth (ft)	3.42	Hydr. Depth (ft)	0.96	1.36	
Conv. Total (cfs)	34799.5	Conv. (cfs)	31464.5	3335.0	
Length Wtd. (ft)	322.79	Wetted Per. (ft)	2463.43	61.39	
Min Ch El (ft)	1601.52	Shear (lb/sq ft)	0.69	0.97	
Alpha	1.57	Stream Power (lb/ft s)	0.98	4.18	
Frctn Loss (ft)	2.83	Cum Volume (acre-ft)	454.05	14.46	40.28
C & E Loss (ft)	0.00	Cum SA (acres)	306.94	6.22	41.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6422.83	7597.24	2420.73	1358.28	936.61	64.86	1.45	1.78
7597.24	8771.65	671.51	734.52	924.78	17.99	0.79	0.91
8771.65	9946.06	282.11	281.82	602.04	7.56	0.47	1.00
LB 9946.06	RB 10046.72	357.66	82.76	61.39	9.58	1.36	4.32

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.793

INPUT
Description: RM.2.793. HORZ. N VALUES USED. AREA TO LT. OF STA. 5350.41 BLOCKED OUT DUE TO RIDGE AND AREA TO RT. OF STA.10070.6.

Station Elevation Data num= 374

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5011.3	1601	5109.26	1601.42	5127.7	1601.4	5163.69	1601.18	5231.86	1601.14
5245.82	1601.3	5272.65	1601.06	5287.85	1600.91	5298.86	1601.18	5327.97	1602.21
5336.56	1602.4	5346.48	1602.67	5347.89	1602.68	5350.41	1602.69	5419.33	1602.19
5470.98	1602.1	5490.08	1602.07	5508.23	1601.56	5554.34	1601.26	5556.83	1601.33
5570.91	1601.6	5591.56	1601.89	5635.46	1602.02	5712.13	1601.98	5808.89	1601.54
5842.62	1601.7	5855.49	1601.76	5879.6	1601.82	5923.63	1602.17	5953.29	1602.07
5995.67	1601.9	6058.58	1601.48	6067.29	1601.46	6072.69	1601.52	6093.55	1601.69
6113.32	1601.6	6117.78	1601.6	6121.35	1601.65	6149.35	1601.84	6153.77	1601.87
6177.05	1602.1	6196.42	1602.27	6209.12	1602.28	6228.94	1602.56	6279.99	1602.56
6288.86	1602.6	6290.82	1602.56	6292.03	1602.56	6308.41	1602.85	6311.57	1602.92
6348.87	1603.1	6390.69	1603.07	6395.99	1603.07	6409.3	1603.07	6410.45	1603.01
6412.56	1603	6418.43	1603	6423.77	1602.96	6430.3	1602.96	6434.1	1602.96
6436.83	1603	6441.26	1602.93	6442.26	1602.93	6445.16	1603	6470.5	1603.1
6540.65	1603.4	6553.14	1603.34	6564.23	1603.2	6571.99	1603.24	6588.24	1603.09
6589.61	1603.1	6600.9	1602.58	6610.16	1602.33	6615.01	1602.48	6638.25	1602.98
6656.96	1602.7	6715.94	1601.75	6719.25	1601.83	6722.51	1601.85	6729.1	1601.94
6731.81	1601.7	6738.8	1601.26	6740.68	1601.01	6745.29	1601.33	6745.72	1601.46
6757.09	1601.2	6770.61	1600.9	6797.32	1600.77	6878.15	1599.9	6913.59	1599.73
6914.98	1599.7	6930.61	1599.98	6979.95	1599.71	7004.27	1599.81	7005.06	1599.81
7039.97	1599.8	7071.3	1600.15	7077.18	1600.19	7078.22	1600.15	7080.05	1600.16
7081.67	1600.2	7099.02	1600.01	7108.49	1599.79	7130.77	1599.57	7147.33	1599.2
7151.19	1599.2	7154.32	1598.99	7157.22	1599.05	7163.47	1598.88	7179.88	1599.04

7200.59	1599.3	7205.62	1599.24	7212.37	1599.18	7229.31	1599.07	7241.99	1598.88
7256.41	1598.9	7291.33	1599.09	7292.04	1599.12	7292.82	1599.12	7315.17	1599.27
7330.44	1599.7	7343.06	1599.96	7390.77	1599.08	7393.63	1599.05	7394.02	1599.07
7411.93	1599.2	7426.27	1599.03	7492.65	1599.85	7513.14	1599.99	7514.58	1599.96
7519.24	1599.9	7557.44	1599.7	7600.72	1599.6	7605.94	1599.56	7630.8	1599.51
7631.22	1599.5	7633.72	1599.54	7635.37	1599.55	7657.9	1599.76	7665.57	1599.75
7716.98	1599.9	7718.01	1599.92	7736.11	1599.96	7796.11	1599.48	7804.77	1599.38
7808.61	1599.4	7835.33	1600.07	7838.19	1600.09	7843.8	1600.1	7873.75	1600
7874.98	1600	7880.27	1600.04	7938.61	1600.38	7951.37	1600.28	7968.21	1600.31
8010.16	1600.1	8034.76	1600.11	8059.61	1600.37	8066.1	1600.39	8076.44	1600.41
8092.57	1600.5	8119.11	1600.59	8163.66	1600.72	8172.54	1600.71	8226.94	1600.62
8233.68	1600.6	8266	1601.1	8275.22	1600.96	8298.38	1600.5	8337.61	1600.69
8362.92	1600.8	8375.47	1600.74	8393.28	1600.66	8491.1	1600.24	8496.83	1600.26
8502.89	1600.2	8516.53	1600.4	8534.45	1600.64	8574.6	1600.56	8605.95	1600.52
8627.92	1600.6	8653.93	1600.59	8701.23	1600.51	8702.35	1600.5	8711.36	1600.47
8724	1600.6	8727.19	1600.57	8733.04	1600.55	8740.02	1600.57	8741.41	1600.59
8748.01	1600.6	8750.5	1600.58	8759.54	1600.6	8762.48	1600.55	8767.45	1600.54
8770.32	1600.5	8781.4	1600.23	8783.81	1600.21	8788.77	1599.87	8800.21	1599.97
8802.29	1600.1	8808.93	1600.32	8811.6	1600.26	8815.88	1600.11	8826.43	1599.84
8835.9	1599.7	8845.66	1599.81	8857.19	1599.81	8868.37	1599.79	8875.76	1599.83
8877.69	1599.9	8882.19	1599.99	8893.36	1600.12	8894.69	1600.13	8904.77	1600.24
8911.7	1600.4	8947.6	1601.08	8953.03	1601.04	8960.16	1601.15	8971.4	1601.06
8987.54	1600.8	8996.71	1600.62	9002.77	1600.55	9011.28	1600.55	9016.37	1600.57
9037.15	1600.3	9038.37	1600.27	9054.97	1600.49	9058.79	1600.46	9065.86	1600.48
9072.16	1600.5	9085.66	1600.53	9100.28	1600.66	9100.33	1600.66	9100.39	1600.66
9100.41	1600.7	9109.37	1600.85	9130.24	1601.01	9141.47	1601.07	9153.11	1600.9
9156.91	1600.9	9208	1601.63	9230.24	1601.65	9236.15	1602.32	9238.4	1602.37
9242.93	1602.3	9245.1	1602.14	9248.5	1602.19	9259.21	1602.2	9286.46	1602.18
9304.14	1602.2	9312.93	1602.29	9315.41	1602.31	9345.64	1601.99	9348.15	1601.96
9350.27	1601.9	9351.33	1601.77	9356.33	1601.33	9365.17	1601.09	9372.91	1600.88
9378.66	1600.9	9388.71	1600.88	9394.6	1600.94	9403.61	1600.7	9406.3	1600.32
9414.85	1600.4	9426.7	1600.55	9449.92	1600.63	9458.15	1600.66	9463.5	1600.61
9475.15	1600.5	9481.36	1600.99	9486.88	1601.18	9493.87	1601.37	9505.53	1601.21
9529.94	1600.5	9542.97	1600.48	9546.3	1600.54	9548.5	1600.54	9567.45	1600.69
9583.14	1600.7	9608.39	1600.87	9635.88	1600.68	9651	1600.63	9657.1	1600.67
9680.27	1600.6	9690.41	1600.57	9700.73	1600.54	9714.58	1600.35	9723.52	1600.29
9726.03	1600.3	9733.8	1600.27	9775.6	1600.45	9795.55	1600.62	9808.4	1600.91
9814.53	1601	9817.04	1601.16	9824.29	1601.06	9828.4	1601.02	9835.16	1601.01
9853	1601.2	9869.04	1601.23	9883.28	1601.46	9887.33	1601.51	9889.69	1601.5
9897.28	1601.5	9906.04	1601.36	9921.81	1601.15	9925.03	1600.85	9929.83	1600.01
9940.3	1599.8	9948.53	1599.55	9956.16	1599.35	9963.23	1599.15	9965.88	1599.11
9967.54	1599.1	9969.18	1599.06	9971.62	1599.27	9988.94	1599.05	10009.57	1598.87
10023.77	1598.9	10024.51	1598.87	10024.74	1598.87	10025.15	1598.91	10025.81	1598.92
10037.29	1599	10039.61	1599.17	10041.91	1599.47	10062.81	1601.03	10070.68	1601.59
10078.93	1601.4	10101.3	1600.86	10105.49	1600.72	10110.42	1600.65	10116.13	1600.91
10124.34	1601.3	10147.02	1601.29	10153.71	1601.3	10155.7	1601.92	10157.84	1602.46
10159.07	1600.8	10162.38	1598.11	10165.15	1598.11	10166.51	1598.81	10171.03	1601.56
10173.2	1601.2	10175.01	1601.41	10178.13	1601.31	10179.08	1601.51	10184.09	1601.05
10185	1600.7	10235.54	1601.13	10241.41	1601.17	10307.41	1600.97	10310.49	1600.96
10315.77	160	110315.98	1601.02	10316.2	1601.01	10316.53	1601.02	10317.75	1601.04
10348.24	1601.7	10354.09	1601.38	10372.41	1601.34	10386.48	1601.34	10400.16	1601.27
10431.78	1601.3	10432.27	1601.3	10432.67	1601.31	10434.24	1601.3	10435.94	1601.51
10447.27	1602.7	10454.14	1602.74	10463.75	1602.62	10464.22	1602.75		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5011.3	.068	5591.56	.15	8882.19	.1	9948.53	.04	10041.91	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9948.53	10041.91	380	384	440	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
5011.3	5350.41	1602.68	10070.68	10464.22	1601.59

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1601.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.143	0.045	0.068
W.S. Elev (ft)	1601.25	Reach Len. (ft)	380.00	384.00	440.00
Crit W.S. (ft)		Flow Area (sq ft)	3011.73	203.39	21.27
E.G. Slope (ft/ft)	0.006920	Area (sq ft)	3011.73	203.39	21.27
Q Total (cfs)	3732.00	Flow (cfs)	2757.94	938.46	35.60
Top Width (ft)	3081.74	Top Width (ft)	2964.35	93.38	24.01
Vel Total (ft/s)	1.15	Avg. Vel. (ft/s)	0.92	4.61	1.67
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)	1.02	2.18	0.89
Conv. Total (cfs)	44862.9	Conv. (cfs)	33153.6	11281.4	427.9
Length Wtd. (ft)	388.87	Wetted Per. (ft)	2964.74	93.43	24.07
Min Ch El (ft)	1598.87	Shear (lb/sq ft)	0.44	0.94	0.38
Alpha	4.51	Stream Power (lb/ft s)	0.40	4.34	0.64
Frctn Loss (ft)	3.91	Cum Volume (acre-ft)	434.26	13.36	40.21
C & E Loss (ft)	0.03	Cum SA (acres)	287.01	5.62	40.91

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6245.61	7479.92	1240.89	1142.02	730.45	33.25	1.56	1.09
7479.92	8714.22	968.76	1214.23	1234.34	25.96	0.98	0.80
8714.22	9948.53	548.30	655.48	999.95	14.69	0.66	0.84
LB 9948.53	RB 10041.91	938.46	203.39	93.43	25.15	2.18	4.61
10041.91	10464.22	35.60	21.27	24.07	0.95	0.89	1.67

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.720

INPUT
Description: RM.2.720. HORZ. N VALUES USED. AREA BLOCKED OUT TO RT. OF STA. 10434.56 DUE TO RIDGE., AND TO LT. OF STA. 6943.33.

Station Elevation Data num= 457

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4895.17	1598	4948.42	1598.54	4955.14	1598.61	5036.32	1598.18	5068.25	1597.96
5073.77	1598	5126.14	1597.38	5189.65	1597.04	5223.8	1596.74	5231.69	1596.86
5252.45	1597.3	5254.34	1597.31	5254.86	1597.36	5264.23	1598.05	5274.24	1596.78
5277.1	1596.3	5288.21	1599.11	5293.83	1600.64	5299.08	1599.98	5307.48	1599.33
5310.66	1598.5	5327.64	1598.53	5419.86	1598.16	5435.59	1598.13	5443.07	1598.16
5449.71	1598	5453.73	1597.98	5477.47	1598.21	5497.73	1598.51	5534.46	1598.66
5536.78	1598.5	5547.78	1597.6	5552.96	1597.56	5555.86	1597.51	5596.66	1597.33
5651.28	1597.2	5653.42	1597.33	5674.09	1597.48	5732.1	1597.78	5765.17	1597.68
5805.42	1597.4	5876.03	1597.57	5878.6	1597.6	5879.37	1597.6	5880.71	1597.62
5885.82	1597.7	5942.58	1598.32	5949.82	1597.74	5957.21	1597.45	5975.37	1597.09
5977.32	1597.6	5979.75	1597.57	5989.3	1598.17	5989.63	1598.22	5992.96	1598.49
6027.26	1598.5	6027.71	1598.5	6042.23	1598.19	6053.66	1598.35	6088.55	1598.28
6099.9	1598.5	6115.62	1598.81	6150.65	1597.78	6170.19	1597.33	6174.07	1597.24
6178.32	1597.3	6204.98	1597.84	6208.63	1597.89	6221.83	1597.66	6240.3	1597.71
6241.39	1597.7	6252.91	1597.46	6257.1	1597.53	6280.84	1597.56	6338.27	1598.04
6349.97	1597.9	6362.83	1597.71	6372.62	1597.7	6418.88	1597.07	6457.82	1596.9
6495.55	1596.6	6500.83	1596.5	6512.79	1596.55	6521.28	1596.49	6571.1	1595.91
6587.99	1595.7	6594.34	1595.74	6596.61	1595.72	6610.97	1595.68	6632.54	1595.87
6661.37	1596	6682.45	1595.97	6701.75	1595.97	6724.33	1596.12	6725	1596.12
6726.67	1596.1	6726.67	1596.12	6773.39	1596.88	6787.57	1597.24	6822.48	1597.76
6838.27	1597.8	6839.29	1597.77	6858.72	1597.9	6865.4	1597	6869.01	1596.9
6871.81	1596.7	6875.12	1596.8	6886.18	1596.9	6896.89	1596.96	6924.18	1597.3
6933.47	1597.8	6942.63	1598.16	6943.33	1598.13	6949.54	1598.07	6964.66	1597.69
6979.53	1597.6	6997.68	1597.69	7023.16	1597.87	7024.81	1597.86	7074.13	1597.9
7075.46	1597.9	7075.85	1597.92	7081.31	1597.9	7086.55	1597.6	7091.17	1597.29
7095.55	1596.6	7102.32	1596.56	7110.54	1596.08	7115.65	1595.74	7126.71	1596.1
7142.64	1596.3	7143.87	1596.3	7149.93	1596.3	7165.09	1596.51	7218.21	1596.54
7231.44	1596.2	7236.15	1596.43	7240.47	1596.28	7248.36	1594.92	7251.79	1595.22
7252.2	1595.2	7252.59	1595.15	7256.65	1595.2	7261.92	1595.15	7266.99	1595.17
7278.02	1595.2	7286.7	1595.29	7316.36	1595.82	7327.04	1595.97	7333.53	1595.74
7334.97	1595.7	7370.95	1595.82	7388.58	1595.87	7411.6	1595.91	7430.82	1595.9
7460.82	1596.3	7499.52	1595.9	7520.46	1595.93	7545.41	1595.84	7546.86	1595.85
7549.78	1595.8	7574.22	1595.97	7600.6	1596.01	7610.8	1596.04	7630.57	1595.91
7641.39	1595.8	7673.95	1595.66	7687.16	1595.61	7706.05	1595.62	7728.35	1595.4
7736.51	1595.5	7760.23	1595.88	7765.9	1596	7781.44	1596.03	7810.73	1596.02
7818.22	1596.1	7855.55	1596.11	7873.24	1596.12	7893.5	1596.25	7921.1	1596.38
7954.18	1596.4	7969.92	1596.45	7998.13	1596.51	8003.18	1596.56	8007.28	1596.59
8013.28	1596.6	8059.28	1596.76	8073.69	1596.76	8085.32	1596.84	8090.83	1596.84
8093.58	1596.8	8099.68	1596.74	8104.77	1596.67	8110.44	1596.66	8113.63	1596.7
8118.42	1596.8	8124.7	1596.92	8129.84	1596.84	8134.77	1596.7	8167.62	1596.53
8196.13	1596.3	8209.56	1596.38	8211.37	1596.33	8235.77	1596.31	8242.34	1596.32
8247.73	1596.3	8296.54	1596.32	8318.98	1596.34	8321.6	1596.34	8331.14	1596.36
8425.11	1596.5	8444.73	1596.94	8453.32	1597.13	8454.76	1597.11	8456.31	1597.16
8505.15	1596.6	8547.96	1596.6	8549.83	1596.64	8573.98	1596.71	8576.79	1596.74
8582.71	1596.7	8668.69	1597.03	8681.73	1597.07	8681.8	1597.07	8681.89	1597.07
8683.43	1597.1	8722.01	1596.94	8735.05	1596.87	8739.01	1596.8	8744.94	1596.93
8748.71	1596.9	8752.02	1596.76	8752.15	1596.74	8753.84	1596.72	8754.6	1596.71
8757.85	1596.8	8786.97	1597.53	8803.38	1597.67	8823.31	1597.41	8836.83	1597.3
8840.22	1597.2	8842.51	1597.23	8855.53	1597.02	8855.64	1597.02	8855.74	1597.02
8855.81	1597	8860.54	1597.1	8862.12	1597.09	8863.23	1597.07	8863.97	1597.02
8869.12	1596.6	8885.53	1596.85	8902.9	1596.92	8910.69	1596.98	8918.83	1596.96
8933.53	1597.3	8937.83	1597.3	8951.89	1597.69	8966.4	1597.39	8982.16	1597.71
8986.66	1597.7	8994.48	1597.69	9021.32	1597.28	9040.44	1596.99	9041.81	1596.98
9042.53	1597	9043.24	1596.99	9044.06	1596.98	9045.6	1596.99	9046.05	1597
9051.77	1597.3	9068.48	1597.28	9072.23	1597.32	9105.47	1597.09	9137.31	1596.95

9137.38	1597	9137.42	1596.95	9167.78	1597.18	9169.18	1597.32	9197.8	1597.51
9208.26	1597.4	9213.24	1597.61	9221.06	1597.66	9227.45	1597.69	9247.32	1597.74
9258.96	1597.8	9263.18	1597.74	9264.44	1597.75	9274.78	1597.43	9283.23	1597.19
9290.37	1597.3	9293.59	1597.27	9295.68	1597.39	9312.95	1597.64	9325.21	1597.82
9327.29	1597.9	9330.68	1597.4	9334.74	1597.38	9336.07	1597.62	9340.17	1597.9
9343.48	1597.9	9349.55	1597.76	9369.37	1597.99	9378.7	1597.98	9386.71	1597.79
9396.33	1597.6	9405.91	1597.74	9415.81	1597.68	9461.68	1597.9	9469.92	1597.74
9478.66	1597.8	9483.59	1597.8	9510.14	1597.75	9516.53	1597.76	9531.29	1598.12
9540.04	1597.8	9544.35	1597.8	9556.08	1598.06	9570.95	1598.29	9576.38	1597.37
9581.11	1596.6	9585.54	1597.01	9589.09	1597.52	9606.26	1597.43	9618.85	1597.28
9624.16	1597.7	9625.3	1597.73	9628.93	1597.55	9633.25	1597.2	9637.08	1597.01
9644.29	1596.6	9651.95	1596.42	9655.59	1596.54	9681.68	1596.12	9683.67	1596.11
9684.18	1596.1	9690.26	1596.09	9690.29	1596.09	9698.27	1596.83	9699.46	1596.86
9707.7	1596.9	9713.23	1597.13	9748.84	1597.26	9751.65	1597.26	9760.41	1597.26
9793.56	1597.3	9805.79	1597.35	9815.16	1597.35	9826.08	1597.43	9830.79	1597.4
9844.8	1597.4	9868.21	1597.1	9872.78	1597.08	9876.61	1597.05	9881.63	1596.81
9883.8	1596.8	9901.85	1596.85	9906.3	1597.06	9908.23	1597.18	9913.47	1597.1
9918.96	1597	9931.65	1596.88	9943.44	1597.23	9952.14	1597.44	9964.54	1597.32
9981.01	1597	9993.56	1594.1	9999	1592.82	10000.73	1592.89	10021.37	1593.49
10022.5	1593.71	10032.74	1595.38	10040.06	1594.82	10042.28	1594.79	10043.71	1594.3
10045.56	1594.71	10056.67	1596.84	10059.72	1596.57	10067.69	1596.66	10069.96	1596.64
10079.32	1596.71	10092.31	1597.48	10093.43	1597.59	10094.96	1596.93	10097.81	1595.86
10098.71	1595.31	10099.38	1595.26	10105.23	159	310112.27	1594.64	10120.07	1596.01
10122.39	1596.41	10125.87	1597.31	10129.34	1597.65	10154.27	1596.37	10185.51	1596.02
10188.94	159	610193.15	1595.87	10197.03	1595.88	10262.27	1595.84	10302.23	1595.79
10305.02	1596.51	10305.17	1596.51	10308.75	1594.76	10309.96	1594.72	10311.87	1595.03
10316.17	1597.11	10317.97	1596.49	10319.1	1595.73	10320.12	1595.68	10342.37	1595.88
10348.16	1595.91	10349.29	1595.93	10350.05	1596.01	10357.08	1596.47	10360.66	1596.26
10370.09	1596.41	10375.48	1596.51	10394.82	1597.06	10417.11	1597.59	10420.57	1597.66
10426.65	1597.81	10431.92	1598.74	10434.56	1599.17	10435.59	1598.93	10438.48	1598.41
10445.5	1597.21	10455.87	1597.01	10457.46	1597.01	10459.77	1596.99	10471.6	1596.05
10475.01	1595.71	10481.54	1596.12	10484.65	1596.39	10507.33	1596.43	10525.93	1596.43
10534.65	1596.41	10577.26	1596.76	10614.27	1596.78	10621.8	1596.81	10629.34	1596.82
10649.35	1596.81	10655.29	1596.81	10667.37	1596.83	10712.21	1597.03	10751.44	1597.14
10794.74	159	710822.43	1596.78	10823.54	1596.77	10840.22	1596.97	10894.82	1597.55
10902.85	1597.61	10919.99	1597.83	10927.06	1597.89	10930.65	1597.92	10948.56	1598.31
10953.73	1598.31	10956.68	1598.29						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4895.17	.068	6150.65	.15	8668.69	.1	9655.59	.068	9981.01	.045
10056.67	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9981.01	10056.67	380	410.52	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
4895.17	6943.33	1598.12	10434.56	10956.68	1599.17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1597.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.	0.146	0.045	0.068
W.S. Elev (ft)	1597.00	Reach Len. (ft)	380.00	410.52	380.00
Crit W.S. (ft)		Flow Area (sq ft)	1233.16	192.80	307.74
E.G. Slope (ft/ft)	0.015858	Area (sq ft)	1233.16	192.80	307.74

Q Total (cfs)	3732.00	Flow (cfs)	1343.31	1482.80	905.89
Top Width (ft)	2189.39	Top Width (ft)	1806.07	75.66	307.67
Vel Total (ft/s)	2.15	Avg. Vel. (ft/s)	1.09	7.69	2.94
Max Chl Dpth (ft)	4.18	Hydr. Depth (ft)	0.68	2.55	1.00
Conv. Total (cfs)	29636.0	Conv. (cfs)	10667.3	11775.0	7193.7
Length Wtd. (ft)	389.34	Wetted Per. (ft)	1806.51	76.65	310.24
Min Ch El (ft)	1592.82	Shear (lb/sq ft)	0.68	2.49	0.98
Alpha	5.62	Stream Power (lb/ft s)	0.74	19.15	2.89
Frctn Loss (ft)	3.74	Cum Volume (acre-ft)	415.75	11.61	38.55
C & E Loss (ft)	0.08	Cum SA (acres)	266.20	4.87	39.24

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6166.63	7438.09	466.90	356.40	345.30	12.51	1.03	1.31
7438.09	8709.55	812.25	817.62	1201.31	21.76	0.68	0.99
8709.55	9981.01	64.17	59.14	259.90	1.72	0.23	1.08
LB 9981.01	RB 10056.67	1482.80	192.80	76.65	39.73	2.55	7.69
10056.67	10956.68	905.89	307.74	310.24	24.27	1.00	2.94

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.643

INPUT
Description: RM. 2.643. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.7411

Station Elevation Data num= 442

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4784.71	1593.6	4786.79	1593.45	4797.34	1594.52	4818.03	1595.14	4821.33	1595.26
4844.11	1595.2	4847.46	1595.22	4852.12	1595.23	4872.45	1595.28	4887.13	1595.23
4895.74	1595.2	4908.09	1595.25	4931.32	1595.41	4937.95	1595.43	4939.43	1595.43
4940.35	1595.4	4941.83	1595.43	4951.45	1595.37	4955.79	1593.64	4958.76	1592.05
4970.47	1592.1	4975.05	1592.17	4982.33	1592.2	4996.02	1594.11	4996.59	1594.23
4996.6	1594.2	4996.97	1594.22	5019.52	1593.82	5037.37	1593.59	5043.7	1593.44
5057.34	1593.7	5058.32	1593.67	5058.68	1593.66	5058.97	1593.65	5059.38	1593.62
5060.19	1593.6	5072.64	1593	5084.54	1593.84	5087.92	1594.13	5095.34	1594.84
5101.01	1594.6	5108.47	1594.39	5118.94	1594.37	5142.87	1594.25	5158.14	1594.18
5205.67	1594.1	5244.07	1594.27	5289.53	1594.29	5357.82	1594.39	5415.48	1594.14
5451.85	1594	5471.56	1593.93	5517.98	1593.42	5573.86	1593.06	5578.11	1593.07
5585.79	1593	5591.68	1593.51	5593.84	1593.67	5594.17	1593.69	5644.61	1593.81
5668.07	1593.8	5678.94	1592.46	5679.49	1592.41	5689.18	1593.04	5690.57	1593.11
5691.29	1593.2	5692.43	1593.3	5693.2	1593.27	5740.74	1593.49	5779.39	1593.68
5780.45	1593.7	5781.21	1593.7	5781.49	1593.71	5781.63	1593.71	5782.1	1593.72

5785.93	1593.9	5801.55	1594.45	5806.06	1594.41	5817.42	1593.76	5818.31	1594.3
5819.24	1594.2	5833.68	1593.52	5835.95	1593.56	5836.77	1593.56	5840.16	1593.55
5871.75	1593.6	5893.55	1593.68	5901.3	1593.69	5949.29	1593.5	5953.52	1593.6
5957.1	1593.7	5960.58	1593.7	5963.82	1593.69	5984.98	1593.99	6002.13	1593.94
6017.51	1593.9	6043.54	1593.9	6056.2	1594.12	6059.92	1593.94	6061.11	1593.83
6089.97	1593.7	6092.03	1593.72	6094.02	1593.76	6106.33	1593.89	6110.69	1593.87
6114.23	1594	6114.76	1593.97	6178.71	1593.46	6179.45	1593.47	6179.83	1593.47
6180.42	1593.5	6181.75	1593.5	6181.86	1593.49	6231.53	1593.73	6232.02	1593.7
6256.43	1592.9	6258.41	1592.92	6265.31	1592.83	6301.74	1593.05	6322.42	1593.19
6352.71	1593.6	6422.81	1594.86	6479.21	1596.03	6484.8	1596.01	6530.08	1595.43
6540.34	1595.3	6541.94	1595.32	6543.89	1595.26	6545.4	1595.22	6546.88	1595.18
6559.54	1594.9	6642.91	1593.25	6670.31	1592.54	6696.92	1592.2	6697.4	1592.24
6699.51	1592.2	6700.41	1592.14	6724.83	1591.7	6741.09	1591.33	6772.29	1590.65
6782.98	1590.4	6802.95	1590.03	6811.66	1589.89	6835.08	1590.16	6862.16	1590.41
6883.15	1590.6	6897.08	1590.94	6899.21	1590.7	6918.19	1590.88	6978.5	1591.37
7028.17	1591.9	7035.7	1591.96	7062.25	1591.97	7113.95	1592.19	7149.24	1592.36
7185.92	1592.7	7239.66	1592.82	7262.58	1592.93	7265.13	1592.96	7273.52	1593.04
7289.6	1593.1	7339.02	1593.23	7361.29	1593.65	7372.51	1593.85	7373.14	1593.86
7375.99	1593.1	7390.3	1589.28	7391.23	1589.27	7392.97	1589.25	7401	1589.15
7402.18	1589.2	7402.88	1589.08	7404.48	1589.27	7411.09	1593.79	7451.31	1593.69
7460.34	1593.5	7460.81	1593.53	7461.25	1593.52	7461.63	1593.53	7463.33	1593.52
7524.81	1593.5	7531.24	1593.52	7552.34	1592.13	7561.15	1591.48	7577.82	1593.5
7579.21	1593.7	7579.95	1593.73	7581.38	1593.87	7581.4	1593.87	7581.8	1593.85
7585.34	1593.8	7602.56	1593.59	7605.5	1593.67	7625.25	1593.78	7642	1593.9
7657.25	1593.8	7659.26	1593.64	7660.21	1593.6	7678.86	1593.3	7707.83	1593.24
7715.25	1592.1	7716.14	1591.98	7720.38	1591.58	7722.62	1591.42	7723.7	1591.38
7730.03	1590.9	7734.12	1590.61	7737.48	1590.35	7745.88	1591.09	7755.08	1591.92
7759.97	1591.9	7765.52	1591.95	7767.25	1591.96	7795.97	1592.19	7805.54	1592.24
7833.54	1592.4	7882.4	1592.43	7974.1	1592.34	7978.23	1592.33	7998.74	1592.36
8054.54	1592	8063.46	1591.95	8075.56	1591.86	8101.18	1591.7	8105.03	1591.73
8105.99	1591.7	8108.99	1591.75	8117.93	1591.98	8123.49	1591.99	8128.49	1591.84
8135.14	1591.8	8141.93	1591.76	8165.1	1591.74	8218.49	1591.96	8221.99	1592.01
8255.87	1591.9	8256.68	1591.87	8257.14	1591.87	8259.46	1591.88	8409.22	1592.5
8440.58	1592.4	8451	1592.68	8456.81	1592.88	8461.34	1592.97	8506.44	1592.88
8525.58	1593.1	8553.14	1593.47	8616.39	1593.14	8626.56	1593.14	8628.75	1593.39
8632.52	1593.3	8638.49	1593.31	8654.54	1592.55	8660.25	1592.39	8677.92	1592.77
8692.19	1592.9	8699.69	1592.99	8727.76	1593.1	8752.54	1592.99	8785.61	1593.04
8822.09	1593.1	8832.57	1593.1	8836.66	1593.07	8843.1	1593.09	8844.61	1593.08
8874.85	1592.6	8882.54	1592.5	8891.16	1592.53	8894.49	1592.55	8908.69	1592.56
8919.51	1592.6	8924.47	1592.63	8931.73	1592.48	8932.41	1592.5	8932.58	1592.51
8932.93	1592.5	8942.14	1593.01	8944.55	1592.93	8951.15	1592.64	8960.09	1592.55
8971.66	1592.4	8981.65	1592.36	8990.91	1592.38	8991.19	1592.5	8992.41	1592.49
8997.76	1592.6	9001.68	1592.51	9019.66	1592.46	9058.05	1592.52	9061.34	1592.57
9076.99	1592.8	9079.55	1592.83	9109.36	1593.09	9124.16	1593.03	9128.19	1592.98
9137.29	1592.8	9144.36	1592.74	9154.69	1592.83	9167.04	1592.49	9168.59	1592.46
9174.1	1592.5	9179.81	1592.48	9184.73	1592.57	9193.2	1592.58	9194.11	1592.71
9215.29	1593.2	9230.35	1593.69	9236.49	1593.7	9254.6	1594.1	9259.31	1594.19
9261.8	1594.2	9263.68	1594.13	9289.32	1593.85	9303.01	1593.95	9303.83	1593.99
9319.31	1593.9	9321.42	1594.25	9329.25	1594.28	9347.7	1594.26	9363.57	1594.24
9376.78	1595.8	9379.37	1596.64	9390.92	1594.94	9391.3	1594.88	9395.73	1594.61
9398.1	1594.3	9405.64	1594.29	9417.27	1594.44	9431.74	1594.36	9436.97	1594.18
9445.33	1594	9458.88	1593.95	9467.34	1593.94	9493.05	1593.74	9519.26	1593.63
9522.83	1593.6	9533.78	1593.49	9539.68	1593.51	9539.99	1593.57	9540.26	1593.7
9540.28	1593.7	9542.72	1593.82	9546.59	1593.95	9554.94	1593.83	9565.44	1594.09
9570.02	1594.1	9585.82	1593.93	9594.41	1593.82	9607.71	1593.84	9619.56	1593.9
9622.2	1593.8	9634.09	1593.77	9641.14	1593.78	9659.74	1594.07	9661.94	1594.01
9669.34	1593.9	9681.11	1593.8	9701.82	1593.38	9705.21	1593.28	9706.35	1593.26

9713.6	1593	9720.13	1592.86	9721.94	1592.79	9721.97	1592.78	9722.98	1592.75
9723.03	1592.6	9729.77	1592.58	9739.14	1592.72	9768.94	1592.82	9775.58	1592.64
9779.39	1592.7	9783.16	1592.72	9784.8	1592.7	9789.84	1592.62	9807.9	1592.38
9815.32	1592.4	9834.62	1592.79	9855.52	1592.96	9857.58	1592.81	9862.46	1592.42
9864.77	1592.2	9870.31	1592.33	9890.52	1593.01	9901.98	1592.98	9906.02	1592.95
9920.8	1592.7	9938.31	1592.68	9938.69	1592.68	9938.99	1592.73	9939.63	1592.68
9940.1	1592.7	9950.96	1592.72	9978.16	1592.84	9978.84	1592.82	9985.02	1593.39
9985.51	1593.4	9985.6	1593.41	9997.7	1589.81	10001.9	1589.78	10008.41	1589.64
10024.19	1590	10029.51	1590.16	10038.85	1593.36	10039.74	1593.51	10041.45	1593.54
10046.4	1593.7	10061.26	1592.19	10062.31	1592.06	10079.72	1593.53	10082.39	1593.89
10099.4	1592.2	10103.81	1591.61	10138.73	1591.91	10140.27	1591.96	10140.43	1591.96
10173.76	1592.3	10188.38	1592.28	10211.21	1592.33	10218.97	1592.45	10238.67	1592.49
10256.16	1592.4	10271.67	1592.46	10275.64	1591.91	10281.75	1591.04	10294.01	1591.66
10294.93	1591.7	10297.21	1591.71	10301.98	1591.72	10354.91	1591.87	10368.39	1591.88
10397.14	1591.8	10443.32	1592.18	10455.44	1592.38	10479.6	1592.59	10488.98	1592.69
10544.73	1592.9	10552.79	1592.91	0553.78	1592.9	10554.2	1592.91	10554.79	1592.91
10588.37	1592.9	10596.3	1592.89						

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4784.71	.15	5037.37	.068	5871.75	.15	8259.46	.1	9329.25	.15
9789.84	.068	9985.51	.045	10041.45	.068				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.51	10041.45	400	468.72	400	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
6479.21	7411.09	1593.79	4784.71	6479.21	1596.03

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1593.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.120	0.045	0.068
W.S. Elev (ft)	1593.45	Reach Len. (ft)	400.00	468.72	400.00
Crit W.S. (ft)		Flow Area (sq ft)	1697.10	152.99	634.33
E.G. Slope (ft/ft)	0.006496	Area (sq ft)	1697.10	152.99	634.33
Q Total (cfs)	3732.00	Flow (cfs)	1675.46	805.89	1250.65
Top Width (ft)	2473.73	Top Width (ft)	1880.45	53.88	539.40
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	0.99	5.27	1.97
Max Chl Dpth (ft)	3.81	Hydr. Depth (ft)	0.90	2.84	1.18
Conv. Total (cfs)	46302.4	Conv. (cfs)	20787.2	9998.5	15516.7
Length Wtd. (ft)	411.87	Wetted Per. (ft)	1881.24	54.95	540.32
Min Ch El (ft)	1589.64	Shear (lb/sq ft)	0.37	1.13	0.48
Alpha	3.43	Stream Power (lb/ft s)	0.36	5.95	0.94
Frctn Loss (ft)	3.71	Cum Volume (acre-ft)	402.97	9.98	34.44
C & E Loss (ft)	0.00	Cum SA (acres)	250.12	4.26	35.54

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7385.11	8685.31	1110.32	1142.44	1056.11	29.75	1.08	0.97
8685.31	9985.51	565.14	554.66	825.12	15.14	0.67	1.02
LB 9985.51	RB 10041.45	805.89	152.99	54.95	21.59	2.84	5.27
10041.45	10596.30	1250.65	634.33	540.32	33.51	1.18	1.97

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.554

INPUT
Description: RM. 2.554. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.6690.45

Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4444.79	1591.7	4454.3	1591.65	4478.65	1591.63	4489.69	1591.11	4492.88	1591.01
4504.26	1590.4	4509.49	1590.46	4532.72	1590.58	4535.85	1590.65	4541.63	1590.8
4547.67	1590.9	4556.23	1591.03	4561.4	1591.03	4631.71	1591.21	4649.85	1591.26
4651.02	1591.3	4652.06	1591.27	4653.53	1591.27	4656.27	1591.25	4696.01	1590.89
4697.24	1590.8	4705.55	1590.44	4708.14	1590.4	4715	1590.11	4721.5	1590.22
4743.17	1590.5	4759.88	1591.14	4762.35	1591.18	4766.23	1591.15	4769.2	1591.14
4823.71	1590.9	4870.64	1590.7	4872.8	1590.7	4873.67	1590.7	4874.97	1590.7
4879.09	1590.7	4897.77	1590.57	4904.11	1590.33	4925.76	1589.86	4948.36	1589.89
4953.84	1589.9	4958.95	1590.01	4960.32	1590.07	4967.18	1590.23	4977.86	1590.48
5000.99	1590.5	5021.62	1590.67	5030.41	1590.68	5044.65	1590.72	5045.46	1590.72
5046.79	1590.7	5047.02	1590.4	5048.39	1589.04	5056.07	1588.61	5060.73	1588.18
5061.72	1588.4	5071.8	1590.72	5075.38	1590.4	5094.28	1589.46	5101.12	1589.91
5101.31	1589.9	5140.44	1589.77	5142.44	1589.77	5185.09	1589.83	5197.16	1590.89
5202.03	1591.2	5203.84	1591.27	5221.67	1591.47	5224.59	1591.04	5235.1	1589.84
5242.62	1589.9	5248.13	1589.89	5269.01	1590.02	5288.26	1590.1	5312.98	1590.18
5327.8	1590.2	5354.24	1590.32	5362.24	1589.94	5379.11	1589.14	5379.97	1589.08
5380.61	1589	5381	1589.02	5382.29	1588.98	5386.64	1589.04	5421.71	1589.36
5435.49	1589.9	5445.04	1590.19	5455.55	1590.08	5459.12	1590.16	5467.63	1590.61
5477.32	1590.9	5489.7	1590.97	5494.03	1591.01	5497.95	1590.94	5507.27	1591.01
5532.07	1591	5544.07	1591.01	5558.68	1590.72	5577.94	1590.47	5583.9	1590.44
5593.3	1590.4	5615.19	1590.35	5621.23	1590.31	5651.25	1589.97	5653.5	1589.91
5665.21	1589.7	5686.25	1589	5708	1588.88	5740.14	1588.98	5749.61	1589.31
5753.77	1589.4	5756.31	1589.43	5762.88	1589.67	5772.43	1590.18	5782.2	1590.21
5782.9	1590.2	5824.22	1589.91	5826.73	1589.93	5831.06	1590.01	5839.41	1590.1
5865.55	1589.9	5893.29	1589.94	5910.26	1589.85	5914.46	1589.83	5923.41	1589.92
5931.07	1590.2	5953.71	1590.31	5958.23	1590.36	5961.58	1590.4	5964.06	1590.42
5970.79	1590.4	6053.16	1590.16	6070.28	1590.21	6074.52	1590.01	6076.58	1589.87
6089.23	1589.1	6089.58	1589.1	6092.42	1589	6095.03	1588.74	6100.1	1588.34
6132.67	1588.2	6142.16	1588.28	6148.31	1588.49	6168.56	1588.77	6174.47	1588.51
6190.95	1588.4	6212.31	1588.51	6229.27	1588.5	6316.9	1589.82	6320.42	1589.89
6322.38	1589.9	6322.48	1589.87	6332.62	1589.87	6335.91	1589.87	6343.49	1589.95

6349.57	1590	6362.31	1590.02	6433.15	1590.11	6445.39	1590.05	6449.45	1590.11
6475.94	1590.5	6481.58	1590.55	6525.41	1591.07	6530.35	1591.06	6544.25	1590.96
6567.91	1590.6	6663	1591.72	6690.45	1591.86	6750.81	1591.13	6812.98	1590.37
6822.55	1590.3	6836.08	1590.07	6906.24	1589.54	6923.29	1589.62	6951.82	1589.59
6960.69	1589.6	6966.75	1589.59	6982.17	1589.45	6996.12	1589.05	6998.33	1589
6999.51	1589	7014.07	1589.54	7023.45	1589.89	7024.03	1589.9	7024.2	1589.9
7037.33	1589.9	7074.64	1590.05	7078.81	1590.05	7080.5	1589.98	7090.45	1589.49
7095.62	1589.8	7103.19	1590.35	7109.42	1589.92	7115.34	1589.73	7128.69	1588.91
7168.54	1589.1	7177.93	1589.21	7177.97	1589.08	7180.44	1588.91	7181.23	1588.93
7181.84	1589	7201.76	1589.81	7210.72	1589.35	7234.76	1588.42	7236.65	1588.4
7303.07	1588	7355.25	1587.92	7384.73	1588.82	7403.43	1589.51	7462.06	1587.87
7496.81	1588	7516.35	1588.16	7531.15	1588.31	7542.7	1590.57	7545.56	1591.14
7546.41	1591.3	7561.51	1590.45	7574.05	1590.71	7581.49	1590.6	7656.27	1590.13
7664.72	1590	7669.96	1589.97	7682.45	1589.65	7687.82	1589.94	7701.74	1591.07
7717.46	1591.1	7732.65	1590.92	7740.43	1590.45	7752.86	1590.37	7807.54	1590.07
7808.74	1590	7809.3	1590	7810.6	1589.94	7819.96	1589.58	7835.64	1589.03
7842.03	1589	7863.94	1588.54	7868	1588.69	7891.51	1589.49	7893.71	1589.57
7893.94	1589.6	7894.18	1589.59	7894.35	1589.59	7917.51	1590.41	7944.21	1590
7981.39	1589.4	7986.28	1588.96	7989.03	1589.13	8000.25	1589.15	8003.3	1589.1
8021.28	1588.9	8032.97	1589.29	8043.35	1589.4	8046.22	1589.29	8084.89	1588.34
8131.88	1588.8	8160.75	1589.43	8172.03	1589.38	8220.56	1589.44	8257.28	1589.45
8283.27	1589.5	8327.02	1589.45	8393.1	1589.66	8400.14	1589.67	8406.04	1589.67
8410.23	1589.7	8468.57	1589.56	8473.95	1589.71	8484.97	1589.7	8488.77	1589.87
8530.64	1589.8	8542.86	1589.62	8544.77	1589.59	8549.42	1589.57	8551.94	1589.53
8573.8	1589.2	8621.83	1588.86	8631.27	1588.88	8657.13	1588.81	8665.84	1588.83
8685.88	1588.9	8710.18	1588.63	8721.65	1588.56	8727.01	1588.6	8736.68	1589.01
8741.59	1589.1	8749.01	1589	8763.71	1589.4	8767.65	1589.46	8776.5	1589.4
8809.14	1589.3	8817.33	1588.94	8824.45	1589.36	8828.91	1588.92	8833.34	1589.44
8835.77	1589.8	8837.63	1589.72	8838.13	1589.62	8845.77	1589.67	8863.53	1589.82
8876.26	1589.9	8879.69	1589.97	8885.71	1590.06	8896.17	1590.37	8897.87	1590.39
8913.88	1590.8	8916.44	1590.79	8927.03	1590.82	8940.52	1590.71	8945.92	1590.84
8959.15	1590.9	8966.83	1590.95	8970.76	1590.97	8991.5	1590.99	9001.27	1590.92
9010.68	1591	9028.92	1590.97	9031.02	1590.94	9038.46	1590.7	9044.18	1590.46
9051.19	1590.3	9051.35	1590.38	9059.35	1590.26	9067.63	1590.61	9096.52	1590.62
9096.82	1590.4	9096.84	1590.38	9105.78	1590.57	9110.78	1590.51	9126.7	1590.64
9140.66	1590.7	9148.32	1590.61	9154.42	1590.65	9168.33	1590.67	9173.78	1590.7
9174.41	1590.7	9177.22	1590.7	9203.53	1590.69	9214.96	1590.71	9224.8	1590.42
9232.19	1590.3	9252.92	1589.55	9257.74	1589.5	9276.29	1589.14	9304.43	1589.12
9309.5	1589.3	9321.21	1589.48	9333.44	1589.42	9341.77	1589.29	9345.42	1589.36
9356.22	1589.4	9366.41	1589.34	9381.28	1589.25	9389.87	1589.21	9406.52	1588.58
9409.36	1588.5	9409.88	1588.5	9440.79	1588.86	9441.12	1588.85	9447.85	1589.01
9451.68	1589.1	9466.26	1589.52	9493.85	1589.3	9495.95	1589.27	9502.15	1589.27
9516.44	1589.4	9520.56	1589.39	9530.86	1586.92	9535.75	1585.78	9541.41	1587.03
9549.17	1588.8	9556.56	1588.73	9565.45	1588.35	9571.46	1588.39	9573.29	1588.4
9590.37	1589	9624.12	1588.88	9626.5	1588.87	9632.37	1588.96	9643.39	1588.71
9646.56	1588.7	9647.47	1588.66	9651.6	1588.67	9671.95	1588.21	9684.04	1588.22
9690.7	1588.3	9697.15	1588.27	9709.04	1588.42	9712.09	1588.54	9730.01	1588.66
9764.6	1589	9766.65	1589	9780.2	1588.76	9783.4	1588.71	9784.14	1588.7
9796.43	1588.7	9821.99	1588.66	9831.32	1588.74	9836.37	1588.74	9851.2	1588.68
9852.64	1588.6	9865.97	1588.22	9872.18	1588.04	9872.39	1588.17	9872.78	1588.22
9898.1	1588.1	9904.69	1588.02	9904.74	1588.02	9912.48	1588.27	9920.81	1588.58
9925.46	1588.6	9926.73	1588.57	9934.39	1588.57	9948.79	1588.83	9958.83	1588.71
9966.91	1588.7	9970.88	1588.65	9974.71	1588.69	9978.72	1588.75	9997.96	1589.11
10009.53	1586.6	10010.52	1586.12	10012.5	1586.07	10019.01	1586.04	10028.05	1590.08
10032.8	1591.6	10047.84	1590.88	10052.13	1590.17	10062.8	1588.73	10072.73	1587.81
10103.98	1587.4	10110.61	1587.31	10114.55	1587.35	10156.37	1586.65	10170.45	1586.43
10176.11	158	6 10183.97	1585.55	10192.35	1585.85	10237.16	1586.88	10251.81	1586.93

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10255.25  1586.910257.89 1586.8910277.43 1588.67 10285.5 1589.0910297.48 1588.79
10300.97  1588.710306.85 1588.6710313.95 1588.8110320.35 1589.1510334.16 1589.26
10339.58  1589.410352.17 1589.5610357.81 1589.6110361.97 1589.5810363.52 1589.63
10378.79  1589.610381.13 1589.6410392.07 1589.5310405.89 1589.4410420.75 1589.71
10426.49  1589.710433.62  1589.710452.64  1589.810457.14 1589.7910461.07 1589.85
10465.47  1589.910470.29 1589.8610480.15 1589.6310486.82 1589.5810491.22 1589.52
10504.22  1589.510505.59 1589.4410506.13 1589.4310508.04 1589.4410517.39 1589.41
10521.74  1589.410542.64 1588.8610546.73 1588.84 10548.1 1588.8410562.94 1588.77
10601.52  1588.810608.93 1588.8110611.89 1588.81 10621.1 1588.5810634.57 1588.57
10648.15  1588.710659.12 1589.15

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4444.79     .15 7863.94      .1 8809.14     .15 9997.96    .045 10032.8     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9997.96 10032.8               400  529.54     400             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 4444.79 6690.45 1591.86

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1589.86  Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.11  Wt. n-Val.                  0.138      0.045      0.150
  W.S. Elev (ft)            1589.74  Reach Len. (ft)            400.00     529.54     400.00
  Crit W.S. (ft)                     Flow Area (sq ft)         1741.00      71.80     806.76
  E.G. Slope (ft/ft)       0.013252  Area (sq ft)              1741.00      71.80     806.76
  Q Total (cfs)             3732.00  Flow (cfs)                2021.95     482.91    1227.14
  Top Width (ft)            2853.61  Top Width (ft)            2253.65      29.34     570.62
  Vel Total (ft/s)             1.42  Avg. Vel. (ft/s)             1.16       6.73       1.52
  Max Chl Dpth (ft)            4.19  Hydr. Depth (ft)             0.77       2.45       1.41
  Conv. Total (cfs)         32419.6  Conv. (cfs)               17564.6     4195.0    10660.0
  Length Wtd. (ft)           418.23  Wetted Per. (ft)          2255.20      30.51     571.53
  Min Ch El (ft)            1586.04  Shear (lb/sq ft)             0.64       1.95       1.17
  Alpha                        3.62  Stream Power (lb/ft s)       0.74      13.09       1.78
  Frctn Loss (ft)              4.19  Cum Volume (acre-ft)       387.18       8.77      27.82
  C & E Loss (ft)              0.01  Cum SA (acres)             231.14       3.82      30.44

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.    % Conv.   Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  5833.08       7221.38          53.64      91.63    253.53       1.44      0.36       0.59
  7221.38       8609.67         941.37     761.22   1007.01      25.22      0.76       1.24
  8609.67       9997.96        1026.94     888.15    994.66      27.52      0.89       1.16
  LB 9997.96    RB 10032.80     482.91      71.80     30.51      12.94      2.45       6.73
  10032.80      10659.12       1227.14     806.76    571.53      32.88      1.41       1.52
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.454**

INPUT
Description: RM. 2.454. HORZ. N VALUES USED. AREA BLOCKED OUT TO LEFT OF STA.7066.08.

Station Elevation Data num= 485

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4639.26	1588.7	4642.64	1588.71	4681.32	1587.61	4701.19	1587.45	4711.47	1587.43
4732.19	1588	4742.15	1588.22	4746.23	1588.28	4774.34	1588.72	4778.44	1588.74
4780.72	1588.7	4844.29	1588.74	4845	1588.71	4869.86	1588.11	4907.52	1587.41
4923.63	1587.5	4940.65	1587.57	4958.62	1588.26	4958.94	1588.27	4959.48	1588.26
4961.43	1588.3	5009.37	1588.05	5027.56	1588.5	5037.36	1589.04	5041.08	1588.95
5043.19	1585.9	5044.96	1584.85	5057.03	1585.57	5061.61	1585.29	5072.91	1588.46
5094.2	1587.5	5097.03	1587.26	5103.5	1587.24	5134.62	1587.42	5165.01	1587.7
5174.42	1587.6	5181.58	1587.66	5192.54	1588.2	5200.65	1588.65	5223.88	1589.9
5230.73	1590.3	5233.33	1590.2	5234.2	1590.19	5257.15	1589.67	5267.07	1589.47
5286.1	1589.1	5308.64	1588.59	5317.11	1588.41	5326.05	1587.83	5343.53	1587.82
5345.4	1587.7	5347.55	1587.65	5364.64	1587.21	5372.79	1587.01	5382.62	1586.97
5387.29	1587	5397.41	1587.12	5412.47	1587.23	5413.18	1587.22	5414.07	1587.29
5429.13	1588.5	5433.38	1588.48	5456.52	1588.46	5462.34	1588.46	5464.51	1588.49
5517.86	1588.5	5532.96	1588.38	5548.03	1588.32	5559.41	1588.44	5588.12	1588.55
5597.7	1588	5622.85	1586.03	5626.89	1586.02	5652.37	1585.9	5666.74	1585.78
5682.36	1585.7	5696.55	1585.73	5716.68	1586.85	5734.99	1587.83	5744.53	1587.55
5752.12	1587.5	5799.9	1587.14	5817.7	1586.99	5821.61	1586.95	5823.44	1586.94
5828.85	1586.9	5885.72	1586.36	5899.75	1586.15	5904.22	1585.97	5921.78	1585.16
5925.28	1585.1	5929.24	1585.09	5950.06	1584.87	5964.74	1584.78	5973.15	1585.37
5979.25	1585.9	5992.44	1586.71	6004.16	1586.55	6024.7	1586.64	6050.52	1586.85
6054.38	1586.6	6064	1586.68	6070.47	1586.62	6104.13	1587.37	6111.76	1587.52
6112.58	1587.5	6142.85	1587.32	6179.35	1587.09	6182.48	1587.09	6183.81	1587.08
6184.24	1587.1	6185.08	1587.08	6187.15	1587.05	6250.99	1586.85	6268.55	1587.02
6270.05	1587	6293.06	1586.04	6300.27	1585.77	6305.28	1585.54	6327.31	1585.57
6341	1585.6	6351.99	1586.02	6374.41	1586.15	6383.02	1586.49	6388.77	1586.76
6398.04	1587.2	6407.9	1587.1	6439.17	1586.89	6448.82	1586.77	6467.18	1587.12
6478.83	1587	6492.07	1587.02	6529.62	1586.9	6535.86	1586.89	6540.99	1586.9
6547.18	1586.7	6548.87	1586.73	6555.98	1586.44	6566.33	1586.1	6568.4	1586.01
6571.94	1585.9	6579.63	1585.75	6610.81	1585.29	6624.83	1586.01	6636.04	1586.58
6645.88	1586.6	6702.8	1586.9	6742.49	1587.04	6745.19	1586.95	6768.35	1586.15
6776.09	1586	6778.22	1585.89	6785.81	1585.59	6796.89	1585.55	6841.75	1585.6
6865.65	1586.7	6869.61	1586.81	6874.25	1586.84	6898.75	1586.68	6905.32	1586.63
6905.61	1586.6	6905.97	1586.63	6906.65	1586.63	6946.77	1586.72	6960.88	1586.67
6970.14	1586.7	6996.1	1586.43	7004.26	1586.46	7029.41	1586.43	7044.98	1586.51
7053.98	1586.5	7056.65	1586.51	7064.87	1587.28	7066.08	1587.44	7091.66	1586.1
7095.04	1585.9	7095.13	1585.9	7095.24	1585.9	7095.48	1585.9	7118.64	1586.06
7141.06	1586.3	7145.31	1586.7	7160.86	1586.9	7161.15	1586.9	7161.68	1586.89
7168.29	1586.6	7202.96	1586.47	7258.44	1585.87	7262.84	1585.83	7264.27	1585.81
7270.4	1585.8	7278.38	1585.95	7299.21	1584.96	7311.3	1584.36	7316.55	1584.35
7349.48	1584.9	7358.67	1585.13	7388.07	1586.66	7409.46	1586.81	7441.26	1586.71
7470.47	1586	7551.14	1584.5	7555.37	1584.48	7577.43	1584.39	7602.02	1584.28
7607.21	1584.2	7609.04	1584.33	7616.47	1584.49	7627.61	1584.56	7629.11	1584.56

7631.73	1584.6	7710.12	1584.51	7749.64	1584.65	7759.95	1584.47	7799.57	1584.68
7832.92	1585.3	7846.72	1585.62	7858.25	1585.85	7874.11	1585.86	7885.29	1585.41
7915.19	1585.4	7917.81	1585.39	7921.01	1585.29	7930.56	1585.16	7935.75	1585.24
7965.52	1585.2	7976.71	1585.15	7978.46	1585.08	7981.97	1584.93	7990.61	1584.61
8005.37	1585	8010.35	1585.16	8014.53	1585.16	8029.23	1585.39	8049.25	1585.55
8067.31	1585.7	8082.06	1585.84	8085.34	1585.62	8099.67	1584.47	8113.96	1584.99
8119.02	1585.2	8135.95	1585.15	8156.76	1585.14	8159.02	1585.15	8161	1585.15
8172.15	1582.6	8183.16	1580.51	8199.92	1580.64	8213.36	1583.48	8219.37	1583.89
8227.02	1585	8231.93	1584.68	8245.26	1584.17	8247.79	1583.88	8251.11	1583.43
8251.49	1578.6	8252.09	1578.31	8269.36	1582.13	8274.17	1583.33	8276.54	1583.31
8284.54	1583.3	8291.72	1583.51	8297.43	1583.65	8323.87	1584.67	8349.27	1585.03
8352.24	1585.1	8383.42	1585.17	8472.74	1585.74	8506.85	1585.84	8526.69	1586.36
8538.82	1585.9	8559.81	1586.72	8594.97	1586.3	8627.61	1585.73	8628.85	1585.72
8652.45	1586.1	8668.88	1585.17	8669.31	1585.17	8679.01	1584.44	8694.22	1586.26
8695.61	1586.3	8710.92	1586.2	8744.04	1586.02	8754.74	1585.84	8762.24	1585.75
8770.62	1585.8	8804.07	1585.39	8804.36	1585.4	8804.5	1585.34	8804.92	1585.37
8828.9	1584.7	8829.44	1584.73	8840.43	1585.27	8857.47	1585.77	8860.24	1585.77
8862.06	1585.8	8895.06	1585.76	8921.13	1585.77	8956	1585.65	8963.88	1585.82
8988.59	1585.7	9053.71	1586.28	9065.83	1586.34	9071.67	1586.2	9078.55	1586.16
9094.47	1586	9113.32	1586.16	9116.17	1586	9118.42	1586.12	9118.99	1586.12
9121.02	1586.1	9123.87	1586.13	9177.05	1585.35	9193.92	1585.44	9219.83	1585.46
9226.96	1585.5	9232.16	1585.3	9243.74	1584.3	9253.33	1583.76	9268.36	1583.46
9272.11	1583.4	9277.59	1583.91	9284.1	1584.67	9299.77	1585.53	9305.96	1585.64
9308.66	1585.6	9325.03	1585.8	9336.36	1585.54	9342.18	1585.52	9352.41	1585.51
9367.8	1585.6	9385.94	1585.42	9386.45	1585.42	9387.88	1585.41	9405.26	1585.59
9423.19	1586.2	9426.21	1586.18	9428.92	1586.18	9442.85	1585.86	9447.18	1585.76
9455.85	1583.8	9461.77	1582.58	9468.07	1583.65	9475.44	1585.12	9478.33	1585.08
9515.39	1584.9	9522.27	1584.88	9552.43	1584.88	9566.39	1584.46	9577.54	1584.5
9578.11	1584.1	9607.38	1584.33	9609	1584.34	9610.44	1584.34	9632.62	1584.32
9640.93	1584.5	9659.94	1584.98	9692.93	1585.24	9700.76	1585.32	9709.29	1585.28
9728.12	1585.3	9751.64	1585.19	9773.29	1585.13	9776.36	1585.06	9794.04	1584.55
9794.43	1584.4	9794.46	1584.21	9806.04	1584.27	9826.31	1584.24	9826.4	1583.98
9826.52	1584.1	9829.48	1584.22	9841.95	1584.48	9842.47	1584.48	9843.15	1584.5
9906.55	1585	9913.95	1585.02	9926.37	1585.2	9931.74	1585.16	9935.7	1585.07
9948.88	1584.8	9964.99	1586.85	9966.38	1586.94	9969.23	1585.68	9980.13	1580.99
9991.52	1583.2	9994.32	1583.7	10012.45	1584.08	10020.32	1584.17	10024.19	1584.17
10051.81	1584.2	10061.54	1584.25	10066.46	1584.34	10067.43	1584.33	10082.74	1584.41
10089.83	1584.3	10103.8	1584.11	10118.48	1583.99	10121.58	1583.97	10129.92	1583.9
10141.86	1583.7	10156.47	1583.61	10160.13	1583.63	10163.61	1583.66	10165.64	1583.64
10191.26	1583.5	10199.79	1583.54	10210.36	1583.6	10222.61	1583.53	10237.41	1583.79
10249.84	1583.8	10260.68	1583.97	10271.8	1584.06	10277.21	1584.2	10286.51	1584.23
10297.52	1584.2	10311.11	1583.87	10314.09	1583.83	10315.89	1583.75	10320.2	1583.86
10334.13	1584.2	10344.03	1584.15	10352.06	1584.15	10363	1584.17	10370.92	1584.19
10377.64	1584.1	10396.64	1583.75	10416.11	1583.46	10427.87	1583.46	10430.39	1583.11
10456.41	1583.1	10478.51	1583.42	10484.29	1583.54	10491.65	1583.47	10500.73	1583.8
10516.24	1584.3	10520.91	1584.42	10524.35	1584.48	10556.7	1584.41	10567.29	1584.41
10570.66	1584.4	10613.52	1584.16	10637.03	1584.03	10642.88	1584	10652.79	1584.08
10658.01	1584.1	10658.92	1584.14	10691.76	1584.32	10693.86	1584.33	10698.51	1584.4
10723.31	1583.2	10728.67	1582.93	10729.77	1582.91	10745.24	1582.62	10773.82	1584.04
10783.01	1583.6	10785.33	1583.45	10798.71	1583.72	10800.98	1583.75	10803.53	1583.43
10805.35	1583	10810	1583.01	10849.35	1583.86	10851.32	1584.03	10851.47	1584.03
10851.71	1584	10861.6	1584.25	10893.14	1585.59	10893.81	1585.61	10894.29	1585.63
10895.16	1585.6	10927.11	1585.55	10935.18	1585.6	10955.12	1585.78	10966.8	1585.99
10993.11	1585.8	11021.32	1586.44	11029.18	1586.52	11053.16	1586.15	11054.68	1586.17
11057.17	1586.2	11083.47	1586.75	11087.96	1586.72	11105.89	1586.81	11109.96	1586.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4639.26	.15	9966.38	.04	510024.19	.15

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9966.38	10024.19	480	399.74	360	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
4639.26	7066.08	1587.44

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1585.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.150	0.045	0.150
W.S. Elev (ft)	1585.59	Reach Len. (ft)	480.00	399.74	360.00
Crit W.S. (ft)	1584.68	Flow Area (sq ft)	1536.48	118.01	1466.43
E.G. Slope (ft/ft)	0.007835	Area (sq ft)	1581.54	118.01	1466.43
Q Total (cfs)	3732.00	Flow (cfs)	1343.39	567.31	1821.30
Top Width (ft)	2908.06	Top Width (ft)	1955.70	54.74	897.62
Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)	0.87	4.81	1.24
Max Chl Dpth (ft)	7.28	Hydr. Depth (ft)	0.87	2.16	1.63
Conv. Total (cfs)	42162.3	Conv. (cfs)	15177.0	6409.1	20576.1
Length Wtd. (ft)	420.98	Wetted Per. (ft)	1783.06	55.95	897.91
Min Ch El (ft)	1580.99	Shear (lb/sq ft)	0.42	1.03	0.80
Alpha	3.18	Stream Power (lb/ft s)	0.37	4.96	0.99
Frctn Loss (ft)	4.25	Cum Volume (acre-ft)	371.93	7.62	17.38
C & E Loss (ft)	0.01	Cum SA (acres)	211.81	3.31	23.70

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5971.04	7302.82	3.44	6.71	16.80	0.09	0.40	0.51
7302.82	8634.60	922.07	967.81	958.83	24.71	1.02	0.95
8634.60	9966.38	417.88	561.96	807.43	11.20	0.70	0.74
LB 9966.38	RB 10024.19	567.31	118.01	55.95	15.20	2.16	4.81
10024.19	11109.96	1821.30	1466.43	897.91	48.80	1.63	1.24

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.378

INPUT
Description: RM. 2.378. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT OF STA.6382.5.

Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4470.09	1582.3	4470.98	1582.29	4480.23	1582.54	4485.95	1582.28	4504.07	1582.37
4545.73	1581.9	4568.5	1582.32	4576.85	1582.32	4585.52	1582.29	4643.63	1582.03
4656.83	1582.1	4670.74	1582.21	4693.67	1582.26	4706.35	1583.11	4723.05	1582.85
4728.45	1583.1	4730.89	1582.88	4739.71	1582.7	4745.73	1581.58	4747.22	1581.7
4750.24	1582.5	4834.72	1581.89	4875.69	1581.88	4876.7	1581.87	4877.89	1581.77
4899.74	1580.3	4906.92	1580.23	4923.37	1580.01	4933.35	1579.79	4942.04	1579.75
4963.8	1579.7	4984.65	1580.96	4988.22	1581.25	5004.48	1581.15	5047.36	1580.95
5068.47	1580.9	5072.85	1580.83	5076.04	1580.83	5081.63	1580.8	5095.23	1580.71
5113.32	1580.6	5165.08	1580.33	5191.45	1580.07	5192.14	1580.19	5193.75	1580.42
5209.81	1583.2	5216.35	1583.13	5242.88	1582.92	5284.87	1582.38	5300.55	1582.26
5323.45	1581.6	5359.24	1581.54	5401.76	1581.23	5409.36	1580.65	5416.48	1580.17
5418.68	1580	5422.31	1579.71	5439.83	1579.73	5465.02	1579.77	5473.43	1580.14
5476.75	1580.4	5485.74	1581.01	5495.73	1581.46	5503.33	1581.36	5506.55	1581.35
5558.48	1581.2	5566.97	1581.19	5567.61	1581.19	5568.08	1581.19	5568.31	1581.19
5571.28	1581.2	5610.74	1581.47	5619.17	1582.53	5628.74	1583.13	5646.88	1582.79
5660.09	1582.6	5683.91	1582.26	5697.4	1582.1	5703.24	1581.97	5734.94	1581.91
5743.8	1581.8	5766.27	1581.49	5780.5	1581.45	5782.8	1581.46	5805.84	1580.06
5821.06	1579.2	5830.95	1579.13	5876.95	1579.28	5896.27	1580.25	5903.05	1580.48
5908.35	1580.8	5917.86	1581.47	5927.97	1581.5	5931.15	1581.49	5945.51	1581.25
5972.99	1581.2	5986.44	1581.13	5994.29	1581.15	6015.29	1581.05	6042.84	1581.17
6052.14	1581.2	6072.15	1581.27	6074.12	1581.28	6082.44	1581.28	6089.72	1580.9
6120.13	1579.4	6141.9	1579.71	6185.76	1579.85	6197.25	1580.49	6201.44	1580.69
6208.02	1581.1	6214.55	1581.47	6218.48	1581.69	6228.72	1581.67	6241.32	1581.73
6289.78	1581.5	6293.1	1581.52	6301.7	1581.56	6317.78	1581.64	6336.54	1581.75
6359.69	1581.9	6374.84	1581.98	6376.49	1581.99	6378.18	1581.98	6382.5	1582
6399.51	1581.4	6411.02	1581.09	6425.29	1580.8	6436.58	1580.76	6448.47	1580.88
6460.47	1581.5	6462.2	1581.61	6464.16	1581.69	6483.09	1581.85	6490.5	1581.76
6545.26	1581.9	6578.24	1581.47	6598.8	1581.49	6619.41	1581.49	6659.78	1581.96
6661.65	1582	6663.23	1582.03	6664.16	1582.17	6670.53	1583.09	6680.41	1583.38
6686.49	1583.6	6728.82	1583.35	6785.84	1582.74	6787.81	1582.72	6788.57	1582.71
6789.15	1582.7	6790.11	1582.7	6807.71	1582.64	6810.05	1582.52	6823.45	1581.87
6827.25	1581.9	6831.66	1581.53	6845.35	1581.62	6871.12	1581.13	6881.61	1582.19
6882.9	1582.3	6889.93	1582.22	6892.37	1582.19	6937.22	1581.46	6960.07	1581.25
6976.05	1581.2	6988.48	1582.38	6995.92	1583.09	7002.58	1583.24	7007.06	1583.17
7020.45	1583.3	7054.25	1583.11	7082.59	1582.65	7093.17	1582.55	7119.58	1582.39
7121.45	1582.4	7122.09	1582.35	7131.58	1582.28	7140.26	1582.11	7172.29	1580.47
7204.18	1580.5	7218.76	1580.45	7226.98	1580.53	7251.27	1581.28	7270.84	1581.96
7289.38	1581.8	7294.94	1581.78	7325.5	1581.27	7341.18	1580.95	7348.52	1580.94
7369.31	1580.8	7378.59	1580.78	7397.47	1580.66	7411.51	1580.48	7422.39	1581.19
7430.74	1581.7	7439.29	1582.25	7447.79	1582.2	7459.61	1582.08	7510.21	1581.44
7515.93	1581.4	7527.37	1581.32	7571.11	1581.1	7579.54	1581.1	7586.73	1581.1
7592.31	1581.1	7612.69	1579.77	7614.89	1579.59	7617.86	1579.33	7618.62	1579.34
7620.83	1579.3	7625.36	1579.31	7648.44	1579.52	7653.61	1579.23	7665.56	1579.75
7667.26	1579.8	7670.43	1579.93	7715.8	1580.31	7767.08	1580.6	7791.47	1581.01
7801.45	1581.3	7802.39	1577.24	7804.2	1574.82	7817.3	1578.3	7821.44	1578.97
7823.24	1579.9	7838.61	1579.75	7842.91	1579.7	7847.7	1579.81	7872.3	1580
7875.48	1580	7885.8	1579.94	7898.22	1580.28	7902.66	1580.54	7903.28	1580.58
7904.84	1580.6	7988.43	1580.11	7991.2	1580.12	7996.39	1580.34	8008.2	1580.73
8019.35	1580.7	8038.29	1580.83	8042	1580.89	8052.85	1580.92	8080.17	1581
8104.65	1581.2	8113.4	1581.03	8135.38	1581.16	8137.54	1581.16	8147.04	1580.63
8156.35	1580.3	8162.1	1580.33	8167.68	1580.48	8180.25	1580.55	8191.4	1580.75
8209.63	1580.8	8212.4	1580.83	8218.73	1580.89	8241.06	1581.09	8243.86	1581.12
8246.2	1581.2	8247.59	1581.21	8261.95	1581.58	8284.67	1581.64	8292.97	1581.74
8297.4	1581.7	8308.42	1581.96	8313.42	1582.26	8325.4	1582.1	8364.66	1581.58
8377.24	1581.5	8387.59	1581.45	8391.79	1581.47	8393.03	1581.46	8407.7	1581.31

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 8419.83  1581.3 8424.99 1581.26 8442.48 1581.14 8465.78 1580.94 8467.23 1580.94
 8476.29  1580.8 8484.49  1580.8 8506.46 1580.99 8508.39    1581  8509.3 1580.99
 8589.32  1580.3 8607.83 1580.24 8620.31 1580.29 8656.14 1580.33  8682.9 1580.46
 8693.33  1580.4 8706.11 1580.69 8714.37 1580.84  8740.3 1581.62 8765.44 1581.98
 8768.82  1580.6 8785.99 1580.88 8795.26  1581.1 8796.29 1581.09 8796.79 1581.08
 8828.83  1580.6 8847.84 1580.29 8876.44  1579.8 8924.37 1582.15  8935.7 1582.67
 8939.86  1582.8 8941.83 1582.94 8949.38 1583.31 8952.34 1583.25 8986.79 1583.27
 8993.87  1583.2 9003.11 1583.24 9011.03 1583.27 9047.92    1583 9088.36 1582.16
 9113.27  1582.1 9140.04 1582.09 9154.31 1582.07 9181.55 1579.68  9192.6 1578.93
 9195.91    1579 9198.75 1579.18 9216.24 1579.95 9227.08 1580.55 9238.23 1580.99
 9250.92  1581.4 9257.55  1581.8 9278.39 1581.52 9285.77 1581.46 9299.31 1581.36
 9305.35  1581.2 9326.25 1580.92 9332.63 1580.75 9334.74 1580.65 9342.47  1579.7
 9357.43  1577.9 9359.19 1578.13 9360.64 1578.16 9385.81 1580.57 9395.16 1580.57
  9404.8  1580.6 9406.66 1580.66 9407.48 1580.66  9426.5 1580.62 9431.54 1580.62
 9447.88  1580.5 9469.76 1580.45 9495.17  1580.4  9504.6 1580.35 9514.93 1580.38
 9522.21  1580.4 9554.56 1580.48 9572.43 1580.49 9578.91 1580.48 9593.09  1580.6
 9613.86  1580.8  9630.1 1580.88 9653.46 1581.18 9658.43 1581.26 9661.59 1581.32
 9668.43  1581.4 9706.83 1581.52 9709.03 1581.52 9713.32 1581.54 9714.47 1581.51
 9716.67  1581.5 9728.25 1581.22 9743.12 1580.88 9750.03 1580.56 9759.99 1580.44
 9764.57  1580.4 9777.08 1580.03 9802.58 1579.55 9815.12 1579.32 9841.52 1580.11
 9849.88  1580.1 9864.23 1579.94 9868.25 1580.14 9874.18 1580.54 9882.89  1581.1
 9893.84  1580.8 9902.25 1580.77 9926.25 1580.75 9946.44  1580.2 9948.27  1580.2
 9950.45  1580.2 9964.87  1580.4 9972.62 1580.53 9985.72 1580.46 9995.96 1577.95
10004.63  1576.2 10015.8 1579.0210021.25 1579.7910041.76 1579.5310059.07 1579.77
10064.19  1579.810081.45 1580.0310105.93  1579.910114.45    158010129.16  1580.2
10129.76  1580.210130.05 1580.2310132.14  1580.210144.42 1580.1710145.23 1580.19
10160.99  1580.210178.47 1580.7410192.83 1580.9610209.87 1580.7510218.57 1580.74
10259.03  1580.510308.01 1580.2410310.04 1580.2810319.25 1580.7410327.25 1580.72
10331.04  1580.610333.72 1580.5410338.88 1580.2210352.08 1580.0910398.36 1580.39
10406.57  1580.510416.27 1580.7510416.95 1580.84 10422.8 1580.8310439.43 1580.27
10484.93  1580.410496.83 1580.0110508.86 1580.0710520.32 1579.9710523.56 1580.06
10527.92  1580.110545.37  1579.910553.93 1580.0910560.87 1579.8510565.82 1579.73
 10580.1  1579.210598.02 1578.9910604.97 1579.0510633.83 1580.2910645.72 1580.74
10649.89  1580.610663.51 1580.3110670.86 1579.7110680.27  1579.910682.37 1580.19
10690.33  1580.210703.17 1580.2410715.14 1580.5210729.02 1580.9310741.84 1580.92
10775.13  1581.1   10779 1580.8810789.71 1580.1710793.94 1580.1310797.35  1580.2
10804.09  1580.4 10819.7 1580.4610836.22 1580.77 10853.2 1583.6610861.76 1584.44
10869.66  1584.5   10877 1584.1910890.82 1582.0410914.67 1581.8610919.35 1581.98
 10925.1  1581.810928.54 1581.7610968.56 1581.2310982.85 1581.1610988.16 1581.15
10993.98  1580.910999.11  1580.711008.24  1580.811028.47 1580.5311029.97 1580.52
11032.11  1580.711051.68 1581.9711054.67 1582.06

Manning's n Values          num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4470.09     .15 7823.24      .1 8589.32     .15 9802.58    .068 9985.72    .045
10059.07     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9985.7210059.07               520  402.78     320             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 4470.09  6382.5    1582

CROSS SECTION OUTPUT    Profile #PF 1
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E.G. Elev (ft)	1581.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.123	0.045	0.150
W.S. Elev (ft)	1581.19	Reach Len. (ft)	520.00	402.78	320.00
Crit W.S. (ft)		Flow Area (sq ft)	1497.31	163.62	718.01
E.G. Slope (ft/ft)	0.013590	Area (sq ft)	1497.31	163.62	718.01
Q Total (cfs)	3732.00	Flow (cfs)	1907.48	1066.68	757.84
Top Width (ft)	2947.02	Top Width (ft)	2031.55	73.35	842.12
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.27	6.52	1.06
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	0.74	2.23	0.85
Conv. Total (cfs)	32013.9	Conv. (cfs)	16362.8	9150.2	6500.9
Length Wtd. (ft)	449.80	Wetted Per. (ft)	2037.58	74.24	842.42
Min Ch El (ft)	1576.20	Shear (lb/sq ft)	0.62	1.87	0.72
Alpha	5.36	Stream Power (lb/ft s)	0.79	12.19	0.76
Frctn Loss (ft)	4.45	Cum Volume (acre-ft)	354.96	6.33	8.36
C & E Loss (ft)	0.01	Cum SA (acres)	189.85	2.72	16.51

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5849.00	7227.90	44.13	57.85	120.36	1.18	0.48	0.76
7227.90	8606.81	820.53	679.85	976.20	21.99	0.70	1.21
8606.81	9985.72	1042.82	759.61	941.02	27.94	0.81	1.37
LB 9985.72	RB 10059.07	1066.68	163.62	74.24	28.58	2.23	6.52
10059.07	11054.67	757.84	718.01	842.42	20.31	0.85	1.06

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.302

INPUT
Description: RM.2.302 . HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 6157.1.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4327.1	1576.6	4330.78	1576.65	4338.25	1576.69	4344.63	1576.7	4358.84	1576.79
4368.5	1576.9	4375.49	1576.79	4402.45	1576.7	4469.44	1576.27	4482.03	1576.24
4485.85	1576.3	4494.3	1576.2	4498.01	1576.2	4501.43	1576.17	4515.57	1575.63
4517.44	1575.7	4548.31	1576.08	4563.65	1576.09	4576.09	1576.11	4595.55	1576.07
4612.07	1576.2	4650.01	1575.86	4666.93	1575.67	4675.99	1575.74	4687.8	1575.9
4695.5	1574.6	4697.8	1574.2	4713.25	1574.92	4725.98	1575.45	4740.71	1575.83
4743.45	1575.9	4761.5	1576.9	4763.56	1576.97	4770.06	1577.13	4786.09	1577.46
4795.54	1577.3	4822.33	1577	4829.67	1576.93	4854.93	1576.14	4859.48	1576.01
4862.1	1576	4867.05	1575.98	4872.71	1575.94	4888.42	1575.83	4913.44	1575.84
4918.04	1575.6	4922.42	1575.65	4929.44	1575.52	4942.86	1575.39	4967.7	1575.15
4979.7	1575.2	4982.52	1575.28	5000.56	1575.57	5024.64	1576.28	5065.37	1575.82
5076.38	1575.9	5085.76	1575.92	5094.96	1575.86	5102.52	1575.83	5116.8	1575.82
5132.29	1575.8	5140.69	1574.15	5152.65	1574.34	5153.65	1574.97	5166.97	1574.75
5182.33	1573.2	5184.58	1573.85	5186.99	1574.41	5189.93	1574.49	5226.15	1574.97

5230.88	1575	5235.01	1574.96	5247.68	1574.98	5277.33	1574.72	5288.5	1574.79
5342.28	1575	5342.64	1574.97	5343.29	1574.95	5344.34	1574.92	5358.39	1574.51
5368.05	1573.6	5370.87	1573.68	5372.67	1573.29	5381.82	1573.23	5423.75	1572.82
5433.31	1572.9	5438.9	1573.08	5445.99	1573.47	5468.27	1574.47	5473.41	1574.71
5492.66	1574.7	5506.5	1574.47	5551.36	1575.07	5557.34	1575.1	5576.93	1575.26
5592.29	1575.3	5599.31	1575.04	5604.42	1575.04	5614.51	1575.36	5618.35	1575.61
5621.12	1575.6	5632.27	1576.13	5637.65	1576.63	5641.3	1576.55	5656.2	1576.36
5670.18	1576.3	5721.09	1575.86	5725.35	1575.84	5731.92	1575.85	5749.92	1575.79
5778.7	1575.8	5793.48	1575.75	5797.69	1575.7	5806.22	1575.46	5820.31	1574.85
5830.45	1574.4	5862.69	1573.92	5881.79	1573.95	5884.83	1574.03	5906.81	1574.15
5910.46	1574.2	5915.58	1574.29	5936.29	1574.79	5954.68	1574.82	5966.36	1575.02
5982.72	1575	5995.02	1574.98	6000.3	1574.85	6005.34	1575.56	6008.1	1575.33
6012.8	1576	6025.05	1575.31	6041.4	1576.8	6058.5	1576.45	6121.64	1578.08
6126.52	1578.3	6126.91	1577.96	6151.67	1578.07	6157.9	1578.65	6160.61	1578.64
6162.93	1578.2	6197.96	1576.56	6200.24	1576.51	6201.21	1576.41	6215.17	1574.62
6220.29	1575.1	6232.48	1575.37	6252.29	1575.66	6269.26	1577.49	6271.87	1577.72
6272.86	1577.9	6273.69	1577.87	6288.33	1577.8	6365.8	1577.35	6368	1577.46
6380.75	1576.7	6386.55	1576.08	6393.68	1575.89	6416.91	1576.06	6425.76	1576.07
6431.68	1576.3	6444.53	1576.98	6448.79	1577	6467.53	1576.99	6500.43	1577.27
6511.37	1577.3	6544.6	1577.03	6609.15	1576.89	6624.83	1576.94	6639.68	1576.98
6667.25	1575.1	6667.25	1575.08	6667.26	1575.08	6667.27	1575.08	6694.75	1574.95
6699.17	1575.2	6703.44	1575.63	6709.52	1576.46	6714.35	1576.55	6724.11	1576.53
6739.68	1576.9	6761.33	1577.17	6785.05	1577.02	6806.02	1577.08	6812.65	1577
6854.93	1576.3	6866.72	1576.41	6870.79	1576.51	6882.77	1576.58	6936.06	1577.01
6939.34	1576.8	6944.75	1576.6	6962.19	1575.64	6963.1	1575.7	6964.86	1575.68
6968.74	1575.5	6989.21	1575.26	7001.67	1575.09	7005.02	1574.98	7007.1	1575.1
7007.56	1575.1	7008.91	1575.17	7011.85	1575.24	7022.01	1575.76	7033.4	1576.27
7053.29	1576.2	7073.34	1576.22	7104.4	1576.28	7143.95	1577.01	7160.89	1576.89
7161.01	1573.4	7165.8	1570.44	7167.78	1573.45	7168.57	1570.85	7174.36	1573.1
7178.81	1575.2	7189.35	1574.91	7193.64	1574.82	7194.7	1574.75	7198.85	1574.71
7203.14	1575	7215.71	1575.4	7237.06	1575.91	7252.33	1576.48	7258.26	1576.37
7263.19	1576.4	7271.95	1576.61	7283.42	1576.7	7318.95	1576.5	7341.17	1576.45
7356.73	1576.3	7363.29	1576.26	7381.2	1576.22	7478.56	1575.91	7508.44	1575.74
7548.52	1575.5	7603.28	1575.51	7715.85	1575.51	7723.42	1575.52	7727.27	1575.54
7733.93	1575.5	7739.24	1575.48	7810.09	1575.42	7827.58	1575.54	7850.23	1575.69
7859.09	1575.4	7869.48	1574.57	7882.49	1574.9	7902.1	1575.04	7908.38	1575.31
7921.93	1574.9	7929.06	1575.44	7956.26	1575.82	8004.84	1576.04	8034.53	1575.9
8048.39	1576.1	8073.28	1575.91	8078.35	1575.87	8095.24	1576.05	8125.91	1576.35
8126.93	1576.4	8136.37	1576.36	8169.15	1576.17	8173.63	1576.17	8175.51	1576.17
8236.55	1576.2	8271.7	1576.23	8271.92	1576.24	8285.1	1576.24	8293.25	1576.26
8294.19	1576.3	8318.22	1576.34	8335.4	1576.45	8340.48	1576.46	8370.82	1576.85
8379.23	1576.8	8393.68	1576.61	8408.63	1576.47	8424.16	1576.35	8432.76	1576.35
8434.45	1576.3	8445.61	1576.37	8471.48	1576.38	8512.34	1576.48	8550.68	1577.11
8554.31	1577.1	8558.94	1577.08	8563.37	1577.08	8599.83	1577.12	8605.66	1577.18
8612.06	1577.2	8649.6	1576.98	8652.07	1576.93	8663.76	1576.8	8671.98	1576.78
8700.76	1576.6	8714.55	1576.48	8728.26	1576.42	8733.35	1576.4	8734.57	1576.4
8754.4	1576.2	8754.92	1576.19	8769.78	1575.79	8782.84	1575.88	8788.09	1575.87
8811.59	1575.4	8814.02	1575.41	8817.99	1575.42	8831.64	1575.27	8873.08	1575.03
8874.09	1575	8875.16	1575.03	8881.21	1575.04	8890.21	1575.17	8902.38	1575.58
8909.67	1575.8	8917.56	1575.74	8923.45	1576.12	8944.52	1576.67	8957.51	1577.05
8978.4	1577.5	9005.36	1578.24	9018.54	1577.87	9024.37	1578.35	9054.86	1579.88
9056.16	1579.9	9059.84	1579.93	9072.42	1579.23	9100.01	1575.85	9157.8	1576.49
9166.49	1576.8	9201.08	1576.51	9224.74	1576.53	9230.59	1576.42	9238.35	1576.75
9245.21	1577	9248.28	1576.97	9319.38	1576.68	9330.45	1576.73	9338.42	1576.81
9350.11	1576.8	9365.87	1576.93	9379.29	1576.76	9384.69	1576.79	9419.53	1577.54
9422.57	1577.6	9423.07	1577.61	9426.89	1577.59	9485.8	1577.36	9514.83	1575.91
9524.19	1575.7	9537.45	1575.2	9545.74	1574.83	9551.85	1575.34	9563.69	1576.87

9574.14	1577.5	9575.34	1577.35	9575.82	1577.32	9594.73	1577.09	9601.58	1577.01
9617.27	1576.7	9620.22	1576.78	9625.46	1576.81	9633.82	1576.63	9640.62	1576.53
9640.79	1576.5	9641.42	1576.44	9650.13	1575.88	9661.07	1575.27	9677.44	1575.04
9678.9	1575	9685.81	1575.04	9725.32	1575.64	9731.82	1575.87	9737.75	1576.56
9749.99	1576.6	9770.18	1576.31	9781.51	1576.24	9794.53	1576.15	9817.44	1576.4
9822.39	1576.4	9839.17	1576.17	9841.89	1576.16	9858.54	1575.78	9864.07	1575.74
9888.35	1574.9	9904.65	1574.53	9912.47	1574.41	9916.61	1574.56	9928.84	1574.39
9953.02	1572.7	9964.83	1572.12	9972.91	1571.72	9983.03	1571.86	9988.82	1571.94
9991.76	1572.4	10016.18	1576.74	10024.56	1576.8	10044.5	1577.06	10054.04	1577.41
10065.94	157	810077.61	1578.12	10081.56	1578.04	10097.56	1577.62	10105.91	1577.62
10118.5	1577.6	10131.99	1577.29	10138.98	1577.24	10155.7	1577.03	10172.86	1576.93
10188.23	1576.8	10201.03	1576.8	10215.22	1576.87	10255.55	1577.18	10256.27	1577.19
10263.57	1578.1	10271.97	1573.96	10276.75	1573.06	10290.35	1575.26	10293.01	1575.42
10294.96	1575.4	10301.45	1574.91	10304.64	1575.25	10305.03	1575.86	10312.99	1575.77
10320.62	1576.2	10324.71	1576.2	10335.23	1576.87	10336.59	1576.97	10354.08	1577
10365.32	1576.7	10377.94	1576.35	10388.21	1576.02	10399.24	1576.21	10407.41	1576.22
10413.42	1576.2	10424.65	1576.54	10452.02	1576.78	10465.02	1576.66	10470.94	1576.62
10483.27	1576.8	10494.44	1576.78	10512.67	1576.69	10524.22	1576.67	10549.59	1576.63
10560.18	1576.6	10562.44	1576.59	10568.24	1576.62	10577.46	1576.97	10580.33	1577.18
10607.33	1576.9	10619.18	1576.75	10627.13	1576.58	10638.42	1576.64	10652.98	1576.53
10663.87	1576.9	10665.18	1577.15	10672.52	1577.19	10678.9	1577.18	10691.35	1576.61
10711.16	157	710712.16	1577.01	10714.42	1577.06	10724.93	1577.23	10740.34	1577.09
10741.09	1577.1	10759.15	1577.51	10760.93	1577.55	10791.19	1577.81	10804.66	1577.89
10815.62	157	810827.79	1578.1	10837.84	1578.14	10847.83	1578.26	10877.59	1577.69
10887.1	1577.6	10894.41	1577.49	10898.94	1577.61	10905.07	1577.65	10927.25	1578.16
10934.81	1578.3	10955.96	1578.38						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4327.1	.1	5226.15	.15	7160.89	.1	8004.84	.15	9928.84	.045
10016.18	.15								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9928.84	10016.18	280	118.36	118	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
4327.1	6157.1	1578.65

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1576.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.120	0.045	0.150
W.S. Elev (ft)	1576.57	Reach Len. (ft)	280.00	118.36	118.00
Crit W.S. (ft)	1576.40	Flow Area (sq ft)	1761.42	297.54	105.22
E.G. Slope (ft/ft)	0.007578	Area (sq ft)	1761.42	297.54	105.22
Q Total (cfs)	3732.00	Flow (cfs)	1690.39	1942.97	98.64
Top Width (ft)	2593.71	Top Width (ft)	2377.29	86.41	130.01
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)	0.96	6.53	0.94
Max Chl Dpth (ft)	6.14	Hydr. Depth (ft)	0.74	3.44	0.81
Conv. Total (cfs)	42871.2	Conv. (cfs)	19418.3	22319.9	1133.1
Length Wtd. (ft)	222.75	Wetted Per. (ft)	2386.61	86.90	131.29
Min Ch El (ft)	1571.72	Shear (lb/sq ft)	0.35	1.62	0.38
Alpha	7.61	Stream Power (lb/ft s)	0.34	10.58	0.36
Frctn Loss (ft)	3.91	Cum Volume (acre-ft)	335.51	4.19	5.33
C & E Loss (ft)	0.01	Cum SA (acres)	163.53	1.98	12.94

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5727.54	7127.97	199.09	286.78	417.70	5.33	0.69	0.69
7127.97	8528.41	1083.61	936.87	1282.57	29.04	0.74	1.16
8528.41	9928.84	407.70	537.76	686.34	10.92	0.78	0.76
LB 9928.84	RB 10016.18	1942.97	297.54	86.90	52.06	3.44	6.53
10016.18	10955.96	98.64	105.22	131.29	2.64	0.81	0.94

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.279**

INPUT
Description: RM.2.279 . BLOCKED OUT INEFF. AREA BELOW EL.1570 AND BETWEEN STA. 5994 AND 6170 AT RET. BASIN. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 5891.39.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4265.03	1573.9	4268.87	1573.75	4287.66	1573.56	4288.69	1573.53	4289.44	1573.51
4298.34	1573.6	4303.69	1573.83	4315.59	1573.8	4330.1	1573.63	4334.29	1573.69
4338.84	1573.9	4340.61	1573.93	4348.57	1574.18	4351.65	1574.27	4356.66	1574.3
4373.5	1574.3	4380.22	1574.36	4434.76	1573.96	4474.83	1573.61	4481.99	1573.55
4492.63	1573	4493.55	1572.99	4495.54	1573.03	4540.04	1573.72	4553.5	1573.69
4554.34	1573.7	4557.8	1573.66	4586.72	1573.58	4590.46	1573.53	4602.05	1573.54
4615.83	1573.6	4631.18	1573.63	4636.53	1572.81	4641.11	1572.14	4660.56	1573.06
4671.07	1573.5	4680.03	1573.62	4729.16	1573.83	4729.26	1573.83	4729.45	1573.83
4740.7	1573.6	4743.97	1573.63	4756.63	1573.58	4765.51	1573.42	4784.85	1573.42
4796.97	1573.5	4805.73	1573.53	4808.3	1573.46	4818.19	1573.16	4868.53	1572.42
4901.2	1572.2	4913.37	1572.19	4920.65	1571.89	4927.91	1571.79	4933.85	1571.89
4938.87	1571.9	4947.91	1571.52	4952.96	1571.51	4959.59	1571.67	4961.55	1571.75
4990.49	1572.2	4993.97	1572.2	5002.56	1572.24	5012.22	1572.25	5020.96	1572.35
5025.28	1572.4	5038.05	1572.52	5044.34	1572.61	5051.27	1572.66	5112.34	1572.87
5118.72	1572.9	5135.47	1572.67	5145.9	1572.64	5146.41	1572.63	5149.16	1572.55
5163.33	1572.1	5164.32	1572.07	5165.75	1571.98	5166.87	1571.99	5169.33	1571.98
5170.94	1572	5186.12	1572.24	5192.75	1572.45	5197.35	1572.5	5212.96	1572.22
5230.28	1572.4	5236.67	1572.53	5243.14	1572.67	5250.71	1572.88	5270.89	1573.09
5317.04	1572.9	5353.24	1572.44	5356.54	1572.6	5360.6	1572.93	5365.06	1572.75
5371.62	1572.2	5374.91	1571.96	5385.22	1569.08	5390.98	1567.31	5392.38	1567.44
5410.85	1572.7	5411.21	1572.78	5424.49	1572.5	5430.17	1572.55	5445.28	1572.66
5481.83	1572.3	5486.91	1572.28	5502.22	1572.27	5515.88	1572.25	5535.4	1572.19
5547.71	1572.2	5550.9	1572.17	5569.54	1572.19	5579.35	1571.67	5593.89	1571
5604.44	1570.6	5608.78	1570.43	5612.24	1570.41	5614.89	1570.37	5660.4	1570.54
5669.93	1571.3	5677.33	1571.84	5682.42	1571.75	5693.48	1571.58	5695.98	1571.63

5697.48	1571.6	5723.1	1571.97	5734.02	1572.2	5747.91	1572.75	5757.57	1572.93
5762.84	1572.7	5768.17	1572.66	5775	1572.53	5781.18	1572.3	5787.75	1572.01
5796.61	1572.1	5807.43	1572.22	5826.74	1572.42	5845.62	1572.59	5855.45	1573.03
5877.44	1573.6	5882.05	1573.77	5884.63	1573.82	5891.39	1573.87	5893.16	1573.82
5894.83	1573.8	5908.62	1573.74	5911.97	1573.74	5916.64	1573.67	5923.32	1573.61
5943.84	1573.4	5961.14	1573.15	5978.13	1572.93	5994	1570.18	6032.47	1563.13
6045.5	1563.3	6105.44	1563.75	6107.66	1563.77	6113.81	1563.83	6124.62	1564.15
6152.2	1568.1	6187.85	1572.85	6190.06	1573.48	6199.13	1575.36	6234.23	1575.38
6240.78	1575.4	6245.43	1575.4	6249.85	1575.44	6293.33	1575.04	6316.47	1574.82
6332.62	1573.9	6338.59	1573.56	6344.67	1573.26	6364.4	1573.19	6382.37	1573.1
6395.53	1573.6	6413.38	1574.19	6427.06	1574.15	6444.68	1574.1	6492.68	1573.96
6548.68	1573.5	6574.23	1573.08	6581.39	1573.06	6585.7	1572.77	6603.5	1571.73
6614.24	1572	6624.23	1571.98	6642.38	1571.87	6654.55	1572.29	6671.24	1572.93
6671.74	1572.9	6672.18	1572.94	6751.56	1573.88	6753.76	1572.48	6760.82	1571.49
6770.04	1573.7	6793.1	1573.46	6793.16	1573.31	6797.09	1571.71	6800.61	1572.85
6805.21	1572.7	6813.96	1572.43	6818.29	1572.44	6823.27	1572.41	6829.03	1572.39
6831.02	1572.3	6832.56	1572.3	6833.47	1572.32	6837.25	1572.31	6842.97	1572.3
6867.03	1572.2	6867.27	1572.54	6877.61	1574.04	6882.67	1574.56	6885.5	1574.21
6904.48	1572.1	6909.13	1572.51	6921.34	1573.34	6938.98	1573.54	6960.89	1573.8
6967.16	1573.9	6992.4	1574.04	7103.92	1573.66	7111.58	1573.64	7117.32	1573.63
7183.05	1573	7242.27	1573.4	7254.09	1573.53	7270.75	1573.5	7336.42	1573.47
7351.45	1573.3	7374.28	1573.15	7384.69	1573.17	7408.6	1572.95	7420.9	1572.88
7427.08	1572.4	7438.36	1571.82	7440.32	1571.82	7441.82	1571.83	7466.25	1572
7484.05	1571.6	7486.87	1571.6	7499.11	1571.48	7505.03	1571.83	7518.99	1572.77
7528.11	1572.7	7546.9	1572.42	7604.41	1572.51	7617.07	1572.5	7654.79	1572.4
7741.99	1572.2	7769.86	1572.18	7831.94	1572.6	7834.2	1572.47	7837.63	1572.56
7850.94	1572.4	7870.34	1572.43	7873.4	1572.41	7873.83	1572.4	7887.4	1572.22
7906.57	1572.1	7909.16	1572	7916.71	1571.79	7931.95	1571.12	7933.08	1571.29
7936.79	1571.9	7945.34	1573.16	7948.43	1573.47	7964.36	1572.96	7972.98	1572.21
8000.84	1572.3	8031.51	1572.41	8046.04	1572.52	8051.79	1572.52	8055.81	1572.57
8065.82	1572.5	8073.44	1572.42	8074.22	1572.41	8076.18	1572.39	8097.58	1571.95
8109.13	1571.8	8113.3	1571.8	8120.99	1571.73	8143.06	1572.08	8167.9	1572.51
8182.69	1572.6	8213.02	1573.77	8224	1573.71	8250.37	1573.67	8251.66	1573.7
8259.55	1573.7	8276.9	1573.73	8288.16	1573.71	8296.58	1573.73	8331.24	1573.62
8342.31	1573.4	8343.79	1573.7	8357.82	1573.55	8373.55	1573.47	8392.89	1573.35
8469.05	1572.6	8477.22	1572.71	8481.59	1572.67	8513.79	1572.86	8513.88	1572.6
8529.93	1573.2	8536.85	1573.4	8582.51	1573.02	8602.19	1572.85	8606.52	1572.8
8608.3	1572.8	8613.27	1572.67	8621.99	1572.71	8653.24	1572.73	8663.28	1572.7
8665.51	1572.7	8692.2	1572.09	8694.38	1572.14	8717.8	1572.02	8732.13	1571.95
8734.45	1571.9	8752.5	1571.84	8769.24	1572.02	8780.44	1572.17	8802.42	1572.4
8804.67	1572.4	8829.9	1572.43	8835.06	1572.45	8850.35	1572.51	8862.3	1572.62
8872.24	1572.6	8880.55	1572.59	8900.72	1572.66	8904.58	1572.67	8925.04	1572.83
8926.06	1572.8	8929.64	1572.86	8944.83	1572.82	8950.58	1572.87	8971.27	1573.12
8977.73	1573.2	8981.52	1573.24	9013.99	1573.43	9019.84	1573.26	9045.96	1573.24
9052.53	1573.2	9065.07	1573.39	9067.45	1573.35	9069.56	1573.56	9071.41	1573.58
9088.51	1573.6	9101.67	1573.29	9105.57	1573.48	9115.81	1573.73	9118.95	1573.78
9120.62	1573.8	9138.79	1573.74	9146.48	1573.68	9167.6	1573.65	9199.91	1573.3
9211.23	1573.2	9217.39	1573.22	9220.23	1573.21	9230.09	1573.86	9233.44	1573.74
9278.65	1573.5	9280.44	1573.52	9288.44	1573.5	9290.76	1573.59	9317.87	1573.99
9321.61	1574	9322.06	1574.03	9329.75	1574.02	9416.34	1573.53	9422.19	1573.53
9429.27	1573.5	9438.03	1573.42	9490.03	1573.45	9509.41	1574.34	9521.03	1575.17
9534.66	1575.2	9561.3	1575.24	9578.83	1574.2	9586.7	1573.96	9594.02	1573.65
9603.08	1574.7	9616.2	1576.04	9617.46	1576.08	9621.47	1576.31	9622.98	1576.35
9658.17	1575.6	9667.41	1575.42	9679.8	1574.24	9686.57	1573.65	9689.45	1574.31
9703.33	1577.5	9708.72	1577.25	9733.93	1577.45	9754.74	1577.38	9769.84	1577.18
9784.2	1577.1	9845.72	1576.9	9875.65	1576.12	9881.9	1575.94	9887.1	1575.75
9911.99	1575.1	9931.99	1574.95	9970.15	1574.23	9975.79	1572.28	9977.5	1571.68

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 9986.13  1571.210000.13 1570.4210008.25 1572.1310019.65 1575.2510039.26 1576.05
10039.39  1576.110040.56 1576.0710082.21  1576.410088.17  1576.5 10089.6  1576.6
10107.29  1578.210110.49  1578.310117.09 1577.3410118.87 1577.0810126.74 1576.21
10135.68  1575.910148.81 1575.8510163.62    157610200.91 1576.3310225.21 1576.55
10229.41  1576.610235.38 1575.4410238.94 1574.7310240.43 1574.5110252.36 1570.58
10254.58  1569.9 10255.1 1569.9810255.54 1570.0710271.73 1574.0210275.12 1574.13
   10286  1574.110315.31 1574.6210334.42 1575.1510336.99 1575.2910341.25 1575.46
10358.42  1575.710364.56 1575.1510372.18 1574.8710375.27 1574.99 10400.1 1576.29
10401.47  1576.410401.51 1576.3610401.66 1576.36 10448.4 1574.9910450.33    1575
10453.89  1575.110456.72 1575.1110461.37 1575.0910481.87 1575.44 10485.3 1575.48
 10486.7  1575.510511.35 1575.99 10541.3  1576.410543.26 1576.4610561.89 1575.78
10568.97  1575.310577.05 1575.6110579.21 1575.6910579.92  1575.710620.24  1575.7
10631.43  1575.810643.59 1575.9410650.57 1576.0710665.92 1576.7910668.76 1576.97
10682.34  1577.210696.74 1574.9210696.96  1574.910697.05 1574.8710697.53 1574.89
10717.05    1576 10739.3 1576.07

Manning's n Values        num=       8
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4265.03      .1 5410.85     .15 6800.61      .1 8055.81     .15 8481.59      .1
 9101.67     .15 9911.99    .04510039.39     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9911.9910039.39               800   96.77     96              .1       .3

Ineffective Flow     num=       1
   Sta L   Sta R    Elev
 4265.03 5891.39 1573.87

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
    5994    6170    1570

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1573.01   Element                  Left OB    Channel   Right OB
  Vel Head (ft)              0.43   Wt. n-Val.                0.140      0.045      0.150
  W.S. Elev (ft)          1572.58   Reach Len. (ft)          800.00      96.77      96.00
  Crit W.S. (ft)          1572.58   Flow Area (sq ft)        864.60      46.79      26.70
  E.G. Slope (ft/ft)     0.075975   Area (sq ft)            1367.28      46.79      26.70
  Q Total (cfs)           3732.00   Flow (cfs)              3131.53     512.90      87.57
  Top Width (ft)          2032.97   Top Width (ft)          1978.44      34.98      19.55
  Vel Total (ft/s)           3.98   Avg. Vel. (ft/s)           3.62      10.96       3.28
  Max Chl Dpth (ft)          5.27   Hydr. Depth (ft)           0.69       1.34       1.37
  Conv. Total (cfs)       13539.6   Conv. (cfs)             11361.2     1860.8      317.7
  Length Wtd. (ft)         743.40   Wetted Per. (ft)        1257.66      35.41      20.29
  Min Ch El (ft)          1570.42   Shear (lb/sq ft)           3.26       6.27       6.24
  Alpha                      1.75   Stream Power (lb/ft s)    11.81      68.70      20.47
  Frctn Loss (ft)            0.04   Cum Volume (acre-ft)     325.46       3.73       5.15
  C & E Loss (ft)            0.13   Cum SA (acres)           149.53       1.81      12.74

Warning: The energy equation could not be balanced within the specified number of iterations.
The program used critical depth for the water surface and continued on with the calculations.
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.
```

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5676.77	7088.51	2455.84	551.50	365.27	65.80	1.51	4.45
7088.51	8500.25	504.88	242.10	704.95	13.53	0.34	2.09
8500.25	9911.99	170.81	71.01	187.44	4.58	0.38	2.41
LB 9911.99	RB 10039.39	512.90	46.79	35.41	13.74	1.34	10.96
10039.39	10739.30	87.57	26.70	20.29	2.35	1.37	3.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.261

INPUT
Description: RM. 2.261. HORZ. N VALUES USED. UPSTREAM EDGE OF CAP CANAL, RAS.I.D.3 =SEC. STA.49+50=CAP STA.479+00=(5) 72"DIA. RAS. I.D.2=SEC. STA.58+10=CAP STA.471+03=(3) 72"DIA RAS.I.D.1=SEC.STA. 73+00=CAP STA.456+50=(2)60" DIA RAS.I.D.4&5=SEC.STA.100+00&102+30=CAP STA.429+20&427+15 =(3) 72"DIA/EA.

Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71

5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77
5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53
6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24
7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89
7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48
7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19

8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76
9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.41	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06
10199.79	1571.2	10216.14	1572.53	10238.57	1571.16	10244.57	1571.15	10247.77	1571.17
10292.94	1576.6	10314.28	1576.75	10322.46	1576.78	10330.24	1576.85	10331.52	1576.85
10342.54	157	7 10353.36	1576.87	10363.5	1576.84	10377.66	1576.78	10386.92	1576.78
10404.98	1576.1	10417.27	1576.9	10420.3	1576.93	10421.82	1576.86	10442.08	1575.88
10444.5	1575.8	10445.01	1575.75	10470.55	1575.33	10472.82	1575.39	10487.11	1575.25
10501.53	1575.1	10515.54	1575.23	10535.23	1576.54	10540.36	1576.54	10553.28	1575.48
10567.76	1575.4	10591.47	1575.52	10596.97	1575.63	10602.07	1575.59		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4349.26	.1	9192.94	.15	9949.1	.045	10039.47	.15

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9949.1	10039.47	200	200.58	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1570.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.100	0.045	0.150
W.S. Elev (ft)	1570.36	Reach Len. (ft)	200.00	200.58	200.00
Crit W.S. (ft)	1560.87	Flow Area (sq ft)	19763.54	3.48	4.28
E.G. Slope (ft/ft)	0.000014	Area (sq ft)	19763.54	3.48	4.28
Q Total (cfs)	3732.00	Flow (cfs)	3731.81	0.13	0.07
Top Width (ft)	3441.21	Top Width (ft)	3404.30	21.05	15.86
Vel Total (ft/s)	0.19	Avg. Vel. (ft/s)	0.19	0.04	0.02
Max Chl Dpth (ft)	12.96	Hydr. Depth (ft)	5.81	0.17	0.27
Conv. Total (cfs)	1008608.9	Conv. (cfs)	1008556.8	34.5	17.7
Length Wtd. (ft)	200.58	Wetted Per. (ft)	3410.15	21.19	15.90
Min Ch El (ft)	1570.01	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	131.42	3.67	5.12
C & E Loss (ft)		Cum SA (acres)	100.10	1.75	12.70

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4349.26	5749.22	43.33	631.14	427.35	1.16	1.48	0.07
5749.22	7149.18	1150.87	6856.07	1214.37	30.84	5.66	0.17
7149.18	8549.14	2465.27	11469.26	1402.00	66.06	8.19	0.21
8549.14	9949.10	72.33	807.07	366.43	1.94	2.20	0.09
LB 9949.10	RB 10039.47	0.13	3.48	21.19	0.00	0.17	0.04
10039.47	10602.07	0.07	4.28	15.90	0.00	0.27	0.02

CULVERT **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.252**

INPUT
Description: CULVERTS ACROSS CAP CANAL
Distance from Upstream XS = 25
Deck/Roadway Width = 160
Weir Coefficient = 2.8
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 36

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
3778.9	1573.16		3935.44	1573.66		4002.7	1574	
4172.27	1574.22		4291.03	1574.26		4357.67	1574.2	
4390.75	1572.8		4414.56	1568.95		4491.44	1568.9	
4526.71	1572.71		4562.88	1573.8		4856.47	1573.83	
5266.74	1573.83		5303.49	1574.9		5398.9	1575	
5460.86	1573.67		5714.85	1573.19		5801.62	1572.03	
5824.78	1571.9		5855.78	1572.91		6153.43	1572.93	
6347.31	1572.9		6588.98	1572.93		7286.17	1572.93	
7403.63	1573.25		7905.82	1573.3		8097.17	1573.11	
8300.29	1573.14		8306.43	1572.8		8410.8	1572.82	
8508.59	1573.79		9436.01	1573.8		9530.22	1574.31	
9716.23	1575.51		9730.42	1577.18		10431.6	1577.28	

Upstream Bridge Cross Section Data
Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71
5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77

5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53
6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24
7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89
7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48
7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19
8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76

9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.4	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06
10199.79	1571.2	10216.14	1572.53	10238.57	1571.16	10244.57	1571.15	10247.77	1571.17
10292.94	1576.6	10314.28	1576.75	10322.46	1576.78	10330.24	1576.85	10331.52	1576.85
10342.54	157	10353.36	1576.87	10363.5	1576.84	10377.66	1576.78	10386.92	1576.78
10404.98	1576.1	10417.27	1576.9	10420.3	1576.93	10421.82	1576.86	10442.08	1575.88
10444.5	1575.8	10445.01	1575.75	10470.55	1575.33	10472.82	1575.39	10487.11	1575.25
10501.53	1575.1	10515.54	1575.23	10535.23	1576.54	10540.36	1576.54	10553.28	1575.48
10567.76	1575.4	10591.47	1575.52	10596.97	1575.63	10602.07	1575.59		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4349.26	.1	9192.94	.15	9949.1	.04	10039.47	.15

Bank Sta: Left	Right	Coeff Contr.	Expan.
9949.1	10039.47	.1	.3

Downstream Deck/Roadway Coordinates
num= 36

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
3778.9	1572.66		3935.44	1573.16		4002.7	1573.5	
4172.27	1573.72		4291.03	1573.76		4357.67	1573.7	
4390.75	1572.3		4414.56	1568.45		4491.44	1568.4	
4526.71	1572.21		4562.88	1573.3		4856.47	1573.33	
5266.74	1573.33		5303.49	1574.4		5398.9	1574.5	
5460.86	1573.17		5714.85	1572.69		5801.62	1571.53	
5824.78	1571.4		5855.78	1572.41		6153.43	1572.43	
6347.31	1572.4		6588.98	1572.43		7286.17	1572.43	
7403.63	1572.75		7905.82	1572.8		8097.17	1572.61	
8300.29	1572.64		8306.43	1572.3		8410.8	1572.32	
8508.59	1573.29		9436.01	1573.3		9530.22	1573.81	
9716.23	1575.01		9730.42	1576.68		10431.6	1576.78	

Downstream Bridge Cross Section Data
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3625.97	1565.5	3632.59	1565.55	3656.69	1565.43	3670.32	1565.61	3685.64	1565.83
3703.88	1565.8	3715.98	1565.84	3731.62	1569.85	3766.14	1568.83	3779.77	1565.5
3790.08	1565.4	3803.14	1565.47	3851.91	1565.64	3856.4	1565.67	3873.41	1565.52
3899.75	1565	3925.19	1565.02	3959.9	1570.78	3965.15	1571.13	4006.22	1567.56

4008.3	1567.6	4012.16	1567.58	4020.39	1567.33	4049.92	1564.77	4078.79	1564.81
4108.82	1564.7	4133.24	1571.32	4140.44	1571.65	4165.95	1564.07	4166.01	1564.07
4166.38	1564.1	4208.01	1569.06	4215.59	1568.67	4241.71	1571	4247.24	1570.97
4253.51	1570.9	4267.78	1570.92	4278.31	1571.37	4292.05	1571.22	4309.15	1569.92
4323.38	1570.7	4325.23	1570.75	4343.13	1566.91	4362.37	1567.88	4376.85	1567.95
4401.99	1568.1	4417.09	1567.21	4445.07	1567.73	4469.07	1568.11	4484.02	1567.93
4492.99	1567.7	4521.03	1568.78	4528.85	1568.41	4539.23	1568.96	4570.77	1572.62
4571.53	1572.6	4573.76	1572.6	4590.5	1573.89	4613.75	1571.72	4618.83	1571.28
4622.04	1571.3	4642.73	1572.53	4643.94	1572.5	4645.31	1572.38	4646.77	1572.43
4663.49	1572.2	4667.67	1572.12	4694.25	1570.5	4704.93	1570.51	4719.91	1571.95
4729.86	1571.8	4745.36	1572.39	4749.8	1572.43	4762.47	1572.52	4772.53	1572.27
4774.87	1572.2	4786.1	1572.18	4800.75	1570.65	4808.38	1572.1	4829.71	1571.4
4838.11	1571.6	4845.85	1571.56	4889.44	1570.56	4889.72	1570.55	4889.81	1570.56
4921.94	1572.6	4943.64	1571.21	4955.75	1570.45	4970.46	1571.48	4982.07	1572.68
4988.87	1572.9	4991.39	1572.99	4992.29	1572.97	5005.11	1572.36	5051.7	1569.27
5073.44	1572.5	5101.78	1572.66	5104.71	1572.83	5108.73	1573.09	5109.43	1573.08
5112.37	1573.1	5116.5	1572.79	5173.45	1572.91	5175.9	1573.14	5202.46	1573.03
5218.29	1573	5224.66	1572.58	5236.09	1572.53	5273.97	1572.27	5282.08	1572.4
5303.03	1572.3	5310.71	1572.19	5324.72	1572.25	5343.71	1572.33	5361.65	1572.1
5378.57	1572.1	5418.95	1575.17	5433.29	1575.26	5459.13	1575	5493.99	1574.9
5501.97	1574.9	5509.68	1574.44	5523.68	1573.5	5543.04	1572.13	5557.18	1571.95
5584.82	1571.4	5598.88	1571.52	5613.49	1571.07	5623.01	1570.67	5626.04	1570.54
5634.22	1569.7	5655.07	1561.31	5656.41	1560.84	5657.57	1560.81	5660.38	1560.78
5694.92	1560.9	5702.53	1561.05	5717.56	1566.72	5723.51	1569.79	5746.38	1570.67
5755.66	1570.8	5758.3	1570.68	5773.84	1569.13	5780.45	1568.87	5807.63	1569.17
5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96
6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49
6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7
6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
7867.2	1559.1	7886.38	1559.95	7912.54	1560.36	7912.67	1560.37	7935.49	1560.59
7949.09	1560.5	7954.1	1560.5	7958.26	1560.57	7970.55	1560.53	7994.48	1566.17
8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87

8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
8270.5	1554.3	8288.83	1555.7	8295.32	1555.89	8307.63	1558.89	8310.76	1560.59
8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
8377.18	1561.6	8380.27	1561.66	8404.61	1561.91	8415.47	1562.14	8436.55	1562.05
8438.21	1562.1	8459.8	1562.89	8461.09	1562.91	8481.78	1562.83	8484.82	1563.14
8503.98	1563.6	8505.95	1563.6	8510.97	1563.65	8551.82	1564.36	8557.83	1564.44
8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
8825.79	1567.4	8836.1	1567.34	8848.28	1567.13	8856.1	1567.16	8883.37	1567.63
8889.52	1567.8	8894.81	1567.75	8901.15	1567.52	8912.17	1567.35	8927.49	1567.78
8935.05	1567.9	8949.24	1568.22	8956.34	1568.22	8978.6	1568.38	8982.37	1568.66
9012.09	1568.8	9030.23	1568.57	9049.15	1569.91	9055.98	1570.57	9081.9	1571.86
9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
9599.89	1572.8	9603.16	1572.75	9609.05	1572.62	9632.08	1573.43	9644.83	1572.95
9675.34	1573.1	9684.59	1573.3	9687.16	1573.46	9695.67	1573.48	9716.26	1573.95
9727.97	1573.9	9734.41	1573.94	9737.25	1573.91	9742.93	1573.85	9779.14	1575.73
9781.05	1575.8	9781.25	1575.72	9782.91	1575.88	9813.37	1568.4	9817.33	1568.12
9822.3	1567.6	9832.96	1568.6	9854.98	1566.21	9855.44	1566.21	9860.61	1566.22
9877.06	1567	9878.67	1567.04	9898.07	1568.33	9911.74	1569.02	9923.22	1569.07
9941.11	1569	9948.16	1569.71	9965.35	1570.68	9977.72	1575.36	9985.5	1575.6
9988.16	1575.6	9994.4	1575.2	110016.91	1569.6	610021.29	1569.5	410040.06	1577.33
10045.4	1577.4	10051.38	1577.2	810065.78	1576.7	10076.98	1576.66	10113.7	1576.53
10138.07	1576.6	10147.19	1576.8	810169.12	1576.7	810170.27	1576.5	310171.93	1575.99
10174.76	1575.2	10188.98	1569.9	110194.75	1569.8	10209.58	1574.9	710220.06	1574.76
10237.94	157	10241.72	1575.2	10244.41	1575.1	310249.36	1575.1	910270.25	1575.77
10299.93	1575.3	10305.03	1575.2	310308.94	1575.1	610309.74	1575.1	210333.08	1574.77
10348.08	1574.4	10348.82	1574.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3625.97	.08	9994.4	.04	510040.06	.08

Bank Sta: Left Right Coeff Contr. Expan.

Left	Right	Coeff Contr.	Expan.
9994.4	10040.06	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
3625.97	7300	1560.5	8500	10348.82	1560.5

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

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Number of Culverts =  5

Culvert Name      Shape      Rise    Span
Culvert #3       Circular      6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 19     162       .012                  .9                1
Number of Barrels =  5
Upstream   Elevation =  1561
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4920    4928    4936    4944    4952
Downstream Elevation =  1560
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4860    4868    4876    4884    4892

Culvert Name      Shape      Rise    Span
Culvert #2       Circular      6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .012                  .9                1
Number of Barrels =  3
Upstream   Elevation =  1560
Centerline Stations
    Sta.    Sta.    Sta.
    5790    5798    5806
Downstream Elevation =  1558.7
Centerline Stations
    Sta.    Sta.    Sta.
    5680    5688    5696

Culvert Name      Shape      Rise    Span
Culvert #1       Circular      5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  5     190       .012                  .9                1
Number of Barrels =  2
Upstream   Elevation =  1555.2
Centerline Stations
    Sta.    Sta.
    7300    7306
Downstream Elevation =  1554.4
Centerline Stations
    Sta.    Sta.
    7200    7206

Culvert Name      Shape      Rise    Span
Culvert #4       Circular      6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
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FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.8
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006
Downstream Elevation =  1567
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006

Culvert Name      Shape      Rise    Span
Culvert #5       Circular      6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.7
Centerline Stations
    Sta.    Sta.    Sta.
   10220   10228   10236
Downstream Elevation =  1567
Centerline Stations
    Sta.    Sta.    Sta.
   10170   10178   10186
```

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.223**

INPUT
Description: RM. 2.223. DOWNSTREAM EDGE OF CAP CANAL.

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3625.97	1565.5	3632.59	1565.55	3656.69	1565.43	3670.32	1565.61	3685.64	1565.83
3703.88	1565.8	3715.98	1565.84	3731.62	1569.85	3766.14	1568.83	3779.77	1565.5
3790.08	1565.4	3803.14	1565.47	3851.91	1565.64	3856.4	1565.67	3873.41	1565.52
3899.75	1565	3925.19	1565.02	3959.9	1570.78	3965.15	1571.13	4006.22	1567.56
4008.3	1567.6	4012.16	1567.58	4020.39	1567.33	4049.92	1564.77	4078.79	1564.81
4108.82	1564.7	4133.24	1571.32	4140.44	1571.65	4165.95	1564.07	4166.01	1564.07
4166.38	1564.1	4208.01	1569.06	4215.59	1568.67	4241.71	1571	4247.24	1570.97
4253.51	1570.9	4267.78	1570.92	4278.31	1571.37	4292.05	1571.22	4309.15	1569.92
4323.38	1570.7	4325.23	1570.75	4343.13	1566.91	4362.37	1567.88	4376.85	1567.95
4401.99	1568.1	4417.09	1567.21	4445.07	1567.73	4469.07	1568.11	4484.02	1567.93
4492.99	1567.7	4521.03	1568.78	4528.85	1568.41	4539.23	1568.96	4570.77	1572.62
4571.53	1572.6	4573.76	1572.6	4590.5	1573.89	4613.75	1571.72	4618.83	1571.28
4622.04	1571.3	4642.73	1572.53	4643.94	1572.5	4645.31	1572.38	4646.77	1572.43
4663.49	1572.2	4667.67	1572.12	4694.25	1570.5	4704.93	1570.51	4719.91	1571.95
4729.86	1571.8	4745.36	1572.39	4749.8	1572.43	4762.47	1572.52	4772.53	1572.27
4774.87	1572.2	4786.1	1572.18	4800.75	1570.65	4808.38	1572.1	4829.71	1571.4
4838.11	1571.6	4845.85	1571.56	4889.44	1570.56	4889.72	1570.55	4889.81	1570.56

4921.94	1572.6	4943.64	1571.21	4955.75	1570.45	4970.46	1571.48	4982.07	1572.68
4988.87	1572.9	4991.39	1572.99	4992.29	1572.97	5005.11	1572.36	5051.7	1569.27
5073.44	1572.5	5101.78	1572.66	5104.71	1572.83	5108.73	1573.09	5109.43	1573.08
5112.37	1573.1	5116.5	1572.79	5173.45	1572.91	5175.9	1573.14	5202.46	1573.03
5218.29	1573	5224.66	1572.58	5236.09	1572.53	5273.97	1572.27	5282.08	1572.4
5303.03	1572.3	5310.71	1572.19	5324.72	1572.25	5343.71	1572.33	5361.65	1572.1
5378.57	1572.1	5418.95	1575.17	5433.29	1575.26	5459.13	1575	5493.99	1574.9
5501.97	1574.9	5509.68	1574.44	5523.68	1573.5	5543.04	1572.13	5557.18	1571.95
5584.82	1571.4	5598.88	1571.52	5613.49	1571.07	5623.01	1570.67	5626.04	1570.54
5634.22	1569.7	5655.07	1561.31	5656.41	1560.84	5657.57	1560.81	5660.38	1560.78
5694.92	1560.9	5702.53	1561.05	5717.56	1566.72	5723.51	1569.79	5746.38	1570.67
5755.66	1570.8	5758.3	1570.68	5773.84	1569.13	5780.45	1568.87	5807.63	1569.17
5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96
6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49
6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7
6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
7867.2	1559.1	7886.38	1559.95	7912.54	1560.36	7912.67	1560.37	7935.49	1560.59
7949.09	1560.5	7954.1	1560.5	7958.26	1560.57	7970.55	1560.53	7994.48	1566.17
8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87
8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
8270.5	1554.3	8288.83	1555.7	8295.32	1555.89	8307.63	1558.89	8310.76	1560.59
8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
8377.18	1561.6	8380.27	1561.66	8404.61	1561.91	8415.47	1562.14	8436.55	1562.05
8438.21	1562.1	8459.8	1562.89	8461.09	1562.91	8481.78	1562.83	8484.82	1563.14
8503.98	1563.6	8505.95	1563.6	8510.97	1563.65	8551.82	1564.36	8557.83	1564.44
8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
8825.79	1567.4	8836.1	1567.34	8848.28	1567.13	8856.1	1567.16	8883.37	1567.63

8889.52	1567.8	8894.81	1567.75	8901.15	1567.52	8912.17	1567.35	8927.49	1567.78
8935.05	1567.9	8949.24	1568.22	8956.34	1568.22	8978.6	1568.38	8982.37	1568.66
9012.09	1568.8	9030.23	1568.57	9049.15	1569.91	9055.98	1570.57	9081.9	1571.86
9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
9599.89	1572.8	9603.16	1572.75	9609.05	1572.62	9632.08	1573.43	9644.83	1572.95
9675.34	1573.1	9684.59	1573.3	9687.16	1573.46	9695.67	1573.48	9716.26	1573.95
9727.97	1573.9	9734.41	1573.94	9737.25	1573.91	9742.93	1573.85	9779.14	1575.73
9781.05	1575.8	9781.25	1575.72	9782.91	1575.88	9813.37	1568.4	9817.33	1568.12
9822.3	1567.6	9832.96	1568.6	9854.98	1566.21	9855.44	1566.21	9860.61	1566.22
9877.06	1567	9878.67	1567.04	9898.07	1568.33	9911.74	1569.02	9923.22	1569.07
9941.11	1569	9948.16	1569.71	9965.35	1570.68	9977.72	1575.36	9985.5	1575.6
9988.16	1575.6	9994.4	1575.21	10016.91	1569.66	10021.29	1569.54	10040.06	1577.33
10045.4	1577.41	10051.38	1577.28	10065.78	1576.71	10076.98	1576.66	10113.7	1576.53
10138.07	1576.61	10147.19	1576.88	10169.12	1576.78	10170.27	1576.53	10171.93	1575.99
10174.76	1575.21	10188.98	1569.91	10194.75	1569.81	10209.58	1574.97	10220.06	1574.76
10237.94	157	510241.72	1575.21	0244.41	1575.13	10249.36	1575.19	10270.25	1575.77
10299.93	1575.31	0305.03	1575.23	10308.94	1575.16	10309.74	1575.12	10333.08	1574.77
10348.08	1574.41	0348.82	1574.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3625.97	.08	9994.4	.04	510040.06	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9994.41	0040.06	400	1069.12	900	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
3625.97	7300	1560.5	8500	10348.82	1560.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1562.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.080		
W.S. Elev (ft)	1561.96	Reach Len. (ft)	400.00	1069.12	900.00
Crit W.S. (ft)		Flow Area (sq ft)	2059.36		
E.G. Slope (ft/ft)	0.002889	Area (sq ft)	2059.36		
Q Total (cfs)	3732.00	Flow (cfs)	3732.00		
Top Width (ft)	1139.28	Top Width (ft)	1139.28		
Vel Total (ft/s)	1.81	Avg. Vel. (ft/s)	1.81		
Max Chl Dpth (ft)	8.96	Hydr. Depth (ft)	1.81		
Conv. Total (cfs)	69432.8	Conv. (cfs)	69432.8		
Length Wtd. (ft)	401.57	Wetted Per. (ft)	1142.89		
Min Ch El (ft)	1569.54	Shear (lb/sq ft)	0.32		
Alpha	1.00	Stream Power (lb/ft s)	0.59		
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	81.32	3.66	5.11
C & E Loss (ft)	0.00	Cum SA (acres)	89.67	1.70	12.67

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5218.08	6810.19	66.57	53.61	51.87	1.78	1.04	1.24
6810.19	8402.29	3665.40	2005.54	1086.31	98.22	1.85	1.83
8402.29	9994.40	0.03	0.21	4.71	0.00	0.04	0.15

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.020

INPUT
Description: RM. 2.020 HYDRAULIC BASELINE CROSSES NEAR APACHE TRAIL.

Station Elevation Data num= 497

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4416.03	1564.7	4419.76	1564.68	4427.4	1564.64	4478.38	1564.37	4487.59	1564.26
4512.93	1564.1	4528.39	1564.09	4531.87	1564.42	4536.52	1564.52	4543.78	1564.77
4551.69	1565.8	4564.13	1566.02	4580.37	1566.02	4581.22	1565.98	4582.47	1565.98
4632.37	1565.3	4651.33	1564.52	4651.47	1564.51	4651.58	1564.51	4651.85	1564.5
4663.64	1564.2	4668.38	1563.98	4675.87	1563.66	4696.32	1564.08	4699.99	1564.17
4707.97	1564	4719.09	1563.86	4725.98	1563.82	4727.53	1563.83	4804.25	1563.5
4824.99	1563.1	4836.57	1563.21	4870.07	1562.71	4873.06	1562.62	4883.14	1561.74
4883.67	1561.7	4883.8	1561.69	4901.53	1562.5	4908.73	1562.63	4940.66	1562.54
4969.42	1562.5	5012.29	1562.15	5022.34	1562.06	5025.97	1562.62	5048.24	1565.68
5054.13	1565.6	5072.06	1565.45	5080.52	1565.42	5101.59	1565.09	5113.22	1564.86
5118.64	1564.3	5127.53	1562.98	5132.7	1562.43	5184.75	1562.05	5206.87	1562
5228.41	1562.1	5236.62	1561.86	5237.16	1561.84	5237.94	1561.88	5242.23	1562.12
5261.11	1563.1	5271.58	1562.89	5293.88	1562.42	5300.62	1562.4	5310.37	1562.45
5319.79	1562.7	5332.69	1562.95	5344.87	1562.7	5366.12	1562.29	5413.64	1561.57
5439.89	1561.1	5456.03	1561.16	5459.38	1561.1	5471.54	1561.15	5483.08	1561.19
5517.43	1561.3	5526.3	1561.41	5569.71	1562.12	5579.31	1562.3	5582.62	1562.34
5593.06	1562.4	5622.23	1562.39	5635.67	1561.27	5642.42	1560.86	5646.08	1560.47
5654.72	1560.3	5659.38	1560.48	5660.17	1560.47	5669.61	1560.46	5712.05	1560.34
5721.16	1559	5725.68	1558.12	5731.78	1559.4	5738.32	1561.07	5752.6	1561.41
5772.83	1561.4	5789.07	1561.01	5808.36	1562.06	5834.45	1563.46	5847.45	1562.8
5852.59	1562.6	5859.1	1562.45	5903.95	1562.01	5934.26	1561.58	5945.12	1561.4
5962.01	1561.3	6008.96	1560.78	6019.74	1561.29	6049.6	1562.7	6052.87	1562.83
6073.49	1563.1	6107.82	1562.85	6145.96	1562.11	6182.97	1561.94	6184.27	1561.93
6185.89	1561.9	6191.97	1561.94	6242.7	1562.22	6263.54	1562.06	6266.24	1562.06
6271.41	1562.2	6287.57	1562	6301.58	1561.95	6307.39	1561.96	6340.53	1562.57
6379.1	1563.5	6409.55	1562.43	6429.48	1561.97	6436.61	1562.11	6481.23	1563.42
6497.46	1563.9	6512.13	1564.17	6512.56	1564.17	6528.06	1561.99	6535.33	1560.93
6555.96	1563.1	6556.71	1563.15	6557.11	1563.15	6597.45	1562.79	6610.75	1562.9
6624.53	1563.1	6628.57	1563.07	6652.13	1563.18	6659.71	1563.21	6666.11	1563.17
6695.65	1563.1	6708.51	1563.14	6728.89	1563.27	6730.52	1563.3	6751.65	1563.51
6767.88	1563.7	6802.96	1563.97	6804.89	1563.99	6840.18	1563.18	6853.92	1562.91
6891.71	1563.2	6897.73	1563.14	6901.62	1563.22	6904.2	1563.3	6904.99	1563.31
6906.68	1563.3	6911.08	1563.3	6934.2	1563.38	6939.88	1562.65	6960.12	1562.41

6967.4	1563.5	6997.8	1563.83	7003.54	1563.81	7006.74	1563.8	7036.76	1563.73
7042.45	1563.8	7068.93	1563.64	7085.04	1563.62	7090.07	1563.49	7098.84	1563.46
7119.04	1563.5	7132.08	1563.42	7142.8	1563.31	7155.49	1563.26	7177.52	1562.82
7183.47	1562.8	7205.68	1562.13	7212.72	1562.1	7224.16	1561.79	7231.82	1561.72
7261.2	1562	7281.11	1561.75	7288.92	1561.68	7305.12	1561.46	7320.57	1561.01
7324.32	1561	7328.21	1560.96	7344.46	1561.01	7349.29	1561.25	7373.9	1560.66
7381.67	1560.4	7401.74	1560.3	7408.27	1560.93	7417.42	1562.23	7440.46	1563.42
7441.68	1563.5	7443.91	1563.56	7448.94	1562.55	7458.24	1560.82	7465.48	1560.68
7484.34	1560.2	7538.29	1559.36	7563.41	1559.19	7617.81	1559.01	7634.77	1559.28
7638.55	1559.3	7650.23	1559.32	7661.22	1559.38	7675.85	1558.7	7694.35	1558.73
7711.09	1559.3	7731.88	1559.29	7734.08	1559.41	7739.34	1559.26	7762.81	1559.34
7767.51	1559.4	7781.64	1558.92	7789.61	1558.78	7793.19	1558.86	7794.39	1558.87
7803.71	1559.1	7827.63	1559.93	7839.51	1560.25	7846.92	1562.16	7850.54	1562.76
7865.35	1557	7867.04	1556.07	7872.06	1556.06	7914.63	1555.73	7915.76	1556.27
7925.26	1560.7	7926.95	1561.49	7943.88	1561.77	7948.8	1561.8	7974.14	1561.98
8002.17	1561.6	8011.3	1561.76	8025.62	1561.5	8029.53	1561.45	8033.6	1561.3
8042.88	1559.7	8069.25	1559.5	8071.56	1559.38	8074.05	1559.28	8081.25	1559.46
8087.89	1559.5	8090.8	1559.69	8091.04	1559.69	8091.32	1559.69	8112.61	1558.85
8122.6	1558.9	8136.87	1558.57	8145.51	1558.62	8166.35	1558.19	8169.19	1558.2
8173.24	1558.2	8183.14	1558.6	8189.88	1558.69	8198.4	1558.08	8209.99	1557.9
8228.93	1558.2	8232.41	1558.24	8235.05	1558.27	8247.7	1558.3	8253.43	1558.32
8254.23	1558.3	8272.17	1558.61	8273.58	1558.61	8277.31	1558.62	8298.11	1559.09
8314.21	1558.7	8329.54	1558.99	8340.69	1559.07	8349.78	1558.95	8359.56	1559.16
8369.87	1559.2	8403.57	1560.53	8415.35	1560.89	8420.7	1560.84	8436.23	1560.04
8442.36	1560	8448.83	1559.65	8458.26	1559.53	8466.34	1559.28	8514.84	1558.96
8527.37	1558.9	8540.77	1558.71	8557.29	1559.36	8574.95	1559.38	8587.84	1558.67
8614.95	1558.7	8619.29	1558.74	8624.34	1558.93	8630.51	1559.22	8642.77	1559.81
8645.14	1559.9	8660.68	1559.87	8668.92	1559.97	8677.86	1560.06	8735.41	1560.04
8744.07	1560	8754.97	1559.91	8766.22	1559.88	8807.9	1560.03	8815.29	1559.85
8826.38	1560.2	8835.26	1559.72	8841.77	1559.79	8850.74	1559.8	8854.03	1559.71
8868.57	1559.2	8878.75	1558.8	8881.32	1558.69	8888.14	1558.7	8902	1558.43
8909.5	1558.4	8918.97	1558.25	8921.82	1558.15	8923.1	1558.21	8931.77	1558.27
8937.66	1558.4	8943.98	1558.22	8952.65	1558.27	8965.17	1558.31	9004.26	1558.85
9008.41	1558.9	9008.86	1558.91	9009.3	1558.92	9009.77	1558.92	9010.52	1558.94
9065.04	1560.1	9069.96	1560.21	9075.38	1560.4	9084.27	1560.68	9104.21	1560.86
9108.4	1561	9114.67	1561.02	9150.47	1561.6	9160.82	1561.77	9163.69	1561.82
9189.84	1562	9234.74	1562.22	9240.3	1562.26	9245.64	1562.3	9249.02	1562.33
9252.21	1562.3	9270.21	1562.41	9272.06	1562.42	9294.74	1562.42	9301.9	1562.42
9329.43	1562.2	9359.25	1562.15	9372.12	1562.02	9385.27	1562.13	9396.02	1561.86
9408.48	1561.7	9416.71	1561.88	9433.04	1562.35	9442.2	1562.61	9473.44	1562.78
9497.73	1562.7	9501.59	1562.65	9505.34	1562.62	9534.3	1562.51	9561.11	1562.48
9563.95	1562.5	9568.6	1562.56	9577.56	1562.61	9592.98	1562.7	9612.57	1562.83
9624.12	1562.9	9635.21	1563.11	9641.9	1562.91	9648.37	1562.67	9657.52	1562.24
9666.44	1562.1	9669.93	1562.4	9685.73	1563.15	9701.34	1563.26	9730.48	1563.46
9730.6	1563.5	9730.67	1563.46	9730.99	1563.45	9752.33	1563.06	9753.78	1563.1
9771.17	1563.5	9788.67	1563.43	9809.78	1563.5	9822.43	1563.36	9829.57	1563.55
9831.42	1563.6	9863.72	1564.07	9895.44	1564.38	9904.13	1564.49	9912.86	1564.43
9929.31	1564.5	9959.35	1564.47	9980.27	1563.98	9996.46	1563.04	10000.98	1561.55
10007.24	1559.3	10024.99	1563.71	10025.45	1563.83	10026.29	1563.81	0053.97	1562.81
10060.39	1562.8	10062.63	1562.67	10107.32	1563.11	0122.28	1563.78	10129.23	1564
10143.42	1564.5	10146.04	1564.48	10153.09	1564.38	10170.67	1563.48	10177.98	1563.64
10188.63	1563.7	10193.55	1563.71	0204.41	1563.92	10215.68	1563.34	10216.65	1563.32
10224.76	1563.4	10242.98	1563.41	10264.07	1563.69	10268.96	1563.54	10280.26	1563.55
10293.39	1564	10309.12	1564.23	10310.9	1564.24	10328.53	1564.49	10346.01	1564.32
10349.7	1564.3	10352.72	1564.06	10374.27	1563	10376.77	1563.03	10380.57	1563.1
10392	1563.4	10401.67	1563.77	10410.54	1563.21	10410.89	1563.19	10418.5	1563.35
10442.7	1563.9	10443.45	1563.92	10445.29	1563.89	10454.58	1563.81	10457.78	1563.98

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10471.52  1564.110482.78 1564.1310485.83 1564.1210494.29 1564.2710513.91 1564.39
10528.86  1564.310540.81 1563.9810574.84 1563.9810590.15 1563.8810601.09 1564.11
10624.42  1564.310634.43 1564.2910654.42 1564.3110665.38 1564.2910669.94 1564.22
10681.93  1564.310687.01 1564.3110690.85 1564.3610699.96  1564.810711.65 1565.21
 10749.2  1565.210755.36 1565.1210767.07 1565.1210801.02 1563.1610805.77 1562.82
10826.67  1564.210843.54 1564.9310845.62 1564.98 10846.3 1564.9510848.87  1564.9
10853.38  1564.810895.48 1564.2610907.08  1562.710913.98 1560.3210925.13 1559.71
10936.63  1560.910949.32 1563.1710973.86 1565.9810974.35 1566.03 10974.9 1565.96
10986.28  1564.510995.21 1564.4311007.73 1565.3211020.06 1566.1711021.46 1566.33
 11026.1  1566.211026.78 1566.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4416.03     .08 9929.31    .04510025.45     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9929.3110025.45              500  646.55     500             .1       .3

Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    8100    8400    1560
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1560.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1560.72	Reach Len. (ft)	500.00	646.55	500.00
Crit W.S. (ft)	1559.70	Flow Area (sq ft)	2423.29	6.86	13.01
E.G. Slope (ft/ft)	0.003362	Area (sq ft)	2423.29	6.86	13.01
Q Total (cfs)	3732.00	Flow (cfs)	3712.04	10.15	9.81
Top Width (ft)	1645.37	Top Width (ft)	1613.65	9.66	22.06
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)	1.53	1.48	0.75
Max Chl Dpth (ft)	4.99	Hydr. Depth (ft)	1.50	0.71	0.59
Conv. Total (cfs)	64361.5	Conv. (cfs)	64017.3	175.1	169.2
Length Wtd. (ft)	501.88	Wetted Per. (ft)	1616.74	10.08	22.20
Min Ch El (ft)	1559.30	Shear (lb/sq ft)	0.31	0.14	0.12
Alpha	1.00	Stream Power (lb/ft s)	0.48	0.21	0.09
Frctn Loss (ft)	3.16	Cum Volume (acre-ft)	60.74	3.58	4.97
C & E Loss (ft)	0.00	Cum SA (acres)	77.03	1.59	12.44

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4416.03	5794.35	44.96	55.55	93.71	1.20	0.60	0.81
5794.35	7172.67						
7172.67	8550.99	2668.50	1649.77	985.27	71.50	1.68	1.62

8550.99	9929.31	998.58	717.98	537.77	26.76	1.34	1.39
LB 9929.31	RB 10025.45	10.15	6.86	10.08	0.27	0.71	1.48
10025.45	11026.78	9.81	13.01	22.20	0.26	0.59	0.75

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 1.898**

INPUT
Description: RM .1.898

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4844.98	1559.8	4853.05	1559.81	4868.58	1559.9	4871.63	1559.82	4881.93	1559.91
4891.47	1559.9	4913.16	1559.71	4938.3	1559.77	4951.15	1559.75	4955.54	1559.77
4962.12	1559.7	4963.86	1559.52	4969.01	1559.4	4991.64	1558.63	4997.02	1558.74
5003.56	1558.9	5009.1	1558.94	5020.05	1558.87	5024.48	1558.95	5028.6	1559
5041.07	1559	5048.47	1559.11	5077.56	1558.92	5079.15	1558.91	5086.68	1558.82
5094.78	1558.9	5096.83	1558.9	5114.98	1559.32	5130.87	1559.51	5140.39	1559.62
5157.29	1559.7	5162.12	1559.66	5190.51	1559.89	5191.99	1559.88	5193.84	1559.88
5206.76	1559.9	5208.91	1559.89	5232.07	1559.77	5262.76	1559.99	5264.07	1560
5271.31	1560.1	5273.65	1560.07	5280.87	1560.06	5292.09	1559.92	5295.51	1559.85
5302.67	1559.5	5304.33	1559.54	5311.57	1559.38	5318.04	1559.22	5325.47	1558.97
5342.29	1558.4	5353.02	1558.42	5404.06	1557.89	5415.79	1555.21	5422.97	1553.45
5425.95	1553.4	5433.08	1553.52	5455.19	1557.8	5455.35	1557.83	5455.6	1557.82
5472.63	1557.6	5478.73	1557.38	5482.9	1557.65	5492.59	1557.98	5496.46	1557.97
5533.95	1557.9	5535.27	1557.82	5535.84	1557.8	5545.03	1557.23	5548.42	1557.04
5548.72	1557	5550.05	1557.05	5553.38	1557.14	5572.82	1557.62	5578.03	1557.51
5582.61	1557.4	5596.96	1557	5611.01	1556.89	5611.15	1556.9	5626.23	1557.21
5629.93	1557.2	5630.92	1557.24	5664.04	1557.3	5675.75	1557.4	5685.06	1557.43
5691.57	1557.5	5700.46	1557.57	5755.17	1556.61	5756.4	1556.59	5756.64	1556.59
5764.6	1556.7	5806.21	1556.79	5824.09	1556.79	5827.56	1556.77	5832.65	1556.81
5901.84	1557.2	5924.44	1557.32	5952.42	1557.07	5972.72	1556.94	6003.79	1556.69
6062.2	1556.3	6079.37	1556.31	6080.31	1556.2	6089.66	1555.38	6091.83	1555.56
6095.41	1555.8	6100.93	1556.1	6102.61	1556.16	6106.62	1556.3	6108.59	1556.26
6113.93	1556.2	6186.62	1556.49	6187.15	1556.49	6187.32	1556.49	6187.34	1556.49
6187.38	1556.5	6187.67	1556.49	6235.88	1556.87	6235.89	1556.87	6235.95	1556.87
6236.3	1556.9	6250.68	1556.99	6255.64	1557.08	6270.87	1557.31	6290.18	1557.62
6303.45	1557.9	6316.34	1558.1	6327.48	1557.86	6351.01	1557.43	6370.91	1557.43
6381.94	1557.5	6395.91	1557.45	6429.42	1557.37	6475.23	1557.09	6542.35	1556.92
6547.1	1556.8	6547.98	1556.79	6552.93	1556.35	6565.86	1557	6590.71	1558.63
6601.18	1558.7	6604.87	1558.74	6610.52	1558.87	6618.52	1558.96	6627.93	1558.88
6637.74	1559	6644.15	1558.97	6649.1	1558.96	6664.8	1559.06	6670.33	1559.07
6674.5	1559	6678.69	1558.91	6701.21	1558.98	6715.08	1559.11	6735.16	1558.31
6780.65	1557	6794.4	1557.15	6814.09	1557.35	6829.13	1557.55	6850.77	1557.63
6869.08	1557.2	6881.15	1557.26	6888.35	1555.59	6890.31	1555.03	6893.6	1555.54
6902.7	1557.6	6908.77	1557.74	6927.7	1557.79	6940.28	1557.8	6941.88	1557.79

6942.79	1557.8	6947.6	1557.77	6965.31	1557.74	6979.95	1557.66	6985.96	1557.93
7009.46	1559.3	7026.72	1559.45	7050.52	1559.67	7074.47	1558.94	7075.42	1558.91
7076.77	1558.9	7155.78	1558.62	7194.82	1558.61	7252.02	1558.78	7278.03	1558.7
7282.61	1558.7	7314.16	1558.35	7322.41	1558.47	7351.68	1558.93	7376.25	1559.23
7389.08	1559.3	7394.16	1559.4	7410.62	1559.41	7429.48	1559.36	7518.97	1558.88
7537.55	1558.5	7581.35	1558.13	7590.84	1558.12	7603.09	1558.45	7619.65	1558.89
7621.43	1558.8	7640.02	1558.62	7709.83	1558.39	7754.63	1557.33	7766.02	1557.5
7788.58	1558.1	7799.39	1558.29	7810.49	1558.46	7821.18	1558.67	7836.86	1558.93
7850.69	1558.7	7872.21	1558.14	7882.24	1558.39	7889.02	1558.64	7893.49	1558.73
7900.96	1558.9	7921.43	1559.08	7983.31	1558.81	8007.16	1558.22	8046.86	1557.43
8052.88	1557.3	8056.28	1557.27	8061.51	1557.18	8082.85	1556.87	8091.25	1556.99
8097.87	1556.9	8108.52	1556.9	8121.9	1556.95	8122.86	1556.94	8131.17	1557.01
8153.49	1557.4	8161.24	1557.43	8168.99	1557.6	8178	1557.68	8183	1557.48
8184.12	1557.5	8188.5	1557.61	8197.29	1557.95	8224.71	1558.27	8230.22	1558.34
8233.72	1558.4	8242.54	1558.59	8248.34	1558.7	8250.42	1558.72	8268.4	1556.67
8279.25	1555.3	8290.14	1556.58	8296.86	1557.25	8301.63	1557.79	8304.49	1558.05
8304.9	1558.1	8310.74	1557.84	8317.04	1557.53	8331.71	1555.83	8332.25	1555.77
8332.65	1555.8	8332.73	1555.77	8346.53	1555.78	8352.87	1555.73	8364.66	1555.87
8372.54	1556.2	8378.85	1556.57	8383.16	1556.74	8387.58	1556.8	8389.29	1556.77
8469	1556.7	8487.25	1556.69	8487.82	1556.68	8488.53	1556.69	8489.03	1556.69
8491.63	1556.7	8492.99	1556.72	8496.61	1556.75	8537.09	1556.99	8553.04	1557.01
8594.81	1557	8611.6	1557.04	8615.64	1557.03	8616.47	1557	8637.31	1556.32
8643.02	1556.2	8648.72	1556.36	8653.43	1556.44	8670.97	1556.87	8685.36	1557.16
8694.59	1557.4	8697.67	1557.38	8710.11	1557.56	8712.43	1557.59	8712.78	1557.59
8713.22	1557.6	8728.75	1557.27	8740.77	1556.98	8746.59	1556.82	8807.12	1556.85
8828.69	1556.9	8841.88	1556.98	8843.52	1556.96	8845.46	1556.98	8861.98	1556.9
8867.01	1556.8	8880.73	1556.71	8964.21	1556.74	8973.01	1556.71	8986.68	1556.85
9002.33	1556.9	9070.12	1557.07	9084.44	1557.12	9088.58	1557.05	9117.8	1556.76
9126.36	1556.8	9128.85	1556.76	9189.62	1556.57	9201.39	1556.56	9212.14	1556.54
9244.68	1556.4	9249.74	1556.39	9254.13	1556.68	9257.22	1556.57	9279.41	1557.1
9283.38	1557.3	9288.05	1557.29	9358.31	1556.89	9373.35	1556.94	9393.24	1556.84
9408.78	1556.9	9416.7	1556.6	9424.72	1556.37	9433.76	1556.74	9449.8	1557.55
9460.37	1557.7	9492.41	1557.77	9493.48	1557.73	9494	1557.7	9495.02	1557.65
9509.45	1557	9509.55	1557	9512.28	1557.16	9524.08	1557.87	9524.76	1557.91
9546.3	1558.1	9546.44	1558.12	9546.54	1558.11	9555.93	1557.66	9563.55	1557.38
9572.27	1557.3	9623.15	1557.5	9637.31	1557.56	9638.63	1557.6	9641.41	1558
9645.64	1558	9650.33	1557.48	9651.65	1557.31	9660.17	1557.39	9669.31	1557.73
9669.43	1557.7	9676.77	1557.99	9685.32	1557.7	9695.71	1557.61	9703.71	1557.4
9718.69	1557.2	9719.49	1557.22	9720.1	1557.23	9721.74	1557.25	9733.59	1556.3
9737.15	1556.3	9743.25	1556.33	9747.19	1556.85	9747.78	1556.98	9747.97	1557
9754.68	1558	9757.07	1558.41	9763.64	1557.8	9771.54	1556.85	9773.2	1556.95
9780.27	1557.3	9787.74	1557.04	9795.71	1557.3	9808.82	1557.19	9811.22	1556.74
9813.54	1556.3	9816.68	1557.08	9817.76	1557.38	9819.29	1557.39	9822.38	1557.35
9832.27	1557.3	9837.66	1557.28	9892.77	1557.69	9897.49	1557.72	9898.65	1557.74
9902.47	1557.8	9904.66	1557.81	9936.19	1558.1	9952.79	1558.17	9964.49	1558
9972.28	1558.3	9979.87	1558.71	9985.7	1559.84	9987.91	1560.24	9990.07	1559.03
9997.02	1554.6	10004.22	1557.56	10010.42	1559.94	10014.83	1559.3	10018.94	1558.29
10019.99	1558.3	10025.38	1558.25	10036.63	1558.58	10061.93	1558.71	10070.51	1558.78
10074.17	1558.8	10088.42	1558.85	10092.56	1558.66	10102.88	1558.46	10128.47	1558.45
10143.52	1558.2	10176.79	1557.98	10187.07	1557.92	10200.87	1557.84	10206.79	1557.84
10213.49	1557.8	10227.79	1557.86	10271.11	1557.83	10310.06	1557.73	10335.02	1557.73
10340.76	1557.7	10347.95	1557.68	10372.98	1557.7	10386.46	1557.78	10410.78	1557.53
10427.24	1557.3	10432.13	1557.38	10440.66	1557.37	10493.46	1557.43	10511.5	1557.36
10543.31	1557.4	10547.37	1557.38	10555.4	1557.35	10571.86	1557.48	10620.33	1557.82
10657.56	1557.4	10657.63	1557.36	10659.03	1557.37	10677.45	1557.5	10679.4	1557.45
10681.43	1557.5	10683.51	1557.46	10692.04	1557.29	10692.41	1557.29	10695.79	1557.15
10707.26	1556.7	10720.37	1555.88	10724.2	1555.95	10736.26	1556.68	10743.48	1556.8

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10750.94  1556.9 10775.5 1556.9310803.56 1556.92 10816.6 1556.8910824.65 1557.01
10847.39  1557.110850.05 1557.1310860.07  1557.210867.95 1557.28 10882.2  1557.3
10895.02  1557.410933.86 1557.6810951.76 1557.5610956.47  1557.610967.75 1557.97
11020.59  1557.811026.16 1557.7311034.85  1557.8 11038.2 1558.06 11047.5 1558.96
11061.66  1555.311062.57 1555.0711075.53 1558.4311078.83  1559.111091.75 1558.57
11097.54  1558.711104.24 1558.67 11126.2 1558.8511155.34 1558.8511158.16 1558.99
11177.58  1559.211179.15 1559.2411180.68 1559.23 11196.3  1559.811203.96 1560.04
11214.06    156011216.87 1560.01

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4844.98     .08 9987.91    .04510010.42     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9987.9110010.42               500  542.03    500              .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1557.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1557.52	Reach Len. (ft)	500.00	542.03	500.00
Crit W.S. (ft)		Flow Area (sq ft)	1710.58	17.10	172.50
E.G. Slope (ft/ft)	0.016140	Area (sq ft)	1710.58	17.10	172.50
Q Total (cfs)	3732.00	Flow (cfs)	3386.21	85.53	260.26
Top Width (ft)	3151.74	Top Width (ft)	2688.85	11.70	451.19
Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)	1.98	5.00	1.51
Max Chl Dpth (ft)	4.12	Hydr. Depth (ft)	0.64	1.46	0.38
Conv. Total (cfs)	29376.0	Conv. (cfs)	26654.2	673.2	2048.6
Length Wtd. (ft)	506.02	Wetted Per. (ft)	2691.42	13.13	451.90
Min Ch El (ft)	1554.60	Shear (lb/sq ft)	0.64	1.31	0.38
Alpha	1.11	Stream Power (lb/ft s)	1.27	6.57	0.58
Frctn Loss (ft)	5.22	Cum Volume (acre-ft)	37.01	3.40	3.91
C & E Loss (ft)	0.01	Cum SA (acres)	52.34	1.43	9.72

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4844.98	6130.71	1068.63	482.47	628.56	28.63	0.77	2.21
6130.71	7416.45	424.16	251.61	493.64	11.37	0.51	1.69
7416.45	8702.18	860.53	407.63	570.73	23.06	0.71	2.11
8702.18	9987.91	1032.89	568.86	998.48	27.68	0.57	1.82
LB 9987.91	RB 10010.42	85.53	17.10	13.13	2.29	1.46	5.00
10010.42	11216.87	260.26	172.50	451.90	6.97	0.38	1.51

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 1.795**

INPUT
Description: RM 1.795

Station Elevation Data num= 462

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4479.61	1554.9	4490.24	1554.7	4504.08	1554.4	4507.84	1554.34	4512.4	1554.43
4513.34	1554.4	4515.48	1553.5	4517.78	1552.75	4520.22	1552.48	4543.75	1552.66
4634.43	1552.9	4659.27	1552.87	4697.2	1552.73	4729.91	1553.03	4737.15	1552.99
4756.53	1553	4774.75	1552.85	4804.97	1552.78	4831.66	1553.12	4860.29	1553.5
4862.16	1553.5	4873.86	1553.63	4875.9	1553.64	4878.62	1553.68	4979.06	1553.93
4979.53	1553.9	4993.96	1552.74	4995.4	1552.68	4997.3	1552.66	5020.17	1552.32
5022.7	1552.2	5030.04	1550.89	5032.64	1550.45	5035.63	1550.65	5047.99	1551.46
5050.71	1551.9	5058.83	1552.76	5090.69	1552.26	5094.38	1552.22	5096.24	1552.28
5110.14	1552.7	5190.37	1553.01	5197.59	1553.05	5199.79	1553.05	5209.36	1552.94
5235.19	1552.7	5242.61	1552.71	5251.58	1552.75	5266.84	1552.79	5275.91	1552.79
5277.07	1552.8	5278.66	1552.84	5295	1552.7	5316.69	1552.51	5321.18	1552.44
5329.96	1552.3	5335.31	1552.34	5339.59	1552.25	5358.89	1552.34	5359.2	1552.34
5359.6	1552.3	5375.38	1552.52	5376.68	1552.46	5383.3	1552.41	5458.14	1551.5
5460.89	1551.5	5461.12	1551.46	5494.91	1551.46	5496.42	1551.46	5498.68	1551.41
5516.05	1551.1	5521.4	1551.19	5523.27	1551.25	5547.93	1551.77	5550.6	1551.8
5559.37	1551.9	5581.63	1552.29	5585.07	1552.37	5588.92	1552.48	5589.41	1552.42
5623.19	1552.1	5634.52	1552.12	5653.74	1552.13	5695.13	1551.88	5733.25	1551.64
5742.79	1551.6	5748.32	1551.55	5754.55	1551.22	5763.35	1550.99	5767.09	1551.1
5776.05	1551.3	5809.89	1551.17	5843.64	1551.17	5853.8	1550.84	5856.79	1550.71
5859.96	1550.9	5866.17	1551.07	5867.65	1551.18	5917.29	1551.57	5969.13	1550.85
5975.97	1550.7	6007.22	1551.15	6025.13	1551.12	6061.93	1551.57	6093.71	1552
6094.9	1552	6117.03	1552.04	6118.3	1552.04	6119.12	1551.99	6130.63	1551.23
6136.64	1551.4	6137.83	1551.46	6185.14	1551.46	6221.62	1551.53	6247.81	1551.5
6258.64	1551.5	6272.7	1551.86	6277.52	1551.94	6327.98	1552.24	6364.64	1552.18
6367.66	1552.2	6376.73	1552.19	6383.7	1552.02	6411.2	1551.12	6435.07	1549.89
6440.32	1549.2	6442.98	1548.67	6450.65	1550.13	6454.45	1551.15	6456.31	1551.2
6460.19	1551.3	6465.81	1551.16	6527.07	1551.32	6587.91	1551.54	6602.17	1551.7
6605.56	1551.7	6609.39	1551.71	6613.07	1551.71	6616.71	1551.74	6625.69	1551.84
6635.77	1552	6684.81	1552.33	6706.87	1552.75	6711.56	1552.81	6715.18	1552.72
6726.77	1552.4	6731.82	1552.36	6746.66	1552.14	6760.75	1552	6770.7	1552.17
6779.06	1552.4	6799.63	1552.84	6809.69	1553.06	6816.58	1553.28	6821.5	1553.31
6826.86	1553.3	6858.75	1553.48	6860.53	1553.51	6873.25	1553.61	6877.61	1553.64
6877.88	1553.6	6880.77	1553.64	6920.15	1553.64	6927	1553.06	6940.52	1552.3
6951.43	1552.6	6957.59	1552.84	6962.6	1552.95	6975.12	1553.27	6988.35	1553.33
7041.64	1554.3	7076.26	1553.41	7137.42	1552.76	7152.24	1553.08	7185.55	1552.93
7190.14	1552.4	7192.56	1552.5	7204.25	1552.76	7212.26	1552.95	7220.69	1553.14
7238.39	1552.2	7249.97	1551.53	7253.26	1551.63	7285.13	1552.84	7311.59	1551.79
7313.08	1551.7	7320.46	1551.73	7333.89	1551.87	7354.18	1552.39	7370.89	1550.96
7373.64	1550.5	7384.09	1549.45	7389.61	1549.01	7395.6	1549.05	7405.97	1547.63
7409.74	1547.9	7412.54	1548.26	7424.63	1549.52	7435.97	1550.26	7443.35	1551.31
7448.91	1551.8	7457.79	1553.04	7457.85	1553.05	7457.98	1553.06	7480.59	1553.04
7483.72	1553.1	7489.86	1553.06	7514.19	1553.06	7519.69	1552.99	7525.13	1553.04
7556.53	1552.7	7561.85	1552.74	7575.11	1552.54	7583.81	1554.64	7594.76	1557.43
7595.53	1557.4	7596.01	1557.43	7618.37	1557.31	7624.85	1557.25	7649.55	1556.5
7652.81	1555.5	7654.5	1554.73	7661.2	1552.33	7669.22	1552.3	7676.78	1552.35
7678.81	1552.7	7752.25	1553.4	7789.27	1553.67	7807.08	1553.19	7812.73	1553.12
7834.61	1552.9	7917.1	1552.36	7925.67	1552.36	7944.35	1551.98	7948.8	1551.83
7956.08	1552.1	7976.57	1551.59	8003.78	1552.53	8005.67	1552.59	8023.45	1552.08
8053.01	1552	8077.13	1552.32	8097.86	1552.52	8163.97	1552.95	8170.6	1553

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 8175.1    1553 8179.33 1553.07 8181.26 1553.08 8187.47  1553.1 8196.69 1553.11
8215.03  1553.1 8221.65 1552.49 8226.58 1552.07 8245.33 1550.31  8249.1 1549.85
8253.83  1550.6 8265.83 1552.37 8272.65 1553.01 8276.08 1553.25 8278.92 1553.58
8319.69  1553.5 8323.86 1553.45 8361.76 1553.07  8377.2 1552.28 8383.06 1551.97
8387.66  1551.8 8405.09 1552.19 8422.56 1552.48 8429.85 1552.46 8464.18 1551.95
8469.75  1551.9 8478.91 1551.59 8480.35  1551.6 8491.77  1549.9 8502.42 1552.48
8502.49  1552.5 8502.61 1552.53 8502.86 1552.54 8535.84 1553.08 8540.37 1552.98
8545.84  1552.8 8558.77 1552.57 8563.13 1552.52 8576.11 1552.32 8591.32 1551.95
8593.59  1551.9 8614.49 1551.75 8620.72  1551.7 8647.39  1551.9 8683.93 1552.09
8721.45  1552.6 8743.21 1552.45 8744.73 1552.46 8754.17 1552.58 8779.28  1552.6
8796.69  1552.9 8798.21 1552.67 8800.12 1552.76 8827.58 1552.87 8845.06 1552.78
8854.24  1552.8 8859.81 1552.81 8870.45 1552.88 8871.86 1552.89 8881.66 1552.88
8895.54  1552.9  8907.8 1552.98  8912.7 1552.98 8928.05 1552.91 8964.12 1552.74
8967.68  1552.8 8980.32  1552.6 9003.03 1552.33 9062.99 1552.64 9070.67 1552.66
9092.94  1552.4 9097.57 1552.39  9105.4 1552.23 9182.14 1552.98 9215.62  1552.7
9218.96  1552.7 9219.03 1552.67 9220.53 1552.62 9221.79 1552.92  9229.5 1552.48
9242.38    1552 9243.74 1552.03 9251.99 1552.16 9255.93 1552.34 9269.01 1551.78
9282.98  1552.1 9309.37 1552.57 9354.31  1552.6 9369.07  1552.6 9371.36 1552.59
9371.95  1552.6 9372.09 1552.63 9372.31 1552.64 9381.59 1553.26 9382.36 1553.32
9382.71  1553.3 9408.78 1553.12 9453.55 1552.79 9453.86 1552.79 9453.97 1552.79
9454.24  1552.8 9454.33 1552.79 9454.51 1552.79 9497.73 1552.94  9504.4 1552.86
9511.24  1552.8 9523.22 1552.64 9531.17 1552.36 9534.36 1552.32 9542.42 1552.26
9548.86  1552.3 9559.22 1552.36 9604.67 1552.53 9608.22 1552.49 9610.88 1552.44
9616.24  1552.5 9672.02 1552.61 9740.74 1552.89 9743.34  1552.9 9743.68  1552.9
9744.79  1552.9  9748.1 1552.91  9751.1 1552.89 9798.59 1552.84 9809.71 1552.81
9811.35  1552.8 9827.51  1549.2 9839.04 1552.72  9860.3 1552.28 9860.43 1552.28
9860.72  1552.3 9878.33 1551.04 9901.96 1549.82 9903.07 1549.83 9904.21 1549.81
9949.44  1549.3 9949.94 1549.35 9953.19 1549.38 9959.43  1549.6 9963.65 1549.68
9965.01  1549.7 9969.76 1549.46 9975.67 1549.68 9982.47 1549.78 9993.78 1548.11
9994.14    1548 9994.71 1547.9510008.91    154810017.95 1547.95   10031  1551.4
10032.14  1551.710032.97 1551.7310046.02 1552.3310054.72 1552.7310055.41 1552.77
10055.86  1552.810081.86 1553.0210085.42 1552.9710095.92 1553.0210100.05 1552.83
   10148  1552.210154.08 1552.48 10162.8 1552.4110169.12 1552.36   10178 1552.38
10242.45  1551.710251.24 1551.4710258.07 1552.3310260.59 1552.2910262.79 1552.25
10375.41  1551.510391.54 1551.5310400.87 1551.5410414.69  1551.510426.77 1551.52
10427.31  1551.5   10498 1551.9310509.46    155210525.11 1552.0510529.17 1552.08
10536.67  1552.110545.41  1552.210576.09 1552.3310579.01 1552.3410579.88 1552.37
10593.22  1552.710622.25 1552.8710640.67 1553.0310675.77  1553.310679.22 1553.25
10690.67    155310697.05 1552.9710700.39 1552.7410701.39 1552.5510708.06 1550.57
 10720.3  1553.610721.45 1553.7910739.12 1553.3410754.13 1553.2110766.23 1553.36
10788.15  1553.710806.66 1553.5110832.15 1553.1810857.38 1553.1710863.99 1553.13
10867.04  1553.710870.11 1554.3310878.55 1554.4110879.99 1554.4110891.72 1554.38
10898.73  1554.410905.95 1554.5710911.12 1554.5510919.02 1554.4610935.67  1554.6
10978.87 1554.9111004.65 1555.03

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
 4479.61     .08 9982.47    .04510054.72     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.4710054.72              520  524.67     500             .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1552.36   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.16   Wt. n-Val.                  0.080      0.045      0.080
  W.S. Elev (ft)            1552.20   Reach Len. (ft)            520.00     524.67     500.00
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Crit W.S. (ft)		Flow Area (sq ft)	1559.82	175.44	143.12
E.G. Slope (ft/ft)	0.007096	Area (sq ft)	1559.82	175.44	143.12
Q Total (cfs)	3732.00	Flow (cfs)	2623.07	982.93	126.00
Top Width (ft)	2370.03	Top Width (ft)	1959.70	60.74	349.59
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)	1.68	5.60	0.88
Max Chl Dpth (ft)	4.57	Hydr. Depth (ft)	0.80	2.89	0.41
Conv. Total (cfs)	44301.8	Conv. (cfs)	31137.8	11668.2	1495.7
Length Wtd. (ft)	520.19	Wetted Per. (ft)	1962.68	61.38	350.08
Min Ch El (ft)	1547.95	Shear (lb/sq ft)	0.35	1.27	0.18
Alpha	2.60	Stream Power (lb/ft s)	0.59	7.09	0.16
Frctn Loss (ft)	4.52	Cum Volume (acre-ft)	18.24	2.20	2.10
C & E Loss (ft)	0.00	Cum SA (acres)	25.66	0.98	5.13

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4479.61	5855.32	375.82	274.26	449.92	10.07	0.61	1.37
5855.32	7231.04	919.91	593.50	809.36	24.65	0.73	1.55
7231.04	8606.75	616.06	361.69	428.18	16.51	0.85	1.70
8606.75	9982.47	711.28	330.37	275.21	19.06	1.20	2.15
LB 9982.47	RB 10054.72	982.93	175.44	61.38	26.34	2.89	5.60
10054.72	11004.65	126.00	143.12	350.08	3.38	0.41	0.88

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 1.696

INPUT
Description: RM 1.696 . DOWNSTREAM END OF STUDY. SECTION I.D.NO.'S ARE IN RIVER MILES ALONG HYDRAULIC BASELINE WITH R.M. 5.00 ASSUMED AT UPSTREAM END OF PROJECT AT SPILLWAY. CROSS-SECTIONS ARE CODED FROM LT. TO RT., LOOKING DOWNSTREAM WITH STA. 10,000 AT THE HYDRAULIC BASELINE. STARTING D/S WSEL BASED ON NORMAL DEPTH (SLOPE AREA METHOD) WITH 0.011 FT./FT SLOPE.

Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4413	1551	4425.04	1550.94	4437.83	1550.57	4442.29	1550.52	4449.88	1550.43
4452.11	1550.4	4457.96	1550.41	4460.25	1550.33	4465.96	1550.31	4501.97	1550.44
4550.8	1550.7	4553.36	1550.58	4556.28	1550.47	4561.86	1550.21	4567.75	1548.08
4579.92	1549.6	4612.64	1550.09	4617.28	1550.21	4626.38	1550.36	4628.82	1550.41
4659.48	1551.2	4664.15	1551.13	4679.26	1550.96	4699.13	1550.25	4699.94	1550.21
4701.62	1550.1	4705.35	1550.1	4748.3	1549.6	4796.19	1549.21	4828.49	1549.22
4862.4	1549.1	4873.56	1549.21	4884.8	1549.16	4923.57	1549.79	4968.43	1548.96
4989.62	1548.9	4994.46	1548.96	5001.32	1549.04	5021.72	1549.12	5060.43	1549.19
5096.01	1549	5107.84	1549	5127.86	1548.98	5132.21	1549.06	5143.39	1549.09
5202.31	1549	5235.78	1549	5269.68	1548.73	5318.34	1548.76	5343.85	1548.56
5346.75	1548.6	5347.97	1548.56	5363.86	1548.76	5370.64	1548.77	5380.01	1548.67
5410.62	1548.4	5430.2	1548.21	5440.8	1548.12	5449.46	1547.4	5456.49	1546.8
5457.5	1546.9	5458.42	1546.91	5466.29	1547.31	5479.5	1547.18	5494.13	1546.87

5497.27	1546.8	5498.42	1546.65	5507.6	1545.21	5515.68	1546.29	5518.86	1546.74
5530.55	1547.4	5533.68	1547.47	5564.47	1547.25	5582.57	1547.07	5586.98	1546.02
5594.63	1546	5605.87	1547.36	5617.28	1547.47	5622.24	1547.32	5630.09	1547.33
5645.45	1547.5	5662.84	1547.39	5668.87	1547.39	5674.33	1547.35	5696.11	1547.57
5708.81	1547.5	5713.28	1547.45	5717.42	1547.21	5722.88	1547.01	5729.34	1546.96
5731.48	1547	5731.94	1546.97	5732.82	1546.92	5738.2	1547.23	5751.11	1547.8
5774.28	1548	5780.29	1548.06	5787.65	1547.59	5807.99	1547.28	5814.56	1547.05
5822.29	1546.8	5824.31	1546.98	5834.27	1547.47	5843.83	1547.44	5845.84	1547.47
5891.47	1548	5905.97	1548.27	5931.37	1549.19	5933.12	1549.25	5934.14	1549.29
5953.62	1549.4	5956.53	1549.44	5970.12	1549.82	5972.5	1549.77	5982.91	1549.24
5991.28	1549	5992.56	1549.01	5994.15	1548.98	6014.69	1548.39	6020.82	1548.2
6028.31	1547.9	6098.54	1546.55	6099.38	1546.52	6099.73	1546.52	6099.95	1546.45
6103.51	1545.4	6107.99	1544.06	6109.1	1544.22	6124.96	1546.6	6133.04	1546.58
6139.15	1546.6	6148.78	1546.7	6158.6	1547.33	6170.14	1547.82	6186.7	1547.53
6196.13	1547.5	6199.03	1547.52	6213.06	1547.42	6228.15	1547.11	6259.46	1546.89
6264.71	1546.8	6267.57	1546.79	6273.55	1546.7	6306.93	1547.09	6316.45	1547.3
6322.04	1547.3	6334.42	1547.06	6337.61	1546.58	6340.8	1547.01	6341.47	1546.81
6357.92	1547.1	6362.57	1547.23	6366.26	1547.3	6397.7	1547.71	6405.23	1547.93
6427.98	1548.7	6433.87	1548.7	6439.41	1548.7	6458.31	1548.7	6467.54	1547.72
6475.65	1546.9	6483.6	1545.94	6492.62	1545.05	6511.77	1543.17	6524.31	1544.27
6540.17	1545.5	6558.95	1547.34	6568.66	1547.52	6574.02	1547.57	6598.48	1547.78
6615.12	1548	6632.78	1548.41	6659.94	1548.66	6664.62	1548.73	6675.9	1549.33
6678.93	1549.8	6684.45	1550.41	6702.31	1551.14	6710.51	1552.59	6715.56	1552.46
6721.42	1552.3	6732.92	1551.93	6734.44	1551.59	6744.59	1550	6752.92	1548.66
6753.55	1548.6	6778.93	1548.93	6818.11	1548.49	6826.68	1548.42	6845.23	1548.22
6846.62	1548.2	6848.14	1548.18	6851.33	1548.14	6852.56	1548.15	6894.04	1548.15
6941.92	1548.2	6951.75	1548.12	6985.98	1548.22	6993.98	1548.18	6995.51	1548.2
7060.73	1546.9	7062.68	1546.9	7066.04	1546.83	7067.72	1546.77	7078.71	1546.33
7087.54	1546.5	7099.63	1546.69	7110.5	1546.69	7129.61	1546.7	7185.65	1546.86
7242.88	1547	7299.42	1546.92	7310.78	1546.81	7318.51	1546.78	7354.73	1547.25
7387.72	1547.7	7396.37	1547.76	7418.36	1547.73	7424.04	1547.75	7425.72	1547.71
7429.4	1547.7	7456.28	1547.88	7533	1548.28	7567.26	1548.25	7568.18	1548.25
7568.71	1548.3	7600.95	1548.32	7664.85	1548.36	7672.44	1548.31	7681.17	1548.22
7752.88	1547.2	7769.65	1546.85	7769.85	1546.85	7776.36	1546.69	7787.1	1547.26
7807.98	1547.6	7832.55	1547.65	7836.89	1547.7	7858.8	1547.9	7860.81	1547.9
7861.47	1547.8	7865.13	1546.95	7874.56	1544.76	7876.1	1544.4	7884.1	1545.87
7886.66	1546.4	7891.35	1546.52	7905.85	1546.72	7915.14	1547.1	7927.84	1547.24
7983.64	1548	7987.37	1547.99	7989.96	1547.95	8009.09	1548.25	8012.46	1548.32
8017.16	1548.4	8022.05	1548.66	8025.58	1548.75	8063.24	1548.51	8076.71	1548.49
8098.23	1548	8116.6	1548.06	8142.22	1547.89	8145.69	1547.91	8151.71	1547.98
8154	1548	8155.7	1548.04	8156.59	1548.04	8192.13	1547.98	8209.95	1547.94
8229.56	1547.8	8247.38	1547.69	8287.09	1547.58	8288.65	1547.57	8290.7	1547.43
8299.38	1547.1	8305.16	1546.83	8310.47	1546.76	8318.45	1546.77	8330.92	1546.72
8353.37	1546.9	8376.89	1547.08	8387.04	1547.3	8392.74	1547.12	8399.02	1546.71
8400.29	1546.8	8427.78	1546.89	8435.89	1546.87	8437.1	1546.87	8438.94	1546.92
8469.6	1547.7	8515.12	1547.07	8520.39	1546.98	8521.44	1546.98	8523.81	1546.99
8552.58	1546.9	8552.79	1546.9	8557.79	1547.14	8561.95	1547.17	8566.68	1547.05
8573.38	1546.6	8577.49	1546.94	8581.67	1547.29	8585.11	1547.6	8645.13	1547.41
8646.05	1547.4	8648.66	1547.42	8663.24	1547.49	8676.3	1547.47	8684.26	1547.33
8693.53	1547.3	8726.67	1547.44	8733.33	1547.47	8734.57	1547.47	8760.72	1547.36
8778.64	1547.4	8783.22	1547.44	8798.75	1547.92	8825.4	1548.54	8837.75	1548.4
8847.43	1548.4	8859.37	1548.47	8867.12	1548.39	8877.93	1548.29	8911.89	1548.14
8930.43	1547.9	8953.99	1547.56	8955.61	1546.49	8967.16	1547.03	8996.31	1546.86
9009.21	1547	9014.79	1545.57	9023.95	1544.93	9027.36	1545.1	9036.12	1546.52
9041.79	1547.3	9065.84	1547.03	9079.22	1547.1	9121.99	1547.3	9140.65	1546.74
9141.1	1546.7	9152.66	1547.41	9176.3	1547.44	9184.8	1547.44	9202.51	1547.44
9252.37	1547.5	9253.83	1547.55	9292.42	1547.62	9355.99	1547.99	9367.45	1548.03

9386.34	1548.1	9387.8	1548.1	9409.89	1548.23	9419.49	1548.43	9439.6	1548.26
9446.97	1548.3	9457.45	1548.28	9461.22	1548.9	9462.33	1548.88	9463.96	1549.05
9471.46	1548.3	9481.45	1549.53	9488.02	1549.52	9502.83	1549.5	9524.55	1549.41
9531.19	1549.4	9547.26	1549.09	9552.78	1549.12	9572.57	1548.92	9585.46	1548.84
9600.19	1548.8	9601.14	1548.78	9604.83	1548.78	9617.99	1548.43	9641.88	1547.92
9654.02	1548	9655.26	1548.06	9656.08	1548.04	9656.96	1548.04	9659.77	1547.95
9676.81	1547.5	9690.45	1548.27	9691.55	1548.35	9702.79	1548.49	9708.3	1548.55
9729.95	1548.7	9735.16	1548.75	9758.39	1548.69	9766.86	1548.69	9773.19	1548.64
9782.5	1548.6	9783.85	1548.54	9789.19	1548.44	9793.76	1548.49	9818.04	1548.29
9830.72	1548.1	9847.77	1547.88	9851.15	1547.85	9860.97	1547.71	9876.97	1548.18
9880.39	1548.3	9882.2	1548.23	9896.38	1547.98	9907.41	1548.06	9930.46	1548.07
9934.85	1548.1	9936.1	1548.08	9938.42	1548.05	9952.13	1547.92	9970.42	1547.6
9977.41	1547.6	9986.7	1545.56	9991.92	1544.33	9995.05	1544.44	10000.99	1544.39
10004.83	1544.4	10009.78	1544.57	10030.5	1545.49	10039.92	1545.77	10051.75	1546.13
10069.72	1548	10078.77	1548.37	10083.66	1548.34	10088.58	1548.34	10091.43	1548.33
10097.26	1548.3	10134.25	1550.59	10146.07	1548.92	10146.45	1548.93	10147.33	1548.93
10165.19	1549.7	10181.5	1548.59	10191.27	1548.63	10206.68	1548.42	10215.07	1546.93
10221	1545.9	10225.82	1545.18	10234.58	1546.41	10243	1547.17	10261.91	1547.22
10271.74	1547.1	10280.85	1546.86	10295.99	1547.25	10300.1	1547.19	10305.55	1547.25
10306.66	1547.3	10315.31	1547.81	10328.23	1547.15	10333.19	1546.89	10346.97	1547.03
10408.19	1547.6	10430.23	1547.61	10442.25	1547.66	10449.47	1547.78	10454.5	1547.22
10459.31	1546.7	10465.72	1547.61	10468.75	1547.86	10480.59	1547.62	10500.17	1547.48
10503.51	1546.8	10509.41	1545.71	10517.74	1546.71	10529.27	1547.59	10529.63	1547.55
10534.29	1547.5	10598.6	1547.31	10623.28	1547.45	10625.13	1547.45	10659.99	1547.8
10673.24	1548	10678.13	1548.03	10684.71	1547.28	10686.02	1547.14	10686.33	1547.15
10694.92	1547.5	10717.08	1547.39	10746.64	1547.46	10768.23	1547.4	10779.18	1547.4
10787.29	1547.4	10791.7	1547.49	10801.25	1547.63	10845.25	1548.01	10860.13	1548.15
10904.64	1548.3	10926.23	1548.38	10933.68	1548.33	10969.34	1549.51	10998.36	1551.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4413	.08	9938.42	.04	10069.72	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9938.42	10069.72	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1547.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1547.69	Reach Len. (ft)			
Crit W.S. (ft)	1547.48	Flow Area (sq ft)	1496.43	190.39	222.59
E.G. Slope (ft/ft)	0.011004	Area (sq ft)	1496.43	190.39	222.59
Q Total (cfs)	3732.00	Flow (cfs)	2465.62	1001.08	265.30
Top Width (ft)	2984.33	Top Width (ft)	2339.57	101.31	543.45
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	1.65	5.26	1.19
Max Chl Dpth (ft)	4.52	Hydr. Depth (ft)	0.64	1.88	0.41
Conv. Total (cfs)	35576.4	Conv. (cfs)	23504.2	9543.1	2529.1
Length Wtd. (ft)		Wetted Per. (ft)	2342.79	101.80	544.26
Min Ch El (ft)	1544.33	Shear (lb/sq ft)	0.44	1.28	0.28
Alpha	2.44	Stream Power (lb/ft s)	0.72	6.76	0.33
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4413.00	5794.35	237.29	168.07	311.35	6.36	0.54	1.41
5794.35	7175.71	1231.25	621.16	691.77	32.99	0.90	1.98
7175.71	8557.06	673.01	443.02	735.32	18.03	0.60	1.52
8557.06	9938.42	324.07	264.19	604.35	8.68	0.44	1.23
LB 9938.42	RB 10069.72	1001.08	190.39	101.80	26.82	1.88	5.26
10069.72	10998.36	265.30	222.59	544.26	7.11	0.41	1.19

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:SIGNAL BUTTE

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8
SPILLWAY	5.000	.03	.03	.03					
SPILLWAY	4.994	.013	.013	.013					
SPILLWAY	4.991	.013	.15	.013					
SPILLWAY	4.986	.03	.09	.03					
SPILLWAY	4.968	.03	.03	.03					
SPILLWAY	4.929	.03	.03	.03					
SPILLWAY	4.914	.068	.03	.03					
SPILLWAY	4.902	.068	.045	.068					
SPILLWAY	4.852	.068	.045	.068					
SPILLWAY	4.776	.068	.045	.068					
SPILLWAY	4.697	.068	.045	.068					
SPILLWAY	4.620	.068	.045	.068					
SPILLWAY	4.575	.068	.045	.068					
SPILLWAY	4.518	.068	.045	.068					
SPILLWAY	4.443	.068	.045	.068					
SPILLWAY	4.367	.068	.045	.068					
SPILLWAY	4.311	.068	.045	.068					
SPILLWAY	4.239	.068	.045	.068					
SPILLWAY	4.171	.068	.045	.068					
SPILLWAY	4.101	.068	.045	.068					
SPILLWAY	4.026	.15	.068	.045	.068				
SPILLWAY	3.956	.15	.068	.045	.068				
SPILLWAY	3.885	.15	.068	.045	.068				
SPILLWAY	3.817	.15	.068	.045	.068				
SPILLWAY	3.747	.15	.068	.045	.068				
SPILLWAY	3.674	.15	.068	.045	.068				
SPILLWAY	3.603	.15	.068	.045	.068				
SPILLWAY	3.532	.15	.068	.045	.068				
SPILLWAY	3.462	.15	.068	.045	.068				
SPILLWAY	3.386	.15	.068	.045	.068				
SPILLWAY	3.310	.15	.1	.15	.068	.045	.068		
SPILLWAY	3.235	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.161	.15	.068	.068	.045	.068			
SPILLWAY	3.082	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.006	.068	.15	.068	.1	.045	.1		

SPILLWAY	2.933	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.857	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.793	.068	.15	.1	.045	.068			
SPILLWAY	2.720	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.643	.15	.068	.15	.1	.15	.068	.045	.068
SPILLWAY	2.554	.15	.1	.15	.045	.15			
SPILLWAY	2.454	.15	.045	.15					
SPILLWAY	2.378	.15	.1	.15	.068	.045	.15		
SPILLWAY	2.302	.1	.15	.1	.15	.045	.15		
SPILLWAY	2.279	.1	.15	.1	.15	.1	.15	.045	.15
SPILLWAY	2.261	.1	.15	.045	.15				
SPILLWAY	2.252	Culvert							
SPILLWAY	2.223	.08	.045	.08					
SPILLWAY	2.020	.08	.045	.08					
SPILLWAY	1.898	.08	.045	.08					
SPILLWAY	1.795	.08	.045	.08					
SPILLWAY	1.696	.08	.045	.08					

SUMMARY OF REACH LENGTHS
River: SIGNAL BUTTE

Reach	River Sta.	Left	Channel	Right
SPILLWAY	5.000	33.7	33.7	33.7
SPILLWAY	4.994	12.96	12.96	12.96
SPILLWAY	4.991	27.8	27.8	27.8
SPILLWAY	4.986	92.6	92.6	92.6
SPILLWAY	4.968	208.34	208.34	208.34
SPILLWAY	4.929	125	76.23	25
SPILLWAY	4.914	120	67.17	25
SPILLWAY	4.902	280	261.94	230
SPILLWAY	4.852	390	402.55	425
SPILLWAY	4.776	420	418.55	365
SPILLWAY	4.697	425	406.56	380
SPILLWAY	4.620	220	235.25	230
SPILLWAY	4.575	275	300.41	290
SPILLWAY	4.518	370	394.81	390
SPILLWAY	4.443	380	401.96	390
SPILLWAY	4.367	280	294.8	290
SPILLWAY	4.311	320	379.86	380
SPILLWAY	4.239	230	363.96	440
SPILLWAY	4.171	350	364.78	370
SPILLWAY	4.101	470	400.93	315
SPILLWAY	4.026	340	365.6	370
SPILLWAY	3.956	310	377.63	300
SPILLWAY	3.885	320	359.41	280
SPILLWAY	3.817	400	370.17	365
SPILLWAY	3.747	390	385.69	400
SPILLWAY	3.674	430	372.11	425
SPILLWAY	3.603	375	374.47	300
SPILLWAY	3.532	260	371.74	350
SPILLWAY	3.462	400	399.38	400
SPILLWAY	3.386	450	404.63	380
SPILLWAY	3.310	380	395.59	410
SPILLWAY	3.235	375	388.39	390
SPILLWAY	3.161	425	416.26	375
SPILLWAY	3.082	370	403.32	390
SPILLWAY	3.006	300	382.27	400
SPILLWAY	2.933	360	404.67	390
SPILLWAY	2.857	320	336.06	320
SPILLWAY	2.793	380	384	440
SPILLWAY	2.720	380	410.52	380
SPILLWAY	2.643	400	468.72	400
SPILLWAY	2.554	400	529.54	400
SPILLWAY	2.454	480	399.74	360
SPILLWAY	2.378	520	402.78	320
SPILLWAY	2.302	280	118.36	118
SPILLWAY	2.279	800	96.77	96
SPILLWAY	2.261	200	200.58	200
SPILLWAY	2.252	Culvert		
SPILLWAY	2.223	400	1069.12	900
SPILLWAY	2.020	500	646.55	500
SPILLWAY	1.898	500	542.03	500
SPILLWAY	1.795	520	524.67	500
SPILLWAY	1.696	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: SIGNAL BUTTE

Reach	River Sta.	Contr.	Expan.
SPILLWAY	5.000	.1	.3
SPILLWAY	4.994	.1	.3
SPILLWAY	4.991	.1	.3
SPILLWAY	4.986	.1	.3
SPILLWAY	4.968	.1	.3
SPILLWAY	4.929	.1	.3
SPILLWAY	4.914	.1	.3
SPILLWAY	4.902	.1	.3
SPILLWAY	4.852	.1	.3
SPILLWAY	4.776	.1	.3
SPILLWAY	4.697	.1	.3
SPILLWAY	4.620	.1	.3
SPILLWAY	4.575	.1	.3
SPILLWAY	4.518	.1	.3
SPILLWAY	4.443	.1	.3
SPILLWAY	4.367	.1	.3
SPILLWAY	4.311	.1	.3
SPILLWAY	4.239	.1	.3
SPILLWAY	4.171	.1	.3
SPILLWAY	4.101	.1	.3
SPILLWAY	4.026	.1	.3
SPILLWAY	3.956	.1	.3
SPILLWAY	3.885	.1	.3
SPILLWAY	3.817	.1	.3
SPILLWAY	3.747	.1	.3
SPILLWAY	3.674	.1	.3
SPILLWAY	3.603	.1	.3
SPILLWAY	3.532	.1	.3
SPILLWAY	3.462	.1	.3
SPILLWAY	3.386	.1	.3
SPILLWAY	3.310	.1	.3
SPILLWAY	3.235	.1	.3
SPILLWAY	3.161	.1	.3
SPILLWAY	3.082	.1	.3
SPILLWAY	3.006	.1	.3
SPILLWAY	2.933	.1	.3
SPILLWAY	2.857	.1	.3
SPILLWAY	2.793	.1	.3
SPILLWAY	2.720	.1	.3
SPILLWAY	2.643	.1	.3
SPILLWAY	2.554	.1	.3
SPILLWAY	2.454	.1	.3
SPILLWAY	2.378	.1	.3
SPILLWAY	2.302	.1	.3
SPILLWAY	2.279	.1	.3
SPILLWAY	2.261	.1	.3
SPILLWAY	2.252	Culvert	
SPILLWAY	2.223	.1	.3
SPILLWAY	2.020	.1	.3
SPILLWAY	1.898	.1	.3
SPILLWAY	1.795	.1	.3
SPILLWAY	1.696	.1	.3

Profile Output Table - Standard Table 1

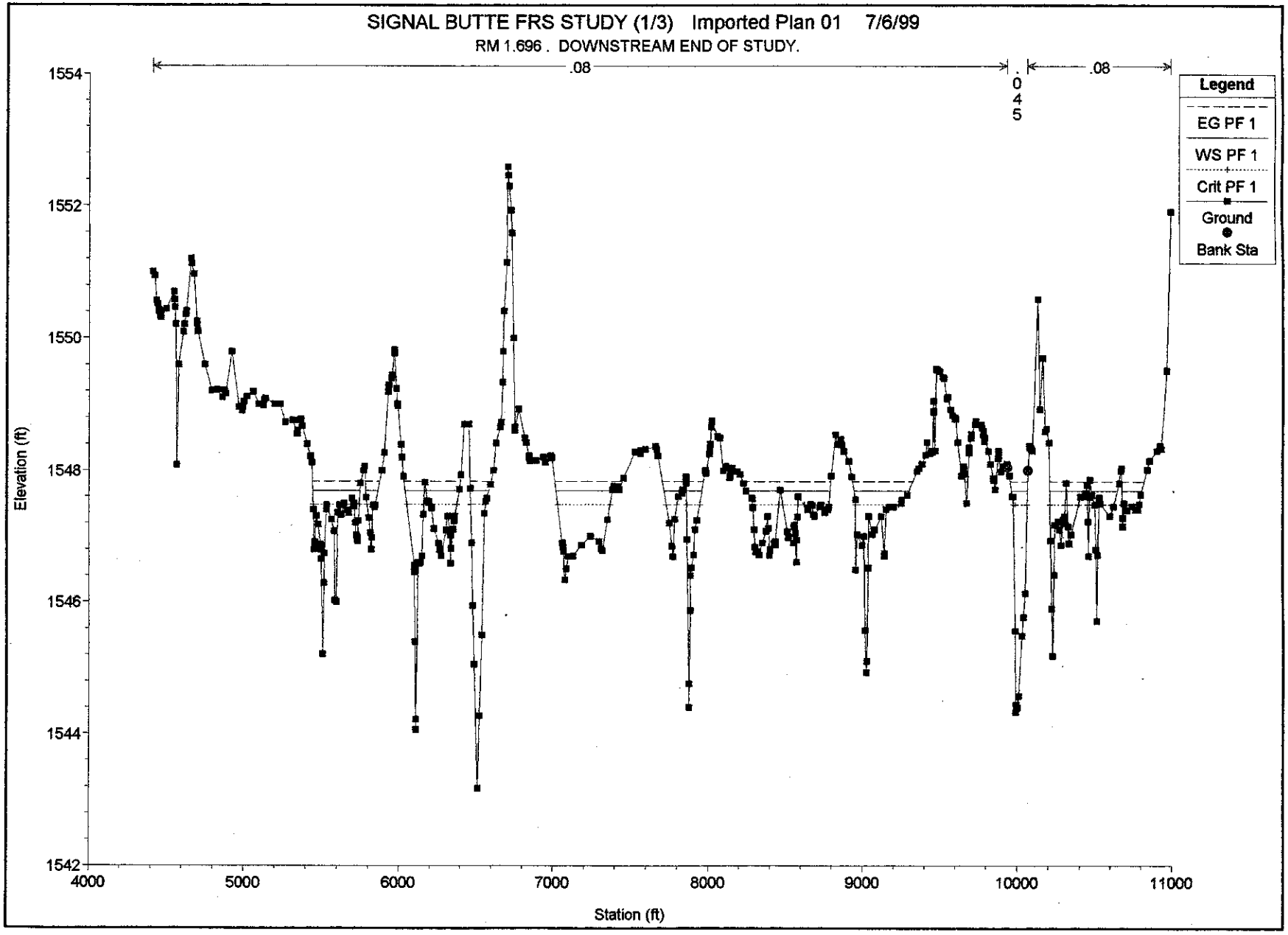
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width ft)	Froude# Chl
SPILLWAY	5.000	3732.00	1709.00	1716.78	1712.09	1716.86	0.000195	2.30	1624.36	266.04	0.16
SPILLWAY	4.994	3732.00	1712.15	1715.30	1715.30	1716.72	0.001844	9.55	390.87	139.33	1.00
SPILLWAY	4.991	3732.00	1711.45	1714.70	1715.04	1716.59	0.354917	11.04	338.00	129.94	1.21
SPILLWAY	4.986	3732.00	1696.37	1698.51	1699.90	1703.67	0.594989	18.25	204.55	117.49	2.44
SPILLWAY	4.968	3732.00	1695.93	1701.87	1698.94	1702.10	0.000738	3.92	952.93	190.16	0.31
SPILLWAY	4.929	3732.00	1695.98	1701.49		1701.89	0.001308	5.03	742.41	155.97	0.41
SPILLWAY	4.914	3732.00	1695.98	1701.44	1699.36	1701.77	0.001294	4.56	817.72	352.08	0.40
SPILLWAY	4.902	3732.00	1695.20	1700.71		1701.54	0.008712	7.30	511.06	139.17	0.67
SPILLWAY	4.852	3732.00	1692.70	1698.73		1699.37	0.007419	6.83	674.42	271.18	0.62
SPILLWAY	4.776	3732.00	1688.02	1694.61	1694.61	1695.61	0.011838	8.75	624.84	376.65	0.79
SPILLWAY	4.697	3732.00	1685.90	1690.81	1689.74	1691.25	0.005989	6.03	975.52	596.27	0.56
SPILLWAY	4.620	3732.00	1682.19	1685.96	1685.96	1687.02	0.022346	8.88	498.81	300.34	1.01
SPILLWAY	4.575	3732.00	1679.69	1683.67	1682.62	1683.99	0.007307	5.64	931.52	429.46	0.59
SPILLWAY	4.518	3732.00	1674.88	1681.21		1681.86	0.006860	6.79	664.99	275.96	0.60
SPILLWAY	4.443	3732.00	1672.10	1678.03		1678.61	0.010070	7.53	761.13	343.41	0.71
SPILLWAY	4.367	3732.00	1667.22	1674.36	1674.28	1674.94	0.008570	8.51	967.12	581.69	0.69
SPILLWAY	4.311	3732.00	1667.54	1671.12		1671.87	0.013138	7.77	672.34	431.51	0.80
SPILLWAY	4.239	3732.00	1662.74	1668.04		1668.28	0.007117	5.78	1307.52	962.84	0.59
SPILLWAY	4.171	3732.00	1659.67	1665.55		1665.96	0.007077	6.83	978.98	868.66	0.61
SPILLWAY	4.101	3732.00	1656.34	1662.42	1662.00	1662.95	0.009962	8.47	990.75	807.11	0.73
SPILLWAY	4.026	3732.00	1653.97	1658.53		1658.83	0.009140	6.99	1432.76	1501.09	0.67
SPILLWAY	3.956	3732.00	1650.81	1654.98		1655.21	0.011497	6.55	1185.85	921.24	0.72
SPILLWAY	3.885	3732.00	1648.10	1652.18		1652.29	0.007441	4.75	1546.80	1381.08	0.57
SPILLWAY	3.817	3732.00	1646.11	1649.56		1649.79	0.008405	5.46	1535.59	1790.92	0.62
SPILLWAY	3.747	3732.00	1643.34	1646.18		1646.28	0.009820	3.04	1596.86	1655.66	0.49
SPILLWAY	3.674	3732.00	1640.73	1642.48		1642.53	0.009248	2.10	2182.39	2373.13	0.51
SPILLWAY	3.603	3732.00	1636.85	1638.44		1638.48	0.009786	2.85	2590.38	2410.73	0.56
SPILLWAY	3.532	3732.00	1633.73	1634.92		1634.95	0.009264	1.95	3217.10	2626.96	0.50
SPILLWAY	3.462	3732.00	1627.25	1632.04		1632.23	0.009969	5.92	2638.59	2754.21	0.67
SPILLWAY	3.386	3732.00	1623.40	1628.65	1628.04	1628.86	0.007164	6.41	2856.33	2434.45	0.60
SPILLWAY	3.310	3732.00	1620.77	1624.81	1624.70	1625.01	0.011001	6.59	2410.69	2709.38	0.71
SPILLWAY	3.235	3732.00	1618.89	1621.19	1620.63	1621.25	0.008700	4.57	2250.53	2154.48	0.59
SPILLWAY	3.161	3732.00	1614.50	1617.54		1617.63	0.010648	5.00	1786.24	2019.59	0.66
SPILLWAY	3.082	3732.00	1612.65	1613.49	1612.51	1613.53	0.008801	2.49	2302.93	1825.09	0.51
SPILLWAY	3.006	3732.00	1609.39	1609.88		1609.97	0.010561	1.72	1605.09	1428.62	0.50
SPILLWAY	2.933	3732.00	1604.70	1607.33		1607.40	0.007001	4.08	1998.77	1596.83	0.53

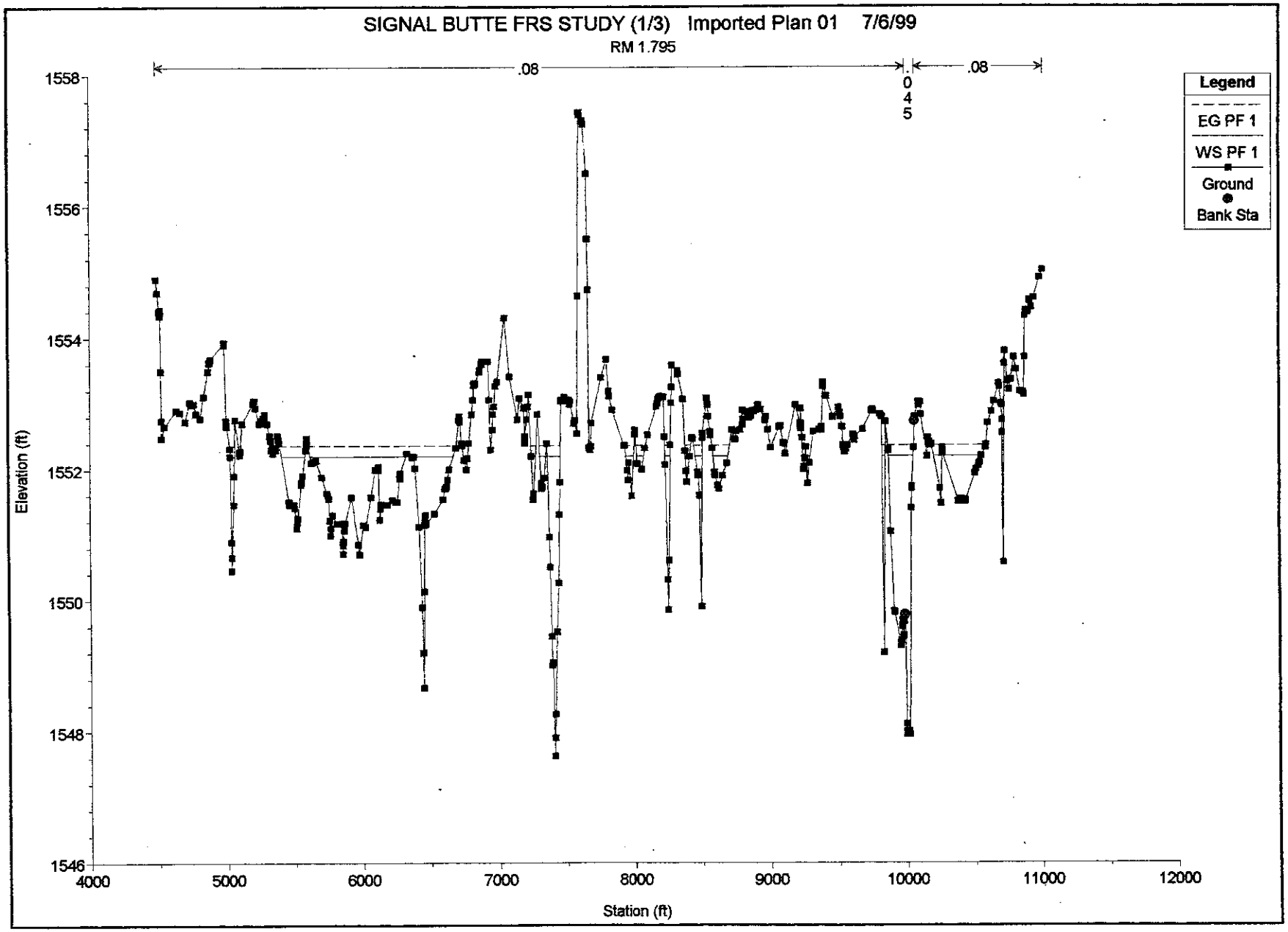
SPILLWAY	2.857	3732.00	1601.52	1604.12		1604.18	0.011501	4.32	2457.38	2523.22	0.65
SPILLWAY	2.793	3732.00	1598.87	1601.25		1601.34	0.006920	4.61	3236.40	3081.74	0.55
SPILLWAY	2.720	3732.00	1592.82	1597.00		1597.40	0.015858	7.69	1733.71	2189.39	0.85
SPILLWAY	2.643	3732.00	1589.64	1593.45		1593.57	0.006496	5.27	2484.42	2473.73	0.55
SPILLWAY	2.554	3732.00	1586.04	1589.74		1589.86	0.013252	6.73	2619.56	2853.61	0.76
SPILLWAY	2.454	3732.00	1580.99	1585.59	1584.68	1585.66	0.007835	4.81	3120.92	2908.06	0.58
SPILLWAY	2.378	3732.00	1576.20	1581.19		1581.39	0.013590	6.52	2378.94	2947.02	0.77
SPILLWAY	2.302	3732.00	1571.72	1576.57	1576.40	1576.93	0.007578	6.53	2164.18	2593.71	0.62
SPILLWAY	2.279	3732.00	1570.42	1572.58	1572.58	1573.01	0.075975	10.96	938.10	2032.97	1.67
SPILLWAY	2.261	3732.00	1570.01	1570.36	1560.87	1570.37	0.000014	0.04	19771.29	3441.21	0.02
SPILLWAY	2.252	Culvert									
SPILLWAY	2.223	3732.00	1569.54	1561.96		1562.01	0.002889		2059.36	1139.28	0.00
SPILLWAY	2.020	3732.00	1559.30	1560.72	1559.70	1560.76	0.003362	1.48	2443.15	1645.37	0.31
SPILLWAY	1.898	3732.00	1554.60	1557.52		1557.59	0.016140	5.00	1900.17	3151.74	0.73
SPILLWAY	1.795	3732.00	1547.95	1552.20		1552.36	0.007096	5.60	1878.39	2370.03	0.58
SPILLWAY	1.696	3732.00	1544.33	1547.69	1547.48	1547.83	0.011004	5.26	1909.41	2984.33	0.68

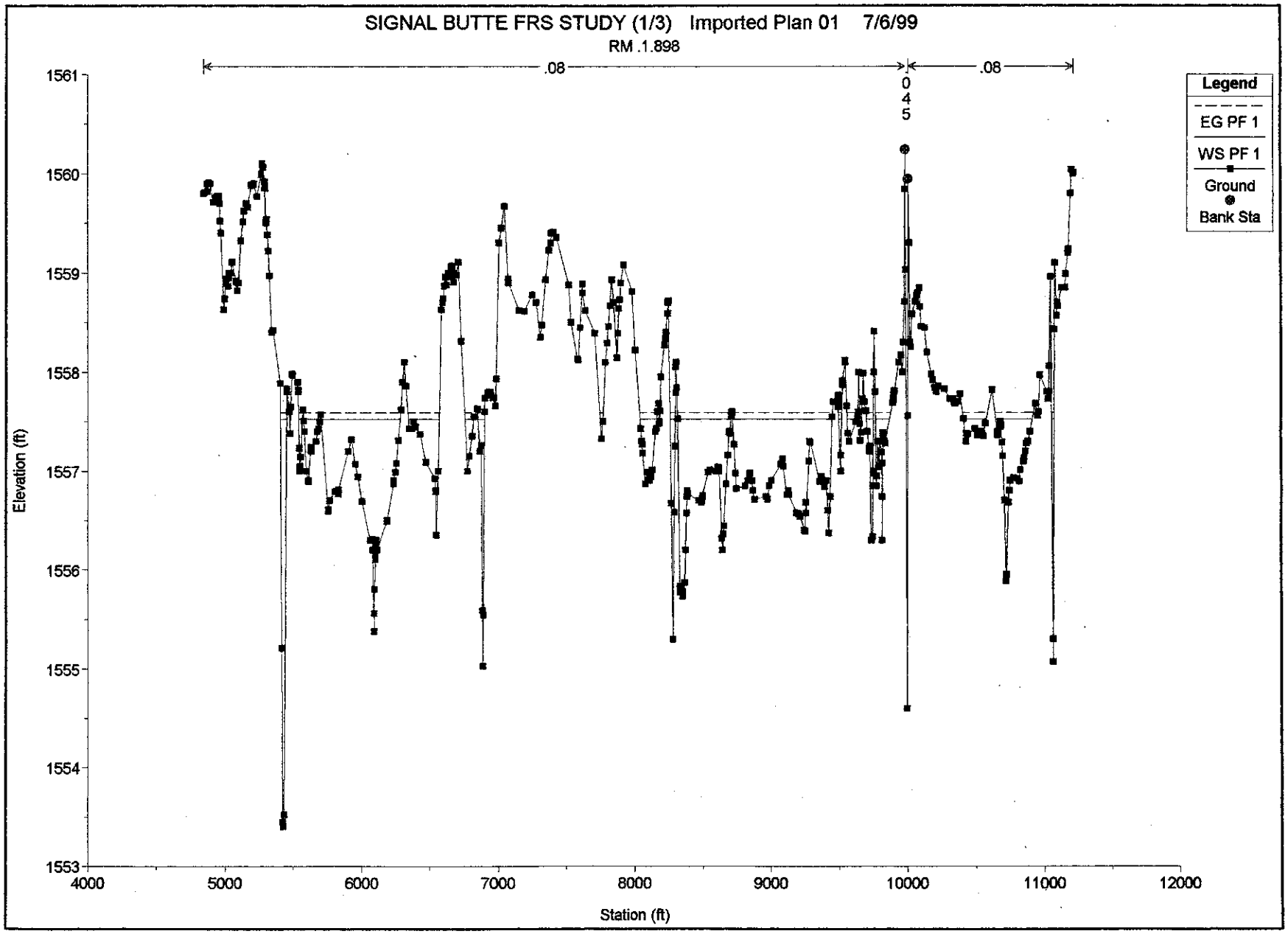
Profile Output Table - Standard Table 2

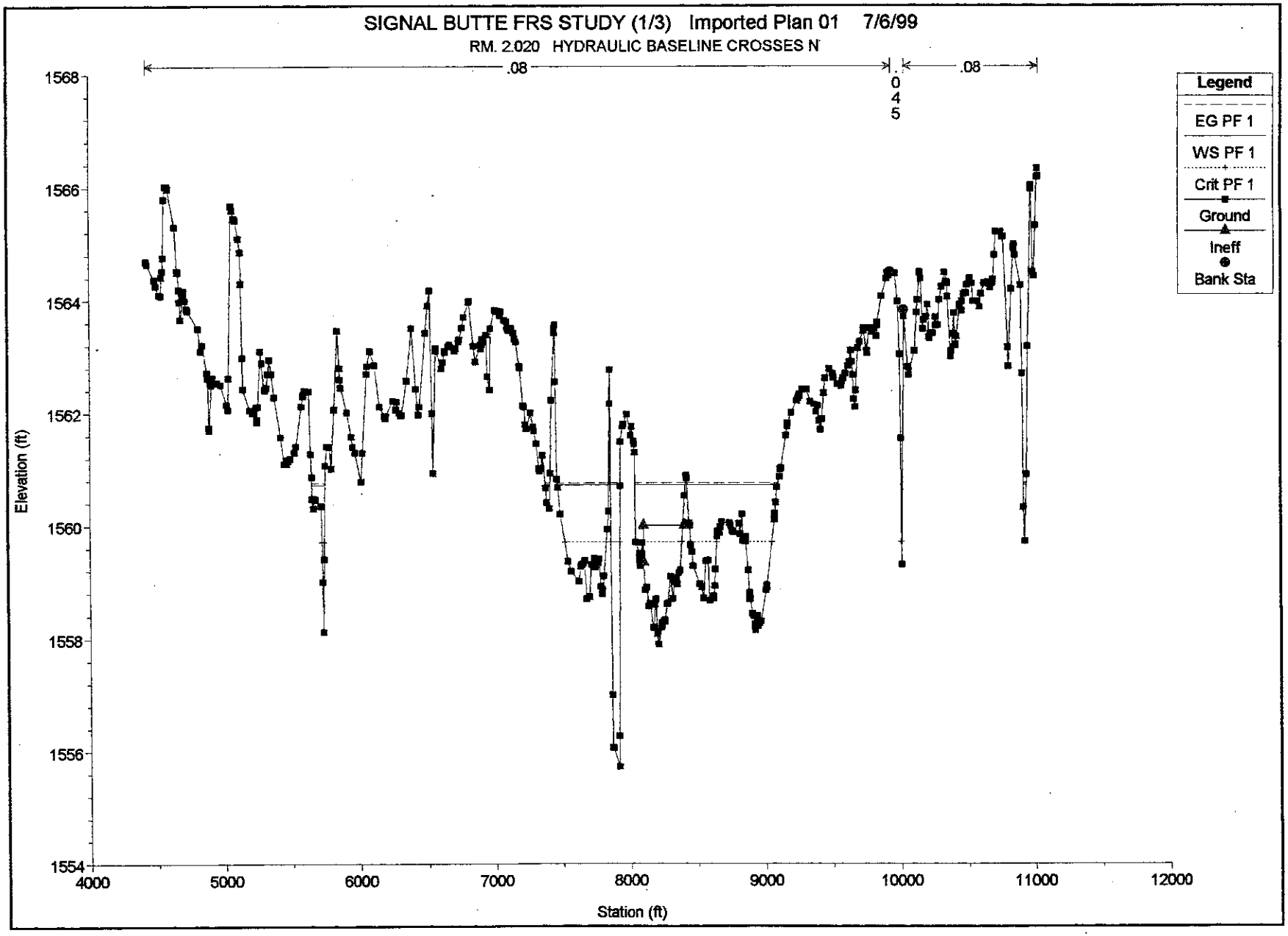
Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
SPILLWAY	5.000	1716.86	1716.78	0.08	0.01	0.13		3732.00		266.04
SPILLWAY	4.994	1716.72	1715.30	1.42	0.08	0.01		3732.00		139.33
SPILLWAY	4.991	1716.59	1714.70	1.89	0.08	0.05		3732.00		129.94
SPILLWAY	4.986	1703.67	1698.51	5.17	12.58	0.33		3732.00		117.49
SPILLWAY	4.968	1702.10	1701.87	0.24	0.20	0.02		3732.00		190.16
SPILLWAY	4.929	1701.89	1701.49	0.39	0.10	0.02		3732.00		155.97
SPILLWAY	4.914	1701.77	1701.44	0.32	0.18	0.05	0.09	3731.91		352.08
SPILLWAY	4.902	1701.54	1700.71	0.83	2.11	0.06		3732.00		139.17
SPILLWAY	4.852	1699.37	1698.73	0.64	3.72	0.04	448.79	3228.52	54.69	271.18
SPILLWAY	4.776	1695.61	1694.61	1.00	3.34	0.17	66.62	3112.88	552.51	376.65
SPILLWAY	4.697	1691.25	1690.81	0.44	4.17	0.06	0.44	2797.25	934.31	596.27
SPILLWAY	4.620	1687.02	1685.96	1.06			35.95	2945.91	750.14	300.34
SPILLWAY	4.575	1683.99	1683.67	0.32	2.09	0.03	137.68	1735.59	1858.73	429.46
SPILLWAY	4.518	1681.86	1681.21	0.65	3.23	0.02	304.09	3352.88	75.03	275.96
SPILLWAY	4.443	1678.61	1678.03	0.57	3.66	0.00	240.60	2092.34	1399.07	343.41
SPILLWAY	4.367	1674.94	1674.36	0.58	3.05	0.02	724.83	1740.29	1266.88	581.69
SPILLWAY	4.311	1671.87	1671.12	0.75	3.44	0.15	770.76	2877.22	84.03	431.51
SPILLWAY	4.239	1668.28	1668.04	0.24	2.30	0.02	1232.57	1333.11	1166.32	962.84
SPILLWAY	4.171	1665.96	1665.55	0.41	3.00	0.01	1761.49	1829.03	141.48	868.66
SPILLWAY	4.101	1662.95	1662.42	0.53	4.05	0.07	1668.26	1534.59	529.16	807.11
SPILLWAY	4.026	1658.83	1658.53	0.30	3.60	0.02	1990.08	1303.98	437.95	1501.09
SPILLWAY	3.956	1655.21	1654.98	0.23	2.88	0.03	1881.92	710.47	1139.61	921.24
SPILLWAY	3.885	1652.29	1652.18	0.11	2.49	0.01	1281.66	481.82	1968.52	1381.08
SPILLWAY	3.817	1649.79	1649.56	0.23	3.47	0.04	1551.37	1676.36	504.27	1790.92
SPILLWAY	3.747	1646.28	1646.18	0.09	3.73	0.01	2003.30	1001.12	727.58	1655.66
SPILLWAY	3.674	1642.53	1642.48	0.05	4.05	0.00	2645.42	226.51	860.07	2373.13
SPILLWAY	3.603	1638.48	1638.44	0.04	3.53	0.00	3192.23	101.83	437.94	2410.73
SPILLWAY	3.532	1634.95	1634.92	0.02	2.69	0.02	3613.06	57.17	61.77	2626.96
SPILLWAY	3.462	1632.23	1632.04	0.20	3.38	0.00	2450.80	1281.20		2754.21
SPILLWAY	3.386	1628.86	1628.65	0.20	3.85	0.00	2609.95	1122.05		2434.45
SPILLWAY	3.310	1625.01	1624.81	0.20	3.72	0.04	2715.42	1016.58		2709.38
SPILLWAY	3.235	1621.25	1621.19	0.06	3.62	0.00	3398.80	333.20		2154.48
SPILLWAY	3.161	1617.63	1617.54	0.09	4.08	0.02	3367.15	364.85		2019.59
SPILLWAY	3.082	1613.53	1613.49	0.04	3.56	0.00	3685.20	46.80		1825.09
SPILLWAY	3.006	1609.97	1609.88	0.08	2.56	0.00	3679.23	52.77		1428.62
SPILLWAY	2.933	1607.40	1607.33	0.07	3.22	0.00	3425.01	306.99		1596.83

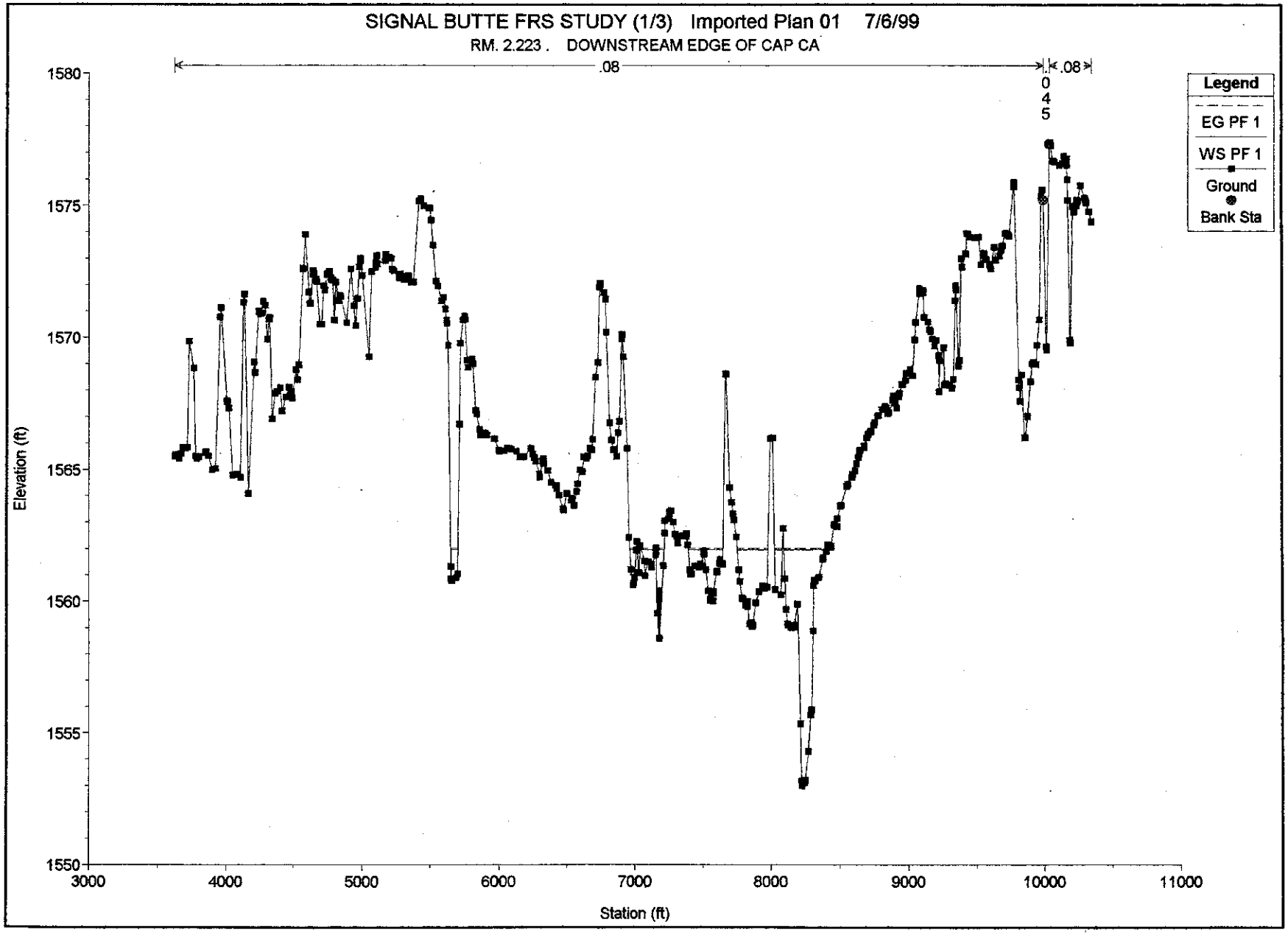
SPILLWAY	2.857	1604.18	1604.12	0.06	2.83	0.00	3374.34	357.66		2523.22
SPILLWAY	2.793	1601.34	1601.25	0.09	3.91	0.03	2757.94	938.46	35.60	3081.74
SPILLWAY	2.720	1597.40	1597.00	0.40	3.74	0.08	1343.31	1482.80	905.89	2189.39
SPILLWAY	2.643	1593.57	1593.45	0.12	3.71	0.00	1675.46	805.89	1250.65	2473.73
SPILLWAY	2.554	1589.86	1589.74	0.11	4.19	0.01	2021.95	482.91	1227.14	2853.61
SPILLWAY	2.454	1585.66	1585.59	0.07	4.25	0.01	1343.39	567.31	1821.30	2908.06
SPILLWAY	2.378	1581.39	1581.19	0.21	4.45	0.01	1907.48	1066.68	757.84	2947.02
SPILLWAY	2.302	1576.93	1576.57	0.35	3.91	0.01	1690.39	1942.97	98.64	2593.71
SPILLWAY	2.279	1573.01	1572.58	0.43	0.04	0.13	3131.53	512.90	87.57	2032.97
SPILLWAY	2.261	1570.37	1570.36	0.00			3731.81	0.13	0.07	3441.21
SPILLWAY	2.252	Culvert								
SPILLWAY	2.223	1562.01	1561.96	0.05	1.25	0.00	3732.00			1139.28
SPILLWAY	2.020	1560.76	1560.72	0.04	3.16	0.00	3712.04	10.15	9.81	1645.37
SPILLWAY	1.898	1557.59	1557.52	0.07	5.22	0.01	3386.21	85.53	260.26	3151.74
SPILLWAY	1.795	1552.36	1552.20	0.16	4.52	0.00	2623.07	982.93	126.00	2370.03
SPILLWAY	1.696	1547.83	1547.69	0.14			2465.62	1001.08	265.30	2984.33

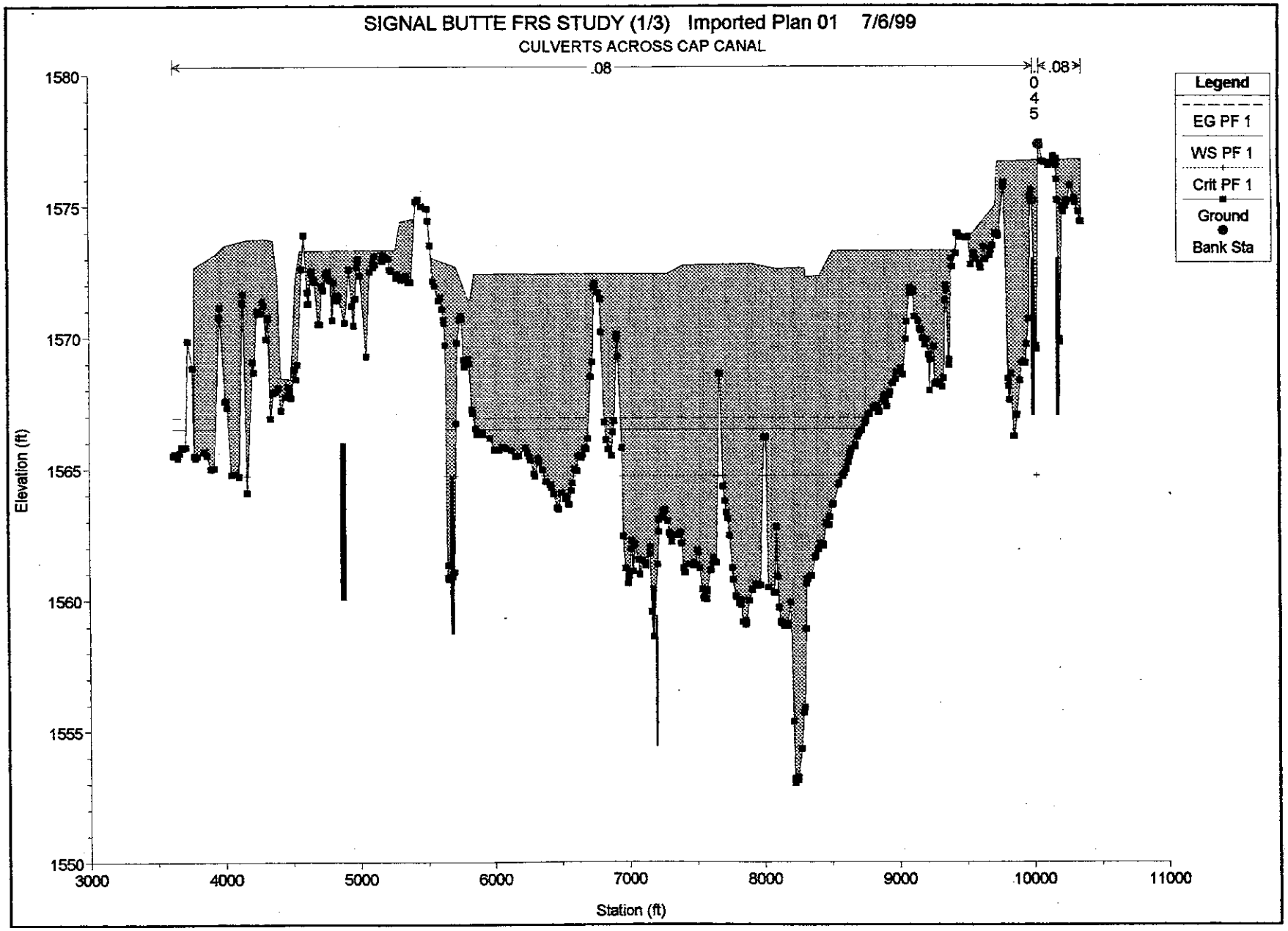

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM 1.696 . DOWNSTREAM END OF STUDY.
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1554
1552
1550
1548
1546
1544
1542
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

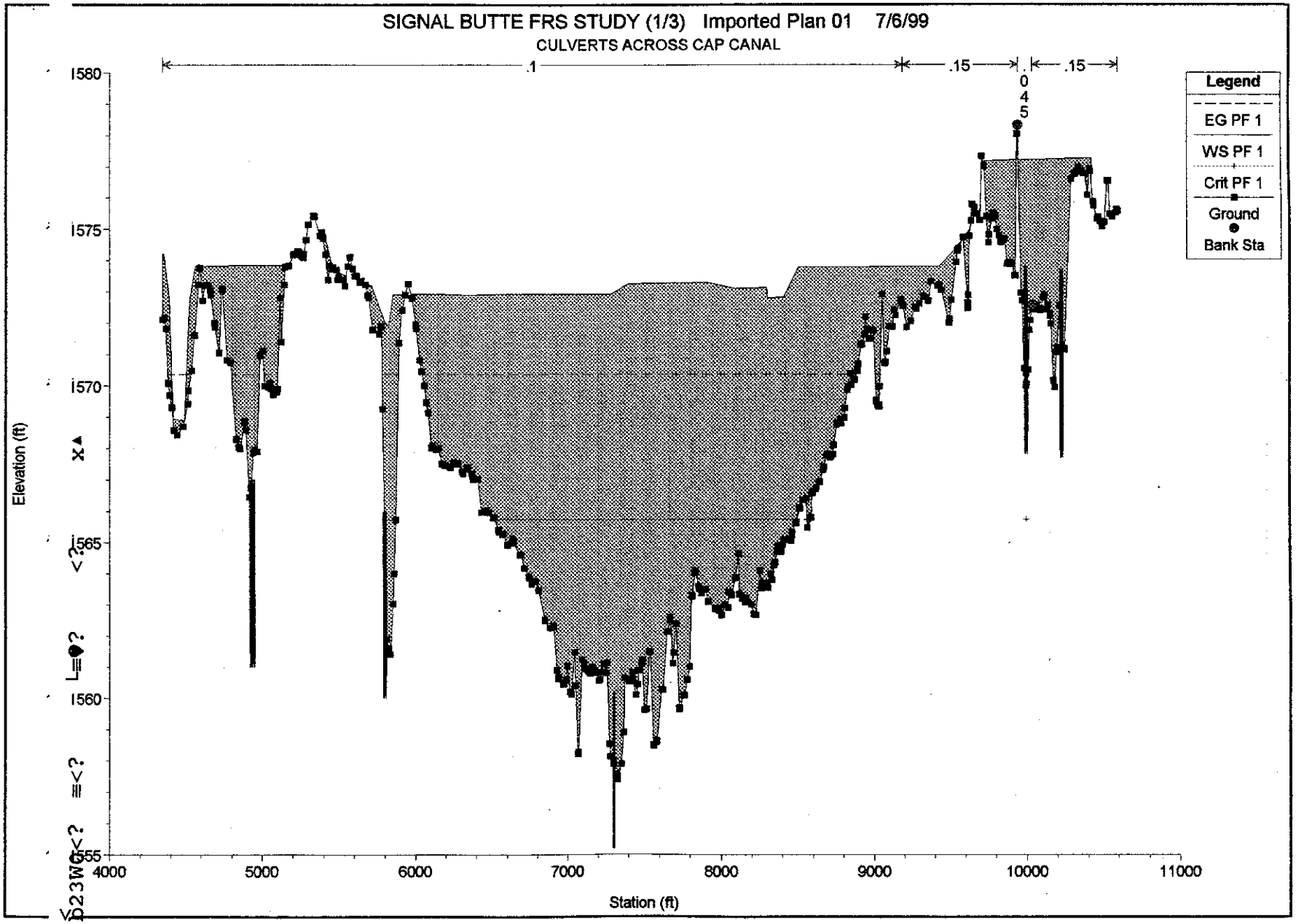

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM 1.795
.08
.045
.08
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1558
1556
1554
1552
1550
1548
1546
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

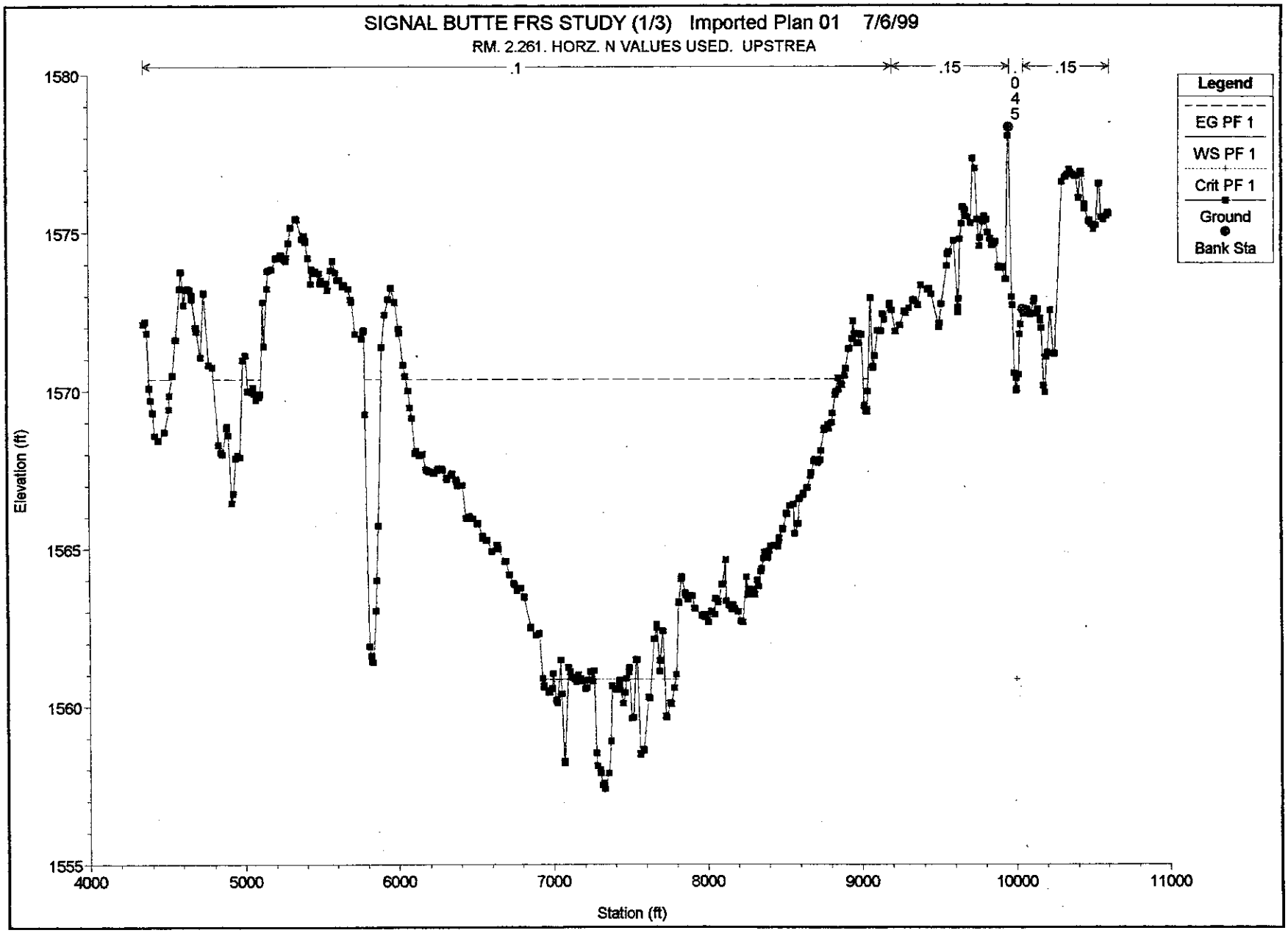

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM .1.898
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1561
1560
1559
1558
1557
1556
1555
1554
1553
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

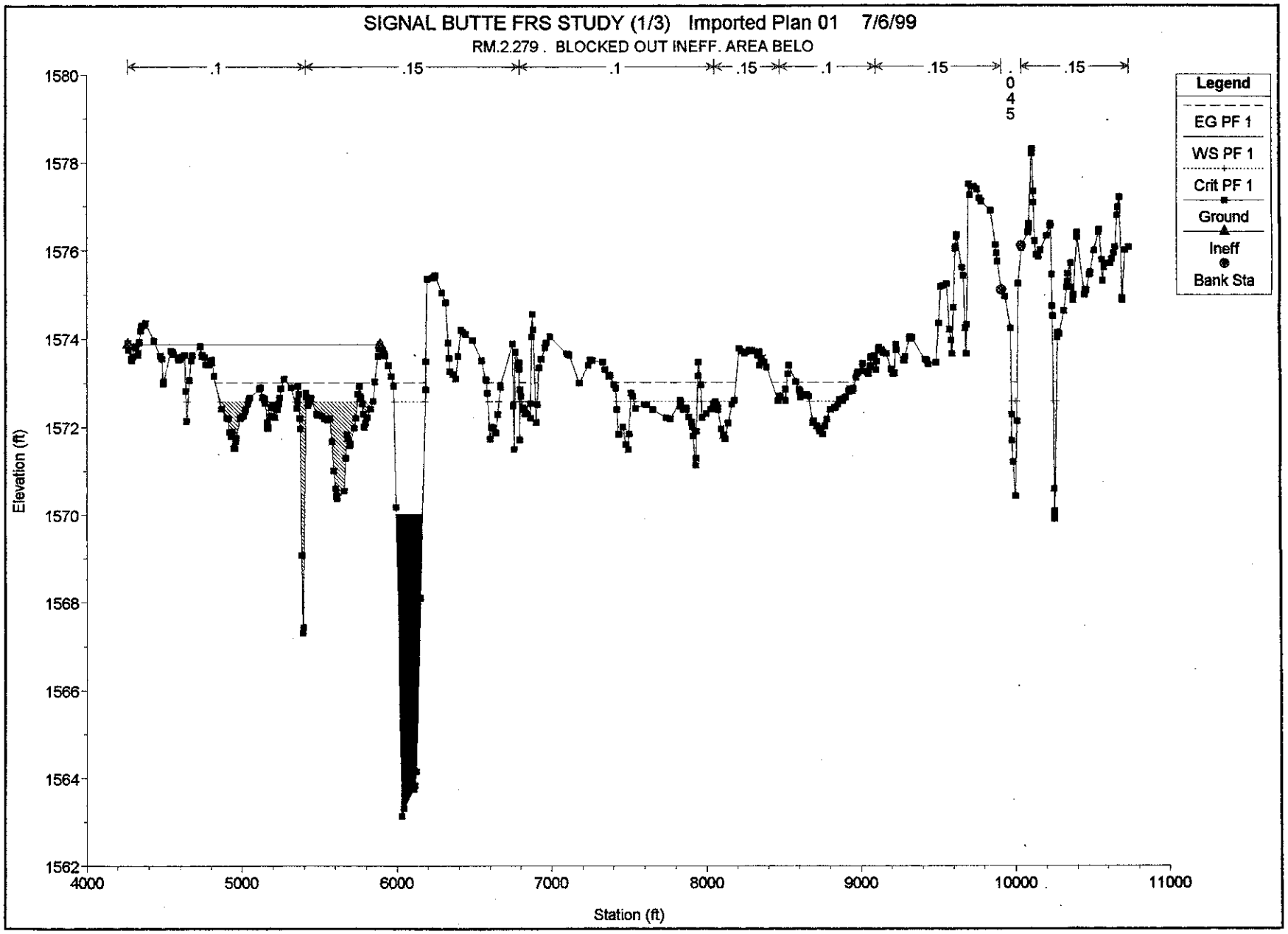

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.020 HYDRAULIC BASELINE CROSSES N
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1568
1566
1564
1562
1560
1558
1556
1554
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

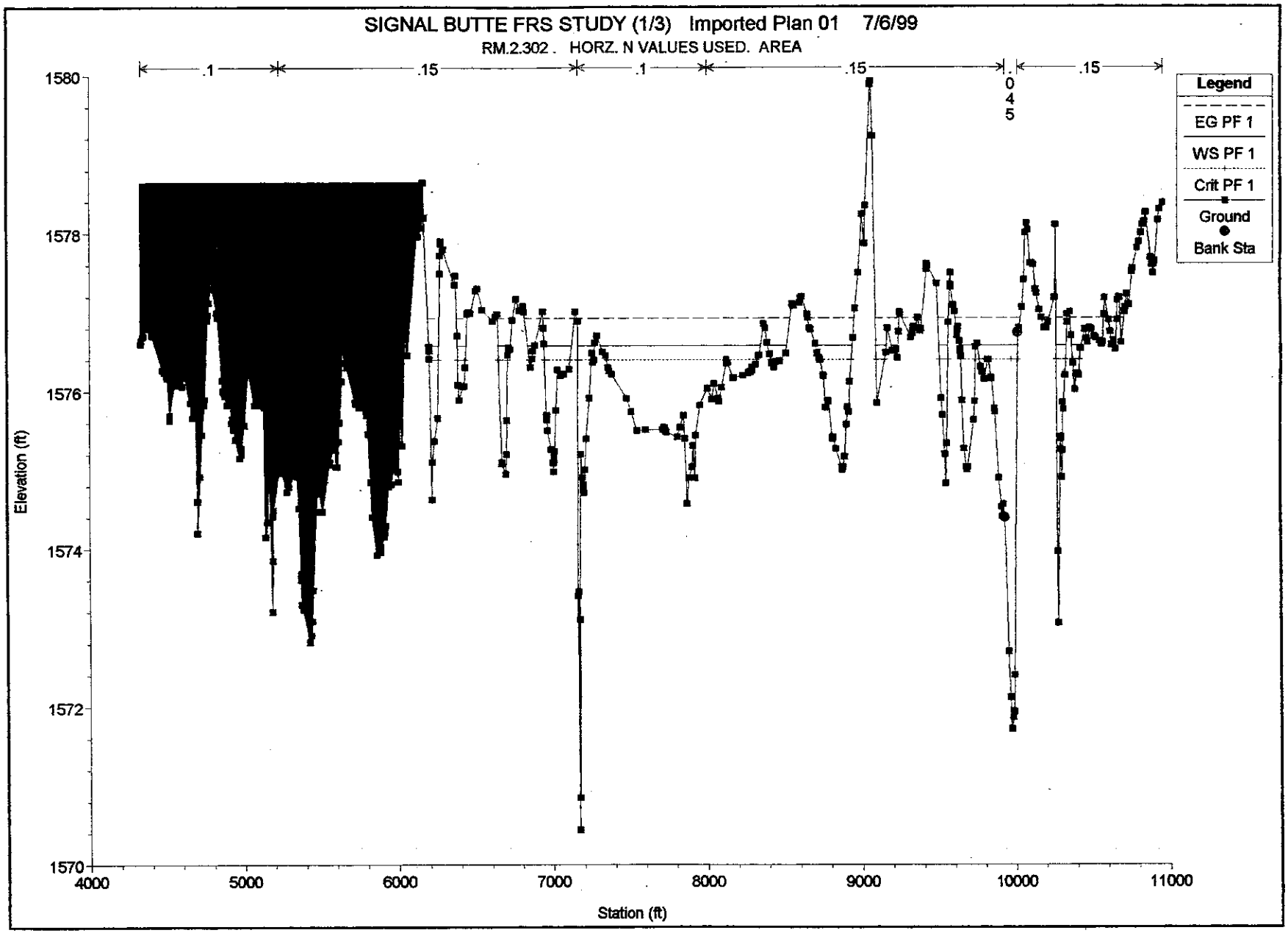

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.223 . DOWNSTREAM EDGE OF CAP CA
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

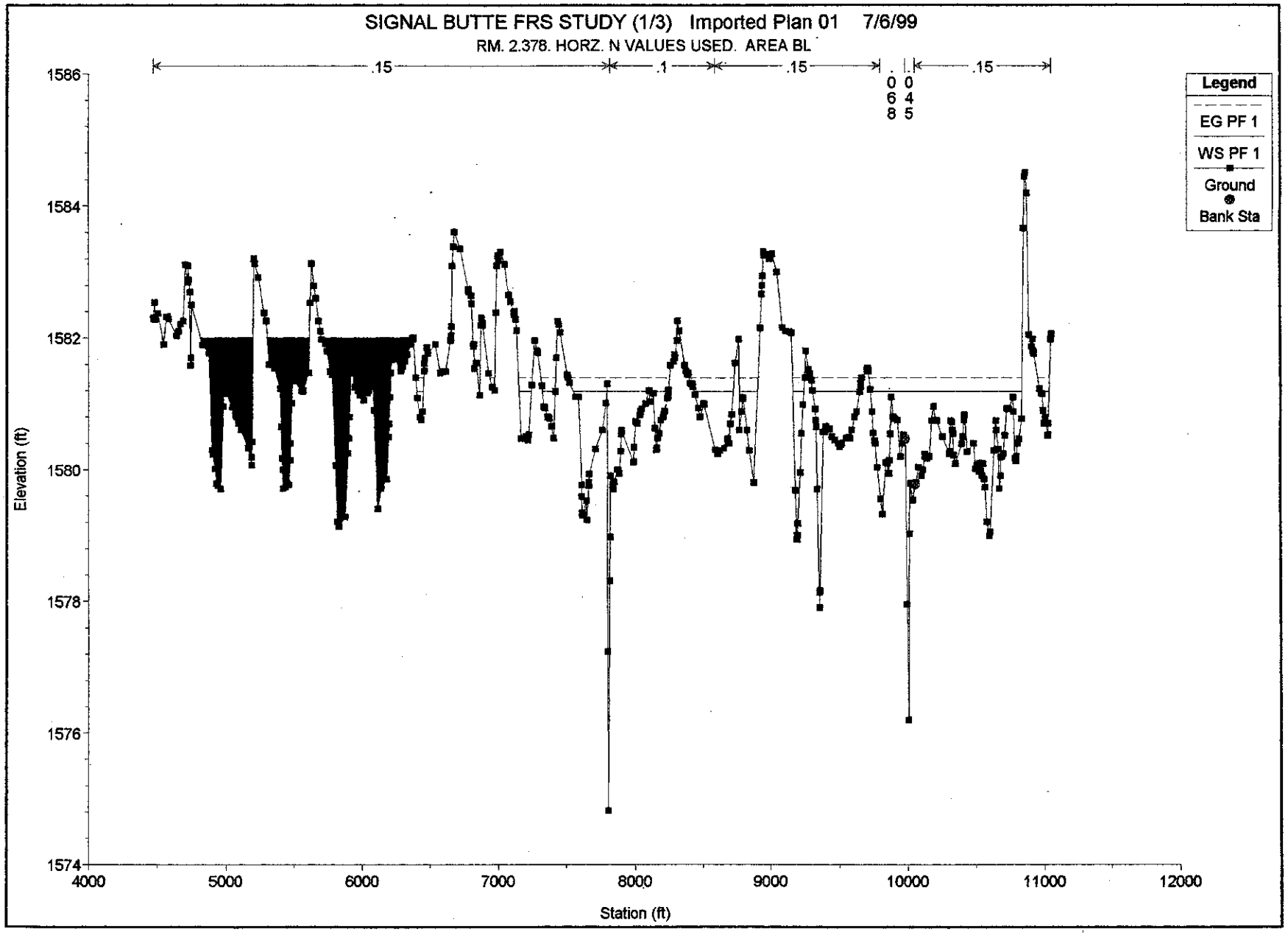

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

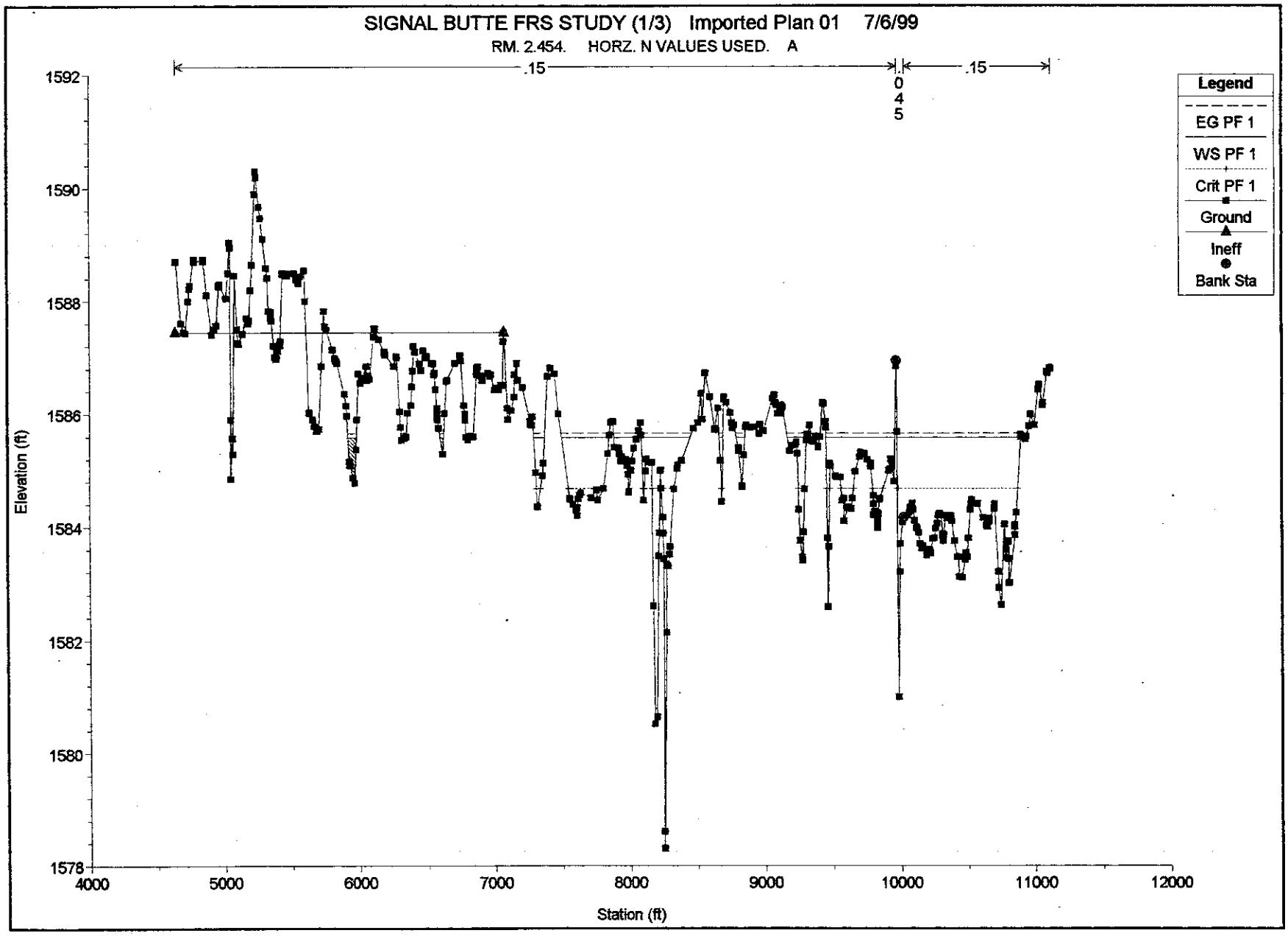

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

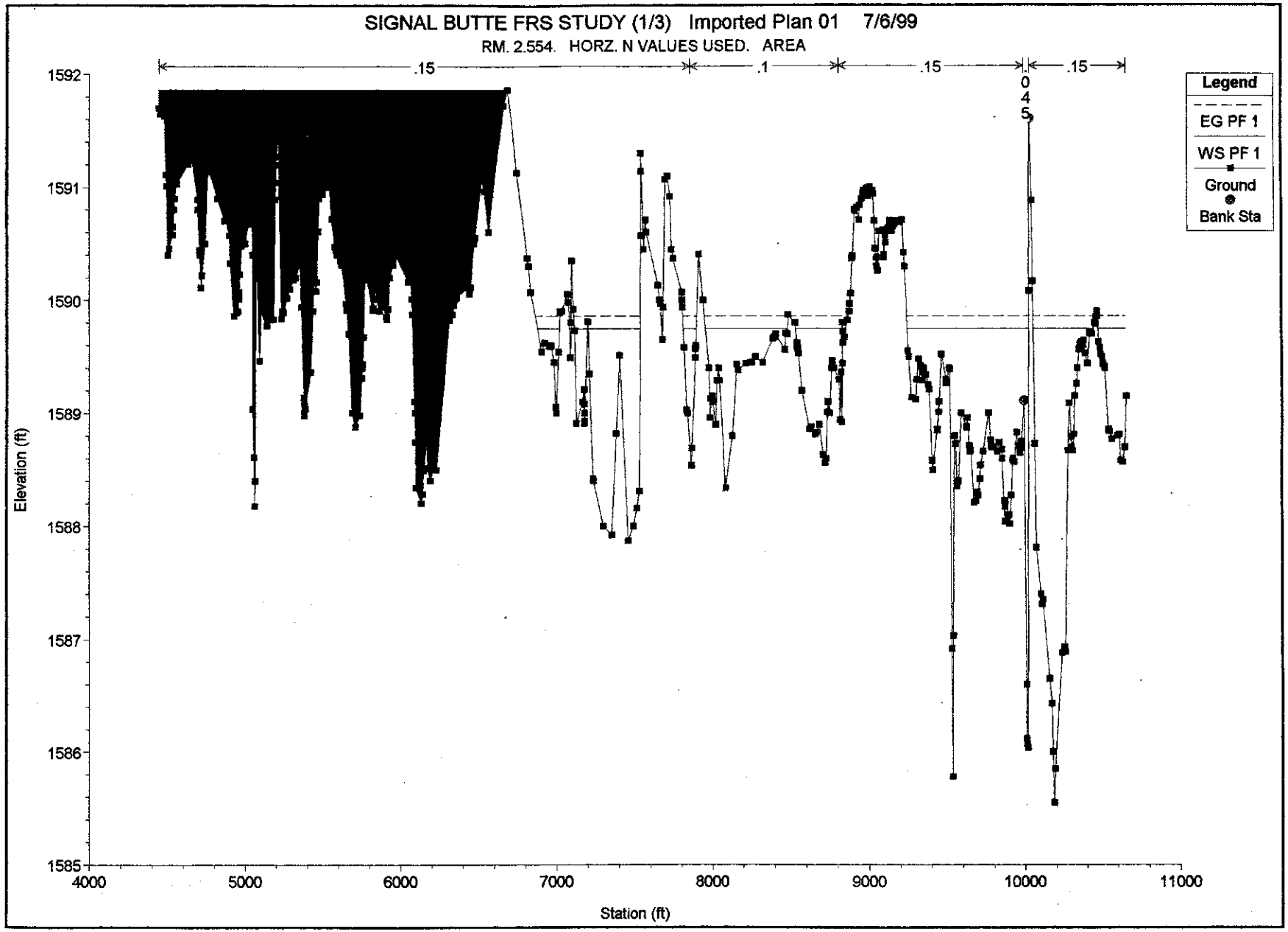

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.261. HORZ. N VALUES USED. UPSTREA
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

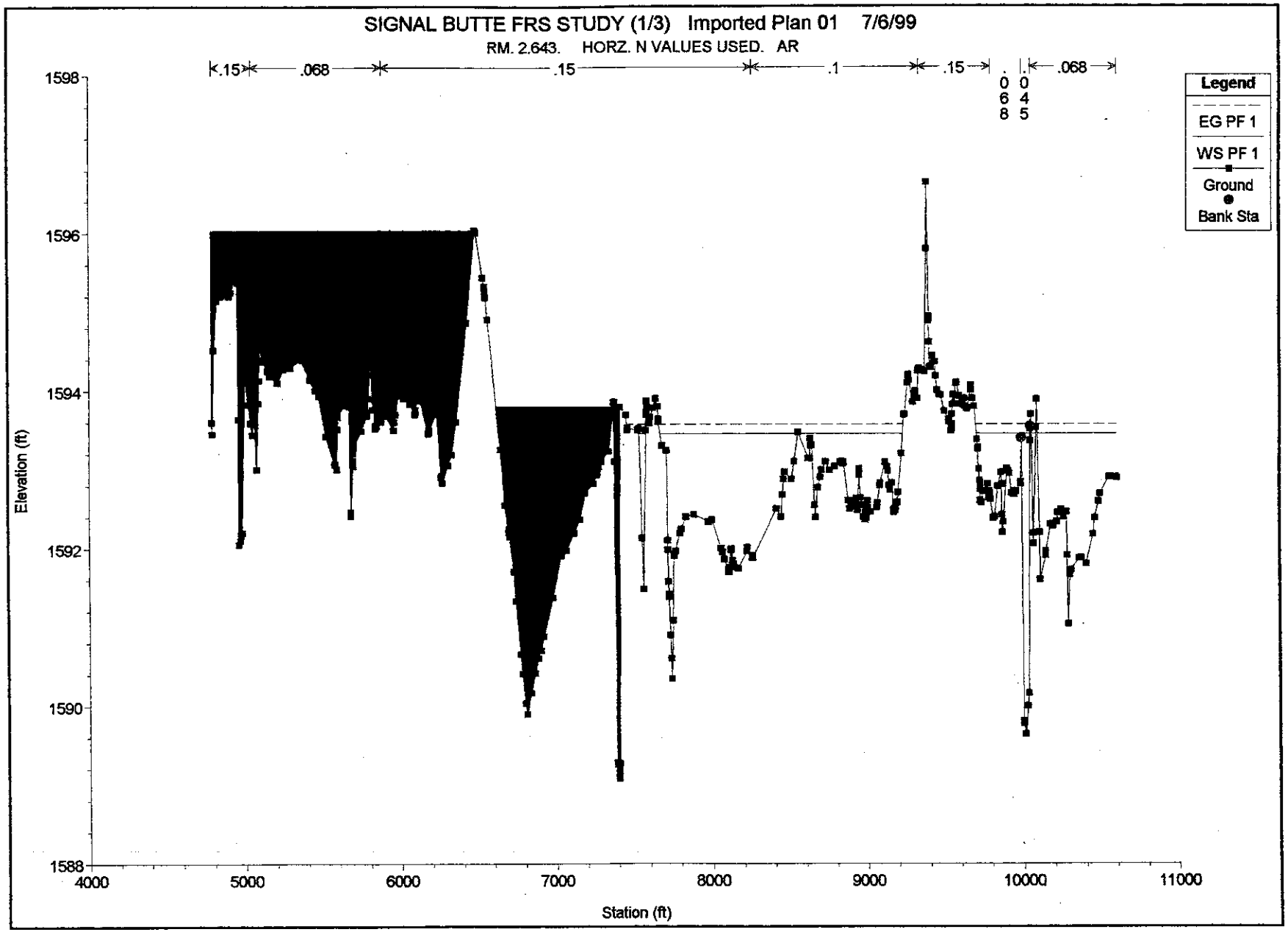

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.2.279 . BLOCKED OUT INEFF. AREA BELO
.1
.15
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
1568
1566
1564
1562
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

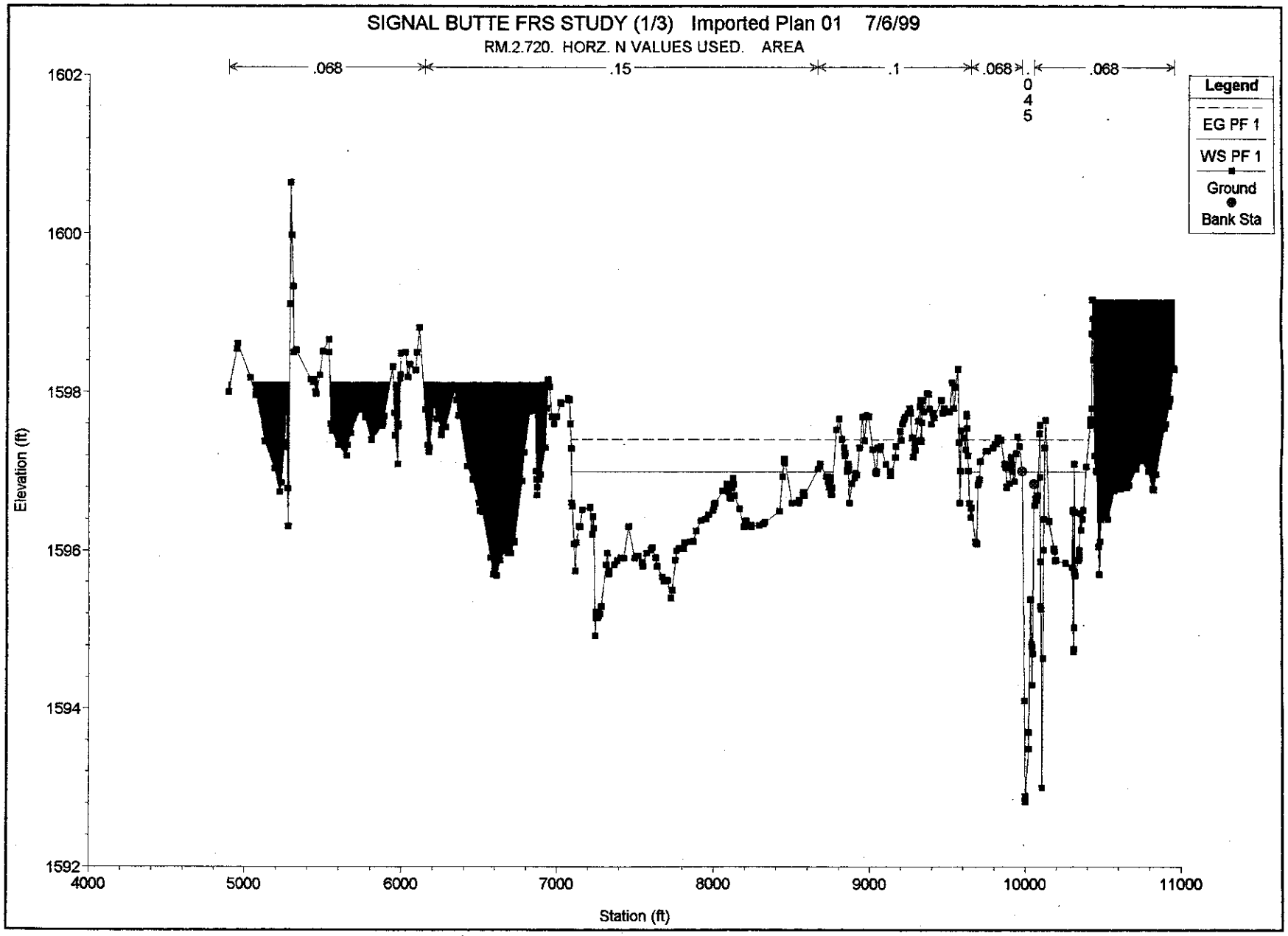

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.2.302 . HORZ. N VALUES USED. AREA
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

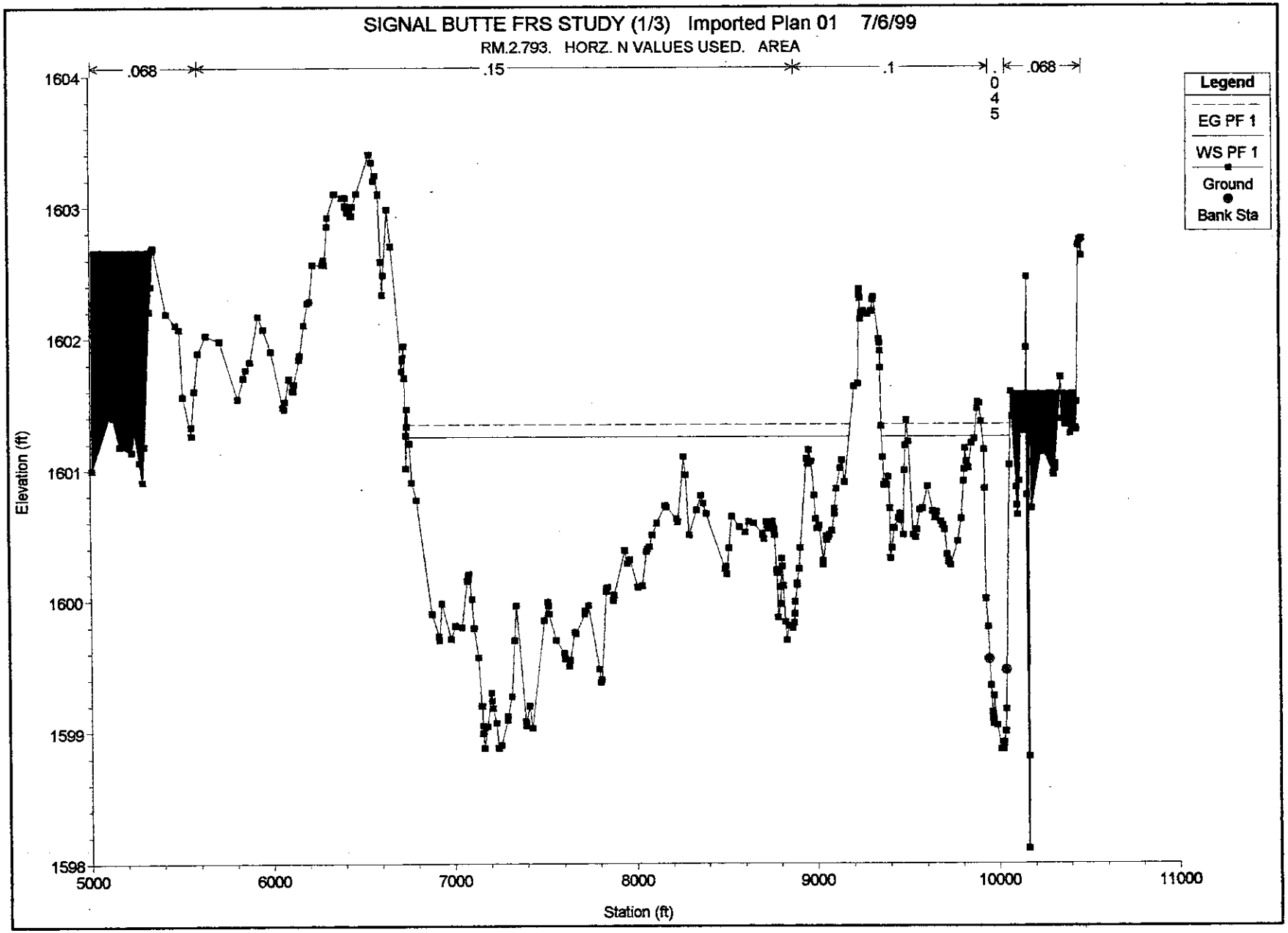

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.378. HORZ. N VALUES USED. AREA BL
.15
.1
.15
.0064
.0085
.15
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1586
1584
1582
1580
1578
1576
1574
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

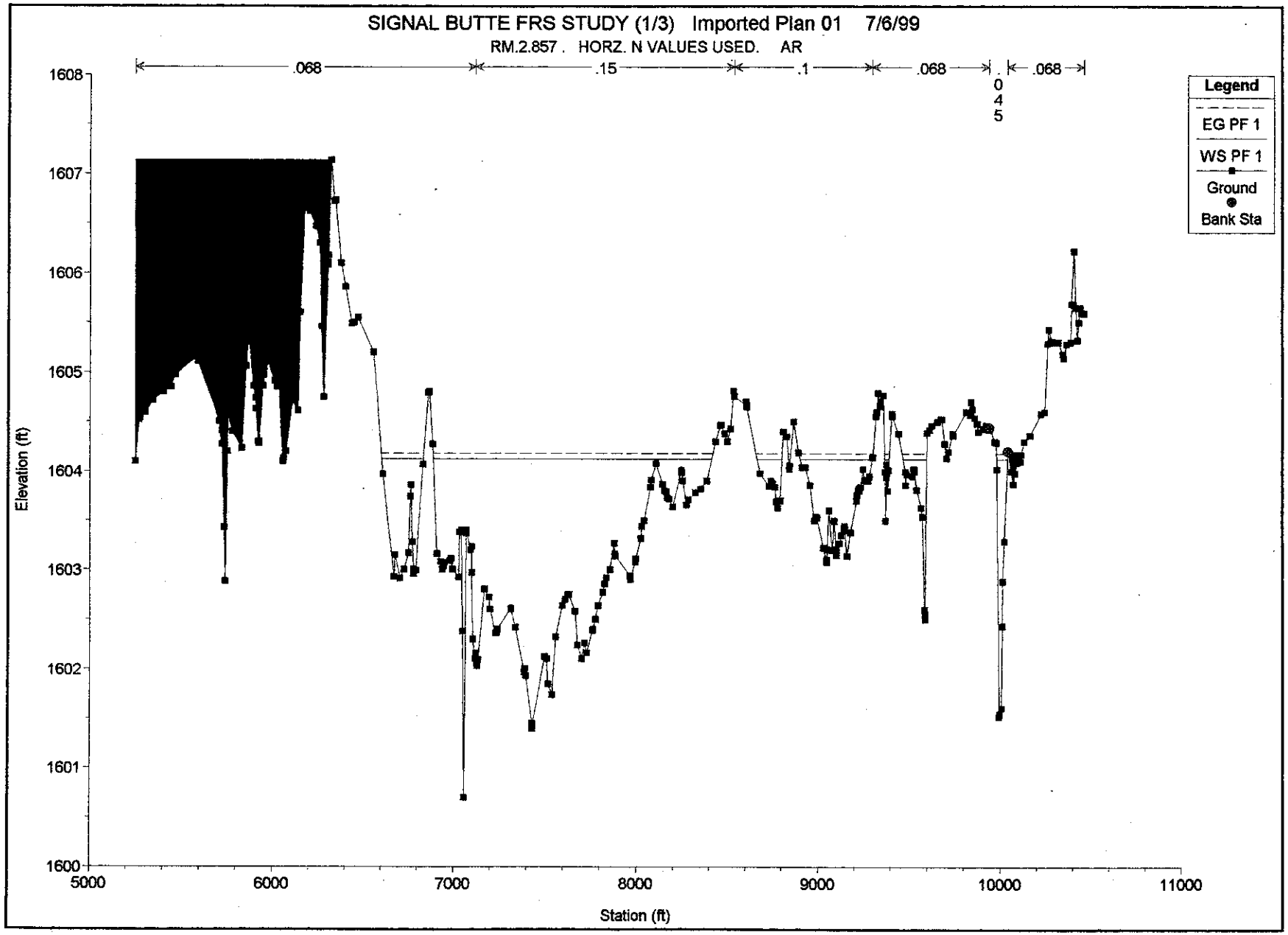

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.454. HORZ. N VALUES USED. A
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1592
1590
1588
1586
1584
1582
1580
1578
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

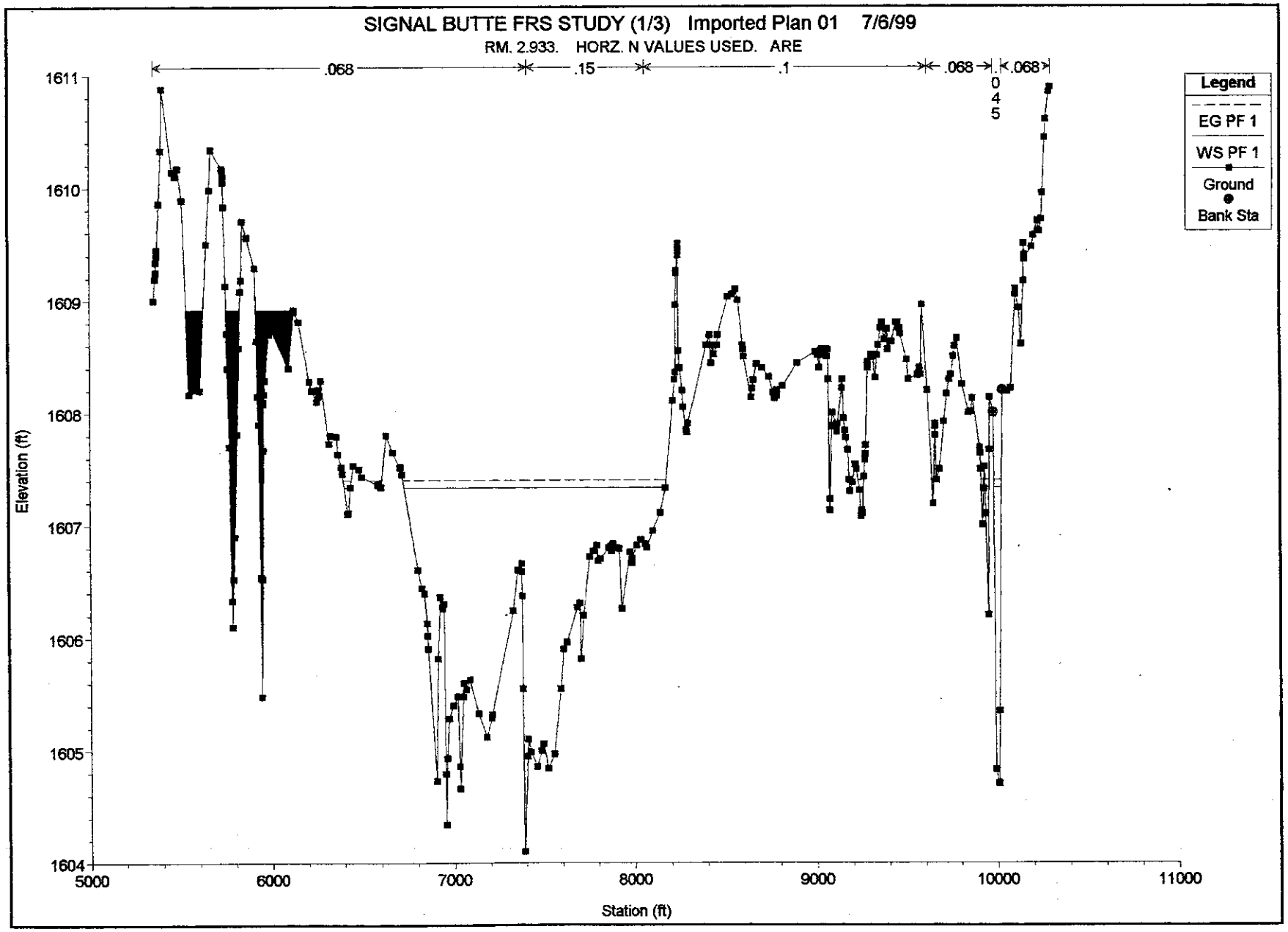

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.554. HORZ. N VALUES USED. AREA
.15
.1
.15
.15
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1592
1591
1590
1589
1588
1587
1586
1585
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

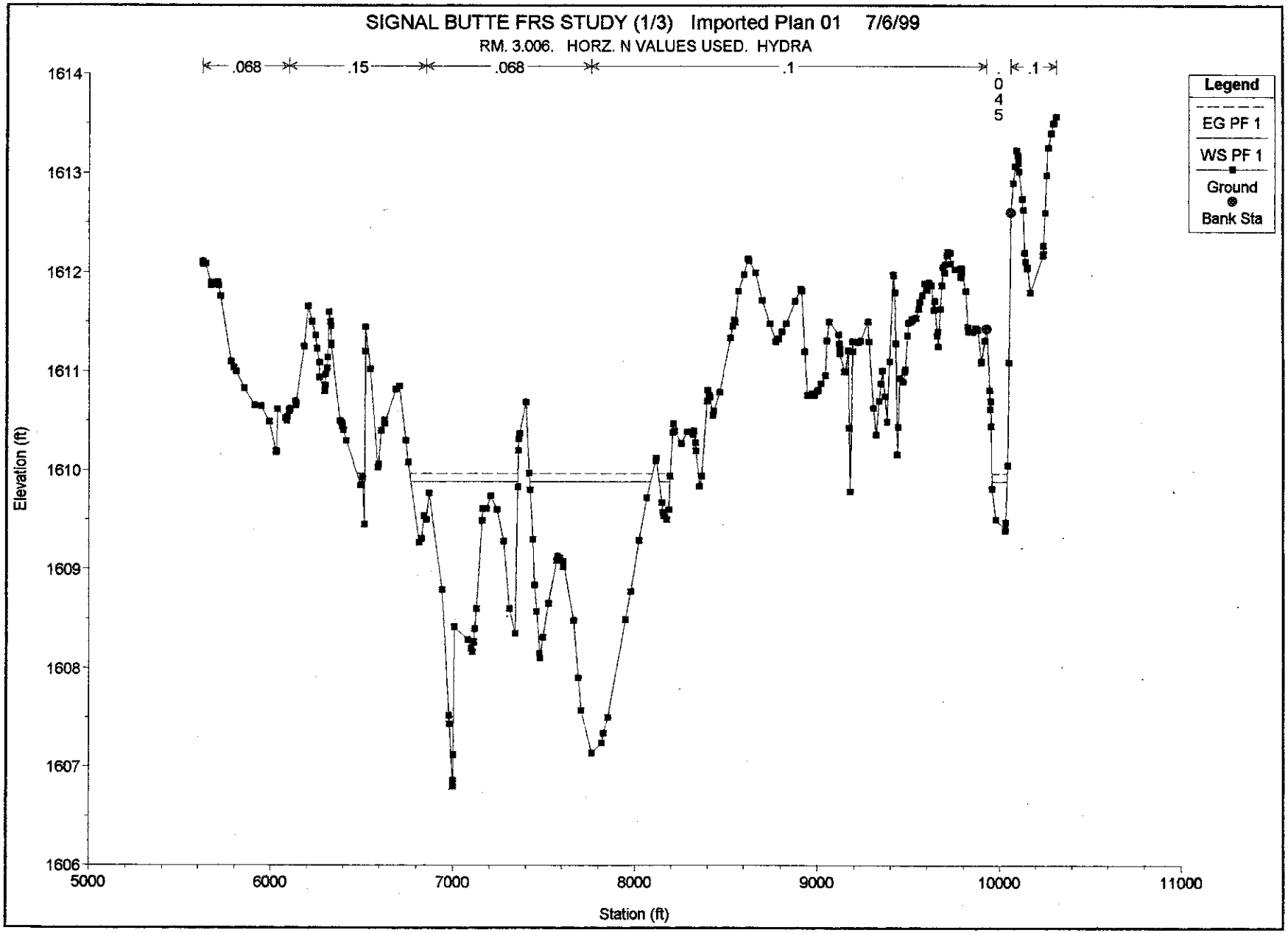

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.643. HORZ. N VALUES USED. AR
.15
.068
.15
.1
.15
.068
0 0
6 4
8 5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1598
1596
1594
1592
1590
1588
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

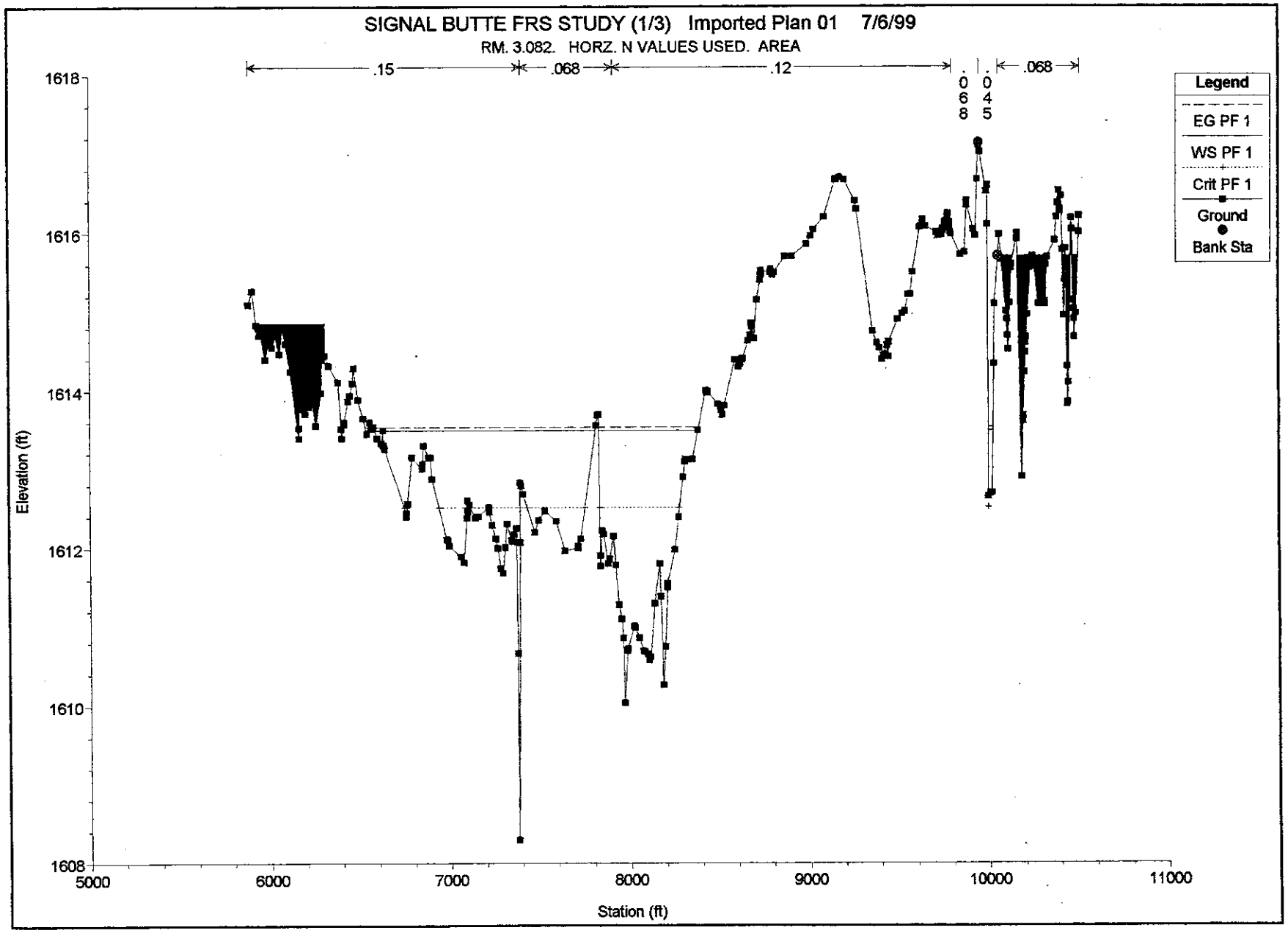

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.2.720. HORZ. N VALUES USED. AREA
.068
.15
.1
.068
0
4
5
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1602
1600
1598
1596
1594
1592
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

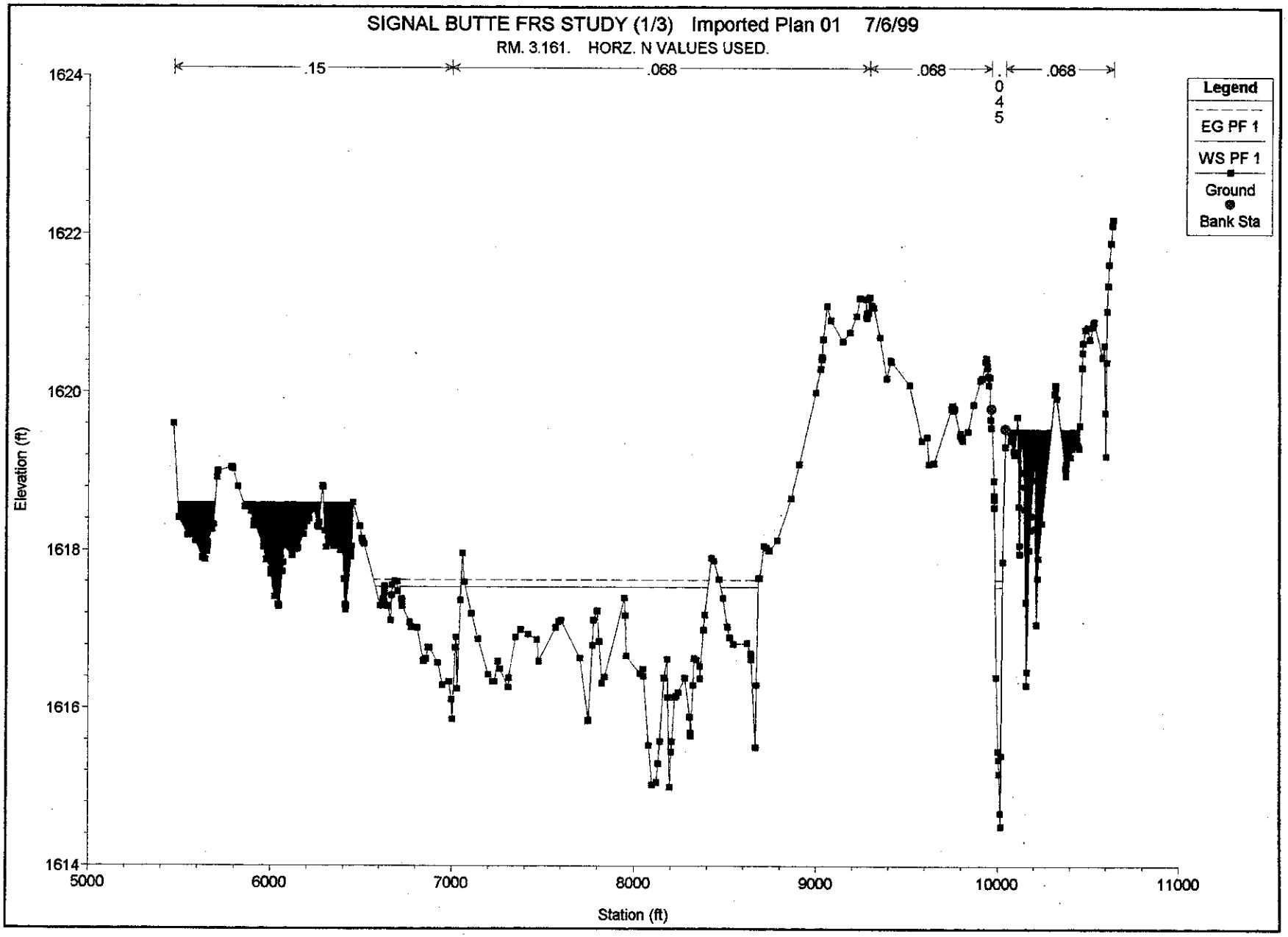

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.2.793. HORZ. N VALUES USED. AREA
.068
.15
.1
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1604
1603
1602
1601
1600
1599
1598
5000
6000
7000
8000
9000
10000
11000
Station (ft)

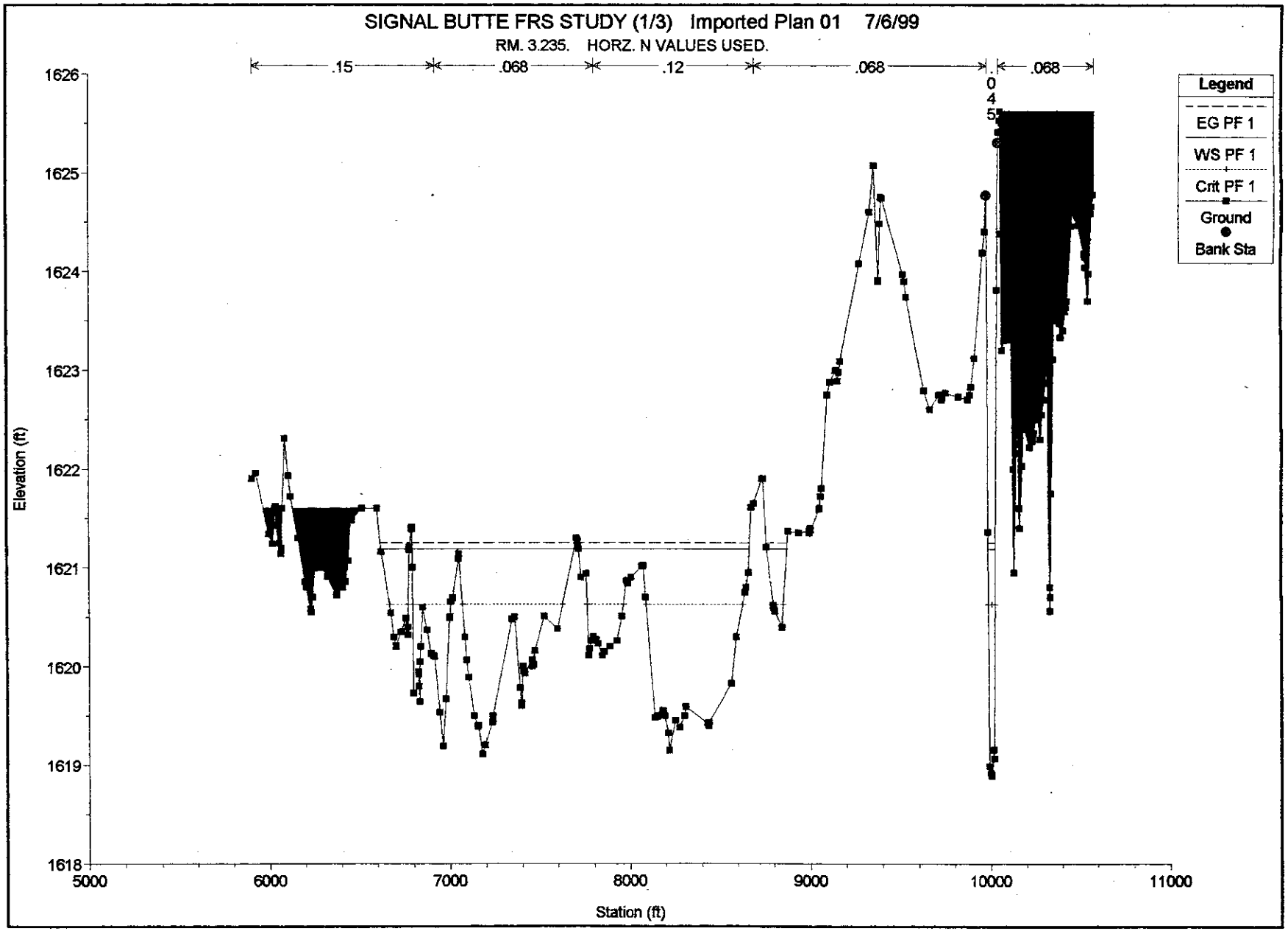

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.2.857 . HORZ. N VALUES USED. AR
.068
.15
.1
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1608
1607
1606
1605
1604
1603
1602
1601
1600
5000
6000
7000
8000
9000
10000
11000
Station (ft)

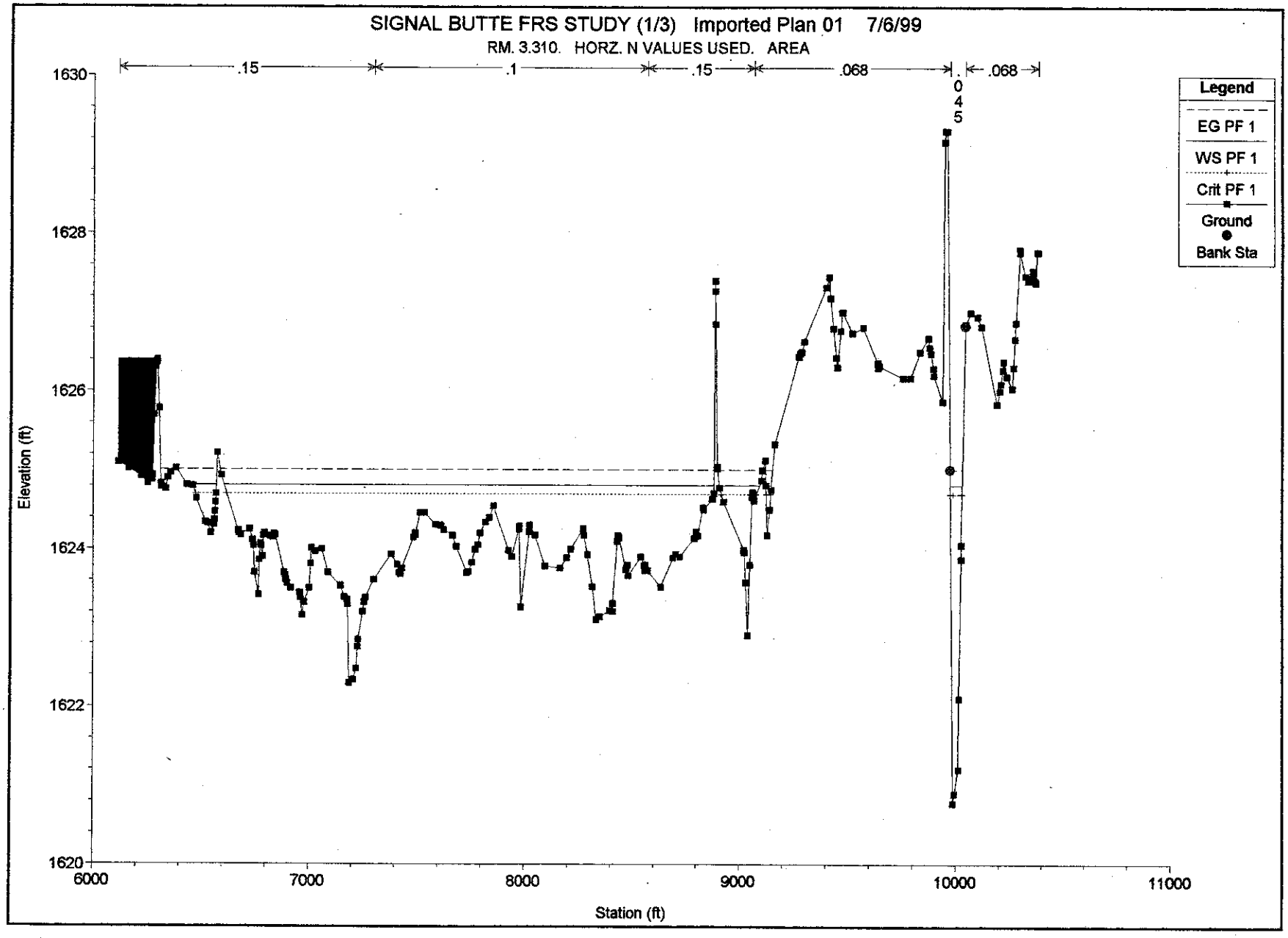

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 2.933. HORZ. N VALUES USED. ARE
.068
.15
.1
.068
.068
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1611
1610
1609
1608
1607
1606
1605
1604
5000
6000
7000
8000
9000
10000
11000
Station (ft)

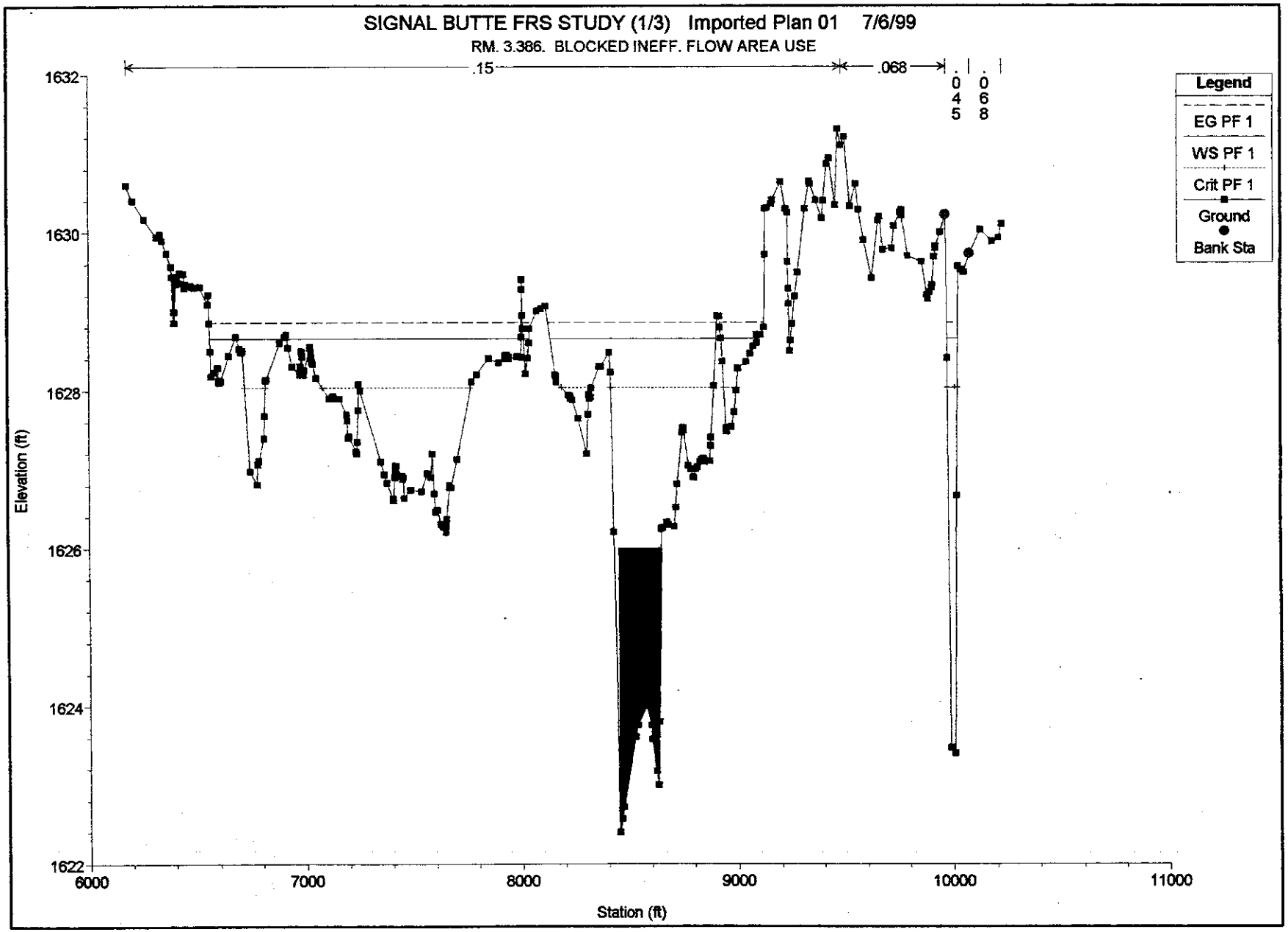

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.006. HORZ. N VALUES USED. HYDRA
.068
.15
.068
.1
.045
.1
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1614
1613
1612
1611
1610
1609
1608
1607
1606
5000
6000
7000
8000
9000
10000
11000
Station (ft)

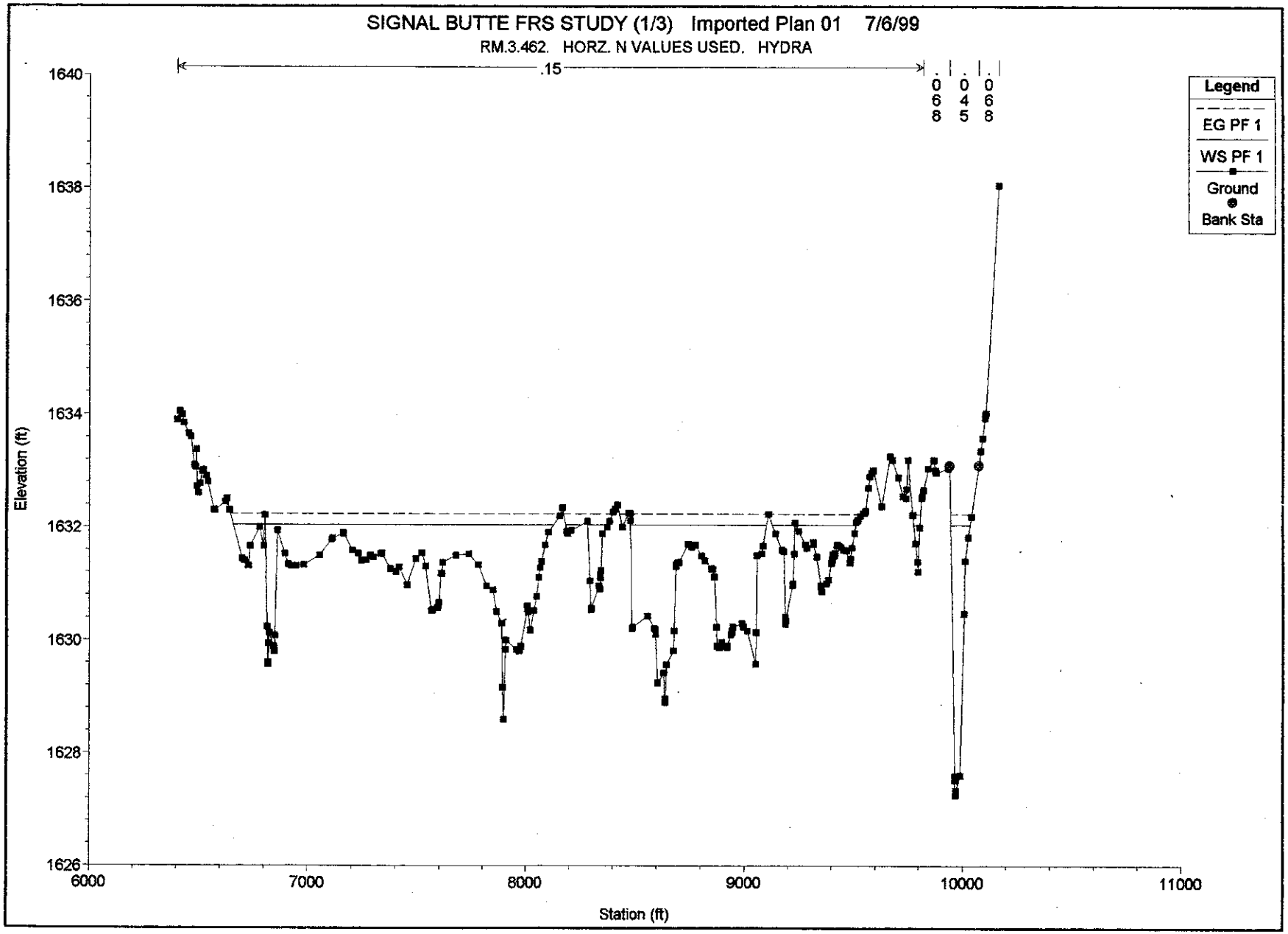

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.082. HORZ. N VALUES USED. AREA
.15
.068
.12
.068
0 0
6 4
8 5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1618
1616
1614
1612
1610
1608
5000
6000
7000
8000
9000
10000
11000
Station (ft)

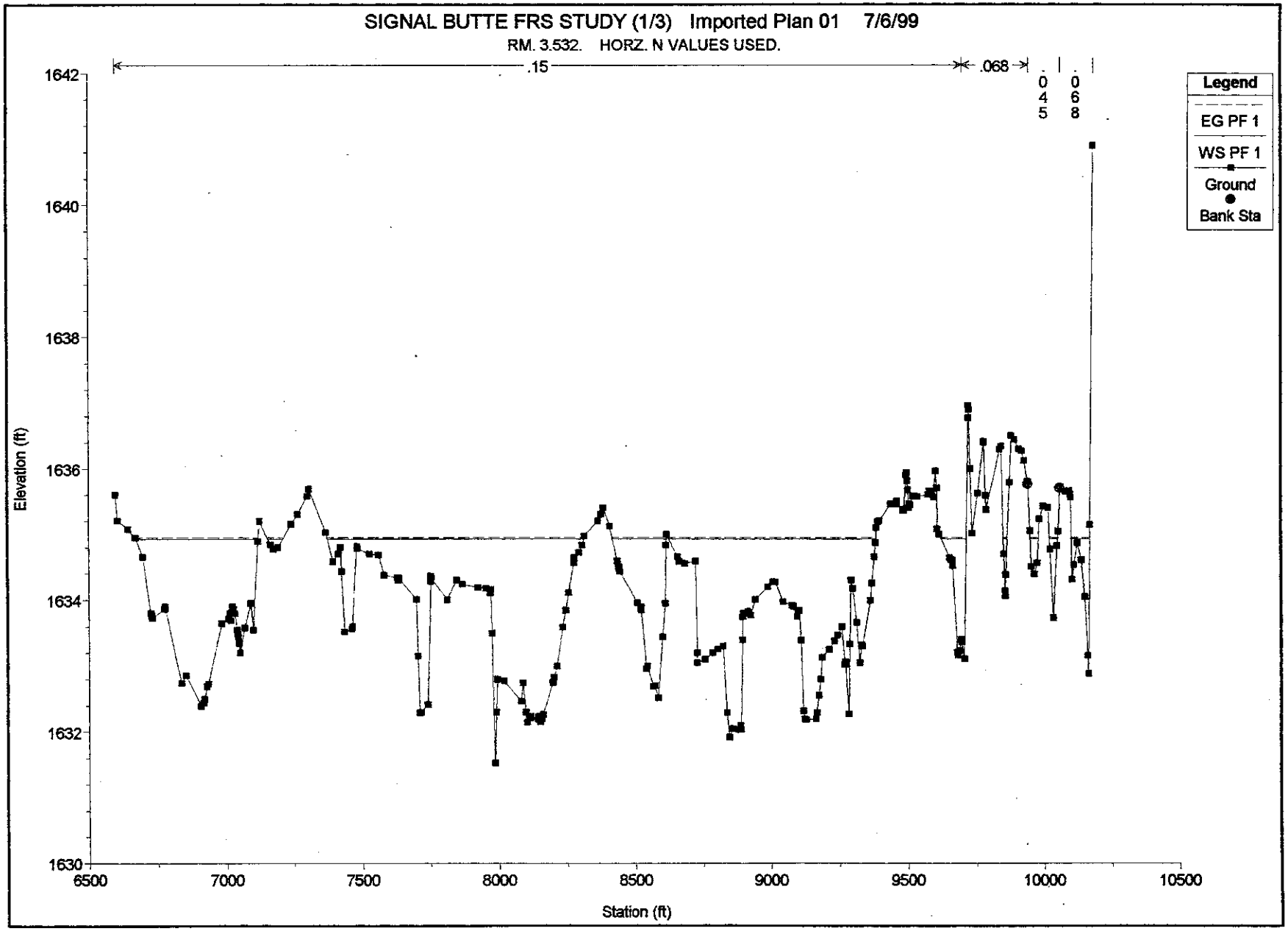

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.161. HORZ. N VALUES USED.
.15
.068
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1624
1622
1620
1618
1616
1614
5000
6000
7000
8000
9000
10000
11000
Station (ft)

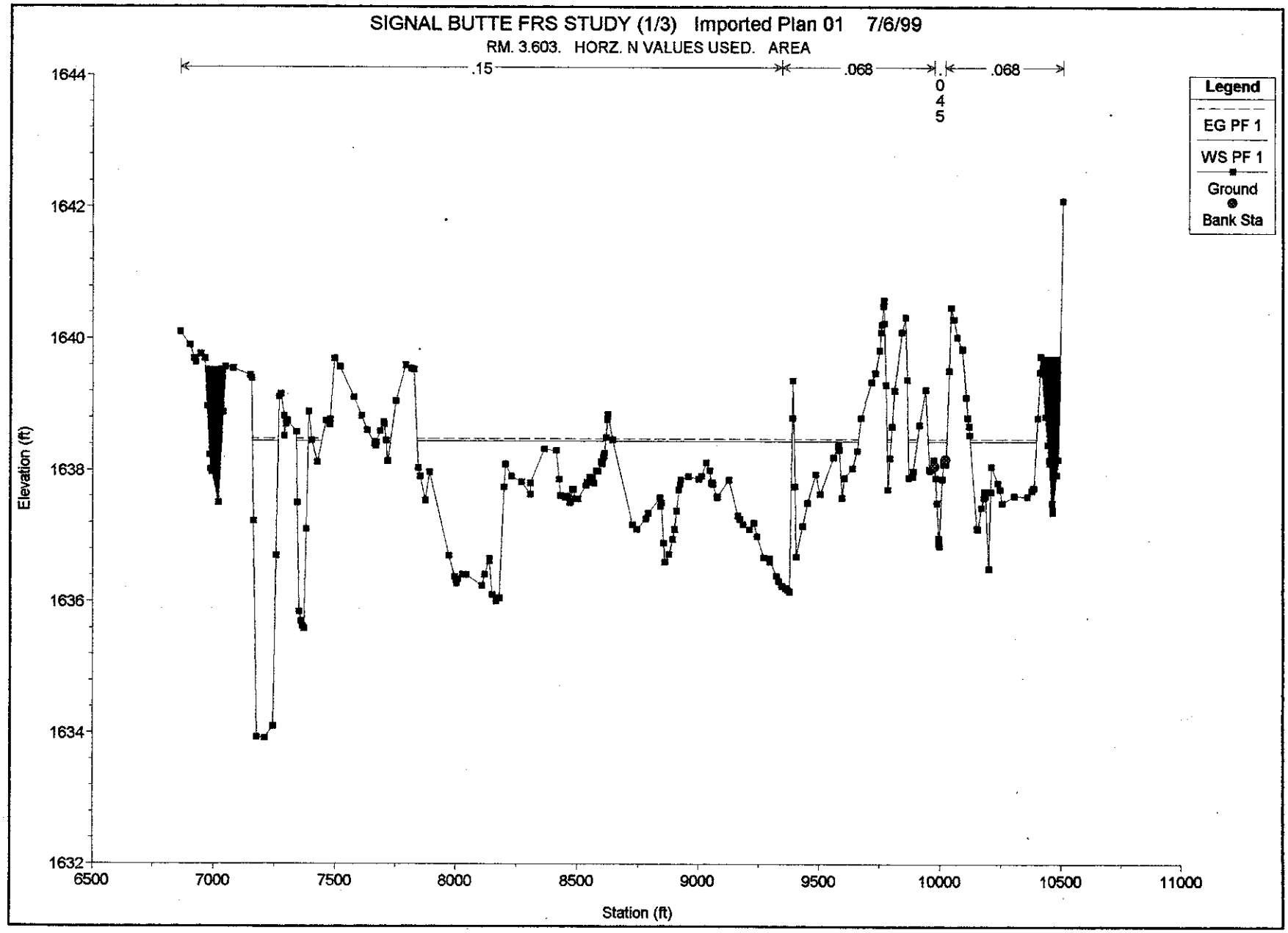

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.235. HORZ. N VALUES USED.
.15
.068
.12
.068
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1626
1625
1624
1623
1622
1621
1620
1619
1618
5000
6000
7000
8000
9000
10000
11000
Station (ft)

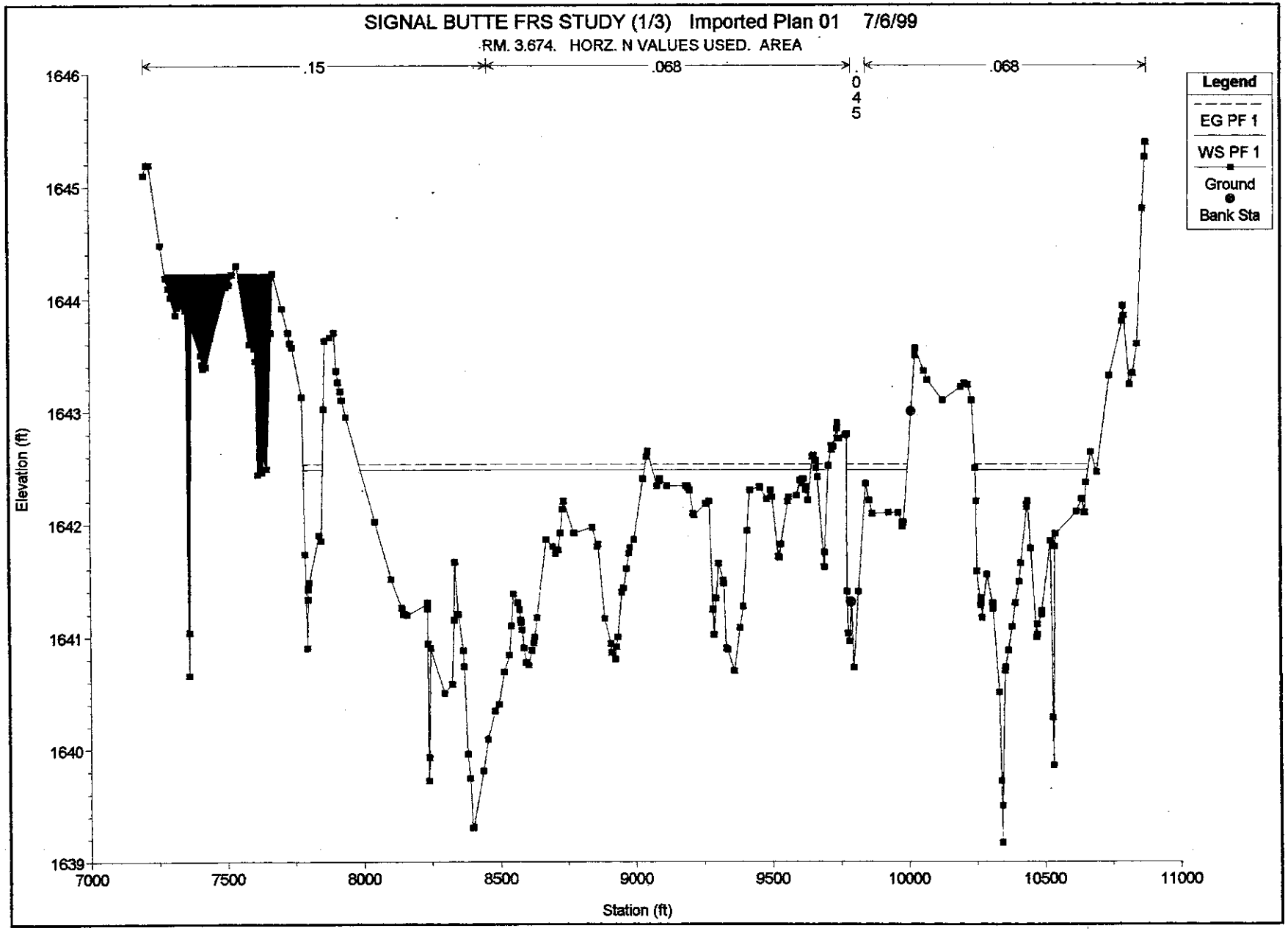

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.310. HORZ. N VALUES USED. AREA
.15
.1
.15
.068
.068
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1630
1628
1626
1624
1622
1620
6000
7000
8000
9000
10000
11000
Station (ft)

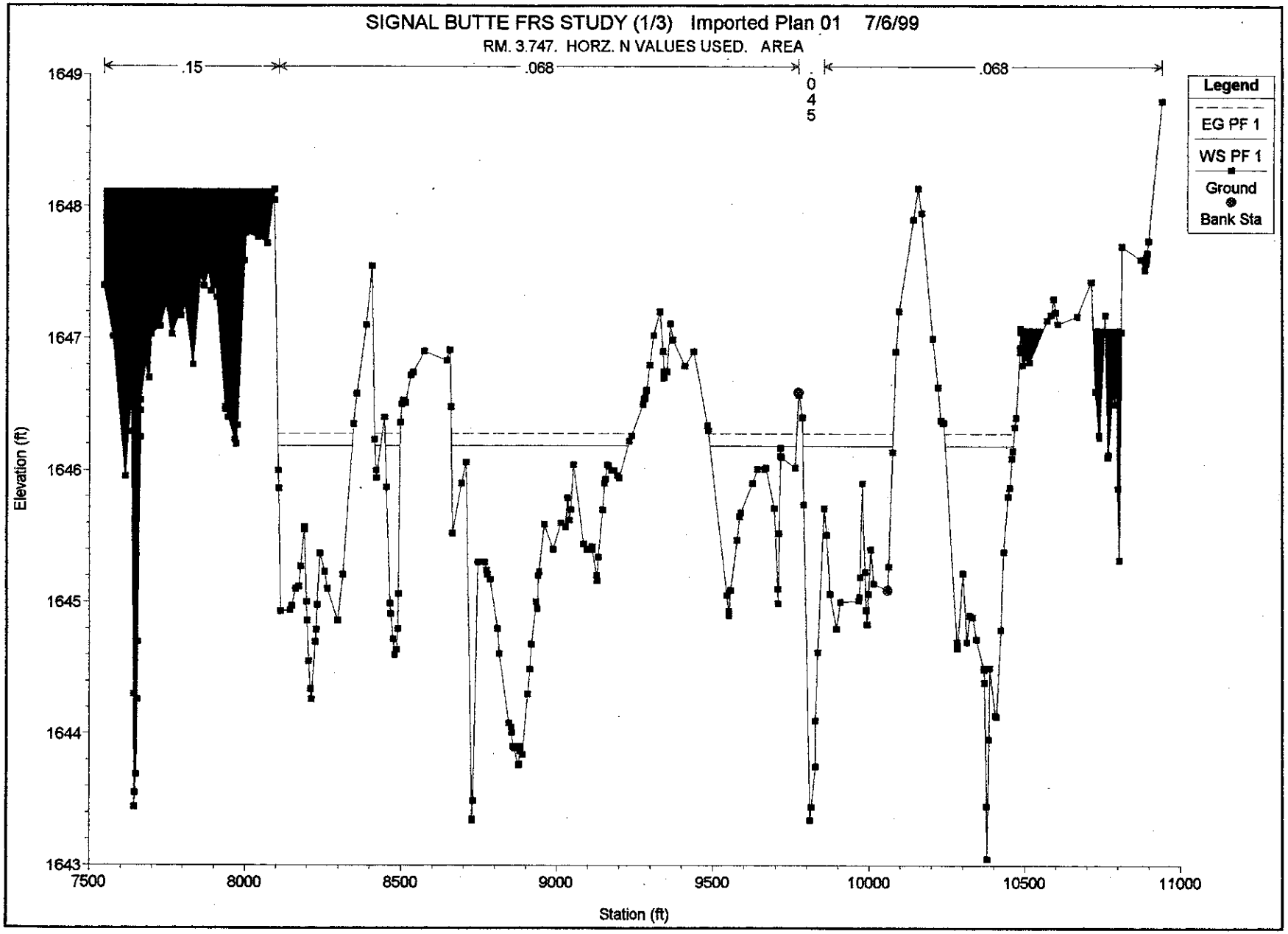

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.386. BLOCKED INEFF. FLOW AREA USE
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1632
1630
1628
1626
1624
1622
6000
7000
8000
9000
10000
11000
Station (ft)

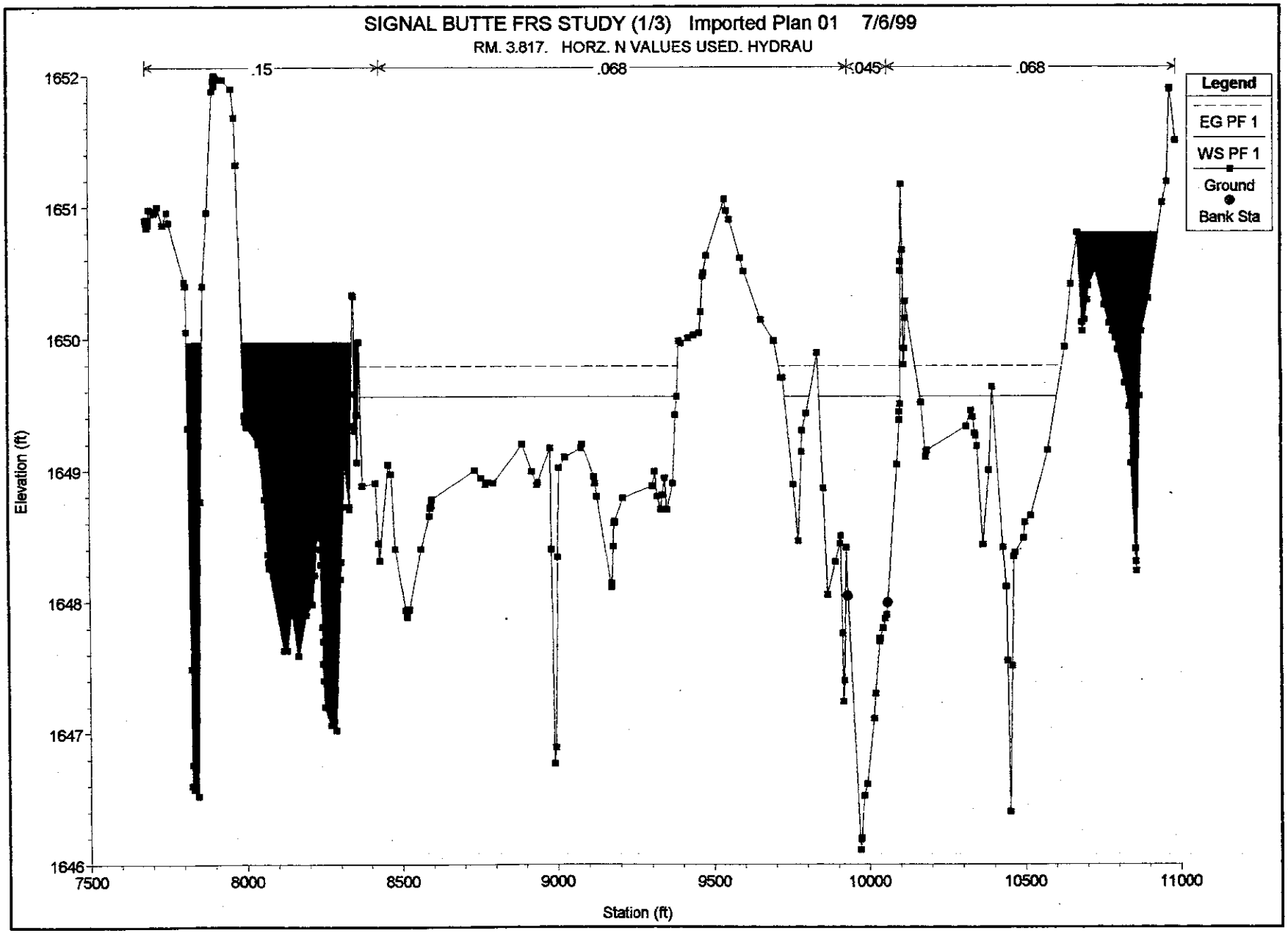

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.3.462. HORZ. N VALUES USED. HYDRA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1640
1638
1636
1634
1632
1630
1628
1626
6000
7000
8000
9000
10000
11000
Station (ft)

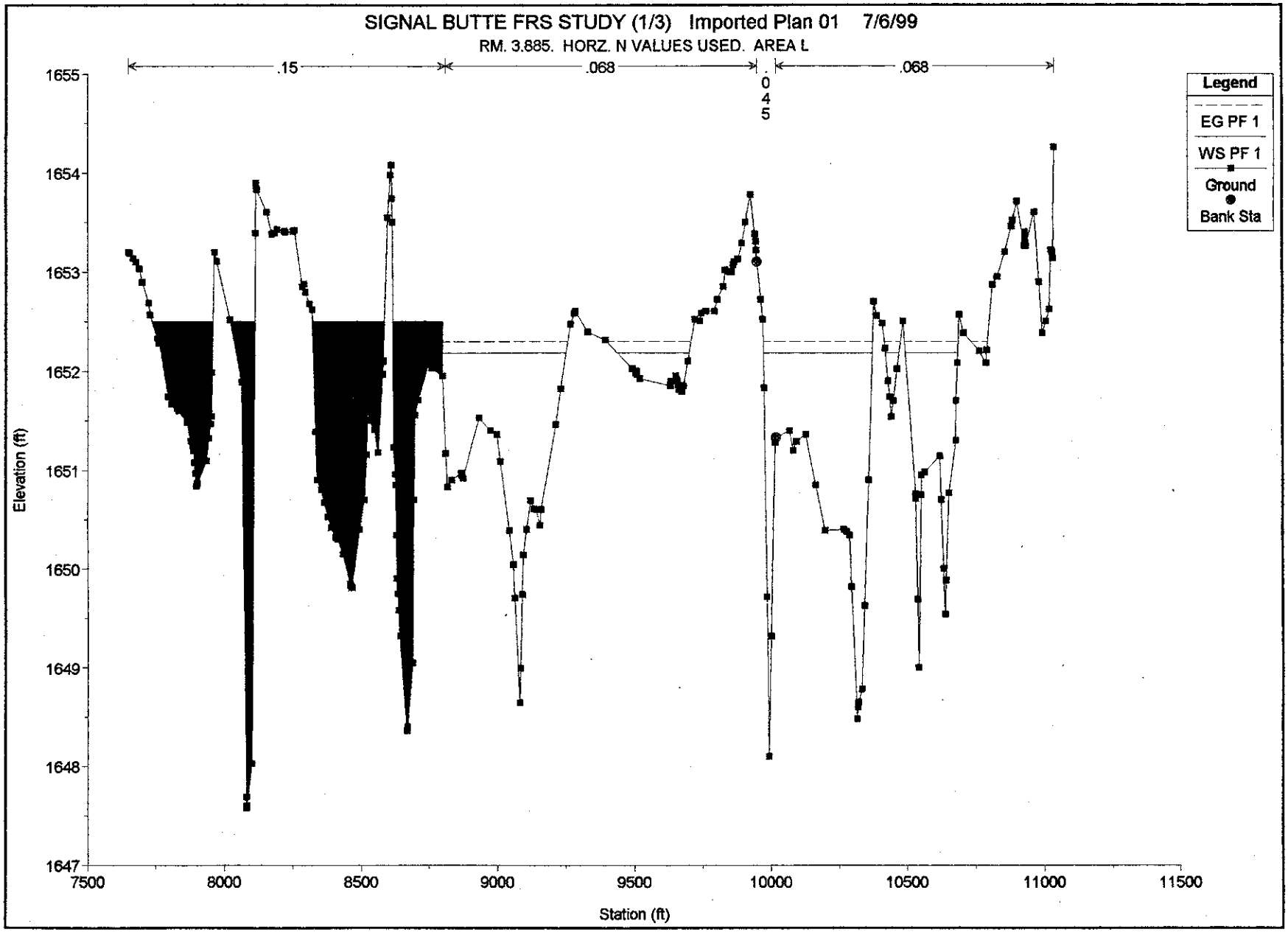

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.532. HORZ. N VALUES USED.
.15
.068
0 0
4 6
5 8
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1642
1640
1638
1636
1634
1632
1630
6500
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)

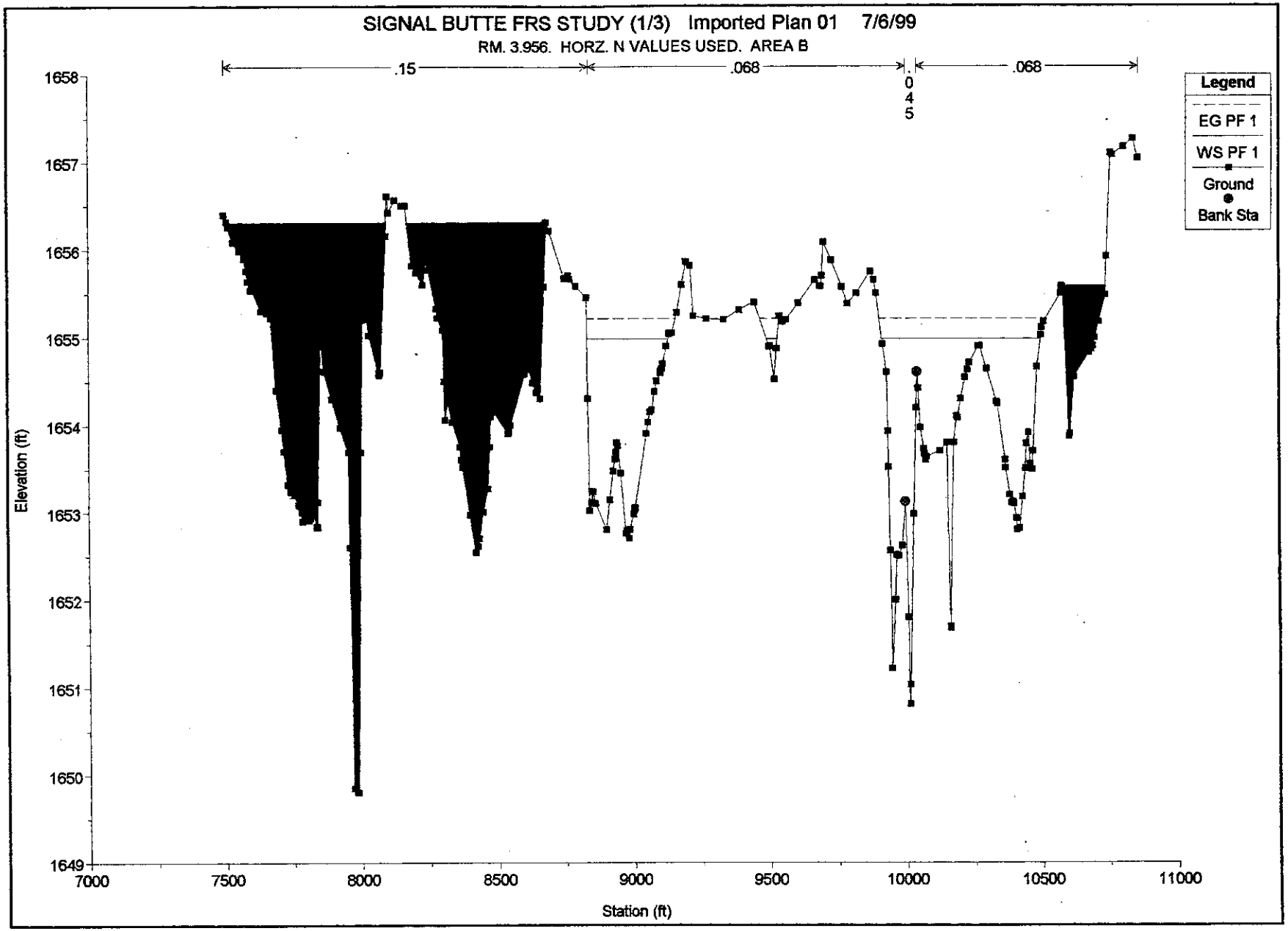

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.603. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1644
1642
1640
1638
1636
1634
1632
6500
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

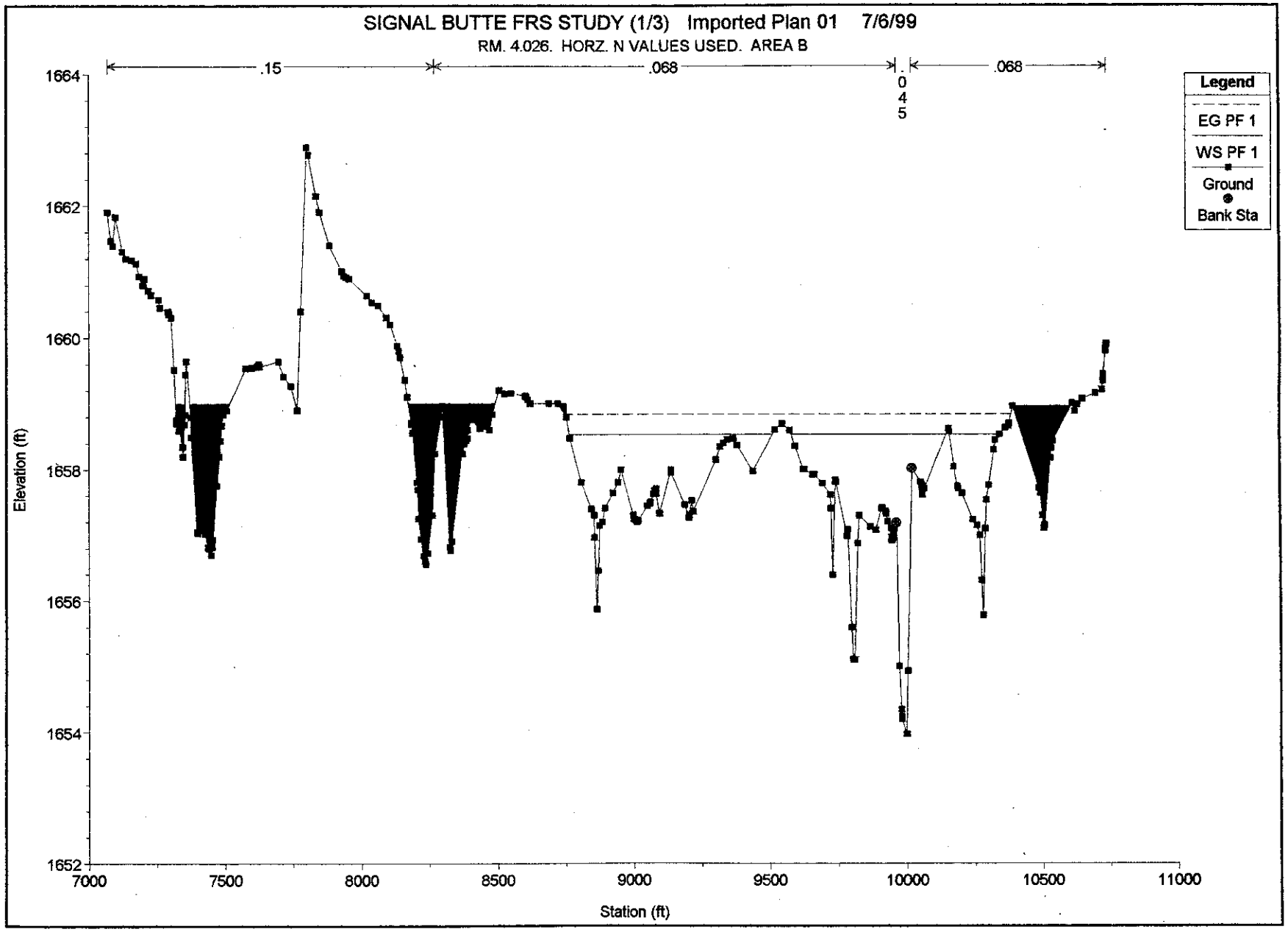

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.674. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1646
1645
1644
1643
1642
1641
1640
1639
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

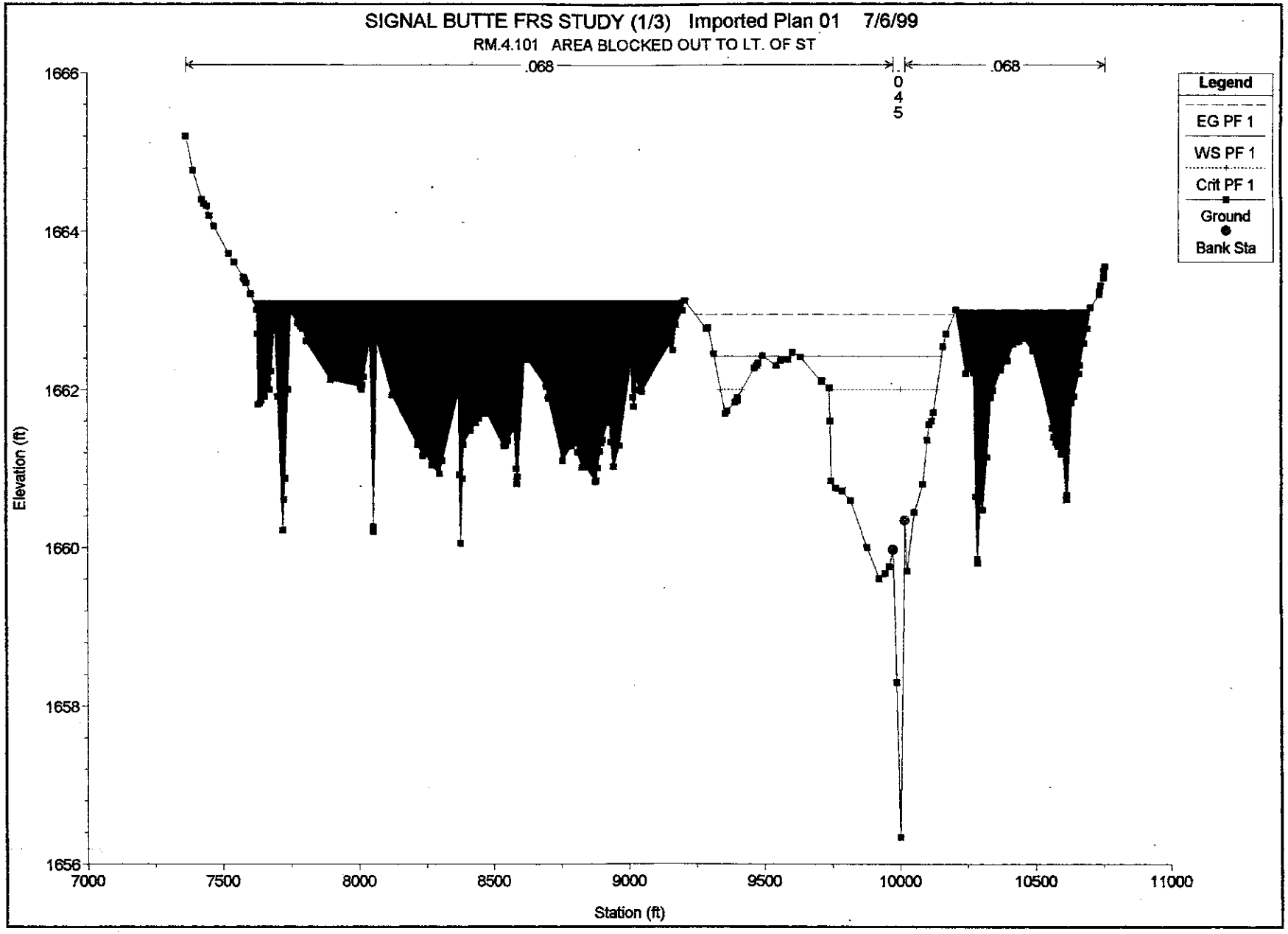

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.747. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1649
1648
1647
1646
1645
1644
1643
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

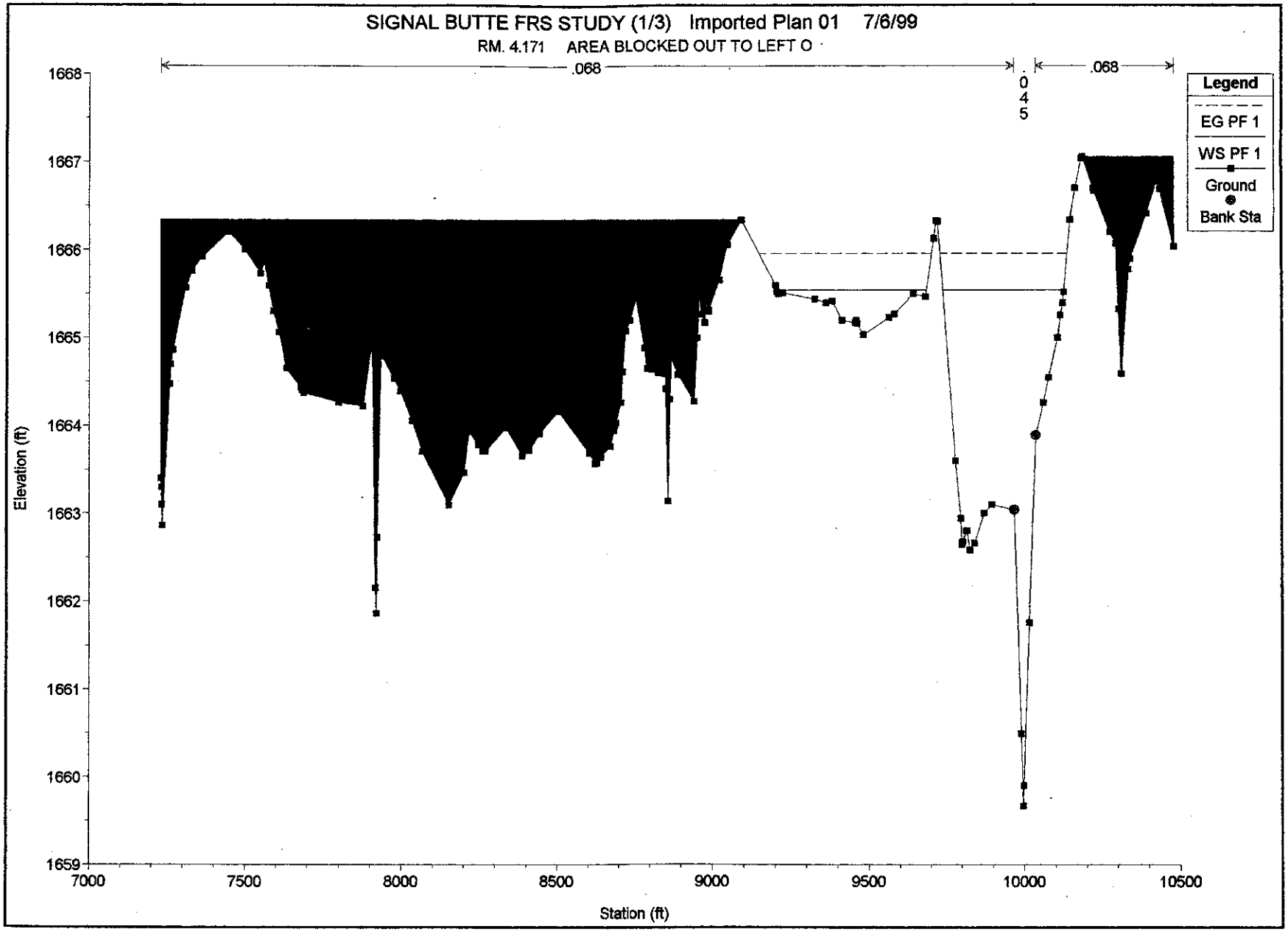

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.817. HORZ. N VALUES USED. HYDRAU
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1652
1651
1650
1649
1648
1647
1646
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

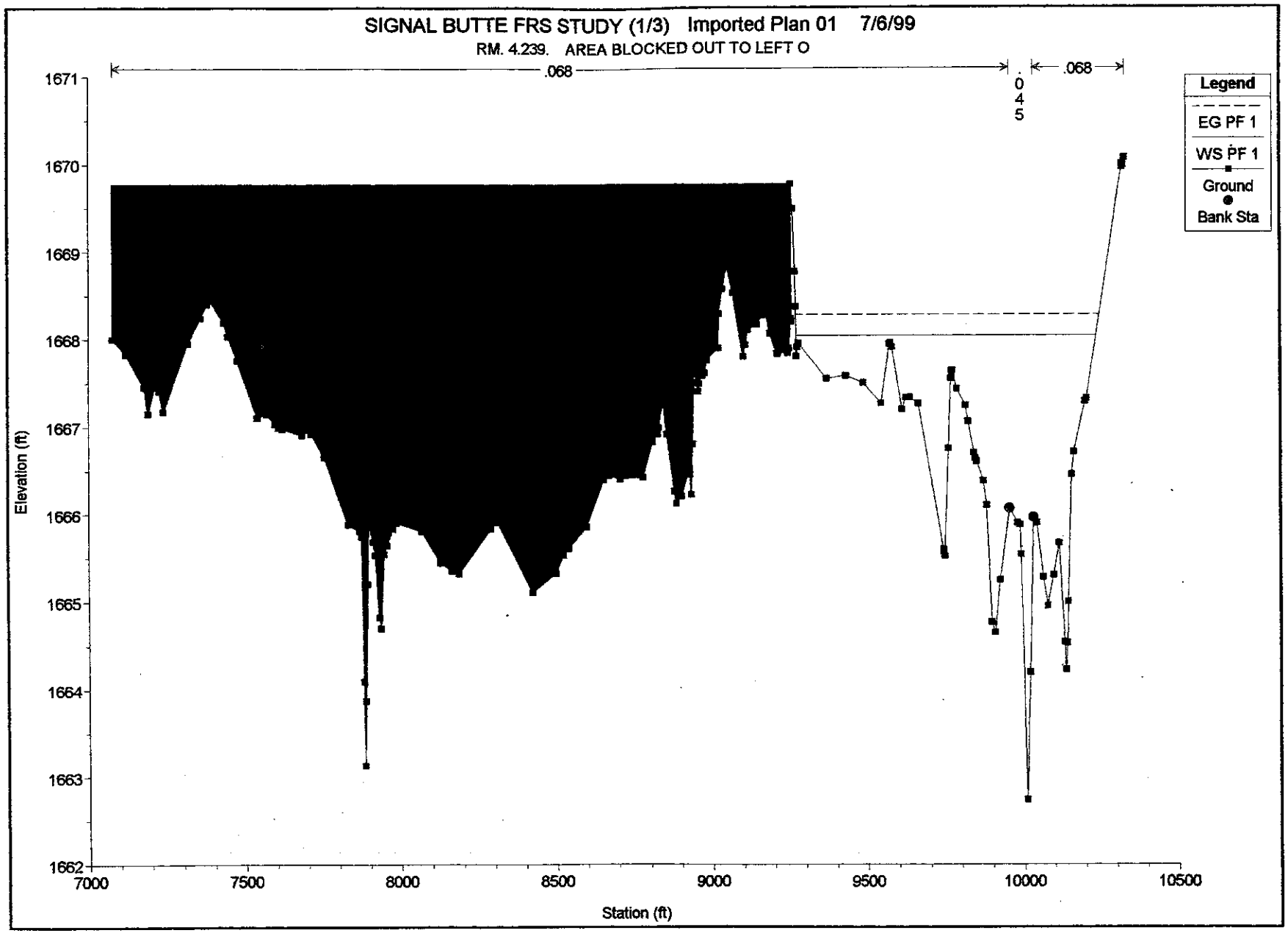

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.885. HORZ. N VALUES USED. AREA L
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1655
1654
1653
1652
1651
1650
1649
1648
1647
7500
8000
8500
9000
9500
10000
10500
11000
11500
Station (ft)

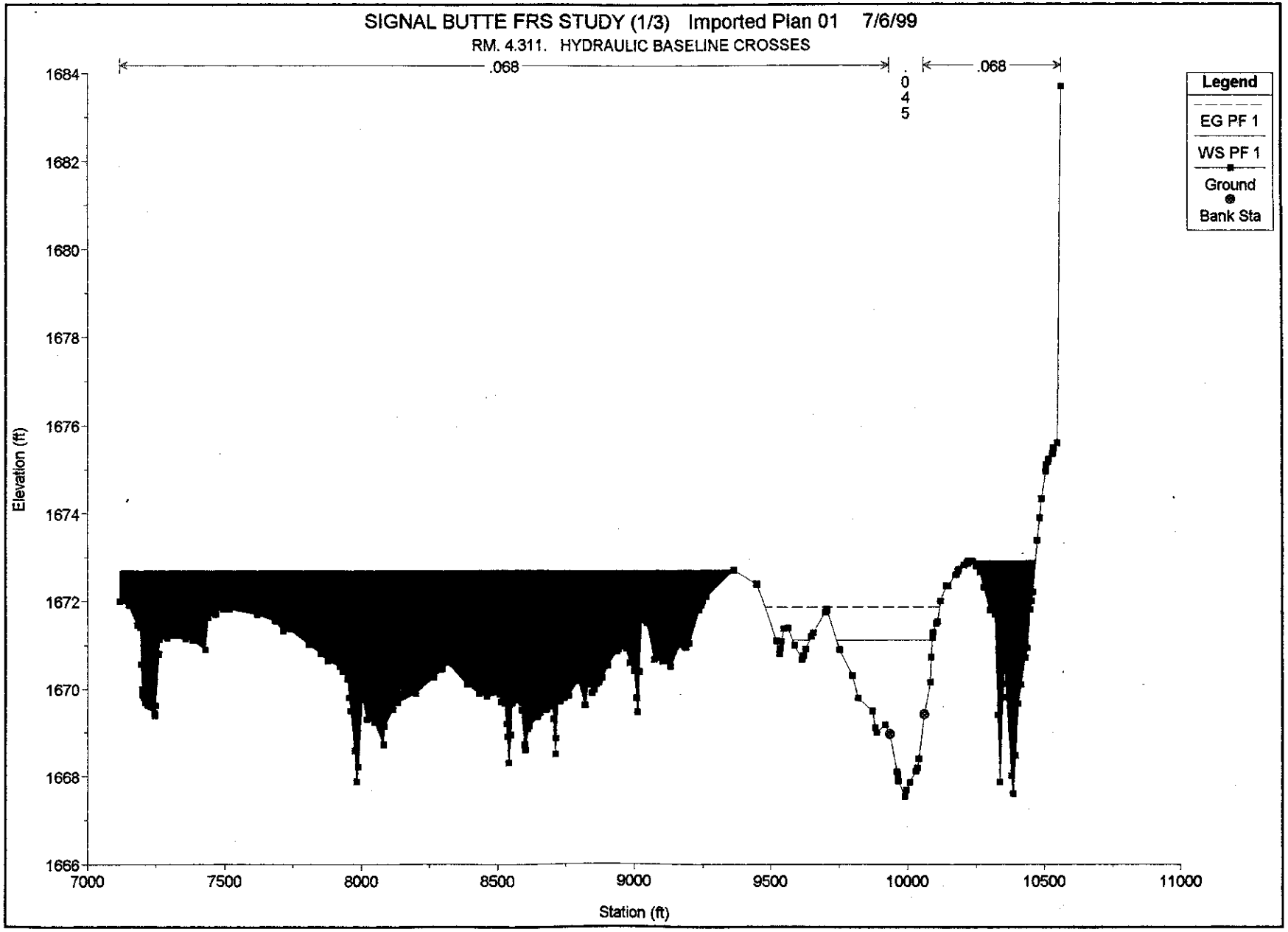

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 3.956. HORZ. N VALUES USED. AREA B
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1658
1657
1656
1655
1654
1653
1652
1651
1650
1649
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

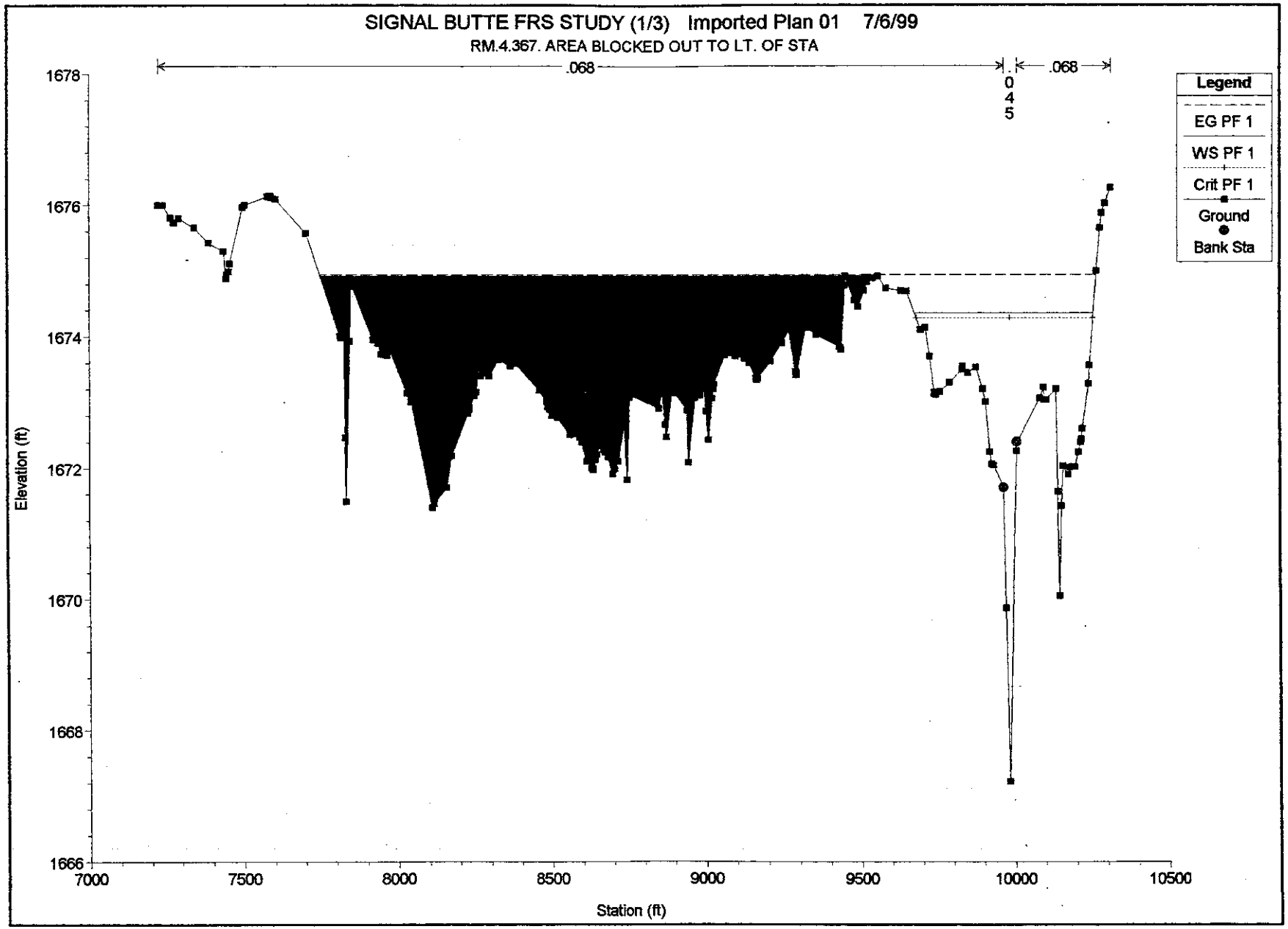

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.026. HORZ. N VALUES USED. AREA B
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1664
1662
1660
1658
1656
1654
1652
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

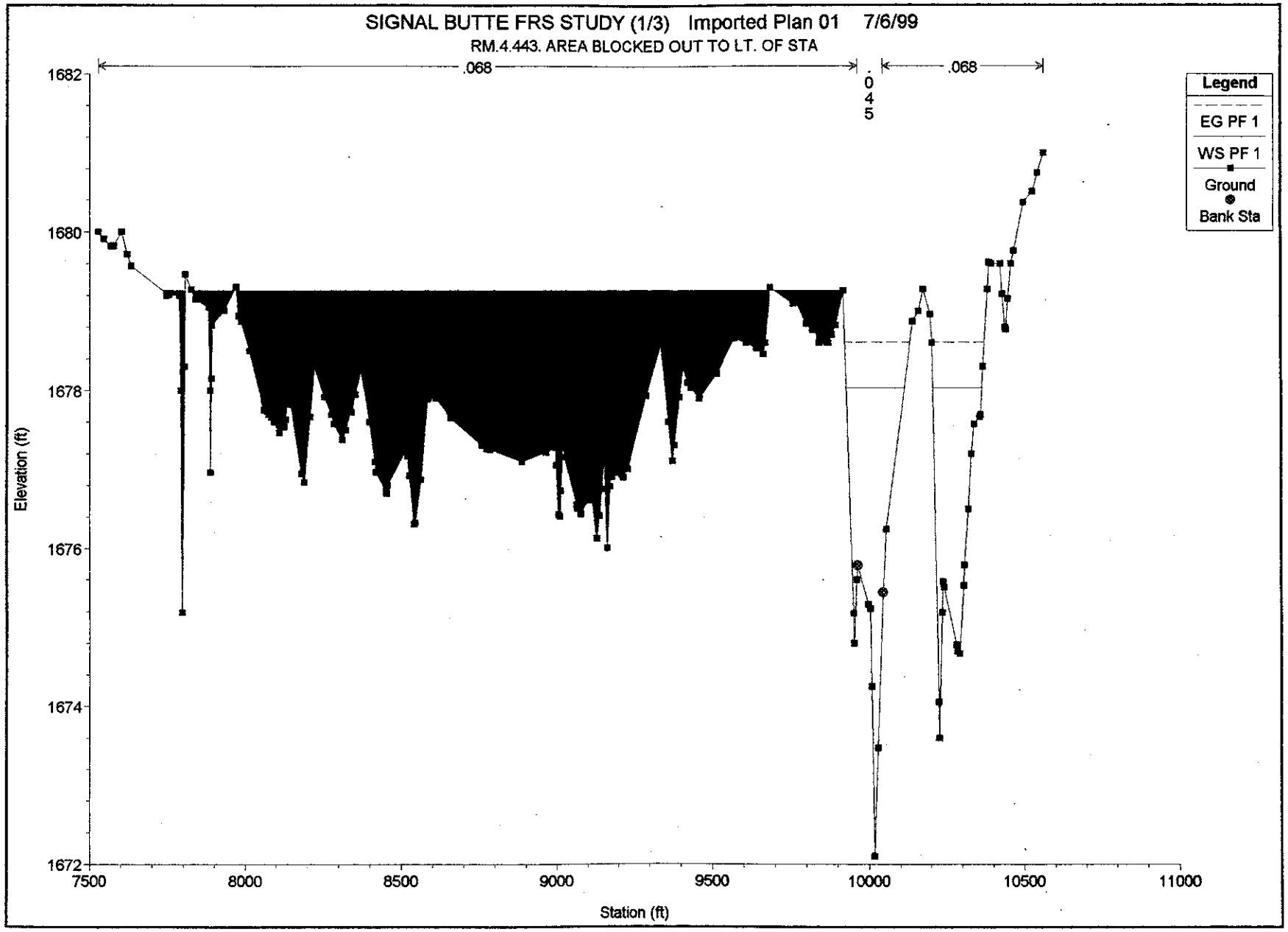

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.4.101 AREA BLOCKED OUT TO LT. OF ST
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1666
1664
1662
1660
1658
1656
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

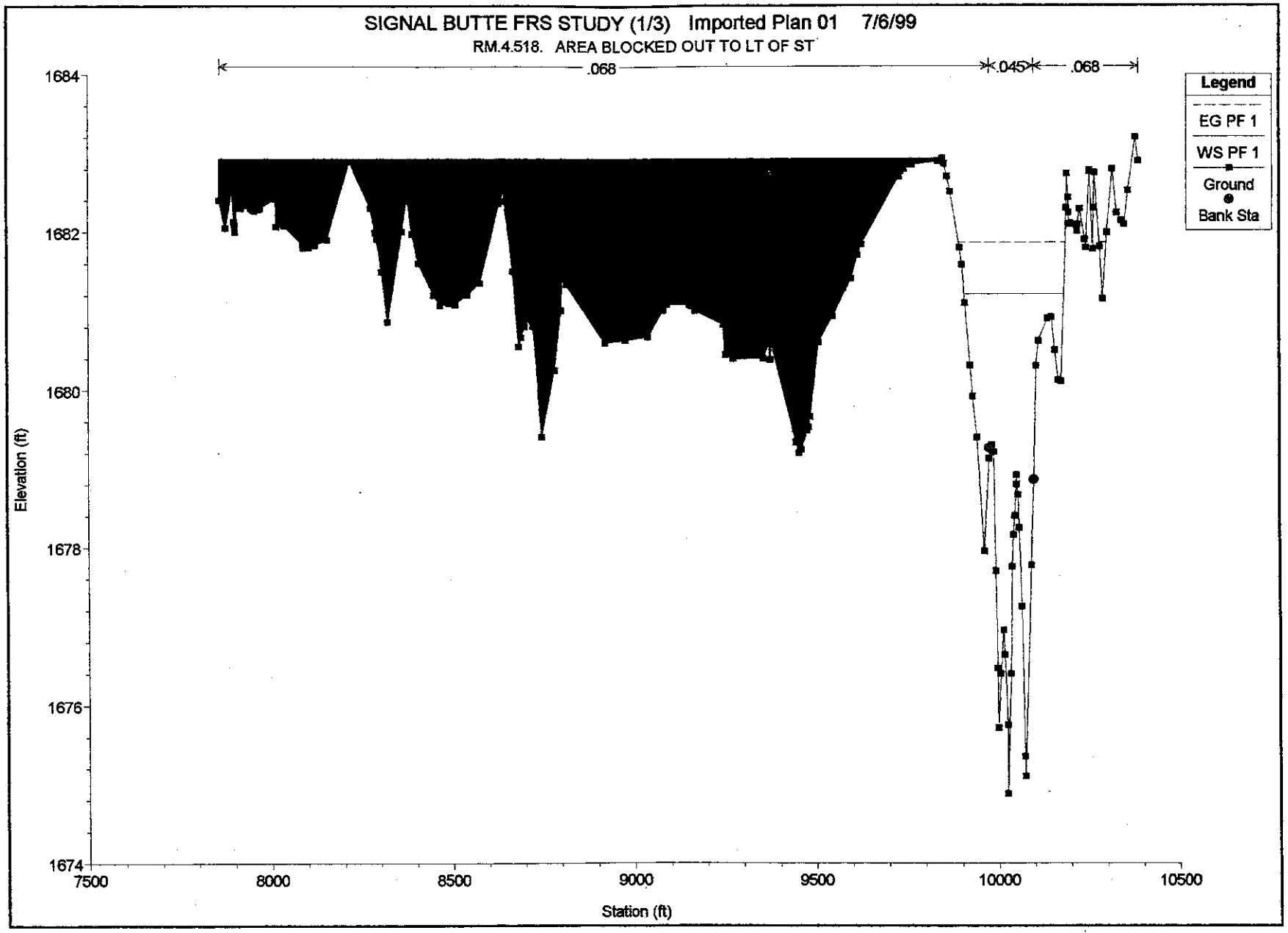

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.171 AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1668
1667
1666
1665
1664
1663
1662
1661
1660
1659
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)

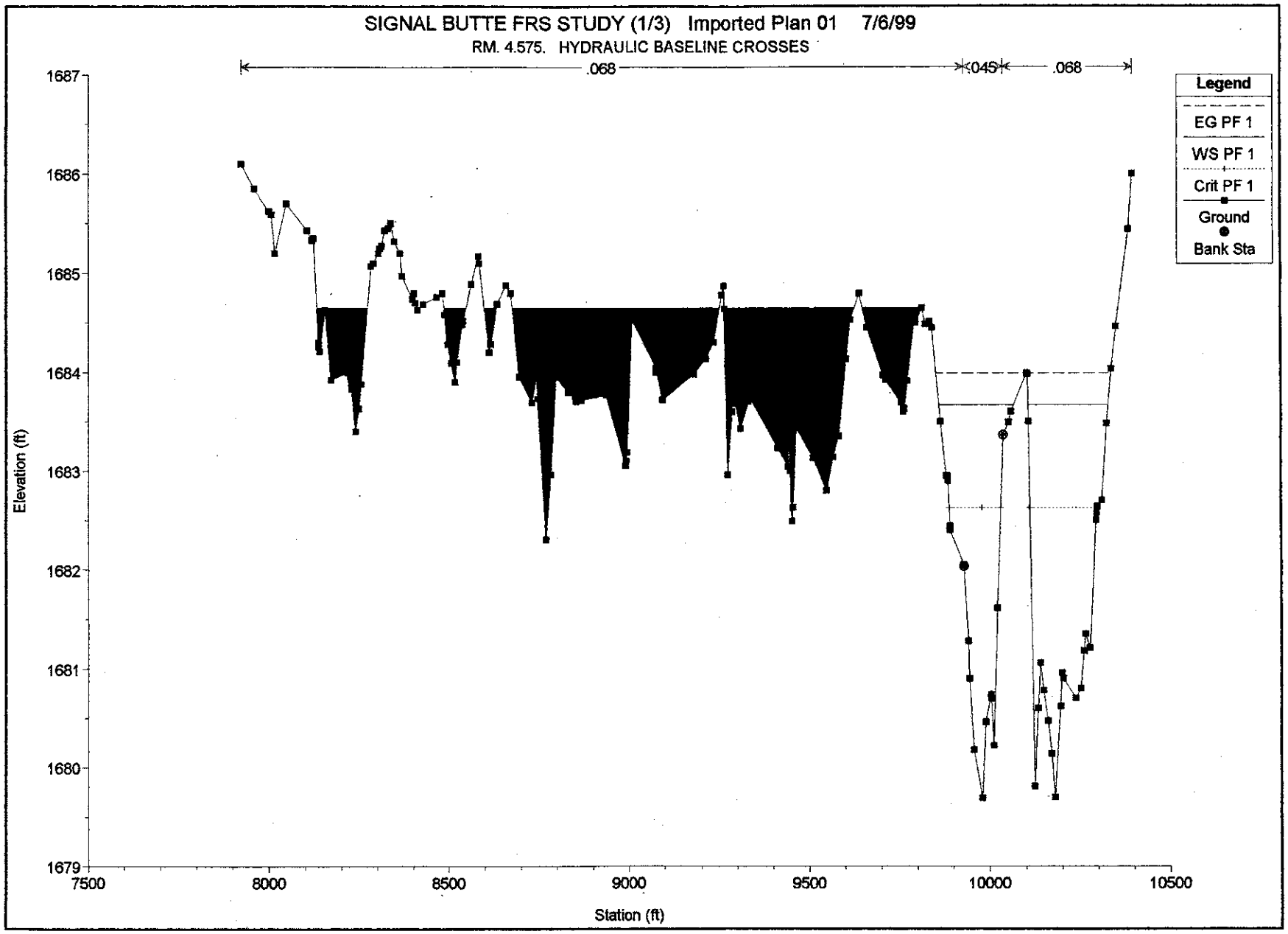

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.239. AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1671
1670
1669
1668
1667
1666
1665
1664
1663
1662
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)

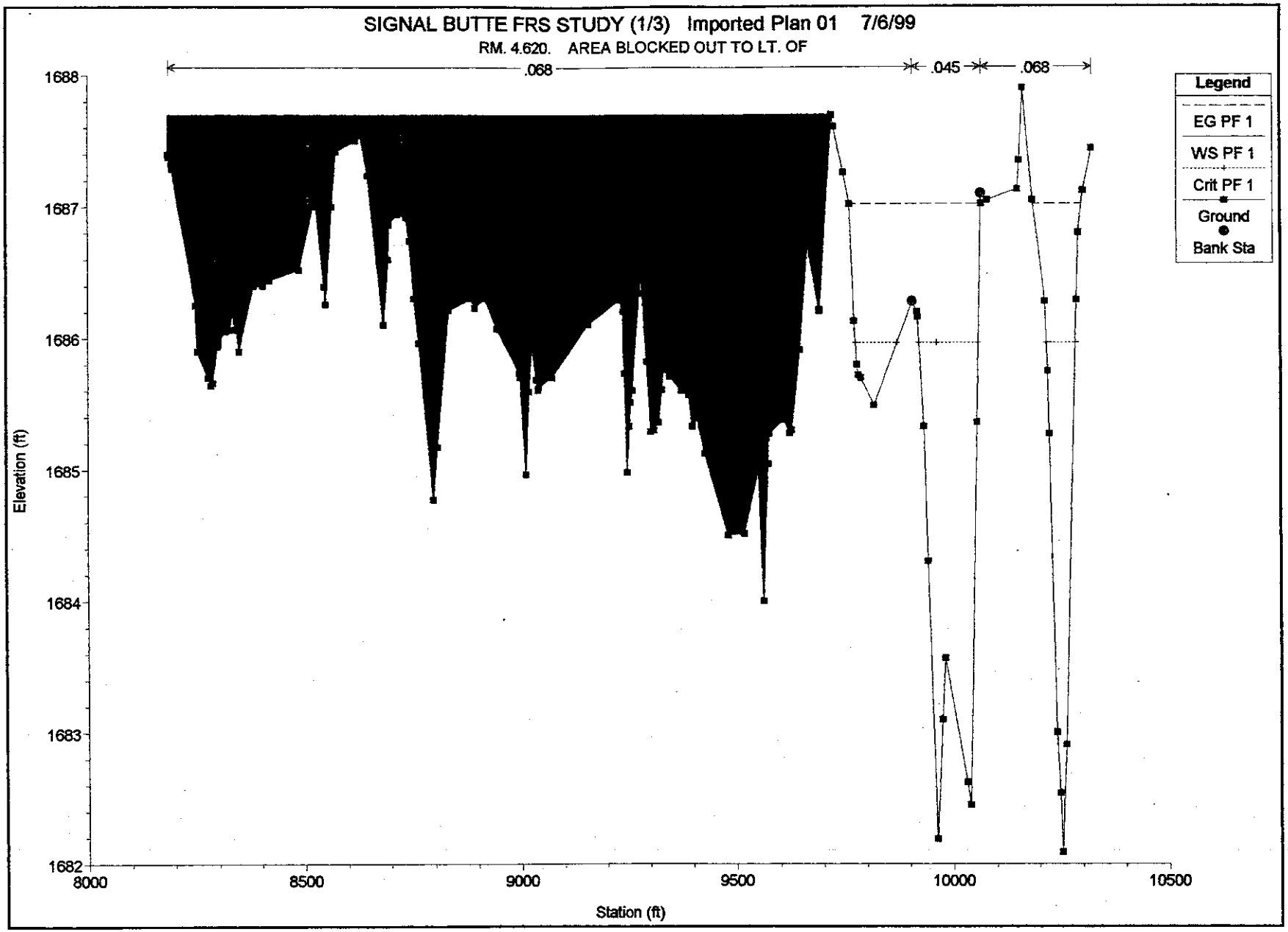

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.311. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
1672
1670
1668
1666
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

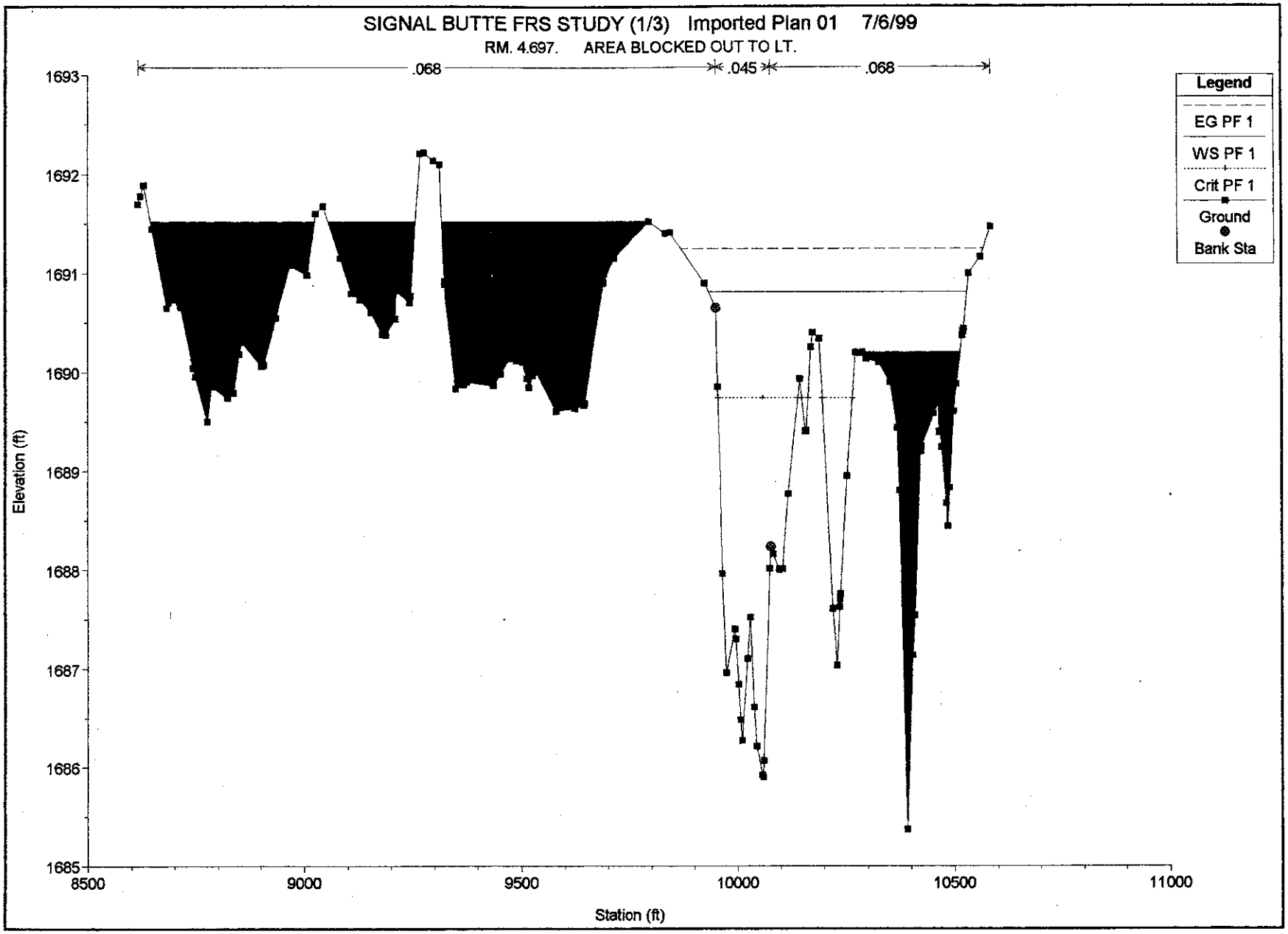

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.4.367. AREA BLOCKED OUT TO LT. OF STA
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1678
1676
1674
1672
1670
1668
1666
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)

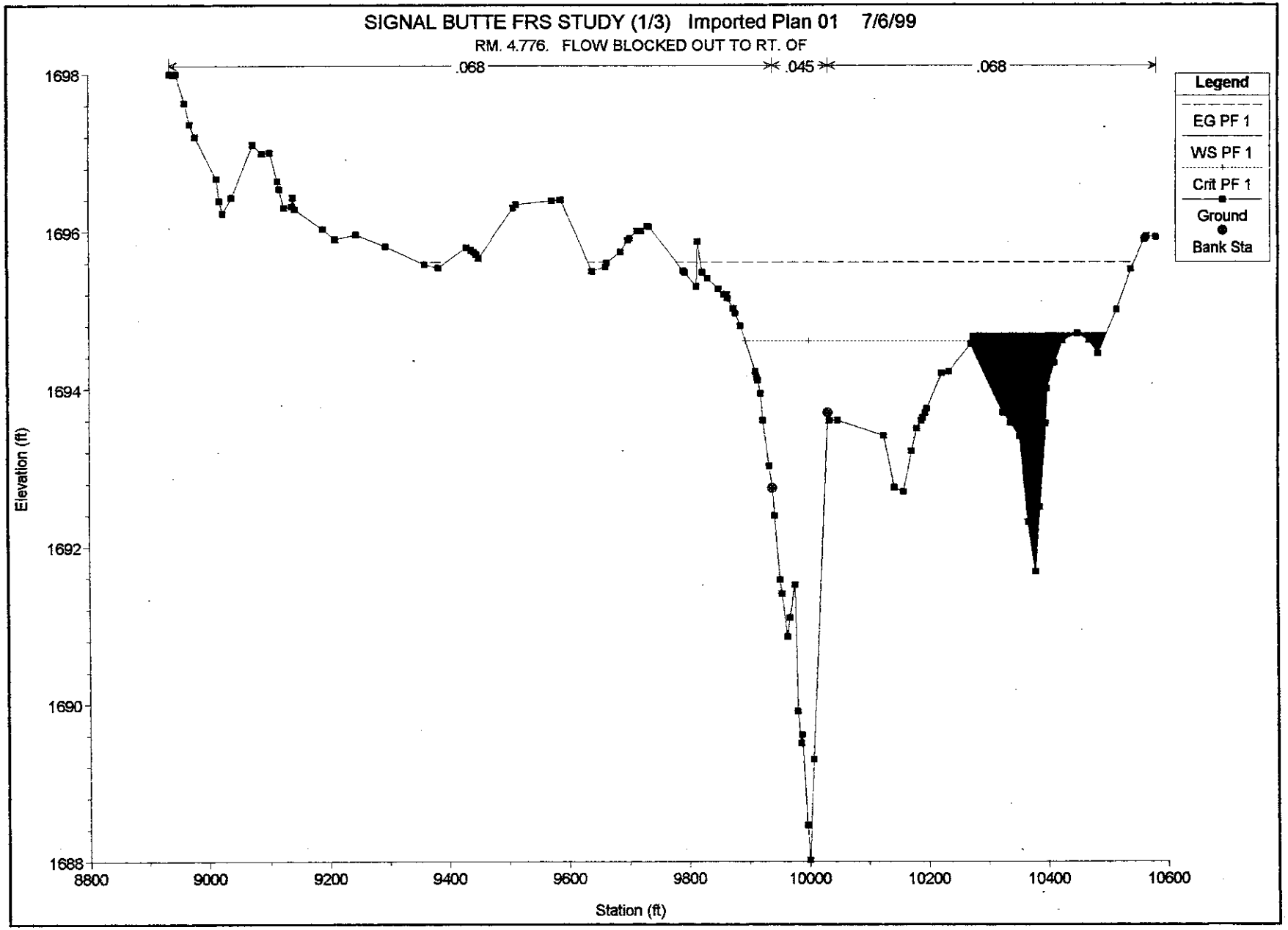

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.4.443. AREA BLOCKED OUT TO LT. OF STA
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1682
1680
1678
1676
1674
1672
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

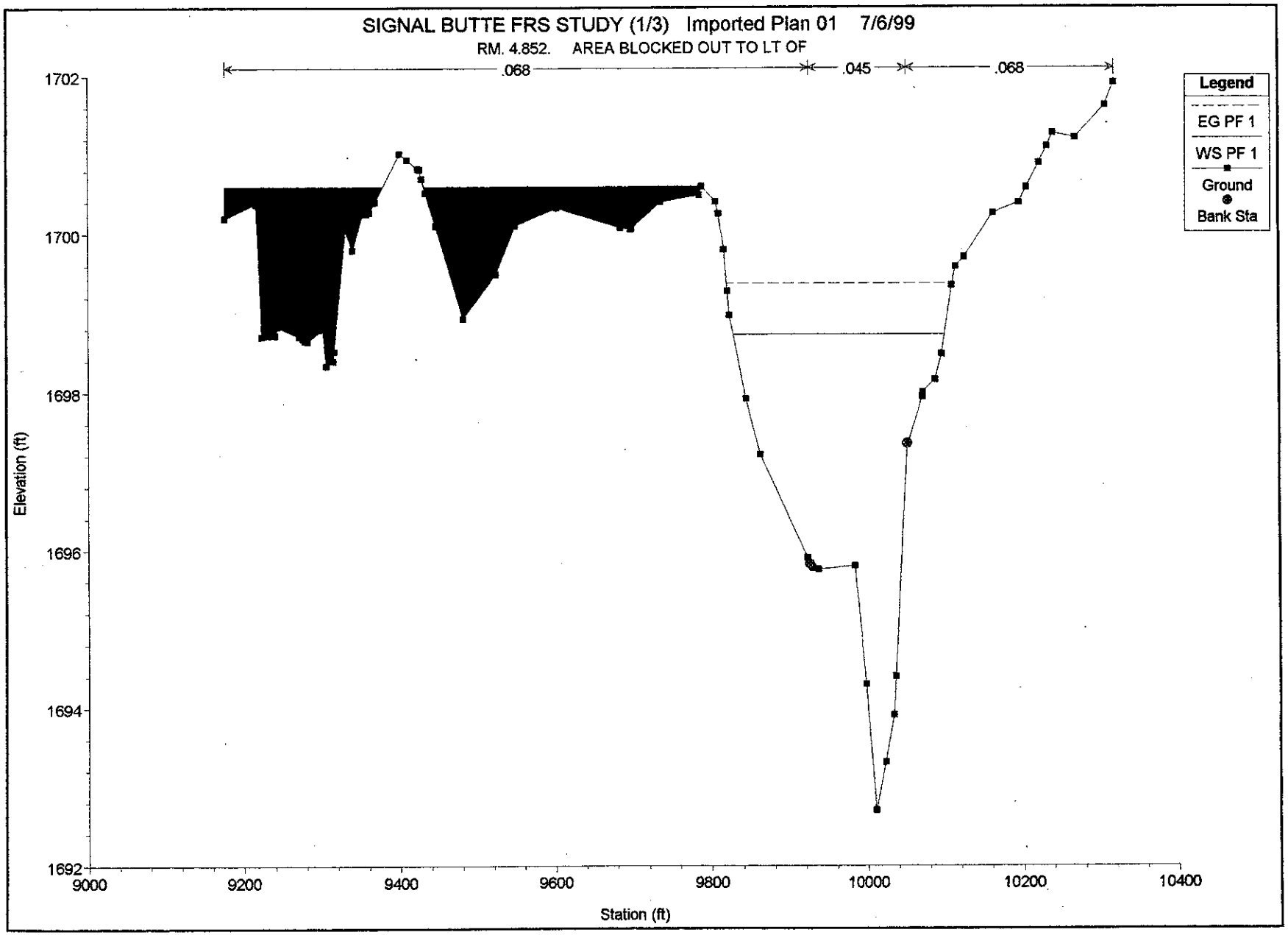

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.4.518. AREA BLOCKED OUT TO LT OF ST
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
7500
8000
8500
9000
9500
10000
10500
Station (ft)

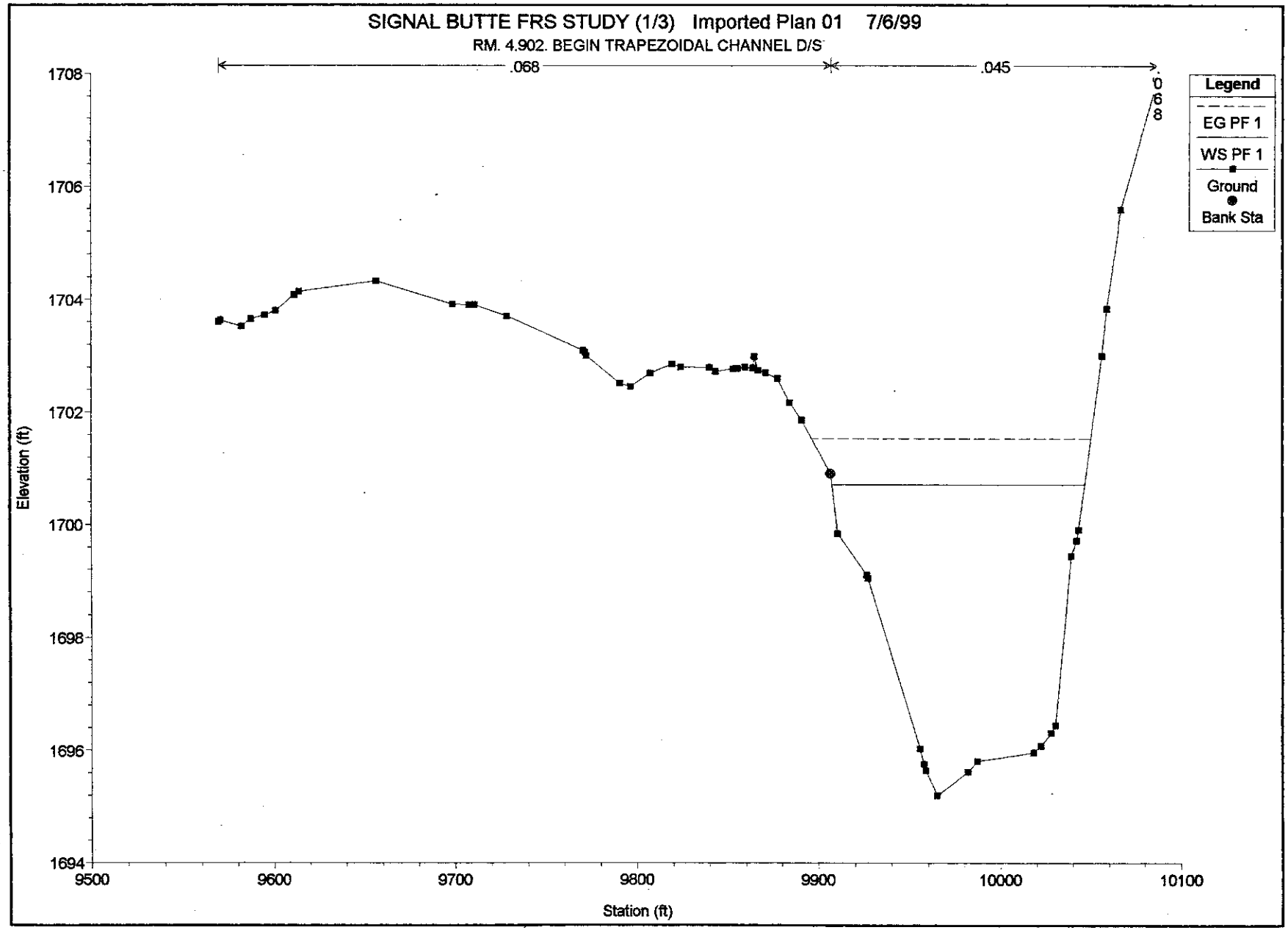

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.575. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1687
1686
1685
1684
1683
1682
1681
1680
1679
7500
8000
8500
9000
9500
10000
10500
Station (ft)

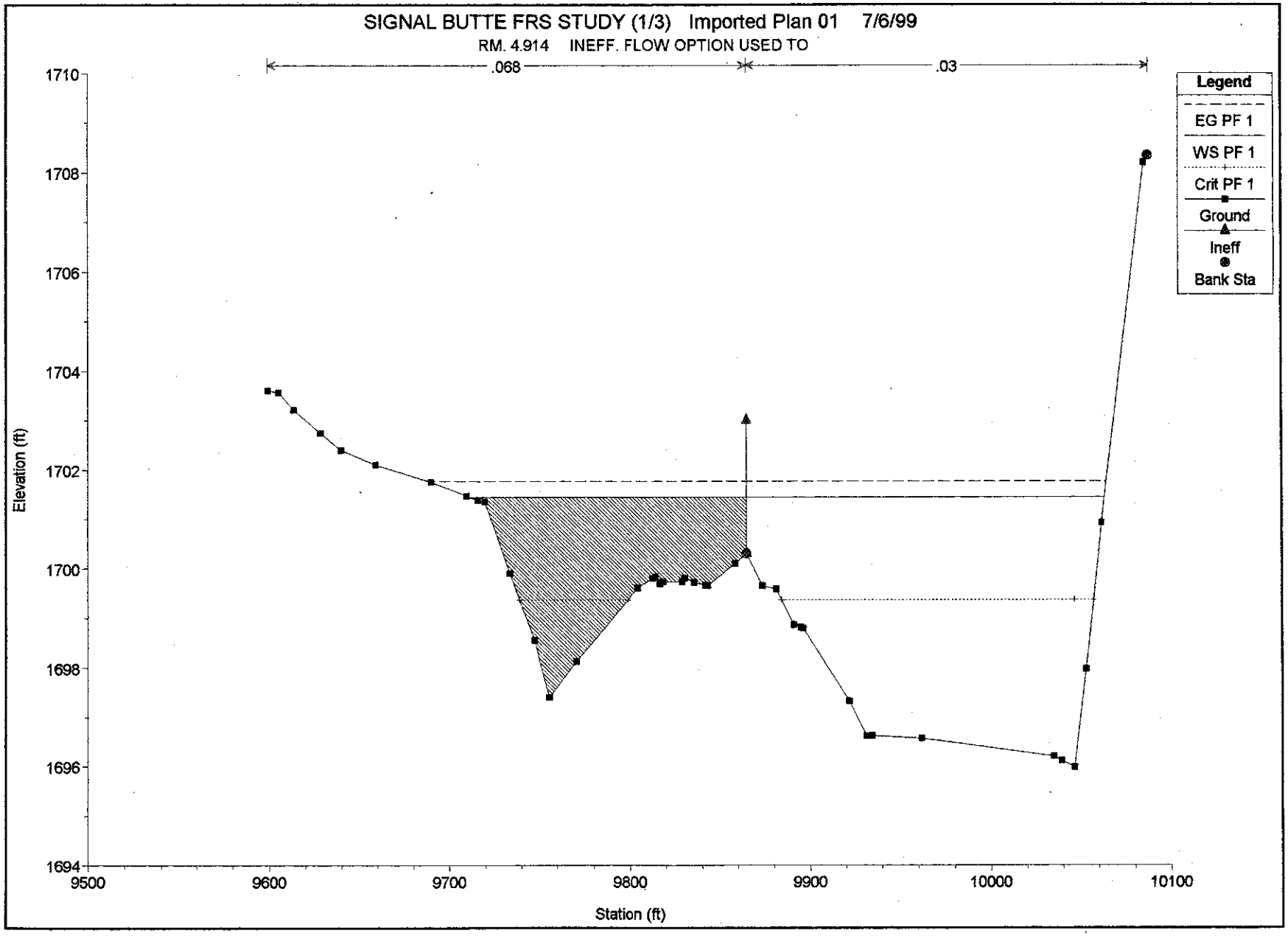

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.620. AREA BLOCKED OUT TO LT. OF
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1688
1687
1686
1685
1684
1683
1682
8000
8500
9000
9500
10000
10500
Station (ft)

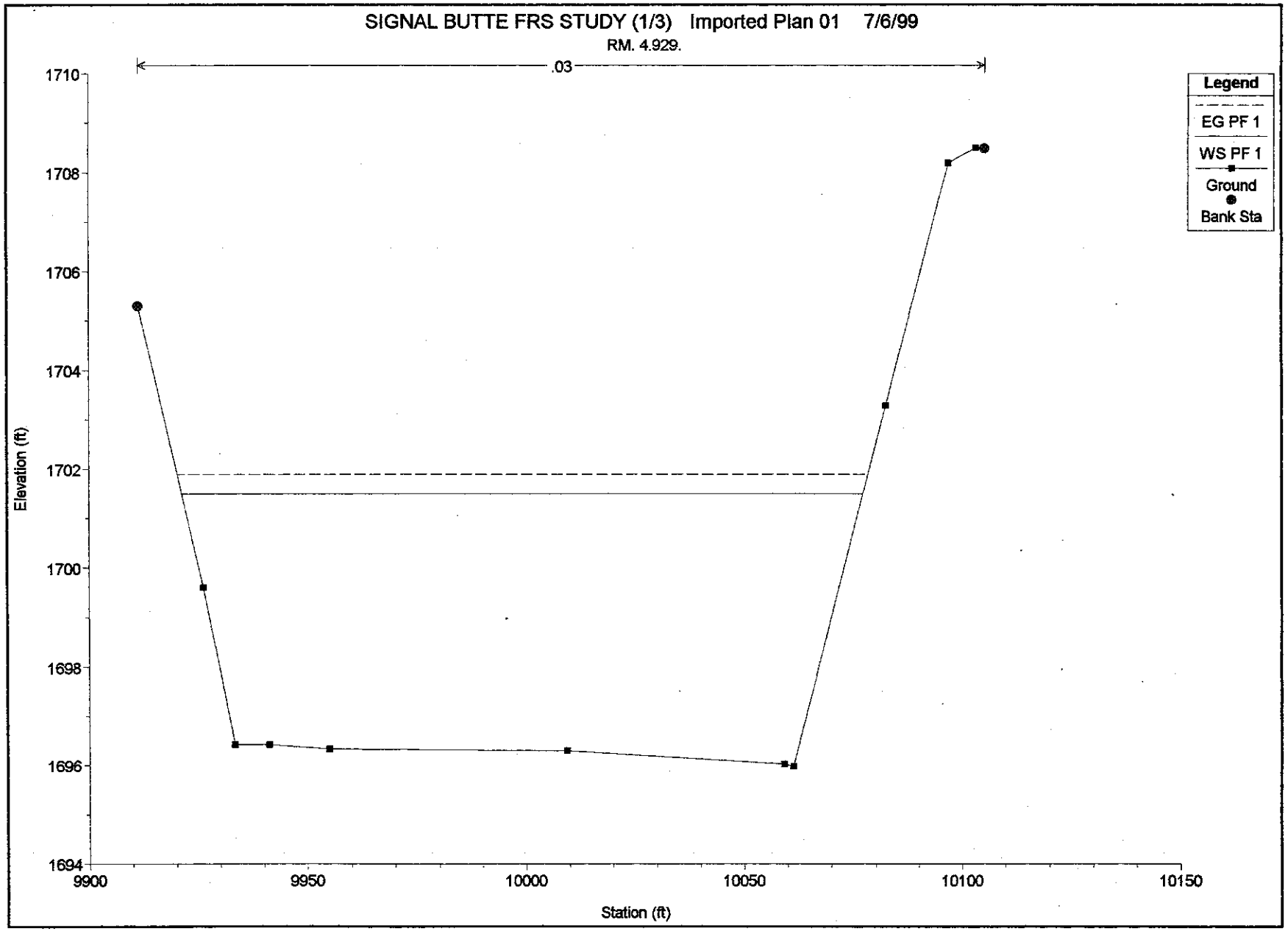

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.697. AREA BLOCKED OUT TO LT.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1693
1692
1691
1690
1689
1688
1687
1686
1685
8500
9000
9500
10000
10500
11000
Station (ft)

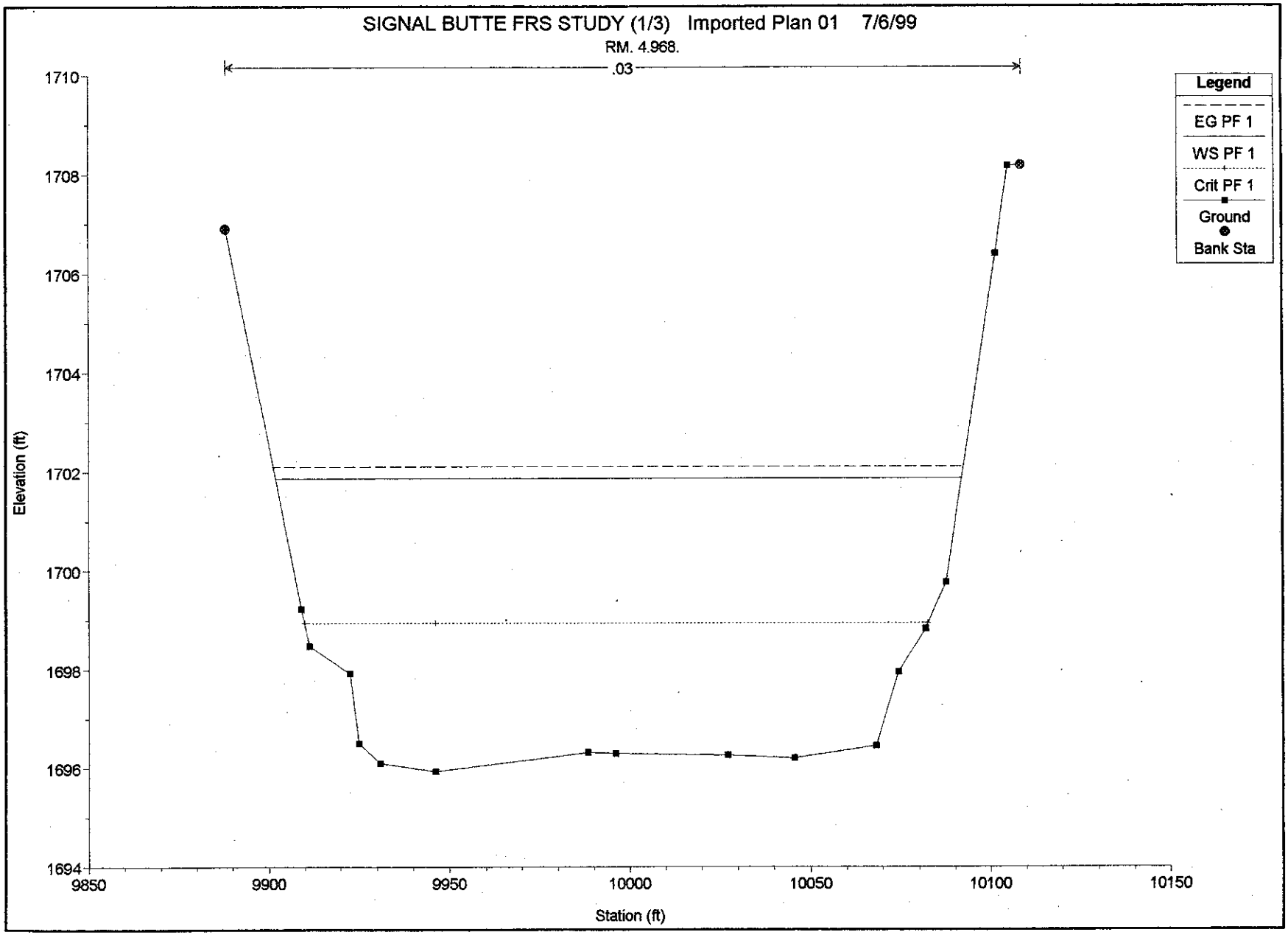

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.776. FLOW BLOCKED OUT TO RT. OF
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1698
1696
1694
1692
1690
1688
8800
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

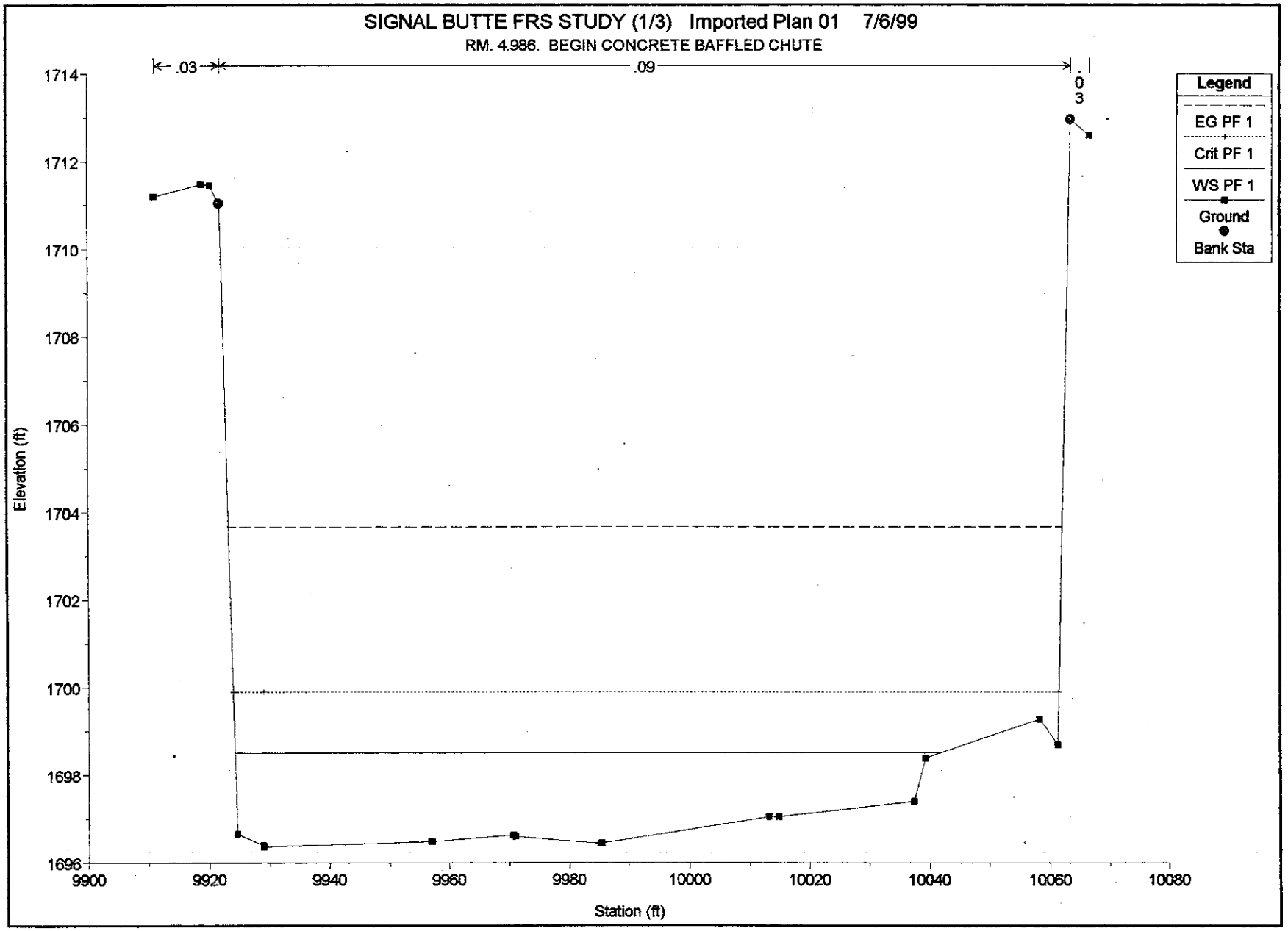

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.852. AREA BLOCKED OUT TO LT OF
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1702
1700
1698
1696
1694
1692
9000
9200
9400
9600
9800
10000
10200
10400
Station (ft)

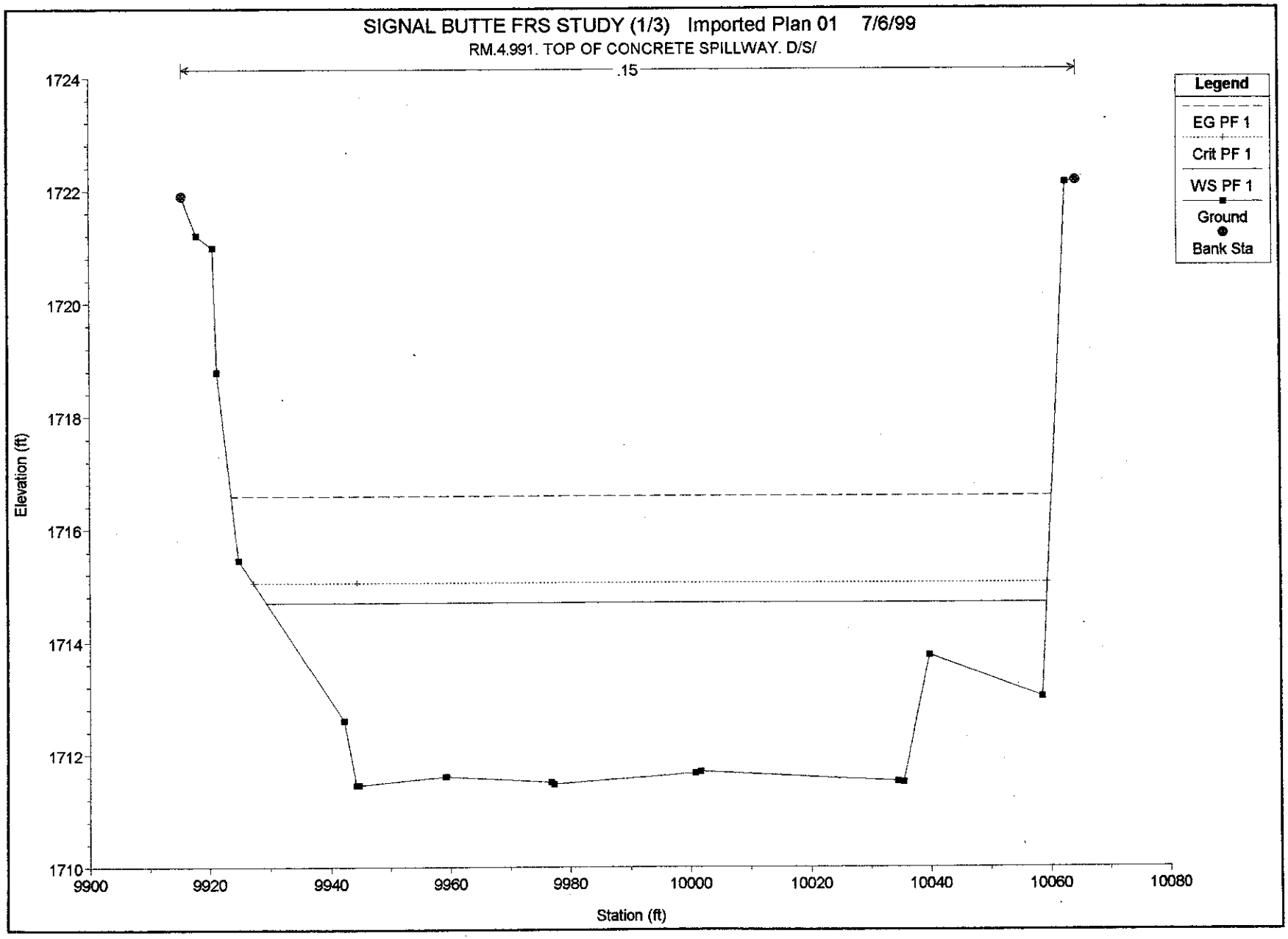

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100
Station (ft)

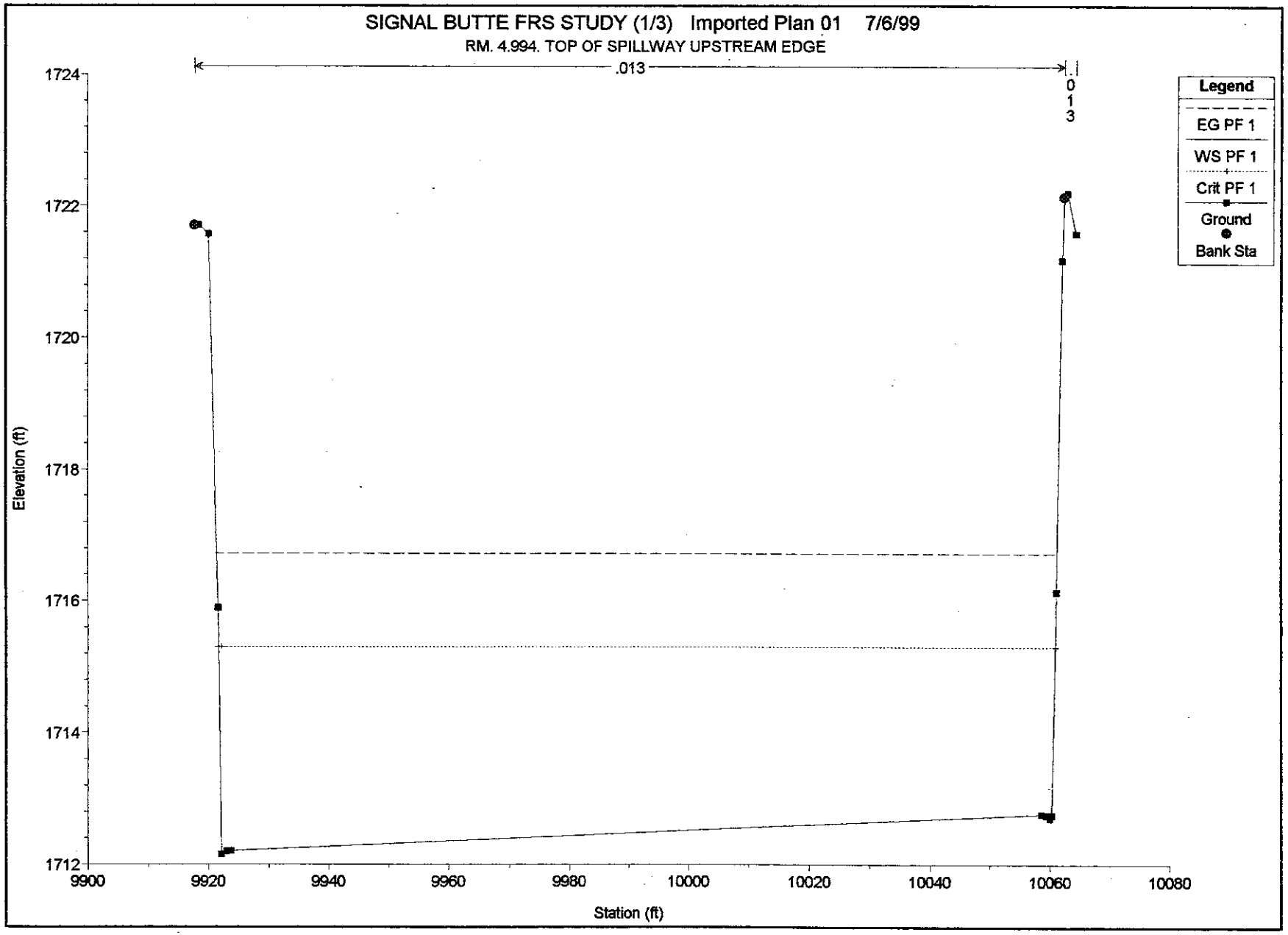

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.914 INEFF. FLOW OPTION USED TO
.068
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100
Station (ft)

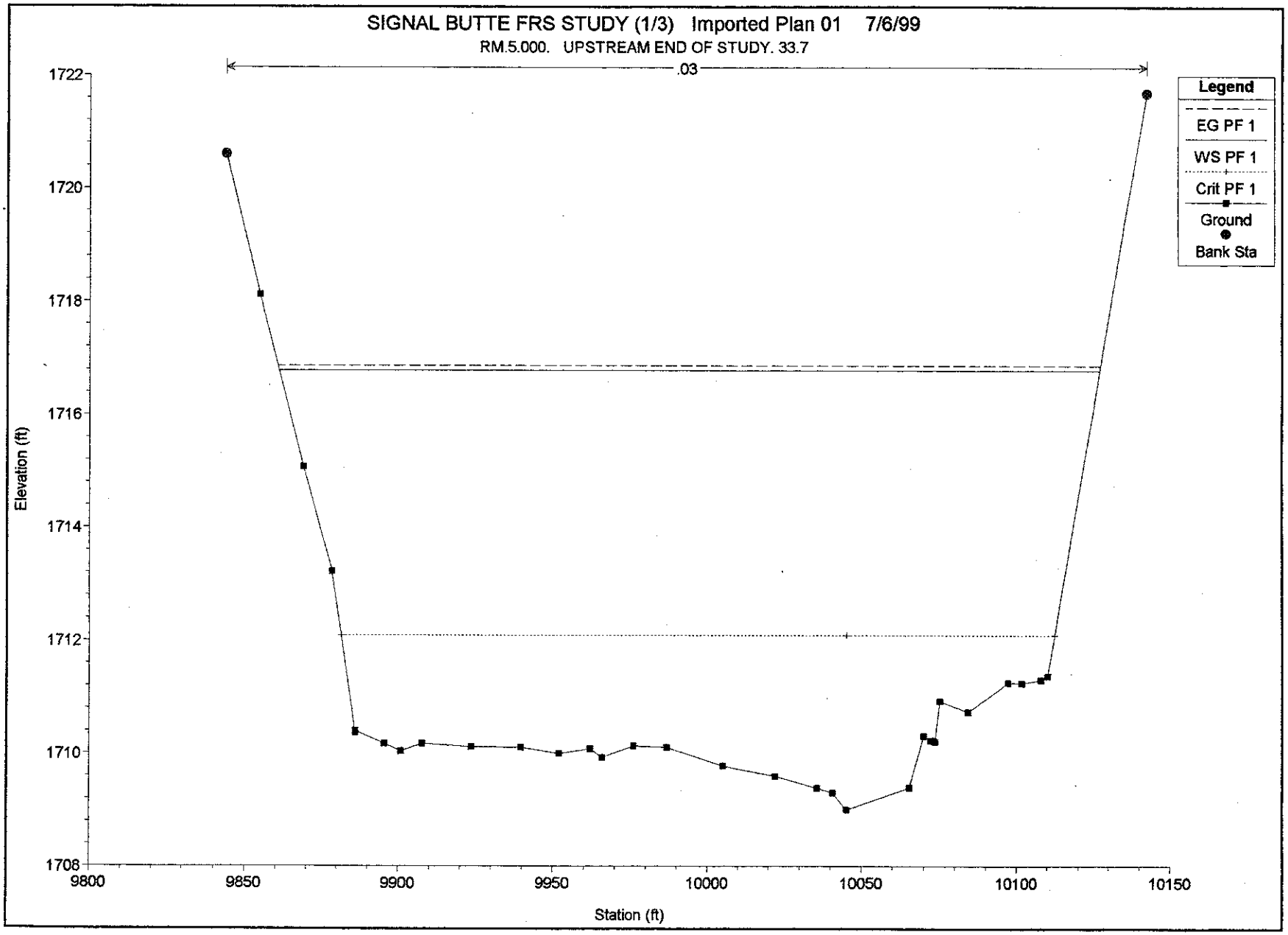

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.929.
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9900
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.968.
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9850
9900
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE
.03
.09
.03
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1714
1712
1710
1708
1706
1704
1702
1700
1698
1696
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)

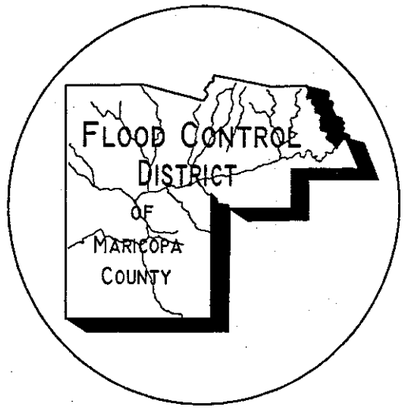

SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/
.15
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
1710
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE
.013
.013
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (1/3) Imported Plan 01 7/6/99
RM.5.000. UPSTREAM END OF STUDY. 33.7
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
1708
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)

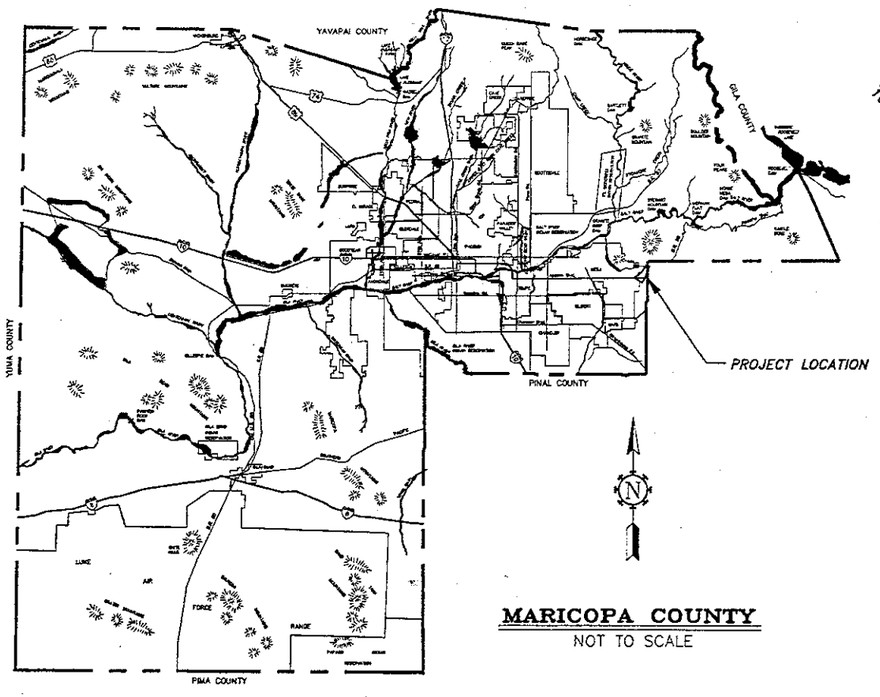
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DELINEATION OF SPILLWAY FLOWS
FOR
SIGNAL BUTTE FLOOD RETARDING STRUCTURE

F.C.D. CONTRACT NO. 98-17

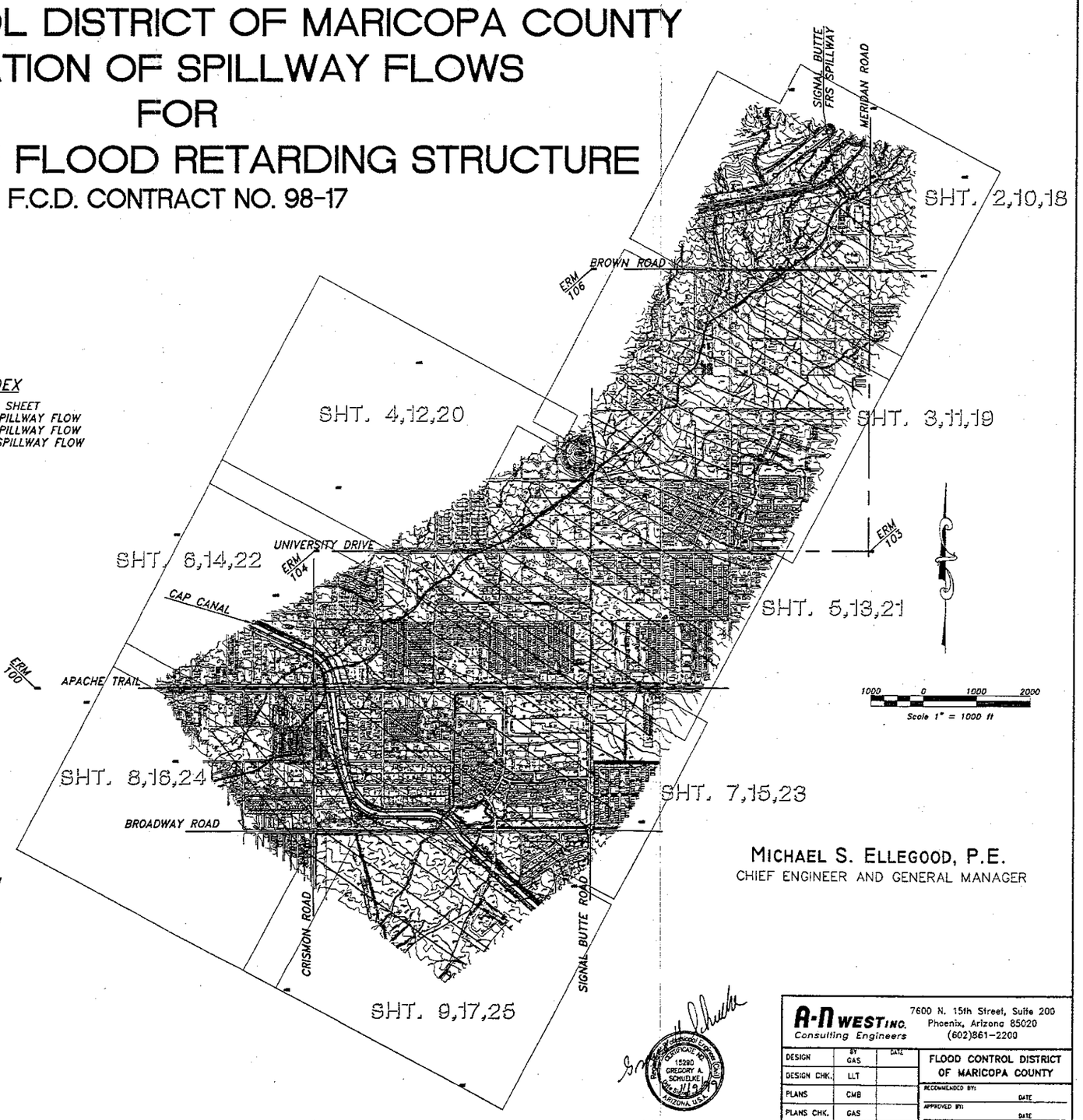


SHEET INDEX

1	COVER SHEET
2-9	1/3 SPILLWAY FLOW
10-17	2/3 SPILLWAY FLOW
18-25	FULL SPILLWAY FLOW



MARICOPA COUNTY
NOT TO SCALE



MICHAEL S. ELLEGOOD, P.E.
CHIEF ENGINEER AND GENERAL MANAGER

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

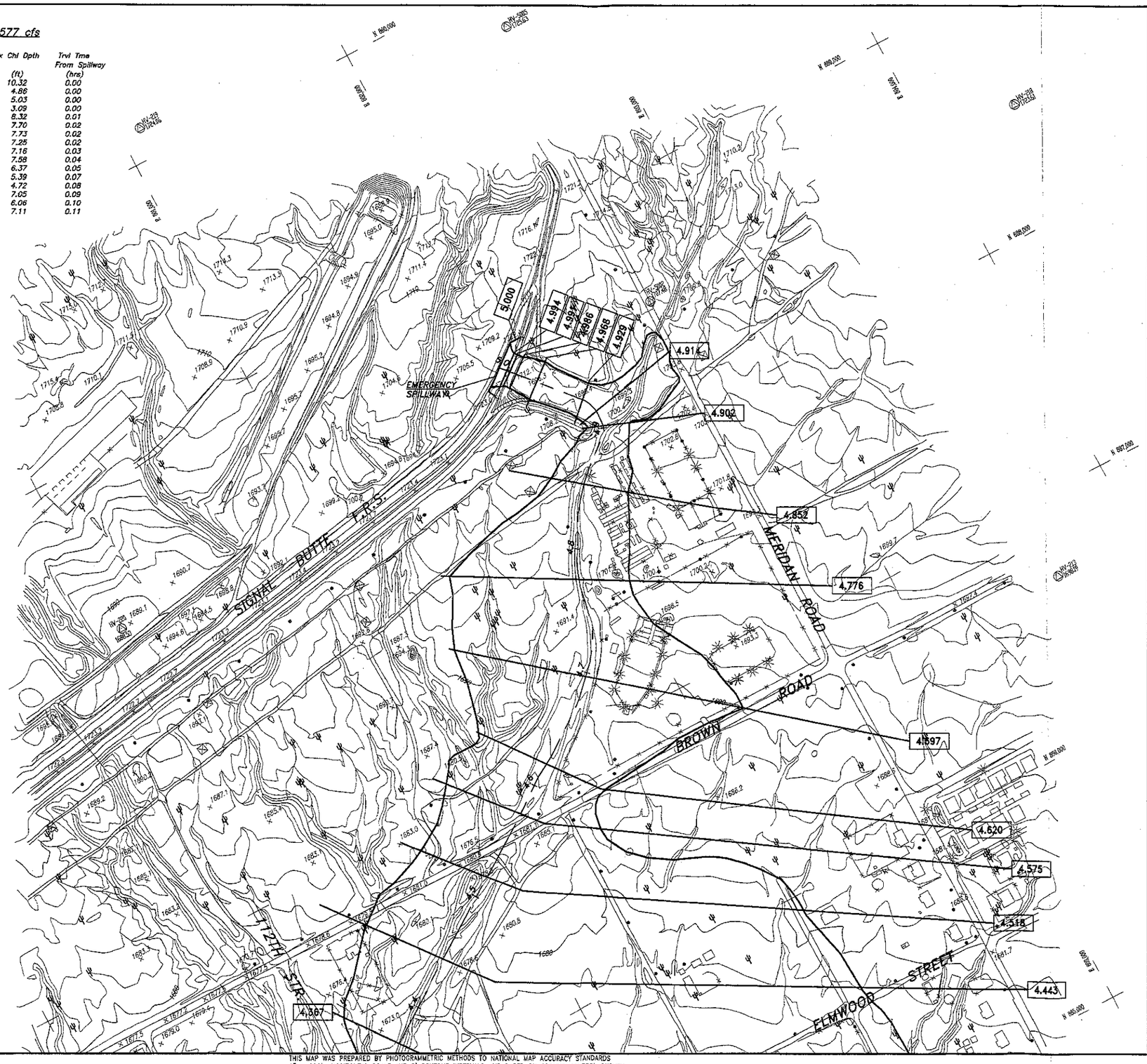
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 25

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
5.000	1719.32	3.26	10.32	0.00
4.994	1717.01	12.04	4.86	0.00
4.991	1716.48	13.10	5.03	0.00
4.986	1699.46	23.08	3.09	0.00
4.968	1704.25	5.33	8.32	0.01
4.929	1703.68	6.91	7.70	0.02
4.914	1703.71	5.91	7.73	0.02
4.902	1702.45	9.90	7.25	0.02
4.852	1699.86	9.88	7.16	0.03
4.776	1695.80	9.92	7.58	0.04
4.697	1691.74	6.80	6.37	0.05
4.620	1687.48	9.67	5.39	0.07
4.575	1684.41	8.99	4.72	0.08
4.518	1681.93	7.37	7.05	0.09
4.443	1678.16	9.52	6.06	0.10
4.367	1674.33	7.96	7.11	0.11



COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS
HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9
CROSS SECTION — RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK — ERM3 X
ZONE DESIGNATIONS — ZONE A
CORPORATE LIMITS
COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

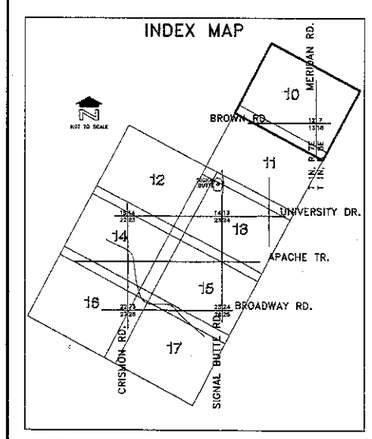
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF BROWN RD. & SIGNAL BUTTE RD.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUBIKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
4.443	1678.16	9.52	6.06	0.10
4.367	1674.33	7.96	7.11	0.11
4.311	1670.96	8.57	3.42	0.12
4.239	1667.55	5.05	4.81	0.14
4.171	1665.35	7.30	5.68	0.15
4.101	1662.85	7.88	6.51	0.17
4.026	1659.03	8.26	5.06	0.18
3.956	1655.48	6.97	5.68	0.19
3.885	1652.68	5.19	5.10	0.21
3.817	1650.06	5.98	3.95	0.23
3.747	1646.70	5.60	3.65	0.25
3.674	1642.99	3.18	3.62	0.28
3.603	1639.13	4.03	5.21	0.30

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
212	1651.61	FOUND CITY OF MESA BRASS CAP IN HANDHOLE 0.47' BELOW RIM AT THE INTERSECTION OF CLANCY & DECATOR
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTER-SECTION OF BROWN RD. & SIGNAL BUTTE RD.

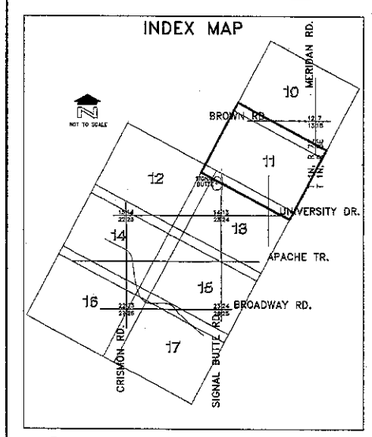
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE.
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUENKE 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 11 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7154-05 / 7154SS11.DWG / 9901171600MSTA, 7154SSTUPO
CMB 11/9/99

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
3.235	1621.70	5.46	2.81	0.41
3.161	1618.14	5.13	3.64	0.43
3.082	1614.20	3.75	5.90	0.46
3.006	1610.65	3.20	3.85	0.49
2.933	1608.05	5.03	3.95	0.52
2.857	1604.69	4.10	3.99	0.54
2.793	1601.79	5.50	3.68	0.56
2.720	1597.51	8.54	4.69	0.58

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

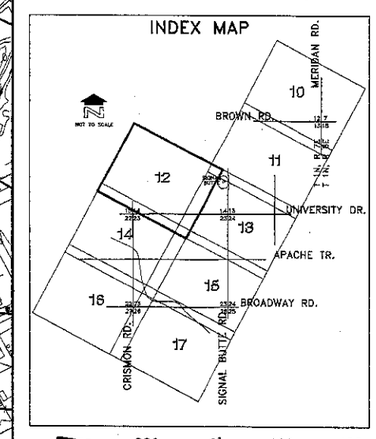
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104*	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE ARIZONA U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 12 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
3.603	1639.13	4.03	5.21	0.30
3.532	1635.55	2.75	4.02	0.33
3.462	1632.86	5.43	5.61	0.36
3.386	1629.52	6.79	7.10	0.38
3.310	1625.46	6.95	4.69	0.39
3.235	1621.70	5.46	2.81	0.41
3.161	1618.14	5.13	3.64	0.43
3.082	1614.20	3.75	5.90	0.46
3.006	1610.65	3.20	3.85	0.49
2.933	1608.05	5.03	3.95	0.52
2.857	1604.69	4.10	3.99	0.54

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17
2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS
HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9
CROSS SECTION — RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK — ERM3 X
ZONE DESIGNATIONS — ZONE A
CORPORATE LIMITS
COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
105	1620.83	FOUND MCDOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF UNIVERSITY DR. & SIGNAL BUTTE RD.
103*	1651.54	FOUND MCDOT BRASS CAP IN HANDHOLE AT THE INTERSECTION OF MERDIAN RD. & UNIVERSITY DR.

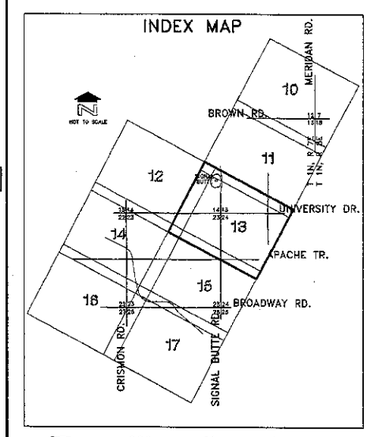
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUEIKE Date 10/9/98 ARIZONA U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

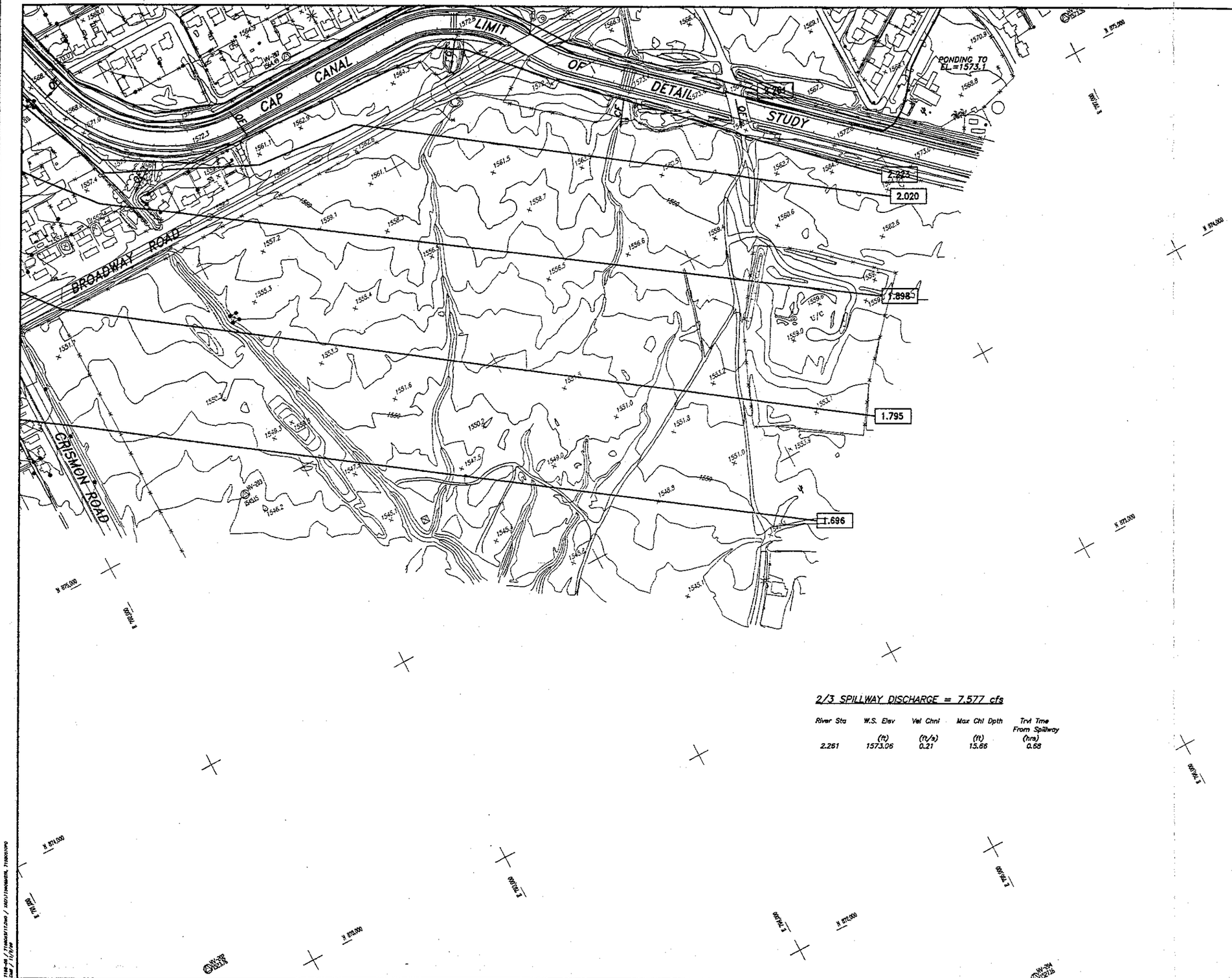
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 13 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.



2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
2.261	1573.06	0.21	15.66	0.68

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101*	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.

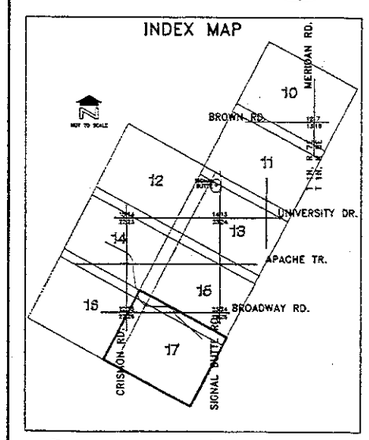
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400+ FEET AT EL.1570.0 AND 1573.5, RESPECTIVELY.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

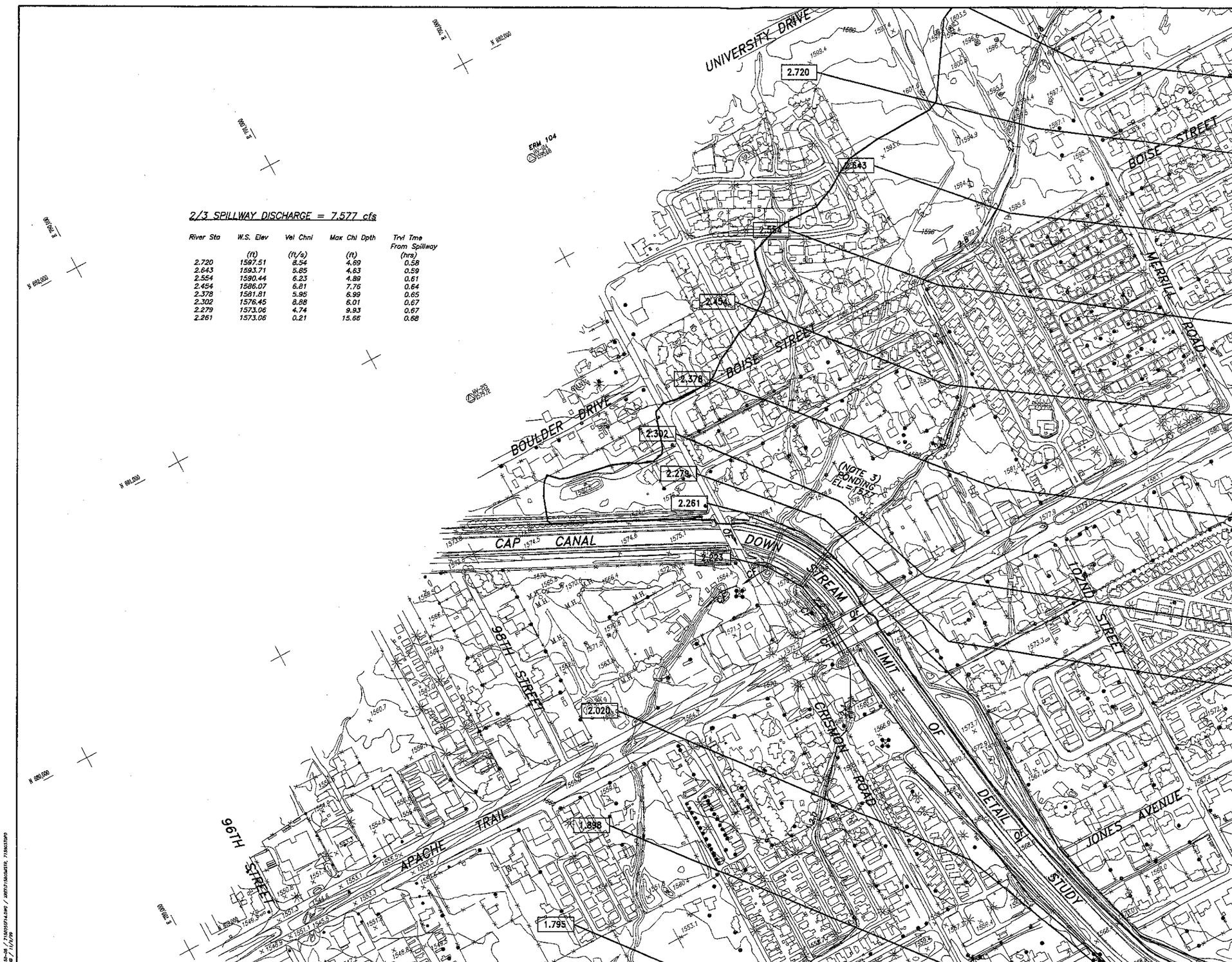
APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 17 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.



2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
2.720	1597.51	8.54	4.69	0.58
2.643	1593.71	5.85	4.63	0.59
2.554	1590.44	6.23	4.89	0.61
2.454	1586.07	6.81	7.76	0.64
2.378	1581.81	5.95	6.99	0.65
2.302	1576.45	8.88	6.01	0.67
2.279	1573.06	4.74	9.93	0.67
2.261	1573.06	0.21	15.66	0.68

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS
HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9
CROSS SECTION — RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK — ERM3 X
ZONE DESIGNATIONS — ZONE A
CORPORATE LIMITS
COUNTY OR STATE
JURISDICTIONAL BOUNDARY
CULVERT FLOW ACROSS CAP — C.F.
OVERFLOW LOCATIONS ACROSS CAP — O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

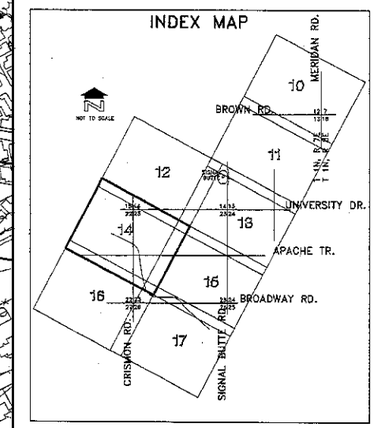
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
3. POTENTIAL PONDING TO EL. 1577 UPSTREAM AND NORTH OF APACHE TRAIL DUE TO APACHE TRAIL ROAD EMBANKMENT

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELLE Date Signed 11/5/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 14 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE	
JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

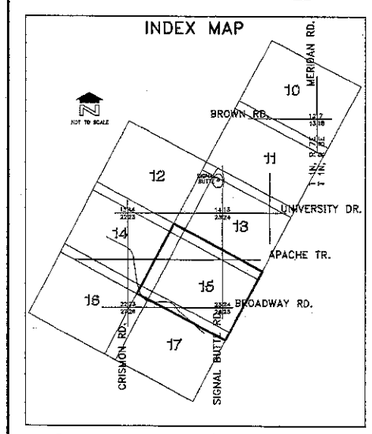
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1581.30	FOUND MCDOT BRASS CAP IN HANDHOLE 0.25' BELOW RIM AT THE INTERSECTION OF SIGNAL BUTTE RD. & BROADWAY

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400± FEET AT EL.1570.0 AND 1573.6, RESPECTIVELY.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Time From Spillway (hrs)
2.857	1604.69	4.10	3.99	0.54
2.793	1601.79	5.50	3.68	0.56
2.720	1597.51	8.54	4.69	0.58
2.643	1593.71	5.85	4.63	0.59
2.554	1590.44	6.23	4.89	0.61
2.454	1586.07	6.81	7.76	0.64
2.378	1581.81	5.95	6.99	0.65
2.302	1576.45	8.89	6.01	0.67
2.279	1573.06	4.74	9.93	0.67
2.261	1573.06	0.21	15.66	0.68

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 15 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

2/3 SPILLWAY DISCHARGE = 7,577 cfs

River Sta	W.S. Elev	Vel Chnl	Max Chl Dpth	Trvl Time From Spillway
	(ft)	(ft/s)	(ft)	(hrs)
2.261	1573.06	0.21	15.66	0.68

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

2/3 SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F. →
OVERFLOW LOCATIONS ACROSS CAP	O.F. →

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

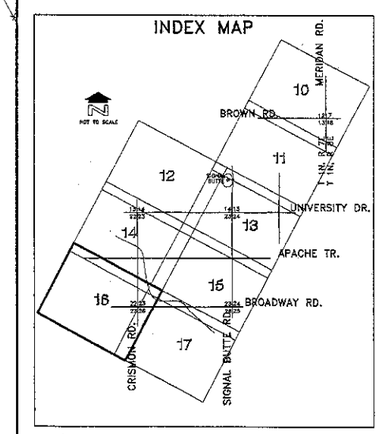
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.
100*	1527.21	FOUND ADOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF ELLSWORTH RD. & APACHE TRAIL

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE Date Signed 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 16 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7156-05 / 7156SC71&LINE / REF07SBSMITH, 7156SSSWP
CMB / 11/9/99

HEC-RAS September 1998 Version 2.2
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: SIGNAL BUTTE FRS STUDY (2/3)
Project File : SIGBUT5.prj
Run Date and Time: 7/6/99 7:30:08 AM

Project in English units

Project Description:
DELINEATE SPILLWAY FLOWS FROM SIGNAL BUTTE FRS DOWNSTREAM TO CAP CANAL
FCD NO.
98-17
PREPARED BY A-N WEST, INC. JOB. NO. 7158-05
EXISTING CONDITIONS .
2/3 SPILLWAY FLOW= 7577 CFS. PROFILE 2
TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL MAPPING OF PHOENIX.
PHOTO
DATE:10/15/98
FIELD SURVEY BY AZTEC ENGINEERING , PHX. AZ.
STARTING D/S WATER
SURFACE ELEV. BASED ON NORMAL DEPTH (S=0.011 FT/FT.)
STARTING U/S WSEL BASED
ON CRITICAL DEPTH.
COMPUTATIONAL FLOW REGIME: MIXED FLOW
MANNIN'GS (N) VALUE
RANGE; 0.013 (CONCRETE SPILLWAY), .030 (TRAP. CHANN. D/S SPILLWAY), .045 (MAIN
CHANN.),.068 (LT.DEV. OVERBANK), 0.10(MOD. DEV. O.B.,0.15 (HVY. DEV.)
FOR
THE 1/3 SPILLWAY FLOW DELINEATION, A NARROWER BAND OF EFFECTIVE FLOW WAS
USED THAN FOR FULL SPILLWAY FLOWS .

PLAN DATA

```
Plan Title: Imported Plan 01
Plan File : C:\HEC\RAS\SIGBUT5.p01

           Geometry Title: Imported Geom 02
           Geometry File : C:\HEC\RAS\SIGBUT5.g02

           Flow Title    : Imported Flow 01
           Flow File     : C:\HEC\RAS\SIGBUT5.f01

Plan Summary Information:
Number of:  Cross Sections =   51    Mulitple Openings =    0
            Culverts       =    1    Inline Weirs      =    0
            Bridges        =    0

Computational Information
    Water surface calculation tolerance =  0.01
    Critical depth calculaton tolerance =  0.01
    Maximum number of interations       =  20
    Maximum difference tolerance        =  0.3
    Flow tolerance factor               =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Mixed Flow
```

FLOW DATA

Flow File : C:\HEC\RAS\SIGBUT5.f01

Flow Data (cfs)

River	Reach	RS	PF 1
SIGNAL BUTTE	SPILLWAY	5.000	7577

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
SIGNAL BUTTE	SPILLWAY	PF 1	Critical	Normal S = .011

GEOMETRY DATA

Geometry Title: Imported Geom 02
Geometry File : C:\HEC\RAS\SIGBUT5.g02

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 5.000**

INPUT
Description: RM.5.000. UPSTREAM END OF STUDY. 33.7 FT. UPSTREAM OF UPSTREAM EDGE OF CONCRETE SPILLWAY OF SIGNAL BUTTE F.R.S. STARTING WSEL BASED ON CRITICAL DEPTH FOR SUPERCRITICAL PROFILE OF MIXED FLOW COMPUTATIONS.

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9843.98	1720.6	9854.85	1718.12	9869.02	1715.08	9878.36	1713.22	9886.06	1710.36
9886.09	1710.4	9895.58	1710.17	9900.94	1710.04	9907.81	1710.17	9923.66	1710.11
9939.71	1710.1	9952.09	1709.99	9962.03	1710.08	9965.76	1709.93	9976.08	1710.13
9986.97	1710.1	10005.07	1709.78	10022.06	1709.59	10035.71	1709.38	10040.68	1709.3
10045.28	1709	10065.44	1709.39	10070.11	1710.3	10072.32	1710.23	10073.01	1710.22
10073.67	1710.2	10075.2	1710.92	10084.32	1710.73	10097.23	1711.25	10101.65	1711.24
10107.98	1711.3	10110.12	1711.37	10142.51	1721.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9843.98	.03	9843.98	.03	10142.51	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9843.98	10142.51	33.7	33.7	33.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1719.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.030	
W.S. Elev (ft)	1719.32	Reach Len. (ft)	33.70	33.70	33.70
Crit W.S. (ft)	1713.31	Flow Area (sq ft)		2324.36	
E.G. Slope (ft/ft)	0.000268	Area (sq ft)		2324.36	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	285.51	Top Width (ft)		285.51	
Vel Total (ft/s)	3.26	Avg. Vel. (ft/s)		3.26	
Max Chl Dpth (ft)	10.32	Hydr. Depth (ft)		8.14	
Conv. Total (cfs)	462987.8	Conv. (cfs)		462987.8	
Length Wtd. (ft)	33.70	Wetted Per. (ft)		288.21	
Min Ch El (ft)	1709.00	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.44	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1372.26	97.10	144.66
C & E Loss (ft)	0.21	Cum SA (acres)	898.77	32.45	109.01

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9843.98	RB 10142.51	7577.00	2324.36	288.21	100.00	8.14	3.26

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.994

INPUT
Description: RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE. DECREASE N VALUE TO 0.013 FOR TOP OF CONC. SPILLWAY.

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9917.72	1721.7	9918.28	1721.71	9919.94	1721.57	9921.53	1715.89	9922.08	1712.15
9922.98	1712.2	9923.3	1712.21	9923.63	1712.21	10058.64	1712.76	10059.41	1712.75
10060.03	1712.7	10060.35	1712.75	10061.14	1716.14	10062.05	1721.18	10062.48	1722.14
10062.99	1722.2	10064.47	1721.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9917.72	.013	9917.72	.013	10062.48	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9917.72	10062.48	12.96	12.96	12.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1719.26	Element			
Vel Head (ft)	2.25	Wt. n-Val.		0.013	
W.S. Elev (ft)	1717.01	Reach Len. (ft)	12.96	12.96	12.96
Crit W.S. (ft)	1717.01	Flow Area (sq ft)		629.53	
E.G. Slope (ft/ft)	0.001603	Area (sq ft)		629.53	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	140.08	Top Width (ft)		140.08	
Vel Total (ft/s)	12.04	Avg. Vel. (ft/s)		12.04	
Max Chl Dpth (ft)	4.86	Hydr. Depth (ft)		4.49	
Conv. Total (cfs)	189254.2	Conv. (cfs)		189254.2	
Length Wtd. (ft)	12.96	Wetted Per. (ft)		147.59	
Min Ch El (ft)	1712.15	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		5.14	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1372.26	95.96	144.66
C & E Loss (ft)	0.01	Cum SA (acres)	898.77	32.29	109.01

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9917.72	RB 10062.48	7577.00	629.53	147.59	100.00	4.49	12.04

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.991

INPUT
Description: RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/ EDGE. MANNING'S N VALUE INCREASED FOR THIS REACH TO 0.15 TO ACCOUNT FOR BAFFLED BLOCK ENERGY DISSIPATOR BLOCKS.

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9915.58	1721.9	9918.01	1721.2	9920.69	1720.98	9921.31	1718.78	9924.8	1715.45
9942.18	1712.6	9944.25	1711.45	9944.71	1711.45	9959.07	1711.6	9959.23	1711.6
9976.87	1711.5	9977.34	1711.47	10000.77	1711.67	10001.66	1711.69	10034.46	1711.52
10035.44	1711.5	10039.72	1713.76	10058.59	1713.02	10062.68	1722.13	10064.47	1722.16

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9915.58	.013	9915.58	.151	10064.47	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9915.58	10064.47	27.8	27.8	27.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1719.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.67	Wt. n-Val.		0.150	
W.S. Elev (ft)	1716.48	Reach Len. (ft)	27.80	27.80	27.80
Crit W.S. (ft)	1716.81	Flow Area (sq ft)		578.20	
E.G. Slope (ft/ft)	0.264593	Area (sq ft)		578.20	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	136.43	Top Width (ft)		136.43	
Vel Total (ft/s)	13.10	Avg. Vel. (ft/s)		13.10	
Max Chl Dpth (ft)	5.03	Hydr. Depth (ft)		4.24	
Conv. Total (cfs)	14730.2	Conv. (cfs)		14730.2	
Length Wtd. (ft)	27.80	Wetted Per. (ft)		140.20	
Min Ch El (ft)	1711.45	Shear (lb/sq ft)		68.13	
Alpha	1.00	Stream Power (lb/ft s)		892.76	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1372.26	95.78	144.66
C & E Loss (ft)	0.04	Cum SA (acres)	898.77	32.25	109.01

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.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9915.58	RB 10064.47	7577.00	578.20	140.20	100.00	4.24	13.10

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.986

INPUT
Description: RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE SPILLWAY. INCREASE N VALUE TO 0.09 TO PROVIDE AVE. N VALUE BETWEEN FULL BAFFLED BLOCK SEGMENT AND TRAP. CHANN. SEGMENT.

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.12	1711.2	9918.76	1711.48	9920.17	1711.46	9921.79	1711.04	9924.61	1696.66
9928.91	1696.4	9929.02	1696.37	9957	1696.48	9957.18	1696.48	9970.7	1696.64
9971.09	1696.6	9985.17	1696.44	9985.42	1696.45	10013.17	1697.05	10014.95	1697.04
10037.37	1697.4	10039.25	1698.39	10058.26	1699.27	10061.28	1698.69	10063.52	1712.95
10066.66	1712.6								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.12	.03	9921.79	.09	10063.52	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9921.79	10063.52	92.6	92.6	92.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1707.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	8.27	Wt. n-Val.		0.090	
W.S. Elev (ft)	1699.46	Reach Len. (ft)	92.60	92.60	92.60
Crit W.S. (ft)	1701.61	Flow Area (sq ft)		328.28	
E.G. Slope (ft/ft)	0.631283	Area (sq ft)		328.28	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	137.34	Top Width (ft)		137.34	
Vel Total (ft/s)	23.08	Avg. Vel. (ft/s)		23.08	
Max Chl Dpth (ft)	3.09	Hydr. Depth (ft)		2.39	
Conv. Total (cfs)	9536.4	Conv. (cfs)		9536.4	
Length Wtd. (ft)	92.60	Wetted Per. (ft)		140.65	
Min Ch El (ft)	1696.37	Shear (lb/sq ft)		91.98	
Alpha	1.00	Stream Power (lb/ft s)		2123.08	
Frctn Loss (ft)	10.85	Cum Volume (acre-ft)	1372.26	95.49	144.66
C & E Loss (ft)	0.56	Cum SA (acres)	898.77	32.16	109.01

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9921.79	RB 10063.52	7577.00	328.28	140.65	100.00	2.39	23.08

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.968

INPUT
Description: RM. 4.968.

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9888.2	1706.9	9909.13	1699.23	9911.27	1698.48	9922.54	1697.93	9925.09	1696.5
9930.97	1696.1	9946.22	1695.93	9988.32	1696.32	9996.02	1696.31	0027.28	1696.26
10045.55	1696.21	0068.23	1696.45	10074.45	1697.95	10081.83	1698.83	10087.66	1699.76
10101.66	1706.41	0105.26	1708.17	10108.82	1708.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9888.2	.03	9888.2	.03	10108.82	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9888.21	10108.82	208.34	208.34	208.34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1704.69	Element			
Vel Head (ft)	0.44	Wt. n-Val.		0.030	
W.S. Elev (ft)	1704.25	Reach Len. (ft)	208.34	208.34	208.34
Crit W.S. (ft)	1700.44	Flow Area (sq ft)		1420.64	
E.G. Slope (ft/ft)	0.000874	Area (sq ft)		1420.64	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	201.71	Top Width (ft)		201.71	
Vel Total (ft/s)	5.33	Avg. Vel. (ft/s)		5.33	
Max Chl Dpth (ft)	8.32	Hydr. Depth (ft)		7.04	
Conv. Total (cfs)	256229.2	Conv. (cfs)		256229.2	
Length Wtd. (ft)	208.34	Wetted Per. (ft)		204.45	
Min Ch El (ft)	1695.93	Shear (lb/sq ft)		0.38	
Alpha	1.00	Stream Power (lb/ft s)		2.02	
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	1372.26	93.63	144.66
C & E Loss (ft)	0.03	Cum SA (acres)	898.77	31.80	109.01

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9888.20	RB 10108.82	7577.00	1420.64	204.45	100.00	7.04	5.33

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.929

INPUT
Description: RM. 4.929.

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.26	1705.3	9926.18	1699.6	9933.33	1696.42	9941.32	1696.42	9954.96	1696.34
10009.41	1696.3	10059.24	1696.03	10061.29	1695.98	10082.37	1703.29	10096.95	1708.19
10103.33	1708.5	10105.48	1708.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.26	.03	9911.26	.03	10105.48	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9911.26	10105.48	120	76.23	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1704.42	Element			
Vel Head (ft)	0.74	Wt. n-Val.		0.030	
W.S. Elev (ft)	1703.68	Reach Len. (ft)	120.00	76.23	25.00
Crit W.S. (ft)		Flow Area (sq ft)		1096.18	
E.G. Slope (ft/ft)	0.001632	Area (sq ft)		1096.18	
Q Total (cfs)	7577.00	Flow (cfs)		7577.00	
Top Width (ft)	168.02	Top Width (ft)		168.02	
Vel Total (ft/s)	6.91	Avg. Vel. (ft/s)		6.91	
Max Chl Dpth (ft)	7.70	Hydr. Depth (ft)		6.52	
Conv. Total (cfs)	187545.6	Conv. (cfs)		187545.6	
Length Wtd. (ft)	76.32	Wetted Per. (ft)		170.75	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)		0.65	
Alpha	1.00	Stream Power (lb/ft s)		4.52	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	1372.26	87.61	144.66
C & E Loss (ft)	0.06	Cum SA (acres)	898.77	30.91	109.01

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9911.26	RB 10105.48	7577.00	1096.18	170.75	100.00	6.52	6.91

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.914**

INPUT
Description: RM. 4.914 INEFFECTIVE FLOW OPTION USED TO BLOCK OUT FLOW TO LEFT OF STA. 9860.

Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9599.38	1703.6	9605.27	1703.57	9613.73	1703.21	9628.26	1702.74	9640.01	1702.4
9659.34	1702.1	9689.85	1701.75	9709.87	1701.47	9716.11	1701.37	9720.11	1701.34
9733.65	1699.9	9747.41	1698.56	9755.78	1697.4	9770.71	1698.13	9804.49	1699.6
9812.95	1699.8	9814.27	1699.83	9816.7	1699.69	9818.67	1699.73	9829.2	1699.73
9830.45	1699.8	9835.71	1699.72	9841.92	1699.66	9843.24	1699.65	9858.76	1700.1
9865.1	1700.3	9873.59	1699.65	9881.28	1699.58	9890.9	1698.86	9894.92	1698.82
9896.1	1698.8	9921.75	1697.32	9931.45	1696.61	9934.31	1696.62	9961.9	1696.57
10034.86	1696.2	10039.04	1696.12	10046.37	1695.98	10052.89	1697.97	10061.87	1700.92
10085.54	1708.2	10085.62	1708.19	10087.97	1708.33				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9599.38	.068	9865.1	.031	10087.97	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9865.1	10087.97	120	67.17	25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
9599.38	9860	1705

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1704.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.	0.068	0.030	
W.S. Elev (ft)	1703.71	Reach Len. (ft)	120.00	67.17	25.00
Crit W.S. (ft)	1700.88	Flow Area (sq ft)	17.80	1275.78	
E.G. Slope (ft/ft)	0.001263	Area (sq ft)	816.16	1275.78	
Q Total (cfs)	7577.00	Flow (cfs)	31.80	7545.20	
Top Width (ft)	471.56	Top Width (ft)	265.72	205.84	
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)	1.79	5.91	
Max Chl Dpth (ft)	7.73	Hydr. Depth (ft)	3.49	6.20	
Conv. Total (cfs)	213203.3	Conv. (cfs)	894.8	212308.4	
Length Wtd. (ft)	67.41	Wetted Per. (ft)	5.10	207.16	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)	0.28	0.49	
Alpha	1.02	Stream Power (lb/ft s)	0.49	2.87	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1371.13	85.53	144.66
C & E Loss (ft)	0.10	Cum SA (acres)	898.41	30.59	109.01

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9798.67	9865.10	31.80	17.80	5.10	0.42	3.49	1.79
LB 9865.10	RB 10087.97	7545.20	1275.78	207.16	99.58	6.20	5.91

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.902

INPUT
Description: RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S/ OF SPILLWAY.

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9569.3	1703.6	9570.24	1703.63	9582.02	1703.52	9587.21	1703.65	9594.87	1703.72
9600.67	1703.8	9611.08	1704.08	9613.59	1704.14	9656.3	1704.32	9698.56	1703.91
9707.61	1703.9	9710.56	1703.9	9728.44	1703.7	9770.15	1703.09	9771.24	1703.06
9772.19	1703	9790.71	1702.51	9796.64	1702.45	9807.42	1702.69	9819.3	1702.85
9824.23	1702.8	9840.04	1702.79	9843.47	1702.72	9853.18	1702.76	9855.36	1702.77
9859.69	1702.8	9864.04	1702.78	9864.74	1702.98	9866.98	1702.74	9871.07	1702.7
9877.7	1702.6	9884.14	1702.17	9890.93	1701.86	9906.82	1700.9	9910.86	1699.84
9926.61	1699.1	9927.39	1699.04	9955.71	1696.03	9957.81	1695.76	9958.84	1695.64
9964.99	1695.2	9982.12	1695.62	9987.28	1695.81	10018.22	1695.96	10022.17	1696.08
10027.92	1696.3	10030.31	1696.44	10039.31	1699.44	10042.31	1699.71	10043.42	1699.91
10056.21	1703	10058.82	1703.84	10066.78	1705.59	10086.97	1707.91	10087.92	1707.83

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9569.3	.068	9906.82	.045	10086.97	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9906.82	10086.97	280	261.94	230	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1703.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.52	Wt. n-Val.	0.068	0.045	
W.S. Elev (ft)	1702.45	Reach Len. (ft)	280.00	261.94	230.00
Crit W.S. (ft)		Flow Area (sq ft)	20.59	761.29	
E.G. Slope (ft/ft)	0.010158	Area (sq ft)	20.59	761.29	
Q Total (cfs)	7577.00	Flow (cfs)	37.91	7539.09	
Top Width (ft)	174.30	Top Width (ft)	27.18	147.12	
Vel Total (ft/s)	9.69	Avg. Vel. (ft/s)	1.84	9.90	
Max Chl Dpth (ft)	7.25	Hydr. Depth (ft)	0.76	5.17	
Conv. Total (cfs)	75177.2	Conv. (cfs)	376.2	74801.0	
Length Wtd. (ft)	262.88	Wetted Per. (ft)	27.23	148.32	
Min Ch El (ft)	1695.20	Shear (lb/sq ft)	0.48	3.26	
Alpha	1.04	Stream Power (lb/ft s)	0.88	32.24	

Frctn Loss (ft)	2.76	Cum Volume (acre-ft)	1369.98	83.96	144.66
C & E Loss (ft)	0.07	Cum SA (acres)	898.00	30.32	109.01

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9822.44	9906.82	37.91	20.59	26.95	0.50	0.77	1.84
LB 9906.82	RB 10086.97	7539.09	761.29	148.32	99.50	5.17	9.90

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.852

INPUT
Description: RM. 4.852. AREA BLOCKED OUT TO LT. OF STA.9790.13.

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9176.68	1700.2	9216.75	1700.39	9216.84	1700.39	9216.88	1700.39	9216.93	1700.38
9223.8	1698.7	9231.22	1698.72	9238.57	1698.73	9239.83	1698.72	9243.73	1698.83
9271.54	1698.7	9273.68	1698.71	9276.37	1698.68	9278.04	1698.65	9282.14	1698.64
9301.81	1698.8	9305.89	1698.34	9314.94	1698.4	9316.21	1698.52	9330.57	1700.06
9339.65	1699.8	9353.73	1700.26	9355.44	1700.25	9357.73	1700.25	9361.39	1700.27
9368.81	1700.4	9401.21	1701.02	9410.55	1700.94	9424.54	1700.83	9426.6	1700.82
9429.18	1700.7	9433.95	1700.52	9446.91	1700.1	9481.8	1698.93	9523.95	1699.49
9549.43	1700.1	9603.66	1700.33	9685.19	1700.08	9697.82	1700.06	9699.23	1700.07
9736.8	1700.4	9786.05	1700.49	9790.13	1700.6	9807.56	1700.41	9811.08	1700.25
9817.32	1699.8	9821.17	1699.28	9823.8	1698.97	9844.24	1697.92	9862.69	1697.21
9922.92	1695.9	9925.6	1695.82	9928.41	1695.78	9929.54	1695.77	9936.64	1695.75
9983.39	1695.8	9998.01	1694.31	10010.25	1692.71	10022.77	1693.31	10033.68	1693.91
10036.17	1694.41	10051.93	1697.35	10052.2	1697.34	10071.29	1697.95	10071.49	1697.94
10071.83	1698	10087.16	1698.16	10095.74	1698.48	10109.44	1699.35	10114.9	1699.58
10125.72	1699.71	10163.22	1700.26	10196.01	1700.39	10205.48	1700.58	10221.91	1700.89
10232.4	1701.11	10240.12	1701.27	10268.65	1701.21	10306.9	1701.62	10318.47	1701.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9176.68	.068	9925.6	.045	10051.93	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9925.61	10051.93	380	402.55	425	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9176.68	9790.13	1700.6

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1701.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1699.86	Reach Len. (ft)	380.00	402.55	425.00
Crit W.S. (ft)		Flow Area (sq ft)	284.60	615.73	103.12
E.G. Slope (ft/ft)	0.010886	Area (sq ft)	284.60	615.73	103.12
Q Total (cfs)	7577.00	Flow (cfs)	1228.33	6080.80	267.87
Top Width (ft)	320.22	Top Width (ft)	109.16	126.33	84.73
Vel Total (ft/s)	7.55	Avg. Vel. (ft/s)	4.32	9.88	2.60
Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)	2.61	4.87	1.22
Conv. Total (cfs)	72622.7	Conv. (cfs)	11773.1	58282.2	2567.5
Length Wtd. (ft)	405.02	Wetted Per. (ft)	109.27	126.86	84.79
Min Ch El (ft)	1692.70	Shear (lb/sq ft)	1.77	3.30	0.83
Alpha	1.43	Stream Power (lb/ft s)	7.64	32.57	2.15
Frctn Loss (ft)	4.47	Cum Volume (acre-ft)	1369.00	79.82	144.39
C & E Loss (ft)	0.09	Cum SA (acres)	897.56	29.49	108.79

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9738.37	9925.60	1228.33	284.60	109.27	16.21	2.61	4.32
LB 9925.60	RB 10051.93	6080.80	615.73	126.86	80.25	4.87	9.88
10051.93	10318.47	267.87	103.12	84.79	3.54	1.22	2.60

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.776

INPUT
Description: RM. 4.776. FLOW BLOCKED OUT TO LT. OF STA.9731.73 DUE TO RIDGE.

Station Elevation Data num= 114

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8935.41	1698	8940.48	1697.99	8945.99	1698	8960.41	1697.63	8969.15	1697.36
8978.82	1697.2	9013.48	1696.67	9018.78	1696.39	9024.13	1696.23	9039.09	1696.43
9074.04	1697.1	9089.48	1696.99	9102.18	1697	9114.78	1696.64	9117.41	1696.54
9125.2	1696.3	9139.09	1696.32	9140.5	1696.43	9143.78	1696.28	9189.59	1696.03
9210.18	1695.9	9244.85	1695.96	9294.39	1695.81	9359.47	1695.58	9382.81	1695.54
9429.66	1695.8	9437.31	1695.76	9442.33	1695.74	9446.46	1695.71	9449.71	1695.66
9509.16	1696.3	9513.47	1696.34	9573.45	1696.39	9586.58	1696.4	9587.04	1696.4
9587.41	1696.4	9587.7	1696.4	9588.72	1696.4	9639.28	1695.49	9661.72	1695.55
9664.15	1695.6	9686.93	1695.74	9699.19	1695.89	9702	1695.91	9715.09	1696
9721.28	1696	9731.73	1696.07	9734.45	1696.06	9791.49	1695.5	9793.31	1695.48
9813.49	1695.3	9815.93	1695.87	9823.49	1695.48	9831.94	1695.4	9850.43	1695.27
9858.68	1695.2	9863.38	1695.2	9865.41	1695.15	9874.84	1695.02	9877.74	1694.96
9885.97	1694.8	9910.84	1694.22	9912.71	1694.14	9914.29	1694.11	9919.29	1693.94
9923.48	1693.6	9933.65	1693.02	9939.13	1692.74	9942.88	1692.39	9951.71	1691.58
9954.46	1691.4	9963.23	1690.86	9967.34	1691.1	9976.35	1691.51	9980.62	1689.91
9986.34	1689.5	9988.05	1689.61	9996.11	1688.46	9999.98	1688.02	10006.86	1689.3

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10031.84  1693.710033.97  1693.610047.09  1693.610125.05 1693.4110143.11 1692.75
10158.57  1692.710171.85 1693.2110180.16  1693.510187.75  1693.610190.27 1693.64
10194.77  1693.710196.69 1693.7510221.59  1694.210233.77 1694.2210270.89 1694.57
10324.27  1693.710336.35 1693.5710351.89  1693.410366.67 1692.3110378.34 1691.68
10385.75  1692.510396.02 1693.5610398.28    169410410.54 1694.3310423.79 1694.61
10449.46  1694.710467.86 1694.6210483.13 1694.4510514.16 1695.0110537.72 1695.52
10561.03  1695.910563.38 1695.9210564.33 1695.9410580.38 1695.93

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 8935.41    .068 9939.13    .04510031.84    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9939.1310031.84              420  418.55     365             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 8935.14 9731.73 1696.07
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1696.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.96	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1695.60	Reach Len. (ft)	420.00	418.55	365.00
Crit W.S. (ft)	1695.60	Flow Area (sq ft)	115.77	448.06	872.22
E.G. Slope (ft/ft)	0.011214	Area (sq ft)	115.77	448.06	872.22
Q Total (cfs)	7577.00	Flow (cfs)	248.53	4446.22	2882.25
Top Width (ft)	755.06	Top Width (ft)	151.52	92.71	510.83
Vel Total (ft/s)	5.28	Avg. Vel. (ft/s)	2.15	9.92	3.30
Max Chl Dpth (ft)	7.58	Hydr. Depth (ft)	0.76	4.83	1.71
Conv. Total (cfs)	71552.7	Conv. (cfs)	2347.0	41987.5	27218.2
Length Wtd. (ft)	396.09	Wetted Per. (ft)	151.62	93.72	511.09
Min Ch El (ft)	1688.02	Shear (lb/sq ft)	0.53	3.35	1.19
Alpha	2.23	Stream Power (lb/ft s)	1.15	33.21	3.95
Frctn Loss (ft)	3.06	Cum Volume (acre-ft)	1367.25	74.91	139.63
C & E Loss (ft)	0.16	Cum SA (acres)	896.43	28.48	105.88

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9688.20	9939.13	248.53	115.77	151.62	3.28	0.76	2.15
LB 9939.13	RB 10031.84	4446.22	448.06	93.72	58.68	4.83	9.92
10031.84	10580.38	2882.25	872.22	511.09	38.04	1.71	3.30

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
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 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.697**

INPUT
Description: RM. 4.697. AREA BLOCKED OUT TO LT. OF STA. 9797.52 AND BELOW EL.1691.52 DUE TO RIDGE , AND ALSO TO LT. OF 9267 DUE TO RIDGE. SOME SHALLOW FOLW OCCURS TO LT. OF STA.9797.52.

Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8615.35	1691.7	8621.19	1691.78	8628.32	1691.89	8647.84	1691.45	8681.66	1690.65
8685.98	1690.7	8711.81	1690.71	8713.45	1690.66	8742.34	1690.04	8747.69	1689.95
8775.29	1689.5	8785.04	1689.85	8822.44	1689.74	8835.79	1689.79	8849.3	1690.18
8855.86	1690.3	8900.66	1690.06	8902.91	1690.08	8903.54	1690.07	8904.13	1690.06
8905.54	1690.1	8906.72	1690.07	8935.66	1690.55	8968.19	1691.08	9007.95	1690.98
9027.69	1691.6	9045.3	1691.68	9084.5	1691.15	9109.44	1690.8	9130.16	1690.73
9155.24	1690.6	9181.66	1690.38	9188.41	1690.37	9210.31	1690.54	9213.33	1690.82
9243.78	1690.7	9245.88	1690.77	9269.01	1692.21	9276.84	1692.22	9298.69	1692.14
9313.27	1692.1	9323.7	1690.92	9324.25	1690.89	9350.46	1689.83	9368.99	1689.87
9376.02	1689.9	9436.31	1689.86	9453.1	1689.98	9473.97	1690.13	9488.68	1690.11
9503.3	1690.1	9513.87	1689.93	9519.01	1689.84	9527.01	1689.96	9536.07	1690
9581.7	1689.6	9625.31	1689.63	9646.29	1689.66	9647.75	1689.68	9690.82	1690.91
9691.3	1690.9	9716.92	1691.15	9797.52	1691.52	9835.95	1691.4	9847.69	1691.41
9926.16	1690.9	9951.62	1690.65	9955.39	1689.85	9965.75	1687.96	9974.68	1686.96
9994.63	1687.4	9997.15	1687.31	0003.25	1686.84	10007.88	1686.48	10010.81	1686.27
10023.5	1687.11	0030.84	1687.52	10039.46	1686.61	10044.28	1686.21	10057.73	1685.92
10060.31	1685.91	0061.45	1686.07	10074.94	1688.01	10079.14	1688.23	10083.15	1688.16
10096.94	1688	10097.71	1688.01	10104.94	1688.01	10117.41	1688.77	10144.83	1689.93
10158.77	1689.41	0159.88	1689.41	10160.08	1689.41	0160.12	1689.41	10171.33	1690.25
10175.55	1690.41	0191.19	1690.34	10220.07	1687.61	10228.82	1687.04	10235.53	1687.63
10236.59	1687.71	0237.85	1687.76	10253.54	1688.95	10273.02	1690.21	0283.18	1690.19
10289.59	1690.21	0298.19	1690.13	10326.9	1690.11	0352.34	1689.91	0368.46	1689.44
10373.51	1688.81	0390.43	1685.37	10402.6	1687.14	10408.58	1687.54	10422.6	1689.22
10423.13	1689.21	0424.95	1689.25	10453.45	1689.58	10463.49	1689.69	10466.12	1689.39
10468.63	1689.41	0472.04	1689.24	10482.12	1688.67	10486.1	1688.44	10489.9	1688.83
10499.44	1689.61	0504.93	1689.88	10520.08	1690.37	10521.74	1690.41	10522.63	1690.44
10535.38	1691	10562.52	1691.16	10586.08	1691.47				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8615.35	.068	9951.62	.045	10079.14	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9951.62	10079.14	425	406.56	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8615.35	9276.84	1692.22	9276.84	9797.52	1691.52

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1692.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1691.74	Reach Len. (ft)	425.00	406.56	380.00
Crit W.S. (ft)	1690.88	Flow Area (sq ft)	188.68	581.74	1199.02
E.G. Slope (ft/ft)	0.005636	Area (sq ft)	188.68	581.74	1199.02
Q Total (cfs)	7577.00	Flow (cfs)	137.80	3953.86	3485.34
Top Width (ft)	1269.60	Top Width (ft)	635.14	127.52	506.94
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)	0.73	6.80	2.91
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	0.30	4.56	2.37
Conv. Total (cfs)	100929.3	Conv. (cfs)	1835.5	52667.4	46426.4
Length Wtd. (ft)	399.36	Wetted Per. (ft)	635.15	128.14	508.33
Min Ch El (ft)	1685.90	Shear (lb/sq ft)	0.10	1.60	0.83
Alpha	1.89	Stream Power (lb/ft s)	0.08	10.86	2.41
Frctn Loss (ft)	3.51	Cum Volume (acre-ft)	1365.78	69.96	130.95
C & E Loss (ft)	0.07	Cum SA (acres)	892.63	27.42	101.62

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9283.48	9617.55	37.01	65.03	301.08	0.49	0.22	0.57
9617.55	9951.62	100.78	123.65	334.07	1.33	0.37	0.82
LB 9951.62	RB 10079.14	3953.86	581.74	128.14	52.18	4.56	6.80
10079.14	10586.08	3485.34	1199.02	508.33	46.00	2.37	2.91

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.620

INPUT
Description: RM. 4.620. AREA BLOCKED OUT TO LT. OF STA. 9720.21 DUE TO RIDGE.

Station Elevation Data num= 138

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8183.54	1687.4	8184.89	1687.38	8186.81	1687.38	8189.78	1687.38	8190.4	1687.39
8191.61	1687.4	8192.65	1687.33	8193.42	1687.29	8247.72	1686.25	8252.69	1685.9
8276.3	1685.7	8282.47	1685.64	8286.78	1685.66	8297.37	1685.93	8298.63	1685.97
8298.72	1686	8299.28	1685.95	8313.34	1686.05	8316.75	1686.05	8325.87	1686.06
8333.25	1686.2	8338.01	1686.07	8342.44	1686.06	8347.31	1685.9	8381.53	1686.4
8402.32	1686.4	8418.07	1686.44	8418.12	1686.44	8487.43	1686.52	8523.15	1687.04
8527.12	1687	8544.28	1686.39	8548.4	1686.26	8563.44	1687	8572.28	1687.42
8619.36	1687.5	8629.86	1687.56	8631.08	1687.54	8646.85	1687.24	8683.07	1686.1
8693.85	1686.6	8697.03	1686.86	8713.67	1686.94	8736.22	1686.92	8743.7	1686.74
8753.78	1686.3	8764.15	1685.96	8796.52	1684.77	8806.21	1685.17	8832.47	1686.21
8885.89	1686.3	8893.28	1686.23	8915.42	1686.3	8944.62	1686.07	8997.14	1685.73
8999.1	1685.7	9012.34	1684.96	9018.78	1685.59	9025.58	1685.96	9035.59	1685.68
9040.14	1685.6	9041.36	1685.62	9071.61	1685.7	9156.97	1686.1	9229.09	1686.29
9238.36	1686.2	9240.57	1685.73	9246.15	1684.98	9250.97	1685.33	9254.36	1685.51
9259.12	1685.6	9275.26	1686.34	9281.03	1686.5	9293.86	1685.82	9301.28	1685.29
9308.97	1685.3	9319.63	1685.36	9327.79	1685.61	9331.55	1685.76	9346.55	1685.71
9373.18	1685.6	9390.49	1685.57	9398.52	1685.33	9410.53	1685.39	9428.27	1685.12
9482.54	1684.5	9519.3	1684.51	9551.85	1685	9552.27	1685.02	9552.65	1684.98
9563.28	1684	9573.01	1685.04	9575.03	1685.27	9610.37	1685.38	9623.76	1685.28
9628.21	1685.3	9646.82	1685.91	9664.39	1686.72	9691.62	1686.21	9691.93	1686.22
9720.21	1687.7	9725.38	1687.61	9747.48	1687.26	9762.48	1687.02	9771.94	1686.13
9778.52	1685.8	9782.17	1685.72	9787.44	1685.7	9817.59	1685.49	9907.42	1686.28
9918.29	1686.2	9919.18	1686.16	9933.7	1685.33	9942.43	1684.3	9962.7	1682.19
9974.77	1683.1	9981.07	1683.57	10031.53	1682.62	10038.88	1682.45	10056.07	1685.36
10065.59	1687.1	10066.81	1687.02	10080.47	1687.05	10150.42	1687.13	10154.68	1687.35
10162.53	1687.9	10187.11	1687.05	10213.74	1686.28	10220.07	1685.75	10223.62	1685.27
10239.74	1683	10247.89	1682.54	10251.65	1682.09	10261.52	1682.91	10287.46	1686.29
10291.34	1686.8	10301.97	1687.12	10322.59	1687.44				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8183.54	.068	9907.42	.045	10065.59	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9907.42	10065.59	160	235.25	230	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
8183.54	9720.21	1687.7

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1688.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1687.48	Reach Len. (ft)	160.00	235.25	230.00
Crit W.S. (ft)	1687.35	Flow Area (sq ft)	240.91	564.42	324.57
E.G. Slope (ft/ft)	0.015831	Area (sq ft)	240.91	564.42	324.57
Q Total (cfs)	7577.00	Flow (cfs)	823.12	5460.62	1293.25
Top Width (ft)	570.88	Top Width (ft)	173.85	158.17	238.87
Vel Total (ft/s)	6.71	Avg. Vel. (ft/s)	3.42	9.67	3.98
Max Chl Dpth (ft)	5.39	Hydr. Depth (ft)	1.39	3.57	1.36
Conv. Total (cfs)	60220.9	Conv. (cfs)	6542.1	43400.3	10278.6
Length Wtd. (ft)	226.94	Wetted Per. (ft)	173.90	158.83	239.49
Min Ch El (ft)	1682.19	Shear (lb/sq ft)	1.37	3.51	1.34
Alpha	1.59	Stream Power (lb/ft s)	4.68	33.98	5.34

Frctn Loss (ft)	3.32	Cum Volume (acre-ft)	1363.69	64.61	124.31
C & E Loss (ft)	0.11	Cum SA (acres)	888.69	26.09	98.36

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9476.45	9907.42	823.12	240.91	173.90	10.86	1.39	3.42
LB 9907.42	RB 10065.59	5460.62	564.42	158.83	72.07	3.57	9.67
10065.59	10322.59	1293.25	324.57	239.49	17.07	1.36	3.98

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.575

INPUT
Description: RM. 4.575. HYDRAULIC BASELINE CROSSES NEAR BROWN RD. AREA BLOCKED OUT TO LT. OF STA. 9641.09 DUE TO RIDGE.

Station Elevation Data num= 171

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7923.93	1686.1	7960.09	1685.85	8002	1685.62	8008.75	1685.59	8016.89	1685.2
8050.52	1685.7	8106.94	1685.43	8119.67	1685.33	8123.23	1685.35	8137.89	1684.25
8138.41	1684.3	8138.47	1684.26	8139.96	1684.21	8156.81	1684.63	8172.24	1683.92
8217.4	1684	8225.67	1683.96	8227.17	1683.93	8227.87	1683.89	8228.9	1683.83
8240.8	1683.4	8249.59	1683.63	8256.19	1683.88	8283.98	1685.07	8289.58	1685.1
8303.89	1685.2	8308.58	1685.25	8313.54	1685.27	8323.14	1685.43	8331.75	1685.45
8339.52	1685.5	8349.44	1685.32	8364.12	1685.2	8370.51	1684.97	8398.85	1684.74
8403.21	1684.8	8406.19	1684.7	8413.43	1684.63	8429.31	1684.69	8466.64	1684.76
8483.97	1684.8	8489.46	1684.58	8497.76	1684.28	8508.08	1684.09	8518.73	1683.9
8524.11	1684.1	8539.21	1684.48	8541.98	1684.52	8565.21	1684.89	8584.77	1685.17
8586.76	1685.1	8614.69	1684.2	8619.02	1684.28	8636.13	1684.69	8660.9	1684.88
8673.38	1684.8	8698	1683.95	8731.34	1683.69	8744.69	1683.94	8748.3	1683.73
8771.66	1682.3	8785.39	1682.96	8799.62	1683.95	8834.03	1683.79	8852.1	1683.76
8855.18	1683.7	8860.54	1683.74	8868.72	1683.71	8938.05	1683.77	8992.59	1683.05
8993.65	1683.1	8995.46	1683.19	9010.69	1684.54	9077.51	1684.04	9077.55	1684.04
9077.56	1684	9077.56	1684.04	9094.76	1683.72	9180.42	1683.98	9214.52	1684.13
9234.85	1684.3	9258.67	1684.78	9264.52	1684.87	9265.9	1684.64	9275.25	1682.96
9286.73	1683.6	9288.55	1683.71	9289.19	1683.69	9295.86	1683.68	9310.73	1683.43
9333.12	1683.7	9337.56	1683.73	9413.89	1683.23	9442.38	1683.04	9444.41	1683.4
9448.35	1683	9453.93	1682.49	9455.79	1682.63	9465.08	1683.44	9511.99	1683.13
9549.89	1682.8	9567.04	1683.14	9583.58	1683.35	9604.27	1684.13	9616.12	1684.53
9641.09	1684.8	9661.78	1684.45	9706.1	1683.97	9712.25	1683.92	9755.92	1683.69
9762.95	1683.6	9763.73	1683.64	9765.05	1683.63	9773.66	1683.91	9794.63	1684.57
9796.09	1684.5	9814.63	1684.65	9824.21	1684.48	9835.53	1684.51	9842.2	1684.45

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 9865.35  1683.5  9881.7 1682.95 9884.55 1682.95 9885.59  1682.9 9892.12 1682.44
 9892.46  1682.4 9928.77 1682.05 9929.75 1682.04 9929.97 1682.03 9941.46 1681.28
  9944.9  1680.9 9955.78 1680.18 9980.17 1679.69 9989.32 1680.4610003.63 1680.74
10004.64  1680.7 10011.8 1680.2210022.14 1681.6110038.51 1683.36 10053.4 1683.49
10059.79  1683.610103.52 1683.9910105.17 1683.9810107.82  1683.510123.59 1679.81
10132.72  1680.610139.55 1681.0610149.23 1680.7810161.04 1680.4710169.43 1680.14
10179.27  1679.7 10179.5  1679.710194.39 1680.62 10198.6 1680.9610203.21  1680.9
10236.99  1680.710250.48  1680.810260.03 1681.1810263.63 1681.3510275.86 1681.21
10294.34  1682.510295.24 1682.5710296.02 1682.6210297.17 1682.6310297.71 1682.64
10311.59  1682.710325.74 1683.4810338.84 1684.0310351.91 1684.46 10387.5 1685.44
10397.97    1686

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 7923.93    .068 9929.97    .04510038.51    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9929.9710038.51              275  300.41     290              .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 7923.93 9641.09  1684.8

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1685.16   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.74   Wt. n-Val.                 0.068      0.045      0.068
  W.S. Elev (ft)            1684.41   Reach Len. (ft)           275.00     300.41     290.00
  Crit W.S. (ft)                      Flow Area (sq ft)         184.40     388.32     769.56
  E.G. Slope (ft/ft)       0.013595   Area (sq ft)              184.40     388.32     769.56
  Q Total (cfs)             7577.00   Flow (cfs)                511.69    3490.61    3574.70
  Top Width (ft)             631.54   Top Width (ft)            211.08     108.54     311.92
  Vel Total (ft/s)             5.64   Avg. Vel. (ft/s)            2.77       8.99       4.65
  Max Chl Dpth (ft)            4.72   Hydr. Depth (ft)            0.87       3.58       2.47
  Conv. Total (cfs)         64984.0   Conv. (cfs)               4388.5    29937.2    30658.3
  Length Wtd. (ft)           291.85   Wetted Per. (ft)          211.15     108.85     312.61
  Min Ch El (ft)            1679.69   Shear (lb/sq ft)            0.74       3.03       2.09
  Alpha                        1.50   Stream Power (lb/ft s)      2.06      27.22       9.71
  Frctn Loss (ft)              2.64   Cum Volume (acre-ft)     1362.91      62.04     121.42
  C & E Loss (ft)              0.07   Cum SA (acres)            887.98      25.37      96.91

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                 (ft)      (ft/s)
  9428.46       9929.97         511.69     184.40    211.15       6.75      0.87       2.77
  LB 9929.97    RB 10038.51    3490.61     388.32    108.85      46.07      3.58       8.99
  10038.51      10397.97       3574.70     769.56    312.61      47.18      2.47       4.65

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.518**

INPUT
Description: RM.4.518. AREA BLOCKED OUT TO LT OF STA. 8640.67 DUE TO RIDGE.

Station Elevation Data num= 172

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7858.44	1682.4	7875.51	1682.05	7893.45	1682.55	7898.24	1682.13	7900.03	1682.09
7901.6	1682	7907.08	1682.38	7907.23	1682.38	7909.91	1682.43	7911.42	1682.5
7918.29	1682.3	7945.58	1682.3	7949.33	1682.28	7954.62	1682.27	7966.73	1682.29
7971.32	1682.3	8012.96	1682.42	8015.09	1682.07	8035.62	1682.08	8088.3	1681.84
8089.65	1681.8	8091.37	1681.83	8095.28	1681.82	8103.15	1681.8	8119.04	1681.83
8153.28	1681.9	8215.31	1682.89	8215.64	1682.89	8215.81	1682.89	8216.06	1682.89
8274.73	1682.3	8287.52	1681.99	8291.98	1681.91	8304.85	1681.49	8322.25	1680.86
8360.21	1682	8372.12	1682.39	8377.87	1682.4	8388.86	1681.97	8406.36	1681.6
8447.34	1681.2	8465.27	1681.07	8490.5	1681.1	8507.46	1681.08	8508.64	1681.09
8540.61	1681.2	8575.54	1681.35	8628.96	1682.36	8635.15	1682.39	8640.67	1682.57
8667.21	1681.5	8683.6	1680.54	8690.59	1680.66	8699.54	1680.8	8705.15	1680.89
8722.62	1680.8	8723.24	1680.81	8747.23	1679.4	8782.16	1680.24	8800.96	1681
8802.56	1681.4	8815.18	1681.33	8920.79	1680.58	8976.21	1680.62	9038.37	1680.66
9080.02	1681	9089.93	1681.08	9150.75	1681.08	9154.6	1681.07	9157.56	1681.06
9159.01	1681.1	9166.33	1681	9245.87	1680.82	9252.91	1680.44	9273.53	1680.39
9356.44	1680.4	9372.13	1680.59	9374.35	1680.38	9378.99	1680.58	9445.8	1679.34
9454.33	1679.2	9460.22	1679.24	9477	1679.49	9481.25	1679.53	9485.24	1679.66
9508.69	1680.6	9546.55	1680.93	9597.4	1681.41	9615.96	1681.71	9626.23	1681.84
9730.41	1682.7	9734.76	1682.77	9737.36	1682.8	9739.66	1682.82	9740.3	1682.83
9743.85	1682.8	9745.9	1682.85	9749.95	1682.85	9766.31	1682.85	9836.83	1682.89
9844.88	1682.9	9849.9	1682.93	9854.11	1682.86	9861.3	1682.7	9870.34	1682.51
9895.22	1681.8	9901.77	1681.58	9909.64	1681.1	9924.21	1680.31	9930.51	1679.92
9942.25	1679.4	9960.98	1677.95	9973.63	1679.13	9974.99	1679.26	9976.43	1679.25
9981.76	1679.3	9986.79	1679.21	9992.36	1677.7	9996.21	1676.47	9998.9	1675.71
10005.98	1676.4	10012.73	1676.95	10017.17	1676.64	10025.01	1675.75	10025.37	1674.88
10034.07	1676.4	10038.11	1677.75	10041.5	1678.16	10045.02	1678.4	10050.35	1678.92
10051.19	1678.8	10054.37	1678.67	10056.76	1678.25	10063.45	1677.25	10072.1	1675.35
10073.21	1675.1	10091.6	1677.77	10098.79	1678.86	10104.72	1680.3	10111.42	1680.62
10136.11	1680.9	10148.25	1680.92	10157.83	1680.5	10166.07	1680.12	10174.13	1680.11
10190.21	1682.3	10191.29	1682.74	10194.46	1682.43	10196.43	1682.24	10197.04	1682.09
10201.22	1682.1	10219.41	1682.01	10221.15	1682.09	10227.64	1682.29	10240.27	1681.9
10242.54	1681.8	10253.12	1682.77	10253.19	1682.78	10253.23	1682.78	10262.69	1681.78
10264.87	1682.3	10267.11	1682.75	10281.9	1681.81	10290.25	1681.15	10302.03	1681.99
10317.1	1682.8	10328.54	1682.24	10341.52	1682.14	10349.64	1682.09	10360.19	1682.52
10380.36	1683.2	10388.39	1682.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7858.44	.068	9974.99	.045	10098.79	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9974.99	10098.79	370	394.81	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7858.44	8640.67	1682.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1682.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1681.93	Reach Len. (ft)	370.00	394.81	390.00
Crit W.S. (ft)		Flow Area (sq ft)	1411.38	583.03	125.80
E.G. Slope (ft/ft)	0.006461	Area (sq ft)	1411.38	583.03	125.80
Q Total (cfs)	7577.00	Flow (cfs)	3026.17	4296.06	254.77
Top Width (ft)	1306.12	Top Width (ft)	1065.46	123.80	116.87
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	2.14	7.37	2.03
Max Chl Dpth (ft)	7.05	Hydr. Depth (ft)	1.32	4.71	1.08
Conv. Total (cfs)	94266.7	Conv. (cfs)	37649.1	53447.9	3169.7
Length Wtd. (ft)	384.35	Wetted Per. (ft)	1065.87	126.04	117.28
Min Ch El (ft)	1674.88	Shear (lb/sq ft)	0.53	1.87	0.43
Alpha	2.57	Stream Power (lb/ft s)	1.15	13.75	0.88
Frctn Loss (ft)	3.65	Cum Volume (acre-ft)	1357.87	58.69	118.44
C & E Loss (ft)	0.01	Cum SA (acres)	883.95	24.57	95.48

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8387.58	8916.71	622.95	311.70	260.40	8.22	1.20	2.00
8916.71	9445.85	1473.28	693.77	529.18	19.44	1.31	2.12
9445.85	9974.99	929.94	405.91	276.29	12.27	1.47	2.29
LB 9974.99	RB 10098.79	4296.05	583.03	126.04	56.70	4.71	7.37
10098.79	10388.39	254.77	125.80	117.28	3.36	1.08	2.03

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.443

INPUT
Description: RM.4.443. AREA BLOCKED OUT TO LT. OF STA. 8222.23 DUE TO RIDGE.

Station Elevation Data num= 191

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7526.67	1680	7545.06	1679.91	7568.71	1679.82	7572.74	1679.82	7577.15	1679.83
7603.68	1680	7619.7	1679.72	7633.68	1679.57	7744.86	1679.23	7746.82	1679.23
7746.97	1679.2	7747.58	1679.21	7747.95	1679.21	7748.38	1679.21	7748.65	1679.21
7749.35	1679.2	7753.99	1679.21	7787.77	1679.2	7791.96	1678	7797.46	1675.19

7804.11	1678.3	7806.25	1679.47	7825.23	1679.28	7839.84	1679.15	7881.83	1679.05
7885.55	1678	7887.72	1676.97	7890.5	1678.15	7892.69	1678.82	7931.27	1679.01
7968.53	1679.3	7968.93	1679.31	7969.67	1679.3	7976.45	1678.94	7986.76	1678.87
8012.87	1678.5	8059.4	1677.76	8071.6	1677.74	8075.81	1677.7	8084.49	1677.66
8094.39	1677.6	8109.81	1677.47	8127.2	1677.54	8130.64	1677.63	8138.35	1677.93
8141.37	1677.9	8146.18	1677.83	8181.53	1676.95	8190.17	1676.84	8208.19	1677.67
8222.33	1678.3	8254.79	1677.92	8276.28	1677.7	8285.67	1677.58	8311.73	1677.38
8321.81	1677.5	8337.73	1677.73	8342.4	1677.73	8353.48	1677.95	8372.5	1678.26
8399.06	1677.6	8416.09	1677.1	8420.04	1676.97	8452	1676.73	8452.96	1676.73
8454.52	1676.7	8456.71	1676.8	8518.47	1677.26	8520.45	1677.17	8526.38	1676.92
8541.61	1676.3	8545.35	1676.32	8562.74	1676.87	8583.66	1677.89	8587.46	1677.91
8612.15	1677.9	8659.71	1677.65	8758.69	1677.31	8773.71	1677.26	8786.13	1677.25
8887.72	1677.1	8965.45	1677.21	8998.52	1677.27	8999.59	1677.05	9006.19	1676.42
9011.36	1676.4	9014.22	1676.72	9020.73	1677.34	9027.22	1677.15	9066.24	1676.55
9066.75	1676.5	9066.86	1676.54	9067	1676.54	9079.9	1676.43	9100.22	1676.6
9101.84	1676.6	9105.36	1676.66	9106.53	1676.65	9109.54	1676.68	9114.08	1676.62
9115.46	1676.6	9131.63	1676.12	9139.36	1676.41	9153.08	1677.21	9157.08	1676.75
9164.32	1676	9171.85	1676.78	9173.07	1676.92	9178.23	1676.91	9209.52	1676.94
9213.9	1676.9	9223.13	1677.02	9229.72	1677.01	9288.05	1677.93	9337.3	1678.58
9361.98	1677.6	9373.36	1677.11	9378.9	1677.31	9394.09	1677.91	9406.32	1678.29
9422.64	1678.1	9432.6	1678.03	9457.73	1677.9	9514.38	1678.21	9571.73	1678.66
9609.4	1678.6	9642.91	1678.53	9664.84	1678.46	9670.22	1678.6	9685.74	1679.3
9757.61	1679.1	9770.07	1679.11	9800.24	1678.84	9819.54	1678.76	9825.27	1678.81
9843.39	1678.6	9844.88	1678.62	9862.63	1678.65	9867.47	1678.6	9871.41	1678.6
9882.14	1678.7	9894.57	1678.82	9918.63	1679.26	9950.13	1675.18	9952.59	1674.8
9960.91	1675.6	9964.4	1675.78	9997.47	1675.29	10003.22	1675.24	10007.44	1674.25
10017.36	1672.11	0028.41	1673.47	10044.95	1675.44	10055.41	1676.24	10141.09	1678.87
10158.77	167	910174.95	1679.28	10196.72	1678.96	10203.25	1678.61	0224.22	1674.05
10226.21	1673.61	0235.26	1675.19	10237.53	1675.58	10241.09	1675.51	10280.4	1674.78
10283.74	1674.71	0291.73	1674.67	10304.14	1675.53	10307.07	1675.79	10319.81	1676.5
10329.1	1677.21	0337.65	1677.58	10355.62	1677.68	10356.35	1677.67	10358.92	1677.7
10367.15	1678.31	0382.08	1679.28	10386.46	1679.62	10388.16	1679.61	10393.5	1679.6
10422.34	1679.61	0429.46	1679.22	10438.66	1678.8	10440.84	1678.77	10447.94	1679.16
10458.16	1679.61	0466.36	1679.76	10499.02	1680.37	10526.88	1680.51	10544.74	1680.75
10564.34	1681								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7526.67	.068	9964.4	.045	10044.95	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9964.41	10044.95	380	401.96	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7526.67	8222.23	1678.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1678.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1678.16	Reach Len. (ft)	380.00	401.96	390.00
Crit W.S. (ft)		Flow Area (sq ft)	1090.78	287.64	440.52
E.G. Slope (ft/ft)	0.015368	Area (sq ft)	1090.78	287.64	440.52
Q Total (cfs)	7577.00	Flow (cfs)	2945.53	2738.35	1893.12
Top Width (ft)	1551.01	Top Width (ft)	1237.72	80.55	232.74
Vel Total (ft/s)	4.17	Avg. Vel. (ft/s)	2.70	9.52	4.30

Max Chl Dpth (ft)	6.06	Hydr. Depth (ft)	0.88	3.57	1.89
Conv. Total (cfs)	61121.3	Conv. (cfs)	23760.7	22089.4	15271.2
Length Wtd. (ft)	388.34	Wetted Per. (ft)	1238.39	81.10	233.58
Min Ch El (ft)	1672.10	Shear (lb/sq ft)	0.85	3.40	1.81
Alpha	2.32	Stream Power (lb/ft s)	2.28	32.39	7.78
Frctn Loss (ft)	4.08	Cum Volume (acre-ft)	1347.24	54.74	115.90
C & E Loss (ft)	0.11	Cum SA (acres)	874.17	23.64	93.92

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8136.10	8745.54	830.66	360.72	500.35	10.96	0.72	2.30
8745.54	9354.97	1867.71	616.57	566.87	24.65	1.09	3.03
9354.97	9964.40	247.17	113.49	171.16	3.26	0.66	2.18
LB 9964.40	RB 10044.95	2738.35	287.64	81.10	36.14	3.57	9.52
10044.95	10564.34	1893.12	440.52	233.58	24.99	1.89	4.30

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.367

INPUT
Description: RM.4.367.

Station Elevation Data num= 195

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7222.98	1676	7240.22	1676	7264.11	1675.81	7274.4	1675.74	7276.63	1675.73
7291.99	1675.8	7340.6	1675.66	7387.23	1675.43	7433.77	1675.3	7441.29	1674.88
7442.63	1674.9	7443.13	1674.94	7450.4	1674.99	7454.44	1675.11	7496.11	1675.97
7502.18	1676	7577.58	1676.13	7580.59	1676.14	7588.15	1676.14	7589.52	1676.12
7604.22	1676.1	7701.39	1675.57	7811.64	1674.01	7814.64	1673.98	7815.92	1674
7816.36	1674	7824	1674.25	7828.7	1672.46	7831.59	1671.49	7842.06	1673.93
7845.87	1674.8	7850.77	1674.77	7852.33	1674.76	7918.48	1673.95	7922.02	1673.98
7934.44	1673.9	7937.73	1673.89	7944.65	1673.73	7964.02	1673.71	7972.4	1673.79
7973.17	1673.8	8026.98	1673.14	8034.06	1673.17	8035.17	1673.14	8040.43	1673.05
8040.8	1673	8041.26	1673.03	8042.37	1673	8109.51	1671.39	8115.51	1671.46
8156.54	1671.7	8171.99	1672.18	8225.95	1672.83	8228.48	1672.88	8229.62	1672.92
8247.78	1673.1	8252.21	1673.15	8260.07	1673.53	8261.68	1673.52	8267.63	1673.4
8292.66	1673.4	8324.74	1673.64	8361.56	1673.55	8380.88	1673.58	8456.49	1673.18
8480.27	1673	8486.09	1672.92	8491.39	1672.89	8499.02	1672.79	8517.81	1672.76
8558.79	1672.5	8575.57	1672.51	8583.57	1672.55	8590.06	1672.46	8595.51	1672.39
8613.16	1672.1	8628.57	1672	8630.35	1671.98	8633.59	1671.97	8640.39	1672.12
8644.87	1672.2	8655.57	1672.37	8658.01	1672.37	8660.29	1672.34	8666.64	1672.28
8667.7	1672.3	8669.98	1672.23	8681.23	1672.16	8696.74	1671.9	8702.12	1671.98
8713.08	1672.1	8732.95	1672.68	8733.3	1672.66	8742.15	1671.82	8750.56	1673.07
8750.81	1673.1	8751.38	1673.11	8753.07	1673.11	8846.43	1672.9	8855.89	1673.13
8857.82	1673.2	8867.55	1672.66	8871.32	1672.47	8888.7	1673.16	8889.87	1673.19
8893.54	1673.2	8899.29	1673.14	8939.82	1672.87	8943.3	1672.08	8964.31	1673.07

8979.79	1673.1	8994.85	1673.21	9000.34	1672.86	9008.41	1672.43	9018.75	1673.06
9021.54	1673.2	9023.81	1673.27	9060.37	1673.71	9093.93	1673.7	9125.17	1673.66
9138.8	1673.6	9159.57	1673.36	9161.7	1673.34	9164.79	1673.36	9205.35	1673.62
9241.57	1673.9	9265.12	1674.1	9286.86	1673.46	9288.38	1673.41	9289.91	1673.44
9321.41	1674.2	9327.8	1674.13	9352.49	1674.02	9426.69	1673.85	9431.69	1673.83
9432.92	1673.8	9445.25	1674.78	9447.58	1674.92	9477.62	1674.55	9488.87	1674.46
9507.62	1674.7	9517.99	1674.83	9537.36	1674.89	9551.85	1674.92	9578.38	1674.73
9626.61	1674.7	9645.81	1674.69	9690.78	1674.1	9693.2	1674.1	9706.61	1674.14
9721.24	1673.7	9735.17	1673.13	9736.31	1673.15	9741.44	1673.12	9754.18	1673.16
9786.45	1673.3	9825.29	1673.5	9827.18	1673.55	9844.28	1673.45	9869.58	1673.53
9893.45	1673.2	9901.85	1673.01	9916.31	1672.25	9921.77	1672.06	9928.56	1672.05
9961.3	1671.7	9969.05	1669.86	9981.82	1667.22	10003.8	1672.26	10004.3	1672.4
10006.33	1672.4	10079.89	1673.07	10092.16	1673.23	10093.19	1673.04	10099.96	1673.04
10131.86	1673.2	10137.88	1671.64	10143.22	1670.05	10149.63	1671.42	10153.91	1672.03
10171.82	1671.9	10176.93	1672.01	10185.27	1672.02	10193.86	1672.02	10204.76	1672.24
10213.41	1672.4	10214.25	1672.44	10217.94	1672.6	10236.4	1673.28	10240.68	1673.56
10262.37	167	10275.61	1675.65	10281.06	1675.88	10292.26	1676.03	10311.16	1676.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7222.98	.068	9961.3	.045	10004.3	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9961.3	10004.3	275	294.8	290	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1674.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1674.33	Reach Len. (ft)	275.00	294.80	290.00
Crit W.S. (ft)	1674.05	Flow Area (sq ft)	2244.68	203.31	425.71
E.G. Slope (ft/ft)	0.007578	Area (sq ft)	2244.68	203.31	425.71
Q Total (cfs)	7577.00	Flow (cfs)	4798.80	1619.34	1158.86
Top Width (ft)	2185.76	Top Width (ft)	1894.79	43.00	247.97
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)	2.14	7.96	2.72
Max Chl Dpth (ft)	7.11	Hydr. Depth (ft)	1.18	4.73	1.72
Conv. Total (cfs)	87043.0	Conv. (cfs)	55127.6	18602.6	13312.7
Length Wtd. (ft)	282.25	Wetted Per. (ft)	1896.13	44.08	248.66
Min Ch El (ft)	1667.22	Shear (lb/sq ft)	0.56	2.18	0.81
Alpha	2.53	Stream Power (lb/ft s)	1.20	17.38	2.20
Frctn Loss (ft)	3.08	Cum Volume (acre-ft)	1332.70	52.48	112.03
C & E Loss (ft)	0.03	Cum SA (acres)	860.51	23.07	91.77

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7222.98	7907.56	44.59	37.89	75.60	0.59	0.51	1.18
7907.56	8592.14	2138.85	933.00	684.64	28.23	1.36	2.29
8592.14	9276.72	1960.04	885.54	684.95	25.87	1.29	2.21
9276.72	9961.30	655.33	388.25	450.94	8.65	0.86	1.69

LB 9961.30	RB 10004.30	1619.34	203.31	44.08	21.37	4.73	7.96
10004.30	10311.16	1158.86	425.71	248.66	15.29	1.72	2.72

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.311**

INPUT
Description: RM. 4.311. HYDRAULIC BASELINE CROSSES NEAR 112TH STR. AREA BLOCKED OUT TO LEFT OF STA. 7488 AND TO RIGHT OF STA. 10230 DUE TO RIDGES.

Station Elevation Data num= 232

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7118.23	1672	7150.91	1671.91	7182.25	1671.46	7191.26	1671.42	7195.81	1670.57
7199.34	1670	7200.25	1669.87	7206.14	1669.81	7210.43	1669.7	7220.54	1669.63
7230.71	1669.6	7237.19	1669.58	7243.62	1669.45	7245.81	1669.39	7248.07	1669.62
7259.42	1670.8	7262.1	1671.14	7291.58	1671.17	7357.92	1671.15	7384.06	1671.12
7428.69	1670.9	7439.37	1671.62	7457.81	1671.74	7460.38	1671.76	7460.53	1671.76
7467.92	1671.7	7488.05	1671.87	7494.52	1671.83	7500.63	1671.84	7518.16	1671.83
7617.21	1671.7	7683.48	1671.56	7714.93	1671.32	7733.78	1671.38	7808.95	1671.02
7850.35	1670.8	7878.05	1670.64	7920.91	1670.51	7931.1	1670.41	7948.08	1670.22
7956.13	1669.8	7960.76	1669.49	7976.13	1668.58	7983.82	1667.87	7988.37	1668.22
8003.74	1669.8	8005.47	1669.81	8005.67	1669.81	8006.33	1669.77	8006.49	1669.75
8021.59	1669.3	8048.43	1669.23	8081.92	1668.72	8083.92	1669.13	8116.44	1669.52
8126.8	1669.7	8134.39	1669.68	8200.08	1669.9	8267.2	1670.27	8298.12	1670.45
8316.65	1670.6	8390.54	1670.1	8433.2	1669.89	8461.75	1669.82	8510.02	1669.87
8515.06	1669.7	8524.06	1669.68	8526.52	1669.66	8533.24	1669.19	8536.24	1668.9
8540.52	1668.3	8549.14	1668.94	8554.1	1669.66	8571.11	1669.73	8588.27	1669.67
8589.46	1669.5	8599.39	1668.71	8599.67	1668.71	8601.54	1668.6	8611.29	1669.07
8611.74	1669.1	8612.1	1669.11	8616.02	1669.13	8648.77	1669.35	8657.75	1669.44
8660.28	1669.5	8666.38	1669.5	8676.35	1669.5	8682.67	1669.52	8705.42	1669.58
8707.32	1669.3	8713.56	1668.5	8715.62	1668.85	8721.63	1669.69	8731.05	1669.71
8738.45	1669.8	8746.72	1669.79	8758.52	1669.84	8760.08	1669.84	8792.35	1670.18
8795.25	1670.2	8819.78	1669.63	8821.49	1669.62	8833.71	1670.25	8835.85	1670.35
8840.95	1670.1	8844.56	1669.91	8852.68	1669.99	8860.91	1670.11	8868.86	1670.16
8869.59	1670.2	8871.08	1670.2	8880.85	1670.27	8902.93	1670.53	8934.59	1670.86
8939.68	1670.9	8952.3	1670.98	8969.55	1670.92	8983.69	1670.6	9001.33	1670.41
9007.29	1669.8	9011.4	1669.48	9018.06	1670.4	9024.58	1671.57	9032.85	1671.63
9045.06	1671.5	9074.16	1670.68	9103.36	1670.63	9132.67	1670.51	9169.29	1671.02
9176.19	1671	9183.93	1670.97	9187.4	1670.93	9199.18	1671.03	9236.64	1671.8
9244.69	1671.9	9246.37	1671.97	9248.97	1672	9249.25	1672	9262.96	1672.1
9365.82	1672.7	9449.83	1672.39	9450.76	1672.38	9451.2	1672.39	9451.37	1672.38
9522.37	1671.1	9533.27	1670.8	9536.47	1670.92	9539.68	1671.08	9547.08	1671.38
9563.88	1671.4	9587.16	1671	9615.37	1670.68	9620.61	1670.76	9630.03	1670.91
9647.92	1671.2	9657.32	1671.29	9699.72	1671.75	9705.04	1671.82	9707.72	1671.8
9752.39	1670.9	9798.88	1670.31	9819.47	1669.79	9871.93	1669.49	9881.28	1669.11
9886.65	1669	9917.67	1669.18	9935.43	1668.96	9959.76	1668.11	9962.55	1668.05
9965.05	1667.9	9989.41	1667.54	9994.89	1667.69	10007.36	1667.86	10030.1	1668.12
10035.78	1668.2	10040.26	1668.4	10061.18	1669.41	10082.13	1670.16	10086.51	1670.73
10090.99	1671.2	10091.3	1671.17	10093.86	1671.29	10105.85	1671.49	10110.6	1671.54
10121.45	1672	10140.94	1672.35	10146.27	1672.34	10149.1	1672.35	10175.24	1672.59

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10180.23  1672.610184.42 1672.68 10188.5 1672.7210206.84 1672.8210219.26 1672.87
10222.08  1672.910222.73 1672.8510229.18 1672.9210235.64 1672.9210237.88  1672.9
10252.16  1672.810266.28 1672.6610279.99 1672.3110301.85 1671.79 10319.1  1671.7
 10329.8  1669.410337.11 1667.8710350.45 1670.1110354.45 1670.8410357.99 1670.42
10363.59  1669.810381.22 1668.0110385.35  1667.610393.38 1668.4810404.35 1669.66
10414.53  1670.110431.25 1670.7210437.67 1670.9310447.62 1671.8110453.62    1672
10459.02  1672.210474.84 1673.3810484.03  1673.910491.75 1674.3310507.36 1674.95
10508.96  1675.110515.19 1675.1710516.99 1675.2310530.24 1675.3510533.99 1675.48
10548.66  1675.610565.27  1683.7

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 7118.23    .068 9935.43    .04510061.18    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9935.4310061.18              325  379.86     380             .1       .3

Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 7118.23 7488.05 1671.8710229.1810565.27 1672.92

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1671.49   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.53   Wt. n-Val.                0.068      0.045      0.068
  W.S. Elev (ft)            1670.96   Reach Len. (ft)          325.00     379.86     380.00
  Crit W.S. (ft)            1670.96   Flow Area (sq ft)       1509.52     349.79      27.12
  E.G. Slope (ft/ft)       0.017222   Area (sq ft)            1509.52     349.79      27.12
  Q Total (cfs)             7577.00   Flow (cfs)              4503.10    2997.02      76.88
  Top Width (ft)            1690.10   Top Width (ft)          1536.83     125.75      27.52
  Vel Total (ft/s)             4.02   Avg. Vel. (ft/s)           2.98       8.57       2.84
  Max Chl Dpth (ft)            3.42   Hydr. Depth (ft)           0.98       2.78       0.99
  Conv. Total (cfs)         57737.5   Conv. (cfs)             34314.1   22837.6      585.8
  Length Wtd. (ft)           342.55   Wetted Per. (ft)        1537.69     125.81      27.58
  Min Ch El (ft)            1667.54   Shear (lb/sq ft)           1.06       2.99       1.06
  Alpha                        2.13   Stream Power (lb/ft s)     3.15      25.61       3.00
  Frctn Loss (ft)              3.54   Cum Volume (acre-ft)    1320.85      50.61     110.52
  C & E Loss (ft)              0.12   Cum SA (acres)           849.67      22.50      90.85

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth.  This indicates
that there is not a valid subcritical answer.  The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta       Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)         (ft)            (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  7118.23      7822.53          0.00       0.01      2.23       0.00       0.01       0.10
  7822.53      8526.83       2209.49     721.42    704.55      29.16       1.02       3.06
```

8526.83	9231.13	1623.13	559.49	592.70	21.42	0.94	2.90
9231.13	9935.43	670.48	228.60	238.22	8.85	0.96	2.93
LB 9935.43	RB 10061.18	2997.02	349.79	125.81	39.55	2.78	8.57
10061.18	10565.27	76.88	27.12	27.58	1.01	0.99	2.84

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.239**

INPUT
Description: RM. 4.239. AREA BLOCKED OUT TO LEFT OF STA. 7387 DUE TO RIDGE.

Station Elevation Data num= 165

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7075.61	1668	7119.41	1667.82	7177.14	1667.45	7189.35	1667.15	7210.08	1667.45
7221.45	1667.5	7224.37	1667.41	7237.86	1667.17	7315.02	1667.95	7356.3	1668.24
7377.59	1668.4	7387.38	1668.44	7431.74	1668.19	7444.43	1668.03	7474.75	1667.76
7537.56	1667.1	7566.64	1667.14	7593.2	1667.03	7604.41	1666.99	7616.17	1666.97
7680.56	1666.9	7682.13	1666.95	7711.65	1666.91	7753.22	1666.65	7830.1	1665.88
7867.17	1665.8	7873.44	1665.74	7879.45	1664.09	7882.83	1663.13	7885.6	1663.87
7891.87	1665.2	7895.1	1665.92	7910.8	1665.68	7916.32	1665.53	7929.81	1664.82
7934.74	1664.7	7945.75	1665.54	7954.61	1665.64	7973.63	1665.83	7986.08	1665.9
8066.99	1665.8	8126.39	1665.44	8162.51	1665.35	8185.44	1665.32	8288.1	1665.83
8303.89	1665.9	8312.97	1665.9	8422.34	1665.1	8499.56	1665.32	8524	1665.52
8540.79	1665.6	8597.23	1665.85	8652.46	1666.39	8667.79	1666.44	8668.83	1666.44
8705.75	1666.4	8777.68	1666.42	8810.33	1666.82	8826.07	1666.91	8829.82	1666.99
8842.87	1667.3	8846.6	1667.24	8857.2	1666.91	8880.23	1666.26	8885.34	1666.12
8904.41	1666.2	8928.74	1666.52	8931.29	1666.45	8934.94	1666.22	8939.31	1666.8
8942.88	1667.5	8944.35	1667.7	8945.7	1667.78	8946.82	1667.71	8947.55	1667.63
8956.94	1667.4	8959.97	1667.49	8970.99	1667.58	8977.32	1667.61	8985.31	1667.75
9023.01	1667.9	9024.64	1668.29	9035.64	1668.57	9050.43	1668.85	9070.29	1668.53
9102.4	1667.8	9109.99	1667.93	9118.32	1668.1	9147.36	1668.16	9165.72	1668.27
9172.28	1668.3	9175.79	1668.33	9189.78	1668.06	9213.21	1667.83	9213.83	1668.14
9215.02	1668	9215.66	1667.84	9247.77	1667.84	9250.97	1667.89	9256.36	1668.23
9257.79	1668.2	9258.47	1669.77	9263.49	1669.49	9270.01	1668.77	9271.75	1668.37
9274.21	1667.8	9277.14	1667.91	9280.65	1667.95	9369.93	1667.55	9432.48	1667.58
9488.37	1667.5	9546.29	1667.27	9573.59	1667.94	9576.31	1667.95	9580.91	1667.91
9611.83	1667.2	9625.17	1667.33	9636.6	1667.33	9663.75	1667.26	9743.58	1665.57
9744.87	1665.6	9746.8	1665.52	9758.68	1666.75	9766.66	1667.55	9767.99	1667.64
9770.01	1667.6	9772.43	1667.64	9786.03	1667.43	9814.78	1667.24	9823.53	1667.06
9840.46	1666.7	9844.15	1666.64	9849.21	1666.61	9850.12	1666.6	9871.06	1666.38
9882.61	1666.1	9897.87	1664.77	9907.13	1664.65	9923.83	1665.25	9954.67	1666.06
9980.06	1665.9	9986.91	1665.88	9988.64	1665.88	9990.94	1665.54	10009.96	1662.74
10020.47	1664.2	10031.52	1665.96	10042.69	1665.91	10062.27	1665.28	10077.9	1664.95
10096.65	1665.3	10114.99	1665.67	10131.91	1664.54	10137.15	1664.23	10140.52	1664.53

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10144.03    166510156.54 1666.4510163.57 1666.7110200.04 1667.29 10205.1 1667.32
10320.69    167010321.62 1669.9610323.86 1669.9810324.68 1669.99 10329.3 1670.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 7075.61    .068 9954.67    .04510031.52    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9954.6710031.52              225  363.96     440            .1        .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 7075.61 7387.38 1668.44
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1667.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1667.55	Reach Len. (ft)	225.00	363.96	440.00
Crit W.S. (ft)	1666.76	Flow Area (sq ft)	2534.93	193.70	309.12
E.G. Slope (ft/ft)	0.006879	Area (sq ft)	2534.93	193.70	309.12
Q Total (cfs)	7577.00	Flow (cfs)	5806.48	978.47	792.06
Top Width (ft)	2190.23	Top Width (ft)	1929.70	76.85	183.68
Vel Total (ft/s)	2.49	Avg. Vel. (ft/s)	2.29	5.05	2.56
Max Chl Dpth (ft)	4.81	Hydr. Depth (ft)	1.31	2.52	1.68
Conv. Total (cfs)	91357.6	Conv. (cfs)	70010.0	11797.6	9550.0
Length Wtd. (ft)	263.83	Wetted Per. (ft)	1930.82	77.32	183.89
Min Ch El (ft)	1662.74	Shear (lb/sq ft)	0.56	1.08	0.72
Alpha	1.29	Stream Power (lb/ft s)	1.29	5.43	1.85
Frctn Loss (ft)	2.03	Cum Volume (acre-ft)	1305.76	48.24	109.05
C & E Loss (ft)	0.02	Cum SA (acres)	836.74	21.62	89.93

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7075.61	7795.38	234.33	186.20	301.03	3.09	0.62	1.26
7795.38	8515.14	3972.55	1442.58	720.50	52.43	2.00	2.75
8515.14	9234.91	1035.87	531.31	445.46	13.67	1.19	1.95
9234.91	9954.67	563.72	374.82	463.83	7.44	0.81	1.50
LB 9954.67	RB 10031.52	978.47	193.70	77.32	12.91	2.52	5.05
10031.52	10329.30	792.06	309.12	183.89	10.45	1.68	2.56

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.171

INPUT
Description: RM. 4.171 AREA BLOCKED OUT TO LEFT OF STA.7447 DUE TO CONTAINMENT BY RIDGE. AND ALSO BETWEEN STA 10187.48 AND 10480.19 DUE TO CONTAINMT. BY RIDGE.

Station Elevation Data num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7230.69	1663.4	7231.21	1663.3	7233.09	1663.1	7235.4	1662.86	7258.65	1664.47
7262.05	1664.7	7270.15	1664.86	7309.93	1665.57	7330.14	1665.76	7363.27	1665.92
7447.86	1666.2	7499.45	1666	7549.7	1665.73	7561.99	1665.86	7577.77	1665.59
7591.74	1665.3	7610.41	1665.06	7632.71	1664.65	7680.26	1664.43	7682.94	1664.4
7684.23	1664.4	7688.96	1664.37	7801.03	1664.26	7878.48	1664.22	7903.97	1664.87
7909.32	1664.9	7918.34	1662.15	7920.27	1661.86	7924.3	1662.72	7936.25	1664.79
7936.38	1664.8	7937.3	1664.81	7977.71	1664.53	7998.2	1664.39	8036.48	1664.05
8067.99	1663.7	8154.2	1663.09	8202.07	1663.46	8219.59	1663.93	8249.15	1663.78
8263.3	1663.7	8271.92	1663.7	8339.01	1663.97	8389.64	1663.65	8411.63	1663.71
8447.02	1663.9	8507.36	1664.16	8606.31	1663.68	8625.09	1663.56	8628.07	1663.58
8628.89	1663.6	8630.32	1663.57	8642.61	1663.64	8672.89	1663.76	8685.66	1663.94
8686.75	1664	8691.19	1664.03	8708.67	1664.26	8714.87	1664.61	8723.91	1665.08
8740.32	1665.2	8759.38	1665.45	8786.64	1664.88	8796.77	1664.65	8809.27	1664.64
8830.29	1664.6	8850.26	1664.59	8855.02	1664.63	8855.56	1664.42	8860.54	1663.14
8869.2	1664.3	8873.39	1664.77	8895.34	1664.58	8945.23	1664.28	8954.7	1665
8960.76	1665.5	8971.08	1665.27	8979.44	1665.17	8980.6	1665.43	8991.42	1665.32
8991.48	1665.3	8991.79	1665.32	9025.37	1665.66	9049.92	1666.06	9095.98	1666.34
9205.08	1665.6	9208.26	1665.53	9213.7	1665.5	9227.83	1665.51	9331.42	1665.44
9365.48	1665.4	9384.66	1665.42	9417.04	1665.2	9417.17	1665.2	9459.46	1665.17
9462.16	1665.2	9465.83	1665.16	9484.99	1665.03	9566.87	1665.23	9584.11	1665.27
9646.09	1665.5	9684.59	1665.47	9711.86	1666.13	9719.68	1666.33	9724.38	1666.32
9780.37	1663.6	9798.24	1662.94	9801.53	1662.67	9801.91	1662.64	9805.56	1662.68
9817.2	1662.8	9818.59	1662.8	9826.97	1662.58	9842.88	1662.66	9872.4	1663
9897.74	1663.1	9966.5	1663.04	9969.64	1663.04	9991.53	1660.49	9997.3	1659.67
9998.69	1659.91	10017.15	1661.76	10038.55	1663.89	10062.83	1664.26	10078.73	1664.55
10107.97	1665	10117.15	1665.26	10123.68	1665.41	10128.13	1665.52	10148.43	1666.34
10163.68	1666.7	10183.2	1667.04	10187.48	1667.06	10221.7	1666.71	10224.49	1666.67
10277.57	1666.21	10295.65	1666.07	10304.54	1665.33	10313.37	1664.59	10336.94	1665.78
10340.66	1665.91	10393.34	1666.41	10424.52	1666.78	10435.88	1666.69	10480.19	1666.04

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7230.69	.068	9969.64	.045	10038.55	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9969.64	10038.55	290	364.78	370	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7230.69	7447.86	1666.21	10187.48	10480.19	1667.06

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1665.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1665.35	Reach Len. (ft)	290.00	364.78	370.00
Crit W.S. (ft)		Flow Area (sq ft)	2190.73	254.09	65.00
E.G. Slope (ft/ft)	0.008647	Area (sq ft)	2190.73	254.09	65.00
Q Total (cfs)	7577.00	Flow (cfs)	5610.11	1854.50	112.39
Top Width (ft)	1963.93	Top Width (ft)	1812.22	68.91	82.80
Vel Total (ft/s)	3.02	Avg. Vel. (ft/s)	2.56	7.30	1.73

Max Chl Dpth (ft)	5.68	Hydr. Depth (ft)	1.21	3.69	0.79
Conv. Total (cfs)	81484.1	Conv. (cfs)	60332.0	19943.5	1208.6
Length Wtd. (ft)	310.89	Wetted Per. (ft)	1813.44	69.33	82.81
Min Ch El (ft)	1659.67	Shear (lb/sq ft)	0.65	1.98	0.42
Alpha	1.97	Stream Power (lb/ft s)	1.67	14.44	0.73
Frctn Loss (ft)	2.52	Cum Volume (acre-ft)	1293.55	46.37	107.16
C & E Loss (ft)	0.01	Cum SA (acres)	827.08	21.01	88.58

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7230.69	7915.43	604.39	294.48	326.39	7.98	0.90	2.05
7915.43	8600.17	3028.65	1041.93	685.18	39.97	1.52	2.91
8600.17	9284.90	693.97	334.87	365.82	9.16	0.92	2.07
9284.90	9969.64	1283.11	519.45	436.06	16.93	1.19	2.47
LB 9969.64	RB 10038.55	1854.50	254.09	69.33	24.48	3.69	7.30
10038.55	10480.19	112.39	65.00	82.81	1.48	0.79	1.73

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.101**

INPUT
Description: RM.4.101 AREA BLOCKED OUT TO RT. OF STA. 10207.91 DUE TO RIDGE.

Station Elevation Data num= 197

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7362.74	1665.2	7391.29	1664.77	7425.1	1664.4	7431.92	1664.35	7441.38	1664.32
7451.45	1664.2	7467.65	1664.06	7521.78	1663.72	7541.24	1663.61	7576.1	1663.42
7578.82	1663.4	7580.64	1663.39	7584.98	1663.35	7602.25	1663.21	7625.04	1663.01
7626.66	1662.7	7629.62	1661.81	7635.05	1661.83	7641.41	1661.86	7654.04	1661.91
7670.7	1662	7675.45	1662.23	7690.41	1662.96	7700.72	1661.91	7719.18	1660.22
7723.11	1660.6	7726.05	1660.87	7736.84	1662	7746.98	1662.99	7773.26	1662.84
7785.13	1662.8	7792.41	1662.77	7805.33	1662.61	7894.96	1662.12	8005.26	1662.04
8009.17	1662	8011.46	1662.06	8016.32	1662.16	8040.99	1662.66	8053.39	1660.26
8053.46	1660.2	8053.54	1660.26	8065.81	1662.63	8067.85	1662.62	8123.38	1661.93
8219.36	1661.3	8237.58	1661.16	8245.59	1661.22	8270.81	1661.04	8299.85	1660.93
8310.01	1661.1	8370.7	1661.99	8373.7	1660.92	8376.55	1660.05	8382.97	1660.87
8386.76	1661.3	8415.12	1661.48	8434.87	1661.58	8445.99	1661.63	8466	1661.71
8471.07	1661.7	8472.16	1661.72	8539.87	1661.28	8546.24	1661.29	8554.37	1661.35
8576.18	1661.5	8576.37	1661.51	8577.73	1661.51	8577.99	1661.5	8585.91	1660.99
8588.17	1660.8	8589.26	1660.89	8615.95	1662.47	8627.29	1662.38	8696.45	1662.04
8702.52	1661.9	8705.06	1661.88	8757.9	1661.09	8787.79	1661.28	8809.72	1661.32
8813.63	1661.2	8829.22	1661.01	8845.59	1661.01	8879.61	1660.83	8881.95	1660.84
8886.12	1661	8894.66	1661.21	8898.99	1661.32	8904.57	1661.36	8921.16	1661.58
8930.67	1661.7	8936.22	1661.33	8943.31	1661.02	8964.39	1661.29	9008.98	1662.34
9015.63	1661.9	9017.14	1661.78	9028.08	1662.14	9030.05	1662.21	9036.97	1661.99
9046.08	1662	9047.44	1661.98	9151.25	1662.58	9162.2	1662.5	9172.23	1662.82

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 9199.28    1663 9207.63 1663.13 9285.59 1662.77 9293.22 1662.78 9314.13 1662.45
 9355.79  1661.7 9363.39 1661.73 9392.23 1661.84 9400.67 1661.86 9401.55 1661.86
 9402.58  1661.9 9465.37 1662.27 9474.08  1662.3 9479.15 1662.33 9493.87 1662.43
 9544.61  1662.3 9563.01 1662.37 9589.47 1662.38 9605.04 1662.47 9633.49 1662.41
 9711.19  1662.1 9711.53 1662.11 9711.61 1662.11 9711.98 1662.11 9738.97 1662.02
 9741.73  1661.6 9745.38 1660.84    9763 1660.75    9787 1660.71 9818.03 1660.59
 9879.77    1660 9924.52  1659.6 9946.63 1659.67 9961.76 1659.75  9976.5 1659.97
 9988.62  1658.310002.39 1656.3410019.79 1660.34 10019.8 1660.3410019.81 1660.34
10026.26  1659.710055.66 1660.4410086.78  1660.810102.76 1661.3610108.32 1661.56
10117.31  1661.610125.47 1661.7110160.34 1662.54 10171.4  1662.710207.99 1663.01
 10245.4  1662.210271.02 1662.2710271.63 1662.2610273.59 1662.2110282.01 1660.64
10286.58  1659.810287.43 1659.8510299.17 1660.6410305.98 1660.4710322.99 1661.14
10336.84  1661.910344.38 1661.9910372.33 1662.2410397.98 1662.3610418.61 1662.57
10433.06  1662.610441.18 1662.61   10457 1662.6510490.92 1662.4910563.49 1661.51
10569.19  1661.410576.59 1661.3310585.01 1661.2810596.69 1661.1810601.12 1661.28
 10615.9  1660.610616.15 1660.6410616.72 1660.6610635.32 1661.8310643.47 1661.91
10662.59  1662.210665.49 1662.3110680.21 1662.5810692.92 1662.77 10705.3 1663.04
10736.03  1663.210737.13 1663.2410741.81 1663.3110752.45 1663.4110753.01 1663.45
10754.53  1663.510758.02 1663.55

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 7362.74    .068  9976.5    .04510019.79    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9976.510019.79              450  400.93     315              .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
10207.9910758.02 1663.01

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1663.11   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.26   Wt. n-Val.                 0.068      0.045      0.068
  W.S. Elev (ft)            1662.85   Reach Len. (ft)           450.00     400.93     315.00
  Crit W.S. (ft)            1662.46   Flow Area (sq ft)        2560.96     199.68     255.89
  E.G. Slope (ft/ft)       0.007571   Area (sq ft)             2560.96     199.68     255.89
  Q Total (cfs)             7577.00   Flow (cfs)               5364.07    1572.59     640.34
  Top Width (ft)            2442.92   Top Width (ft)           2230.23      43.29     169.40
  Vel Total (ft/s)             2.51   Avg. Vel. (ft/s)            2.09       7.88       2.50
  Max Chl Dpth (ft)            6.51   Hydr. Depth (ft)            1.15       4.61       1.51
  Conv. Total (cfs)         87082.7   Conv. (cfs)             61649.4    18073.9     7359.4
  Length Wtd. (ft)           422.38   Wetted Per. (ft)         2231.87      44.00     169.47
  Min Ch El (ft)            1656.34   Shear (lb/sq ft)            0.54       2.15       0.71
  Alpha                        2.62   Stream Power (lb/ft s)      1.14      16.89       1.79
  Frctn Loss (ft)              3.76   Cum Volume (acre-ft)     1277.74      44.47     105.80
  C & E Loss (ft)              0.01   Cum SA (acres)            813.62      20.54      87.51

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.
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FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7362.74	8016.18	392.18	260.58	361.60	5.18	0.72	1.51
8016.18	8669.62	1738.70	807.32	654.43	22.95	1.24	2.15
8669.62	9323.06	1167.79	598.36	562.27	15.41	1.06	1.95
9323.06	9976.50	2065.40	894.71	653.57	27.26	1.37	2.31
LB 9976.50	RB 10019.79	1572.59	199.68	44.00	20.75	4.61	7.88
10019.79	10758.02	640.34	255.89	169.47	8.45	1.51	2.50

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.026

INPUT
Description: RM. 4.026. HORZ. N VALUES USED. AREA BLOCKED OUT TO LEFT OF STA.7801 DUE TO RIDGE.

Station Elevation Data num= 266

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7068.44	1661.9	7081.6	1661.47	7088.09	1661.39	7099.17	1661.83	7123.5	1661.31
7139.3	1661.2	7158.22	1661.18	7174.23	1661.13	7184.9	1660.93	7198.81	1660.8
7204.09	1660.9	7217.93	1660.72	7229.3	1660.65	7256.75	1660.58	7261.92	1660.46
7290.96	1660.4	7291.79	1660.37	7294.84	1660.36	7301.12	1660.31	7311.85	1659.52
7320.01	1658.7	7320.54	1658.76	7328.52	1658.59	7333.33	1658.59	7343.04	1658.35
7345.14	1658.2	7349.53	1658.69	7350.89	1658.84	7353.65	1659.45	7357.06	1659.65
7372.01	1658.8	7374.34	1658.49	7395.73	1657.05	7397.49	1657.03	7397.9	1657.03
7410.38	1657.1	7417.47	1657.08	7426.06	1657.02	7436.22	1656.82	7438.19	1656.8
7446.97	1656.7	7451.42	1656.81	7452.47	1656.85	7454.15	1656.93	7469.66	1657.75
7479.03	1658.2	7482.62	1658.44	7488.26	1658.67	7492.57	1658.84	7494.47	1658.88
7504.78	1658.9	7575.68	1659.54	7598.31	1659.55	7615.69	1659.56	7618.33	1659.57
7622.43	1659.6	7626.73	1659.56	7695.08	1659.64	7714.48	1659.41	7743.37	1659.27
7765.39	1658.9	7778.41	1660.4	7801.55	1662.89	7808.31	1662.77	7837.14	1662.15
7850.6	1661.9	7886.72	1661.4	7930.84	1661.01	7937.56	1660.94	7945.93	1660.92
7957.29	1660.9	8021.68	1660.64	8039.9	1660.54	8062.19	1660.49	8093.85	1660.31
8107.26	1660.2	8132.94	1659.88	8138.09	1659.8	8143.38	1659.7	8161.11	1659.36
8169.33	1659.1	8185.42	1658.71	8186.26	1658.69	8189.49	1658.56	8190.67	1658.55
8204.15	1657.8	8208.31	1657.69	8211.08	1657.25	8219.72	1656.93	8228.09	1656.68
8233.36	1656.6	8236.79	1656.55	8245.15	1656.72	8262.62	1657.3	8270	1658.24
8293.08	1658.8	8296.13	1658.93	8298.34	1658.97	8325.15	1656.81	8327.98	1656.76
8332.62	1656.9	8368.38	1658.24	8372	1658.24	8375.28	1658.41	8376.3	1658.47
8377.23	1658.5	8378.18	1658.39	8379.54	1658.5	8385.21	1658.44	8389.13	1658.47
8391.75	1658.6	8405.28	1658.76	8435.94	1658.62	8471.08	1658.6	8481.04	1658.84
8505.91	1659.2	8527	1659.15	8550.4	1659.16	8600.46	1659.12	8604.37	1659.11
8604.9	1659.1	8611.12	1659.06	8618.39	1659	8619.42	1659	8688.38	1659
8721.21	1659	8752.37	1658.79	8763.16	1658.47	8805.23	1657.8	8843.95	1657.39
8853.35	1657.3	8855.31	1656.96	8864.99	1655.86	8869.45	1656.45	8874.07	1657.14
8884.22	1657.2	8892.9	1657.41	8923.51	1657.64	8941.66	1657.8	8951.65	1658
8997.23	1657.3	9000.92	1657.24	9002.35	1657.24	9007.13	1657.22	9011.75	1657.2
9011.9	1657.2	9013.57	1657.21	9015.79	1657.22	9048.52	1657.44	9059.01	1657.48
9061.81	1657.5	9072.06	1657.62	9075.61	1657.68	9079.83	1657.68	9080.54	1657.67
9081.46	1657.7	9082.65	1657.63	9094.26	1657.32	9094.63	1657.33	9095.02	1657.33

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 9135.32    1658 9135.75 1657.95 9187.66 1657.46 9202.55 1657.26 9203.08 1657.26
 9204.45  1657.3 9214.54 1657.52 9219.24 1657.36  9301.3 1658.15 9316.95 1658.34
 9329.78  1658.4 9345.01 1658.45 9365.24 1658.46 9379.77 1658.36 9436.68 1657.97
  9518.9  1658.6 9543.58 1658.69 9572.42 1658.59 9592.69 1658.35 9622.89    1658
 9626.85    1658 9657.48 1657.92  9661.8 1657.92 9690.81 1657.78 9720.91 1657.61
 9722.13  1657.4  9727.7 1656.39 9738.76 1657.82 9738.82 1657.83 9738.93 1657.83
 9739.08  1657.8 9780.91 1656.98 9782.49 1657.08  9797.8 1655.59 9801.77  1655.1
 9806.78  1655.1 9820.39 1656.87 9824.31 1657.29 9865.88 1657.12 9885.41 1657.07
 9906.46  1657.4 9908.89 1657.41 9921.17 1657.35    9924 1657.32 9928.45  1657.2
 9941.91  1657.1 9943.91 1656.91 9944.86 1656.96  9948.5 1656.93 9950.42 1657.03
  9953.3  1657.1 9960.94 1657.18 9970.51    1655 9979.51 1654.34 9979.95 1654.23
 9980.06  1654.2  9980.4 1654.19 9997.05 1653.9710001.81 1654.9310016.93 1658.01
10048.86  1657.810051.33 1657.7710052.87 1657.7510054.68 1657.6610055.71 1657.61
10062.08  1657.7 10151.7 1658.6210153.28 1658.5710170.32 1658.0410184.36 1657.74
10187.57  1657.710202.36 1657.63 10241.5 1657.23 10257.6 1657.1410267.31 1656.99
10274.88  1656.310279.51 1655.7710288.67 1657.0910292.18 1657.5310300.02 1657.75
10320.21  1658.3   10325 1658.4410340.86 1658.5310360.77 1658.63 10373.3 1658.66
 10375.7  1658.710389.33 1658.9610485.11 1657.7110490.66 1657.63 10499.5 1657.29
10505.49  1657.110505.95 1657.1410528.01 1658.1710531.41 1658.3210535.75 1658.43
10609.26    1659 10616.7 1658.8810627.72 1658.9810647.11 1659.0710694.08 1659.15
10720.28  1659.210722.71 1659.3410724.39 1659.4410733.24 1659.7910735.43 1659.88
10736.17  1659.9

Manning's n Values          num=        4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7068.44     .15    8270    .068 9960.94    .04510016.93    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9960.9410016.93               340   365.6     370             .1       .3

Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
 7068.44 7801.55 1662.89

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1659.34   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.31   Wt. n-Val.                 0.072      0.045      0.068
  W.S. Elev (ft)            1659.03   Reach Len. (ft)           340.00     365.60     370.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1915.74     214.57     579.48
  E.G. Slope (ft/ft)       0.010608   Area (sq ft)             1915.74     214.57     579.48
  Q Total (cfs)             7577.00   Flow (cfs)               4560.39    1772.40    1244.21
  Top Width (ft)            2345.76   Top Width (ft)           1668.17      55.99     621.60
  Vel Total (ft/s)             2.80   Avg. Vel. (ft/s)            2.38       8.26       2.15
  Max Chl Dpth (ft)            5.06   Hydr. Depth (ft)            1.15       3.83       0.93
  Conv. Total (cfs)         73567.7   Conv. (cfs)              44278.4    17208.8    12080.5
  Length Wtd. (ft)           351.21   Wetted Per. (ft)         1669.19      56.68     621.88
  Min Ch El (ft)            1653.97   Shear (lb/sq ft)            0.76       2.51       0.62
  Alpha                        2.57   Stream Power (lb/ft s)      1.81      20.71       1.32
  Frctn Loss (ft)              3.66   Cum Volume (acre-ft)     1254.61      42.56     102.78
  C & E Loss (ft)              0.05   Cum SA (acres)            793.49      20.08      84.65

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.
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FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7791.56	8514.69	483.87	306.91	322.27	6.39	0.95	1.58
8514.69	9237.82	1763.12	715.23	623.31	23.27	1.15	2.47
9237.82	9960.94	2313.39	893.61	723.61	30.53	1.24	2.59
LB 9960.94	RB 10016.93	1772.40	214.57	56.68	23.39	3.83	8.26
10016.93	10736.17	1244.21	579.48	621.88	16.42	0.93	2.15

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.956

INPUT
Description: RM. 3.956. HORZ. N VALUES USED.

Station Elevation Data num= 245

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7493.42	1656.4	7504.43	1656.32	7509.71	1656.26	7526.4	1656.09	7548.6	1655.99
7568.56	1655.9	7575.56	1655.76	7581.54	1655.64	7592.25	1655.54	7598.62	1655.54
7629.82	1655.3	7651.88	1655.28	7653.28	1655.29	7654.2	1655.28	7665.94	1655.22
7686.14	1654.4	7705.61	1653.95	7714.07	1653.7	7729.29	1653.32	7739.01	1653.24
7752.15	1653.2	7768.01	1653.09	7771.6	1653.08	7773.76	1653.09	7776.42	1653.07
7780.23	1653	7783.19	1652.9	7790.75	1652.91	7807.06	1652.91	7811.43	1652.93
7822.46	1653	7836.24	1652.84	7836.98	1652.83	7838.32	1653.12	7847.93	1655.07
7853.85	1654.9	7862.33	1654.61	7888.82	1654.3	7920.16	1653.97	7951.23	1653.69
7956.12	1652.6	7968.32	1649.85	7979.65	1649.81	7985.56	1649.8	7999.27	1653.69
8004.41	1655.2	8023.45	1655.21	8030.56	1655.02	8064.03	1654.59	8066.49	1654.57
8069.28	1654.6	8089.89	1656.16	8094.93	1656.61	8101.49	1656.42	8123.66	1656.57
8149.85	1656.5	8160.78	1656.5	8184.95	1655.82	8201.57	1655.74	8224.63	1655.6
8235.45	1655.9	8246.5	1655.77	8275.89	1655.33	8279.92	1655.22	8297.29	1655.08
8303.08	1654.5	8306.64	1654.06	8317.18	1654.27	8333.95	1654.03	8361.7	1653.75
8365.22	1653.6	8371.53	1653.52	8397.97	1652.97	8419.49	1652.54	8425.83	1652.61
8431.95	1652.7	8445.55	1653	8462.25	1653.27	8469.5	1653.75	8472.9	1654.09
8484.1	1654.2	8485.6	1654.15	8537.8	1653.9	8538.9	1653.91	8540.92	1653.93
8545.17	1654	8597.86	1654.58	8616.34	1654.63	8626.95	1654.48	8641.04	1654.37
8655.02	1654.3	8670.28	1655.57	8679.01	1656.31	8688.96	1656.21	8747.17	1655.67
8760.26	1655.7	8762.69	1655.66	8765.8	1655.66	8787.55	1655.58	8826.3	1655.45
8830.77	1654.3	8836.99	1653.02	8844.51	1653.11	8847.75	1653.24	8859.68	1653.1
8898.85	1652.8	8911.66	1653.14	8923.61	1653.47	8930.14	1653.61	8933.62	1653.69
8936.32	1653.8	8939.6	1653.76	8950.99	1653.45	8969.85	1652.76	8974.27	1652.79
8981.84	1652.7	8985.45	1652.8	8999.96	1652.98	9002.95	1653.03	9003.7	1653.05
9045.59	1653.9	9053.02	1654.03	9059.81	1654.15	9065.91	1654.17	9076.78	1654.38
9086.49	1654.5	9099.82	1654.59	9101.32	1654.61	9104.5	1654.64	9108.51	1654.7
9119.58	1654.9	9131.31	1655.04	9132.68	1655.05	9141.68	1655.05	9158.54	1655.28
9174.98	1655.6	9192.27	1655.86	9206.28	1655.82	9218.28	1655.24	9267.03	1655.21
9331.41	1655.2	9388.72	1655.31	9444.54	1655.4	9497.12	1654.89	9497.75	1654.89
9498.65	1654.9	9515.86	1654.52	9523.68	1654.87	9533.61	1655.24	9545.74	1655.17
9557.67	1655.2	9602.57	1655.39	9664.08	1655.65	9683.41	1655.58	9685.95	1655.58
9688.94	1655.7	9697.24	1656.08	9723.76	1655.88	9763.18	1655.57	9783.93	1655.38
9816.42	1655.5	9866.39	1655.75	9877.97	1655.65	9887.44	1655.5	9909.16	1654.92
9925.33	1654.6	9930.08	1653.93	9932.66	1653.52	9938.22	1652.56	9944.59	1651.22

9955.97	1652	9961.1	1652.51	9967.72	1652.5	9981.96	1652.62	9994.75	1653.12		
10003.68	1651.81	10010.19	1650.81	10012.05	1651.03	10025.9	1652.98	10034.22	1654.2		
10037.46	1654.61	10041.76	1654.42	10050.54	1653.97	10062.62	1653.73	10065.78	1653.67		
10068.44	1653.61	10072.86	1653.64	10119.96	1653.71	10146.25	1653.81	10158.45	1651.68		
10158.54	1651.71	10158.61	1651.68	10170.76	1653.81	10181.49	1654.11	10184.22	1654.08		
10197.63	1654.31	10212.11	1654.54	10220.56	1654.63	10228.08	1654.71	10260.47	1654.9		
10268.49	1654.91	10292.33	1654.64	10328.47	1654.27	10331.12	1654.25	10332.17	1654.24		
10360.89	1653.61	10363.55	1653.51	10378.78	1653.21	10384.75	1653.11	10390.02	1653.12		
10394.22	1653.11	10403.27	1652.93	10405.9	1652.81	10414.43	1652.82	10425.56	1653.18		
10434.89	1653.51	10439.91	1653.79	10447.04	1653.91	10454	1653.55	10461.14	1653.49		
10464.67	1653.71	10478.45	1654.66	10493.76	1655.02	10496.54	1655.11	10504.46	1655.17		
10567.89	1655.51	10569.25	1655.58	10573.01	1655.57	10575.29	1655.55	10597.79	1653.87		
10602.02	1653.91	10616.91	1654.55	10673.62	1654.83	10679.78	1654.9	10683.1	1654.86		
10688.98	1654.91	10695.89	1654.99	10708.67	1655.17	10733.56	1655.48	10738.39	1655.92		
10753.96	1657.11	10760.65	1657.08	10802.11	1657.17	10837.12	1657.27	10854.37	1657.04		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
7493.42	.15	8836.99	.068	9994.75	.045	10037.46	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9994.75	10037.46	310	377.63	300	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.101	0.045	0.068
W.S. Elev (ft)	1655.48	Reach Len. (ft)	310.00	377.63	300.00
Crit W.S. (ft)		Flow Area (sq ft)	2272.93	129.98	825.60
E.G. Slope (ft/ft)	0.010236	Area (sq ft)	2272.93	129.98	825.60
Q Total (cfs)	7577.00	Flow (cfs)	4539.15	905.81	2132.04
Top Width (ft)	2510.98	Top Width (ft)	1784.36	42.71	683.91
Vel Total (ft/s)	2.35	Avg. Vel. (ft/s)	2.00	6.97	2.58
Max Chl Dpth (ft)	5.68	Hydr. Depth (ft)	1.27	3.04	1.21
Conv. Total (cfs)	74890.3	Conv. (cfs)	44864.5	8952.9	21072.8
Length Wtd. (ft)	313.44	Wetted Per. (ft)	1786.77	43.14	684.49
Min Ch El (ft)	1650.81	Shear (lb/sq ft)	0.81	1.93	0.77
Alpha	1.83	Stream Power (lb/ft s)	1.62	13.42	1.99
Frctn Loss (ft)	2.84	Cum Volume (acre-ft)	1238.27	41.11	96.81
C & E Loss (ft)	0.02	Cum SA (acres)	780.01	19.67	79.11

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7493.42	8118.75	1200.18	758.96	475.98	15.84	1.60	1.58
8118.75	8744.08	891.57	594.39	403.50	11.77	1.47	1.50
8744.08	9369.42	1847.83	629.34	507.91	24.39	1.24	2.94
9369.42	9994.75	599.58	290.24	399.38	7.91	0.73	2.07
LB 9994.75	RB 10037.46	905.81	129.98	43.14	11.95	3.04	6.97
10037.46	10854.37	2132.04	825.60	684.49	28.14	1.21	2.58

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.885**

INPUT
Description: RM. 3.885. HORZ. N VALUES USED. AREA BLOCKED OUT TO RT. OF STA. 10881.9.

Station Elevation Data num= 248

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7650.82	1653.2	7653.74	1653.19	7667.17	1653.14	7678.49	1653.1	7690.69	1653.03
7701.42	1652.9	7725.19	1652.69	7729.9	1652.57	7757.63	1652.33	7760.65	1652.28
7763.22	1652.3	7793.94	1651.75	7795.32	1651.74	7808.63	1651.67	7827.81	1651.63
7832.36	1651.6	7862.74	1651.48	7877.13	1651.3	7881.39	1651.29	7884.24	1651.25
7887.74	1651.2	7890.56	1651.08	7894.44	1650.97	7897.39	1650.84	7900.75	1650.87
7935.24	1651.1	7943.41	1651.33	7949.82	1651.47	7953.22	1651.55	7955.94	1651.99
7963.87	1653.2	7973	1653.11	8021.72	1652.52	8064.33	1651.89	8081.12	1647.69
8081.42	1647.6	8081.54	1647.58	8082.39	1647.6	8099.75	1648.03	8114.4	1653.39
8115.69	1653.9	8117.1	1653.84	8117.5	1653.84	8118.1	1653.84	8119.39	1653.83
8154.63	1653.6	8173	1653.38	8184.3	1653.39	8191.97	1653.43	8217.96	1653.41
8222.41	1653.4	8251.82	1653.41	8255.55	1653.42	8284.94	1652.85	8290.38	1652.88
8296.4	1652.8	8311.1	1652.68	8322.26	1652.62	8333.8	1651.39	8340.01	1650.9
8355.36	1650.8	8364.93	1650.67	8378.63	1650.53	8390.75	1650.42	8406.35	1650.32
8416.04	1650.3	8435.07	1650.15	8461	1649.85	8462.61	1649.83	8465.54	1649.81
8493.41	1650.4	8510.45	1650.7	8520.17	1651.16	8523.74	1651.66	8525.16	1651.72
8528.48	1651.5	8548.18	1651.41	8561.78	1651.18	8579.03	1651.97	8579.4	1652.11
8579.7	1652.1	8598.16	1653.55	8607.74	1653.98	8611.88	1654.08	8613.36	1653.74
8613.97	1653.5	8618.94	1651.23	8625.29	1650.96	8627.02	1650.85	8628.64	1650.34
8630.73	1649.9	8634.09	1649.75	8636.61	1649.58	8642.76	1649.32	8668.32	1648.36
8669.58	1648.4	8688.69	1649.05	8694.39	1650.7	8697	1651.56	8709.35	1651.71
8751.59	1652.1	8760.19	1652.03	8799.74	1651.95	8809.73	1651.17	8817.79	1650.83
8833.08	1650.9	8866.81	1650.97	8869.12	1650.95	8874.71	1650.92	8933.14	1651.53
8975.42	1651.4	8998.8	1651.36	9010.54	1651.09	9044.9	1650.39	9059.86	1650.04
9063.96	1649.7	9082.86	1648.64	9086.19	1648.99	9092.38	1649.74	9095.48	1650.14
9107.14	1650.4	9122.35	1650.69	9134.51	1650.61	9142.59	1650.6	9155.78	1650.44
9159.33	1650.6	9212.88	1651.46	9232.59	1651.82	9269.23	1652.47	9282.12	1652.58
9286.08	1652.6	9332.57	1652.39	9396.84	1652.31	9493.73	1652.02	9506.01	1651.98
9510.42	1652	9510.86	1651.96	9521.78	1651.92	9631.9	1651.85	9634.5	1651.9
9639.27	1651.9	9641.22	1651.9	9651.83	1651.95	9652.75	1651.95	9656.71	1651.91
9658.54	1651.9	9660.07	1651.86	9664.38	1651.81	9674.29	1651.79	9680.96	1651.85
9696.71	1652.1	9724.35	1652.52	9740.86	1652.5	9746.58	1652.58	9763.9	1652.6
9795.26	1652.6	9805.18	1652.72	9826.11	1652.85	9833.45	1653.02	9847.46	1653
9856.84	1653	9862.61	1653.07	9866.22	1653.1	9879.58	1653.13	9893.79	1653.29
9908.29	1653.5	9925.91	1653.78	9941.93	1653.38	9944.86	1653.22	9946.02	1653.31
9948.66	1653.1	9963.68	1652.72	9970.61	1652.52	9973.59	1651.83	9983.3	1649.72
9990.87	1648.1	9999.98	1649.32	10014.84	1651.28	10018.65	1651.33	10067.18	1651.4
10081.08	1651.2	10092.4	1651.29	10127.86	1651.36	10163.66	1650.85	10197.84	1650.39
10267.67	1650.4	10278.71	1650.38	10287.99	1650.34	10295.41	1649.82	10315.86	1648.48
10318.39	1648.6	10319.99	1648.64	10320.99	1648.65	10333.32	1648.78	10343.52	1649.63
10359.68	1650.9	10378.43	1652.71	10388.98	1652.56	10410.39	1652.48	10419.49	1652.23
10429.95	1651.9	10436.73	1651.74	10442.86	1651.54	10449.34	1651.71	10463.86	1652.02
10484.87	1652.5	10530.6	1650.76	10530.89	1650.75	10531.1	1650.71	10537.4	1649.69
10541.46	1649	10551	1650.75	10552.02	1650.95	10563.06	1650.98	10618.28	1651.14
10623.83	1650.7	10632.81	1650	10638.59	1649.54	10641.61	1649.88	10652.24	1650.77

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10678.12  1651.310680.11  1651.710684.13 1652.0810691.76 1652.5710707.86 1652.38
10763.73  1652.210788.33 1652.0810791.92 1652.2110812.87 1652.8710830.61 1652.95
10858.54  1653.210881.94 1653.4610887.34 1653.5210903.28 1653.7110928.27 1653.26
10930.87  1653.410931.37 1653.3410932.55 1653.29 10934.2 1653.2610965.53  1653.6
10981.26  1652.910993.38 1652.38 11006.5  1652.5 11019.5 1652.6211025.27 1653.22
11029.81  1653.211031.96 1653.1411038.59 1654.26

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7650.82     .15 8809.73    .068 9948.66    .04510018.65    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9948.6610018.65              320  359.41     280             .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
10881.9411038.59 1653.46
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1652.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.103	0.045	0.068
W.S. Elev (ft)	1652.68	Reach Len. (ft)	320.00	359.41	280.00
Crit W.S. (ft)		Flow Area (sq ft)	2333.45	125.63	1175.38
E.G. Slope (ft/ft)	0.008065	Area (sq ft)	2333.45	125.63	1175.38
Q Total (cfs)	7577.00	Flow (cfs)	3726.18	652.58	3198.24
Top Width (ft)	2639.63	Top Width (ft)	1799.93	53.50	786.20
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)	1.60	5.19	2.72
Max Chl Dpth (ft)	5.10	Hydr. Depth (ft)	1.30	2.35	1.50
Conv. Total (cfs)	84370.2	Conv. (cfs)	41491.2	7266.5	35612.5
Length Wtd. (ft)	316.04	Wetted Per. (ft)	1802.72	54.19	787.03
Min Ch El (ft)	1648.10	Shear (lb/sq ft)	0.65	1.17	0.75
Alpha	1.54	Stream Power (lb/ft s)	1.04	6.06	2.05
Frctn Loss (ft)	2.51	Cum Volume (acre-ft)	1221.87	40.01	89.92
C & E Loss (ft)	0.01	Cum SA (acres)	767.26	19.25	74.04

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7650.82	8225.28	432.20	434.19	340.00	5.70	1.28	1.00
8225.28	8799.74	1069.71	844.41	460.56	14.12	1.84	1.27
8799.74	9374.20	1933.72	821.59	574.68	25.52	1.43	2.35
9374.20	9948.66	290.55	233.26	427.49	3.83	0.55	1.25
LB 9948.66	RB 10018.65	652.58	125.63	54.19	8.61	2.35	5.19
10018.65	11038.59	3198.24	1175.38	787.03	42.21	1.50	2.72

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.817**

INPUT
Description: RM. 3.817. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR ADOBE RD. ALIGN. AREA BLOCKED OUT TO RT. OF STA. 10673.07 DUE TO RIDGE.

Station Elevation Data num= 251

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7682.24	1650.9	7684.74	1650.88	7686.56	1650.84	7688.54	1650.84	7691.14	1650.86
7693.03	1650.9	7695.72	1650.98	7710.05	1650.95	7712.7	1650.96	7716.44	1650.97
7721.29	1651	7737.77	1650.86	7751.66	1650.96	7758.06	1650.88	7806.42	1650.43
7807.72	1650.4	7810.96	1650.4	7812.58	1650.05	7815.81	1649.32	7824.87	1647.49
7827.78	1646.6	7828.14	1646.76	7831.32	1646.57	7844.72	1646.52	7854.7	1648.76
7863.2	1650.4	7877.88	1650.96	7896.01	1651.88	7900.19	1651.96	7901.21	1651.92
7903.35	1652	7904.32	1651.99	7907.18	1651.98	7914.16	1651.97	7928.25	1651.97
7955.26	1651.9	7965.1	1651.68	7970.81	1651.32	7994.41	1649.42	7997.45	1649.37
7998.83	1649.4	8001.42	1649.33	8038.43	1649.2	8058.74	1648.78	8069.11	1648.36
8071.8	1648.3	8074.11	1648.25	8120.15	1647.63	8129.34	1647.63	8142.86	1647.91
8144.5	1647.9	8146.04	1647.91	8164.4	1647.59	8190.85	1647.9	8209.23	1647.98
8218	1648.2	8223.35	1648.49	8229.41	1648.57	8234.51	1648.55	8235.23	1648.53
8236.43	1648.4	8238.69	1648.28	8242.49	1647.81	8243.43	1647.7	8244.33	1647.53
8246.68	1647.4	8249.39	1647.2	8269.99	1647.06	8285.76	1647.02	8300.85	1648.17
8302.69	1648.3	8310.75	1648.72	8315.37	1649.08	8331.96	1648.72	8331.99	1648.72
8332.01	1648.7	8334.16	1649.34	8335.75	1649.58	8341.63	1650.33	8345.56	1650.32
8350.01	1649.3	8355.76	1649.42	8357.41	1649.06	8363.65	1649.97	8373.18	1648.88
8416.94	1648.9	8426.17	1648.44	8429.19	1648.31	8457.36	1649.04	8465.7	1648.97
8479.28	1648.4	8511.77	1647.93	8515.75	1647.88	8520.03	1647.93	8523.54	1647.94
8561.58	1648.4	8589.65	1648.65	8592.56	1648.71	8594.48	1648.73	8596.12	1648.78
8735.49	1649	8754.96	1648.94	8770.76	1648.89	8777.77	1648.91	8794.96	1648.9
8889.33	1649.2	8918.99	1648.99	8935.59	1648.89	8938.32	1648.91	8977.87	1649.17
8980.94	1648.4	8989.87	1646.77	8994.96	1646.89	9000.12	1648.34	9004.8	1649.02
9025.15	1649.1	9076.26	1649.17	9079.37	1649.2	9116.09	1648.95	9118.87	1648.9
9125.71	1648.8	9171.92	1648.11	9172.92	1648.14	9178.35	1648.42	9181.65	1648.6
9182.42	1648.6	9183.21	1648.61	9209.01	1648.79	9303.25	1648.88	9310.94	1648.99
9318.95	1648.8	9330.65	1648.7	9335.85	1648.81	9343.1	1648.94	9351.29	1648.7
9368.24	1648.9	9378.4	1649.42	9383.35	1649.56	9390.93	1649.98	9399.63	1649.96
9422.08	1650	9438.08	1650.02	9458.97	1650.04	9462.97	1650.2	9469.33	1650.47
9471.78	1650.5	9480.67	1650.63	9539.72	1651.06	9546.61	1650.97	9546.84	1650.97
9556.57	1650.9	9590.82	1650.61	9601.71	1650.51	9655.94	1650.14	9697.48	1649.98
9718.44	1649.7	9724.7	1649.7	9757.44	1648.89	9775.14	1648.46	9785.75	1649.14
9787.55	1649.3	9799.87	1649.43	9835.62	1649.89	9854.86	1648.86	9868.28	1648.05
9892.93	1648.3	9908.45	1648.44	9910.77	1648.5	9915.98	1647.76	9919.25	1647.24
9922.27	1647.4	9929.04	1648.41	9934.06	1648.04	9971.21	1646.11	9973.14	1646.19
9974.93	1646.2	9984.49	1646.52	9993.52	1646.61	10015.5	1647.11	10019.5	1647.3
10033.7	1647.7	10034.27	1647.72	10034.6	1647.72	10044.46	1647.8	10051.6	1647.87
10056.5	1647.9	10060.88	1647.99	10091.51	1649.04	10098.19	1649.38	10099.04	1649.44
10101.34	1649.5	10103.18	1650.51	10103.88	1650.58	10106.81	1651.17	10109.82	1650.67
10112.11	1649.8	10115.76	1649.92	10118.34	1650.15	10118.93	1650.28	10168.11	1649.51
10183.95	1649.1	10185.66	1649.14	10187.66	1649.15	10313.01	1649.33	10326.94	1649.45
10333	1649.4	10340.41	1649.28	10343.15	1649.26	10346.69	1649.18	10367.43	1648.43
10384.62	164	9103 96.42	1649.63	10430.58	1648.41	10440.44	1648.11	10443.88	1647.55
10451.12	1646.4	10459.39	1647.51	10465.45	1648.34	10470.62	1648.37	10496.61	1648.48
10502.34	1648.6	10522.06	1648.65	10575.84	1649.15	10631.22	1649.93	10649.6	1650.41
10673.07	1650.8	10686.55	1650.12	10688.07	1650.05	10693.34	1650.14	10702.44	1650.29
10706.31	1650.4	10730.96	1650.52	10758.11	1650.25	10774.38	1650.11	10784.5	1650.05
10793.85	165	10800.83	1649.91	10825.07	1649.66	10839.99	1649.48	10844.06	1649.05

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10857.02  1648.410859.16  1648.310860.14 1648.2310871.76 1649.5610876.98 1650.05
10900.64  1650.310945.61 1651.0310960.78 1651.1910968.12 1651.8910969.99  1651.9
10987.53  1651.5

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7682.24     .15 8429.19    .068 9934.06    .04510060.88    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9934.0610060.88              400  370.17     365             .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R   Elev
10673.0710987.53  1650.8
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1650.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.089	0.045	0.068
W.S. Elev (ft)	1650.06	Reach Len. (ft)	400.00	370.17	365.00
Crit W.S. (ft)		Flow Area (sq ft)	2323.18	371.36	568.86
E.G. Slope (ft/ft)	0.007820	Area (sq ft)	2323.18	371.36	568.86
Q Total (cfs)	7577.00	Flow (cfs)	4226.86	2218.56	1131.58
Top Width (ft)	2450.75	Top Width (ft)	1773.00	126.82	550.93
Vel Total (ft/s)	2.32	Avg. Vel. (ft/s)	1.82	5.97	1.99
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)	1.31	2.93	1.03
Conv. Total (cfs)	85684.0	Conv. (cfs)	47799.1	25088.5	12796.4
Length Wtd. (ft)	385.92	Wetted Per. (ft)	1775.32	126.90	551.52
Min Ch El (ft)	1646.11	Shear (lb/sq ft)	0.64	1.43	0.50
Alpha	2.39	Stream Power (lb/ft s)	1.16	8.54	1.00
Frctn Loss (ft)	3.39	Cum Volume (acre-ft)	1204.77	37.96	84.31
C & E Loss (ft)	0.01	Cum SA (acres)	754.13	18.51	69.75

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7682.24	8245.20	725.01	561.05	308.64	9.57	1.82	1.29
8245.20	8808.15	1585.54	810.37	556.35	20.93	1.46	1.96
8808.15	9371.10	1471.86	679.11	563.48	19.43	1.21	2.17
9371.10	9934.06	444.44	272.65	346.84	5.87	0.79	1.63
LB 9934.06	RB 10060.88	2218.56	371.36	126.90	29.28	2.93	5.97
10060.88	10987.53	1131.58	568.86	551.52	14.93	1.03	1.99

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.747

INPUT
Description: RM. 3.747. HORZ. N VALUES USED. AREA BLOCKED OUT TO RIGHT OF 10594.83 DUE TO RIDGE

Station Elevation Data num= 290

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7545.9	1647.4	7574.93	1647.01	7613.05	1645.95	7622.49	1646.29	7633.4	1646.53
7640.58	1644.3	7643.04	1643.44	7644.6	1643.55	7647.71	1643.69	7650.74	1644.26
7653.17	1644.7	7661.31	1646.25	7662.38	1646.45	7662.8	1646.53	7677.94	1646.81
7689.54	1646.7	7697.36	1647.03	7725.07	1647.09	7743.98	1647.26	7763.21	1647.03
7791.34	1647.2	7793.77	1647.17	7807.28	1647.26	7831.13	1646.8	7858.09	1647.48
7867.31	1647.4	7884.4	1647.53	7884.62	1647.51	7884.66	1647.51	7891.05	1647.36
7903.22	1647.4	7904.88	1647.48	7908.86	1647.31	7935.61	1646.46	7935.93	1646.48
7945.86	1646.4	7966.59	1646.23	7971.29	1646.2	7975.03	1646.34	7998.03	1647.59
8002.15	1647.8	8042.01	1647.77	8071.95	1647.72	8094.78	1648.13	8095.18	1648.05
8106.64	1646	8108.16	1645.86	8114.38	1644.93	8144.87	1644.94	8150.49	1644.97
8164.08	1645.1	8174.11	1645.12	8179.67	1645.27	8192.14	1645.57	8192.25	1645.55
8198.42	1645	8199.52	1644.86	8203.91	1644.55	8210.83	1644.34	8212.85	1644.26
8226	1644.7	8227.8	1644.79	8230.82	1644.98	8240.49	1645.37	8255.95	1645.23
8264.51	1645.1	8298.71	1644.86	8314.29	1645.21	8349.65	1646.35	8360.74	1646.58
8390.81	1647.1	8408.27	1647.55	8416.28	1646.23	8421.2	1646	8423.08	1645.94
8447.72	1646.4	8454.47	1645.87	8466.69	1644.99	8468.26	1644.91	8475.12	1644.72
8479.22	1644.6	8486.16	1644.64	8489.92	1644.8	8492.4	1645.06	8497.74	1646.36
8502.98	1646.5	8507.76	1646.53	8514.26	1646.51	8530.87	1646.72	8538.89	1646.74
8573.55	1646.9	8644.68	1646.83	8657.09	1646.91	8659.89	1646.48	8664.84	1645.52
8693.41	1645.9	8709.07	1646.06	8727.21	1643.35	8727.35	1643.34	8729.03	1643.49
8747.14	1645.3	8767.83	1645.3	8774.08	1645.24	8777	1645.21	8785.67	1645.17
8808.01	1644.8	8815.22	1644.61	8845.55	1644.08	8851.98	1644.05	8853.38	1644.01
8858.62	1643.9	8861.43	1643.89	8874.95	1643.76	8878.46	1643.77	8880.05	1643.87
8881.57	1643.9	8889.33	1643.84	8904.97	1644.3	8912.76	1644.49	8918.08	1644.68
8933.61	1645	8936.96	1644.95	8941.01	1645.2	8943.19	1645.23	8961.27	1645.59
8988.77	1645.4	9014.31	1645.6	9030.2	1645.57	9034.98	1645.79	9042	1645.62
9045.7	1645.7	9055.66	1646.04	9086.89	1645.44	9098.55	1645.4	9113.72	1645.42
9113.77	1645.4	9128	1645.2	9129.85	1645.16	9133.8	1645.34	9147.31	1645.7
9153.82	1645.9	9156.95	1645.93	9162.4	1646.04	9167.25	1646.03	9176.52	1646
9184.87	1646	9196.46	1645.96	9200.5	1645.94	9233.35	1646.22	9241.25	1646.26
9278.64	1646.5	9280.62	1646.54	9283.37	1646.55	9287.45	1646.6	9289.14	1646.61
9299.03	1646.8	9311.58	1647.02	9331.89	1647.2	9341.55	1646.9	9344.43	1646.75
9344.52	1646.7	9353.28	1646.75	9365.36	1647.11	9373.31	1646.99	9411.37	1646.79
9440.7	1646.9	9484.63	1646.34	9487.36	1646.3	9545.87	1645.05	9551.9	1644.93
9552.29	1644.9	9558.52	1645.09	9579.03	1645.47	9587.63	1645.65	9590.94	1645.68
9629.81	1645.9	9644.33	1646.01	9666.9	1646.01	9671.58	1646.02	9697.26	1645.71
9708.76	1645.1	9710.05	1644.99	9713.27	1645.52	9716.86	1646.11	9717.22	1646.17
9720.55	1646.1	9764.21	1646.02	9775.15	1646.57	9775.35	1646.59	9776.68	1646.57
9786.79	1646.4	9792.14	1645.74	9810.55	1643.34	9815.75	1643.44	9827.83	1643.75
9827.99	1644.1	9834.89	1644.62	9858.49	1645.71	9864.92	1645.51	9876.69	1645.06
9896.62	1644.8	9907.62	1645	9966.94	1645.01	9969.96	1645.04	9971.36	1645.19
9978.88	1645.9	9988.14	1645.23	9992.09	1644.94	9994.17	1644.83	9998.98	1645.06
10006.1	1645.4	10016.2	1645.14	10060.91	1645.09	10064.55	1645.27	10076.54	1646.14
10086.69	1646.91	10097.57	1647.21	10144.33	1647.91	10159.29	1648.14	10169.33	1647.95
10205.58	1647	10221.6	1646.63	10230.88	1646.38	10237.31	1646.36	10239.11	1646.36
10282.35	1644.71	10282.72	1644.66	10283	1644.65	10283.14	1644.65	10302.14	1645.22
10314.54	1644.71	10322.86	1644.91	10332.37	1644.89	10344.08	1644.72	10368.5	1644.49
10369.08	1644.51	10369.52	1644.39	10375.31	1643.45	10378.17	1643.05	10382.99	1643.96
10385.95	1644.51	10404.15	1644.14	10409.63	1644.13	10422.26	1644.79	10433.9	1645.38
10447.54	1645.81	10453.24	1645.87	10458.95	1646.09	10462.71	1646.15	10468.59	1646.33
10472.46	1646.41	10486.29	1646.91	10486.45	1646.93	10487.49	1647.05	10487.81	1647.08

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10494.22  1646.810505.56 1646.8610517.27 1646.8210575.13 1647.14 10586.9 1647.18
10594.83  1647.310601.63  1647.210607.31 1647.1110669.92 1647.1710715.02 1647.43
10727.21  1646.6 10740.1 1646.2710740.28 1646.2610741.14 1646.2510761.52 1647.18
10770.27  1646.110770.34 1646.1110770.62 1646.1210784.33 1646.5810791.73  1646.5
10798.49  1646.710802.33 1645.8610806.61 1645.3210813.48 1647.0510815.62  1647.7
10875.94  1647.610887.87 1647.5210890.94 1647.5710891.43 1647.5810892.94  1647.6
10893.28  1647.610894.19 1647.6210896.19 1647.6510899.98 1647.7410942.18  1648.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
  7545.9     .15 8108.16    .068 9775.35    .04510060.91    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9775.3510060.91               390  385.69     400             .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
10594.8310942.18  1647.3
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1646.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.069	0.045	0.068
W.S. Elev (ft)	1646.70	Reach Len. (ft)	390.00	385.69	400.00
Crit W.S. (ft)		Flow Area (sq ft)	1708.91	473.19	424.91
E.G. Slope (ft/ft)	0.009950	Area (sq ft)	1708.91	473.19	424.91
Q Total (cfs)	7577.00	Flow (cfs)	4179.19	2179.54	1218.27
Top Width (ft)	2045.69	Top Width (ft)	1474.81	285.56	285.31
Vel Total (ft/s)	2.91	Avg. Vel. (ft/s)	2.45	4.61	2.87
Max Chl Dpth (ft)	3.65	Hydr. Depth (ft)	1.16	1.66	1.49
Conv. Total (cfs)	75960.6	Conv. (cfs)	41897.0	21850.3	12213.4
Length Wtd. (ft)	391.09	Wetted Per. (ft)	1476.80	286.14	285.74
Min Ch El (ft)	1643.34	Shear (lb/sq ft)	0.72	1.03	0.92
Alpha	1.27	Stream Power (lb/ft s)	1.76	4.73	2.65
Frctn Loss (ft)	3.77	Cum Volume (acre-ft)	1186.26	34.37	80.15
C & E Loss (ft)	0.03	Cum SA (acres)	739.22	16.75	66.24

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7545.90	8103.26	66.61	91.06	140.91	0.88	0.65	0.73
8103.26	8660.63	1220.76	483.54	383.03	16.11	1.26	2.52
8660.63	9217.99	2348.13	832.77	557.83	30.99	1.49	2.82
9217.99	9775.35	543.68	301.54	395.03	7.18	0.76	1.80
LB 9775.35	RB 10060.91	2179.54	473.19	286.14	28.77	1.66	4.61
10060.91	10942.18	1218.27	424.91	285.74	16.08	1.49	2.87

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.674**

INPUT
Description: RM. 3.674. HORZ. N VALUES USED.

Station Elevation Data num= 279

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7200.95	1645.1	7211.54	1645.19	7219.61	1645.19	7260.08	1644.48	7279.15	1644.19
7288.35	1644.1	7297.92	1644.02	7316.08	1643.86	7321.27	1643.93	7353.04	1643.92
7353.15	1643.9	7353.19	1643.9	7361.78	1640.66	7363.34	1641.04	7372.98	1643.75
7408.7	1643.5	7412.99	1643.42	7415.02	1643.39	7416.03	1643.38	7416.24	1643.38
7425.15	1643.4	7499.77	1644.11	7509.93	1644.13	7521.83	1644.22	7538.53	1644.3
7584.48	1643.6	7604.7	1643.56	7607.01	1643.45	7614.4	1642.44	7630.9	1642.46
7636.43	1642.6	7648.39	1642.49	7664.91	1643.7	7670.78	1644.23	7705.96	1643.92
7729.2	1643.7	7736.07	1643.61	7742.72	1643.57	7776.43	1643.13	7787.33	1641.73
7794.09	1640.9	7797.5	1641.33	7798.06	1641.42	7798.28	1641.43	7800.99	1641.48
7839.99	1641.9	7846.9	1641.85	7854.88	1643.02	7860.26	1643.63	7878.75	1643.66
7894.43	1643.7	7903.51	1643.36	7908.51	1643.26	7917.13	1643.18	7920.3	1643.1
7922.82	1643.1	7938.39	1642.95	8043.21	1642.02	8102.41	1641.51	8141.02	1641.26
8145.75	1641.2	8152.14	1641.2	8160.16	1641.19	8235.28	1641.29	8235.49	1641.29
8235.63	1641.3	8235.81	1641.25	8236.53	1640.94	8239.63	1639.72	8240.59	1639.93
8246.33	1640.9	8296.29	1640.5	8325.73	1640.58	8332.34	1641.15	8337.05	1641.66
8348.82	1641.2	8366.1	1640.88	8368.86	1640.74	8381.74	1639.96	8389.42	1639.74
8398.31	1639.3	8401.93	1639.3	8438.27	1639.81	8455.2	1640.09	8481.07	1640.34
8495.56	1640.4	8514.78	1640.69	8533.24	1640.84	8540.73	1641.1	8549.92	1641.38
8564.28	1641.3	8572.39	1641.24	8574.85	1641.15	8576.46	1641.13	8579.65	1641.06
8586.82	1640.9	8595.78	1640.77	8604.56	1640.75	8615.97	1640.88	8623.73	1640.95
8627.11	1641	8636.05	1641.17	8672.32	1641.86	8672.58	1641.86	8672.79	1641.86
8696.12	1641.8	8706.82	1641.74	8717.09	1641.77	8723.15	1641.92	8733.09	1642.13
8736.02	1642.2	8774.54	1641.92	8776.05	1641.92	8776.61	1641.92	8843.88	1641.97
8860.6	1641.8	8864.64	1641.82	8886.75	1641.16	8909.19	1640.94	8913.39	1640.86
8925.82	1640.8	8929.16	1640.91	8935.25	1641	8950.89	1641.39	8957.4	1641.43
8967.2	1641.6	8976.69	1641.74	8981.82	1641.79	8996.76	1641.86	9030.15	1642.4
9043.95	1642.6	9047	1642.64	9047.84	1642.65	9082.39	1642.34	9090.1	1642.38
9091.86	1642.4	9118.29	1642.34	9185.68	1642.34	9190.98	1642.34	9195.01	1642.32
9200.15	1642.3	9212.28	1642.09	9215.05	1642.08	9258.42	1642.18	9262.34	1642.18
9271.16	1642.2	9283.31	1641.24	9286.46	1641.02	9294.34	1641.34	9303.36	1641.65
9321.3	1641.5	9321.8	1641.49	9322.43	1641.47	9332.21	1640.9	9336.26	1640.89
9360.74	1640.7	9381.89	1641.08	9392.94	1641.27	9408.74	1641.94	9419.61	1642.3
9420.73	1642.3	9456.15	1642.33	9457.21	1642.32	9457.67	1642.32	9481.42	1642.22
9495.1	1642.3	9501.74	1642.24	9523.77	1641.71	9526.63	1641.7	9533.03	1641.82
9557.36	1642.2	9561.39	1642.24	9590.96	1642.25	9605.38	1642.39	9609.42	1642.36
9614.59	1642.4	9623.2	1642.33	9623.65	1642.3	9627.17	1642.33	9631.91	1642.21
9648.03	1642.6	9651.84	1642.61	9651.96	1642.61	9661.95	1642.56	9662.28	1642.56
9662.68	1642.5	9667.82	1642.42	9691.93	1641.62	9693.89	1641.75	9706.54	1642.52
9718.37	1642.7	9719.73	1642.66	9719.86	1642.66	9724.18	1642.69	9737.54	1642.85
9739.12	1642.9	9740.58	1642.76	9747.41	1642.76	9769.8	1642.79	9774.62	1642.8
9774.69	1641.4	9778.6	1641.03	9782.95	1640.96	9790.92	1641.31	9798.17	1640.73
9816.29	1641.4	9844.6	1642.36	9856.09	1642.21	9868.37	1642.09	9927.35	1642.1
9963.5	1642.1	9978.34	1642.01	9979.37	1641.98	9980.55	1642.02	9981.8	1642.01
10010.89	1643	10027.78	1643.5	10028.34	1643.56	10059.89	1643.36	10072.58	1643.28
10128.88	1643.1	10195.84	1643.22	10208.75	1643.25	10220.61	1643.24	10235.16	1643.1
10246.39	1642.5	10249.89	1642.2	10251.56	1641.58	10266.45	1641.28	10267.72	1641.34
10268.86	1641.3	10272.1	1641.17	10291.03	1641.55	10310.4	1641.27	10310.54	1641.26
10310.71	1641.3	10311.14	1641.25	10334.08	1640.51	10339.72	1639.72	10343.64	1639.17
10345.88	1639.5	10355.55	1640.7	10357.51	1640.73	10367.73	1640.88	10381.69	1641.09

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10394.01  1641.310407.73 1641.4910415.38 1641.6510437.33 1642.1510437.94 1642.17
10440.61  1642.210452.14 1641.7810471.36    164110473.02 1641.0210474.33 1641.11
10491.31  1641.210491.46 1641.2310524.79 1641.8510530.54 1640.2810532.57 1639.86
10539.89  1641.810540.48 1641.91 10543.3 1641.9110621.25 1642.1110639.75 1642.22
10648.07  1642.110653.59 1642.3710671.06 1642.6410695.13 1642.4610741.29 1643.32
10790.61  1643.810791.58 1643.9410795.23 1643.85 10817.1 1643.2410829.08 1643.34
10843.59  1643.610864.34  1644.810873.18 1645.2610877.77 1645.39

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7200.95     .15  8455.2    .068 9790.92    .04510010.89    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9790.9210010.89               430  372.11     425             .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1643.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.091	0.045	0.068
W.S. Elev (ft)	1642.99	Reach Len. (ft)	430.00	372.11	425.00
Crit W.S. (ft)		Flow Area (sq ft)	2641.81	215.31	646.45
E.G. Slope (ft/ft)	0.009509	Area (sq ft)	2641.81	215.31	646.45
Q Total (cfs)	7577.00	Flow (cfs)	5230.02	683.91	1663.06
Top Width (ft)	2699.33	Top Width (ft)	1993.32	219.67	486.34
Vel Total (ft/s)	2.16	Avg. Vel. (ft/s)	1.98	3.18	2.57
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)	1.33	0.98	1.33
Conv. Total (cfs)	77703.6	Conv. (cfs)	53634.9	7013.6	17055.0
Length Wtd. (ft)	425.46	Wetted Per. (ft)	1996.50	219.74	487.29
Min Ch El (ft)	1640.73	Shear (lb/sq ft)	0.79	0.58	0.79
Alpha	1.08	Stream Power (lb/ft s)	1.56	1.85	2.03
Frctn Loss (ft)	3.88	Cum Volume (acre-ft)	1166.78	31.32	75.23
C & E Loss (ft)	0.01	Cum SA (acres)	723.70	14.52	62.70

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7200.95	7848.44	115.57	126.15	131.41	1.53	0.97	0.92
7848.44	8495.94	1722.60	1039.63	568.50	22.73	1.83	1.66
8495.94	9143.43	2150.13	858.16	647.56	28.38	1.33	2.51
9143.43	9790.92	1241.72	617.87	649.03	16.39	0.95	2.01
LB 9790.92	RB 10010.89	683.91	215.31	219.74	9.03	0.98	3.18
10010.89	10877.77	1663.06	646.45	487.29	21.95	1.33	2.57

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.603

INPUT
Description: RM. 3.603. HORZ. N VALUES USED. AREA BLOCKED OUT TO RT. OF STA. 10414.43.

Station Elevation Data num= 263

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6861.52	1640.1	6901.54	1639.9	6918.66	1639.7	6924.99	1639.64	6945.38	1639.76
6964.26	1639.7	6972.39	1638.97	6982.46	1638.23	6986.7	1638.01	6992.08	1637.97
7020.87	1637.5	7040.23	1638.88	7049.92	1639.57	7080.83	1639.55	7151.28	1639.44
7155.26	1639.4	7163.61	1637.22	7176.7	1633.93	7211.21	1633.92	7243.5	1634.1
7254.81	1636.7	7267.71	1639.12	7275.68	1639.16	7287.8	1638.82	7288.53	1638.52
7296.3	1638.7	7296.77	1638.76	7299.65	1638.75	7303.11	1638.74	7339.26	1638.58
7343.5	1637.5	7350.75	1635.84	7358.66	1635.7	7365.4	1635.63	7369.87	1635.59
7379.89	1637.1	7389.19	1638.89	7402.65	1638.45	7427.37	1638.12	7460.96	1638.75
7475.8	1638.7	7477.15	1638.7	7477.36	1638.69	7477.91	1638.73	7478.79	1638.77
7496.87	1639.7	7519.93	1639.57	7577.49	1639.11	7609.75	1638.82	7634.15	1638.61
7662.34	1638.4	7667.65	1638.37	7669.95	1638.42	7685.93	1638.59	7700.97	1638.73
7702.66	1638.7	7711.72	1638.45	7717.11	1638.13	7719.7	1638.14	7751.74	1639.05
7793.58	1639.6	7816.04	1639.55	7828.8	1639.53	7846.25	1638.03	7853.88	1637.9
7875.49	1637.54	7875.5	1637.54	7875.53	1637.54	7891.72	1637.97	7971.17	1636.7
7995.1	1636.37	8003.09	1636.27	8008.46	1636.34	8028.24	1636.41	8044.65	1636.4
8108.91	1636.24	8120.91	1636.41	8138.65	1636.65	8140.16	1636.61	8150.6	1636.1
8167.71	1636	8180.97	1636.05	8200.69	1637.74	8205.42	1638.09	8231.78	1637.9
8271.22	1637.82	8308.37	1637.63	8309.76	1637.8	8366.14	1638.32	8414.89	1638.3
8425.12	1637.86	8431.56	1637.61	8451.64	1637.58	8459.77	1637.6	8471.29	1637.5
8472.42	1637.52	8479.83	1637.71	8480.25	1637.71	8484.55	1637.71	8485.09	1637.7
8491.96	1637.56	8503.41	1637.56	8536.42	1637.77	8539.99	1637.81	8540.1	1637.8
8540.33	1637.81	8551.04	1637.89	8554.25	1637.87	8563.91	1637.88	8567.32	1637.8
8579.6	1637.99	8585.84	1637.98	8599.08	1638.13	8600.19	1638.13	8603.31	1638.1
8606.45	1638.19	8610.64	1638.21	8611.27	1638.24	8612.53	1638.26	8619.01	1638.5
8625.37	1638.77	8627.32	1638.85	8646.21	1638.46	8728.15	1637.17	8745.05	1637.1
8781.22	1637.26	8792.82	1637.34	8839.98	1637.58	8842.1	1637.45	8846.64	1637.5
8855.18	1636.89	8860.99	1636.6	8877.28	1636.72	8893.71	1636.95	8901.88	1637.1
8908.32	1637.38	8918.41	1637.7	8923.49	1637.79	8926.29	1637.85	8959.38	1637.9
9002.63	1637.87	9014.05	1637.91	9033.63	1638.12	9048.76	1638	9055.01	1637.8
9057.14	1637.81	9058.65	1637.82	9060.44	1637.79	9078.33	1637.59	9080.09	1637.6
9126.43	1637.85	9163.23	1637.31	9170.85	1637.26	9186.12	1637.18	9211.86	1637.1
9230.09	1637.2	9244.22	1636.99	9271.35	1636.67	9294.25	1636.66	9295.03	1636.6
9296.94	1636.63	9322.51	1636.39	9332.81	1636.31	9347.65	1636.24	9363.32	1636.2
9369.57	1636.18	9377.64	1636.15	9378.03	1636.15	9378.44	1636.15	9389.17	1638.8
9391.8	1639.37	9400.41	1637.75	9405.47	1636.68	9431.66	1637.15	9452.49	1637.5
9487.08	1637.94	9505.28	1637.64	9559	1638.2	9578.1	1638.37	9580.82	1638.4
9581.81	1638.31	9593.35	1637.58	9603.08	1637.88	9637.2	1638.03	9655.84	1638.3
9672.14	1638.8	9719.2	1639.35	9734	1639.48	9752.16	1639.83	9758.36	1640.1
9762.22	1640.22	9767.8	1640.5	9769.87	1640.59	9771.67	1640.24	9776.52	1639.3
9784.24	1637.71	9791.91	1638.19	9801.54	1638.67	9812.39	1639.22	9843.18	1640.1
9859.25	1640.33	9864.07	1639.38	9871.47	1637.89	9884.39	1637.9	9885.31	1637.9
9888.64	1637.99	9913.29	1638.69	9938.22	1639.23	9954.79	1638.02	9955.6	1638
9960.87	1638.01	9972.7	1638.16	9976.41	1638.06	9979.55	1637.88	9986.21	1637.5
9992.78	1636.96	9993.74	1636.88	9994.27	1636.85	10007.58	1637.87	10012.22	1638.1
10020.33	1638.17	10022.16	1638.11	0036.98	1639.52	10043.62	1640.48	10055.28	1640.3
10068.42	1640.03	10089.93	1639.85	10090.08	1639.84	10106.37	1639.12	10112.53	1638.8
10117.08	1638.68	10120.53	1638.54	10151.76	1637.11	10153.41	1637.11	10154.24	1637.1
10169.4	1637.43	10179.39	1637.58	10182.39	1637.67	10185.38	1637.61	10199.71	1636.5
10206.93	1637.67	10209.52	1638.06	10236.19	1637.81	10246.88	1637.71	10255.19	1637.5
10304.59	1637.61	10359.23	1637.61	0379.67	1637.69	10386.83	1637.73	10401.85	1638.8
10411.54	1639.51	0414.43	1639.74	10434.12	1638.82	10443.35	1638.41	0443.78	1638.4
10449.6	1638.16	10450.36	1638.11	10462.38	1637.51	0464.09	1637.36	10465.25	1637.4
10480.9	1637.93	10487.76	1638.17	10508.76	1642.1				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6861.52	.15	9347.65	.068	9976.41	.045	10020.33	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9976.41	10020.33	375	374.47	300	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10414.43	10508.76	1639.74

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1639.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.131	0.045	0.068
W.S. Elev (ft)	1639.13	Reach Len. (ft)	375.00	374.47	300.00
Crit W.S. (ft)		Flow Area (sq ft)	3987.26	65.82	432.48
E.G. Slope (ft/ft)	0.008722	Area (sq ft)	3987.26	65.82	432.48
Q Total (cfs)	7577.00	Flow (cfs)	6207.43	265.48	1104.09
Top Width (ft)	2935.54	Top Width (ft)	2578.93	43.92	312.69
Vel Total (ft/s)	1.69	Avg. Vel. (ft/s)	1.56	4.03	2.55
Max Chl Dpth (ft)	5.21	Hydr. Depth (ft)	1.55	1.50	1.38
Conv. Total (cfs)	81132.0	Conv. (cfs)	66467.0	2842.7	11822.2
Length Wtd. (ft)	368.45	Wetted Per. (ft)	2582.28	44.01	313.01
Min Ch El (ft)	1636.85	Shear (lb/sq ft)	0.84	0.81	0.75
Alpha	1.23	Stream Power (lb/ft s)	1.31	3.28	1.92
Frctn Loss (ft)	3.59	Cum Volume (acre-ft)	1134.06	30.12	69.97
C & E Loss (ft)	0.01	Cum SA (acres)	701.13	13.39	58.80

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6861.52	7640.24	1061.88	759.46	461.38	14.01	1.65	1.40
7640.24	8418.96	1601.33	1150.02	703.00	21.13	1.64	1.39
8418.96	9197.69	1484.55	1144.91	778.83	19.59	1.47	1.30
9197.69	9976.41	2059.66	932.87	639.07	27.18	1.46	2.21
LB 9976.41	RB 10020.33	265.48	65.82	44.01	3.50	1.50	4.03
10020.33	10508.76	1104.09	432.48	313.01	14.57	1.38	2.55

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.532

INPUT
Description: RM. 3.532. HORZ. N VALUES USED.

Station Elevation Data num= 281

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6596.9	1635.6	6605.07	1635.21	6644.47	1635.08	6668.86	1634.95	6695.67	1634.65
6725.09	1633.8	6728.54	1633.76	6729.66	1633.73	6773.42	1633.87	6774.39	1633.86
6774.76	1633.9	6835.11	1632.74	6851.67	1632.86	6906.54	1632.39	6915.68	1632.44
6918.01	1632.5	6926.76	1632.69	6931.88	1632.73	6981.27	1633.65	7006.17	1633.71
7010.35	1633.8	7015.83	1633.69	7018.74	1633.81	7021.11	1633.9	7024.87	1633.86
7029.1	1633.8	7037.5	1633.55	7040.83	1633.49	7042.18	1633.45	7045.22	1633.35
7048.96	1633.2	7066.22	1633.58	7089.25	1633.95	7097.23	1633.55	7115.28	1634.89
7120.78	1635.2	7162.52	1634.84	7172.83	1634.77	7191.45	1634.8	7239.87	1635.15
7263.79	1635.3	7298.02	1635.58	7303.33	1635.69	7364.58	1635.03	7392.2	1634.58
7412.24	1634.7	7418.88	1634.8	7423.21	1634.43	7432.31	1633.52	7461.41	1633.56
7462.29	1633.6	7462.5	1633.58	7462.79	1633.6	7479.92	1634.81	7481.99	1634.78
7526.14	1634.7	7558.69	1634.68	7580.31	1634.37	7630.72	1634.34	7632.37	1634.33
7632.53	1634.3	7633.63	1634.32	7697.16	1634.01	7702.8	1633.15	7709.09	1632.29
7714.87	1632.3	7738.92	1632.41	7750.9	1634.28	7751.96	1634.36	7753.27	1634.33
7811.97	1634	7846.9	1634.3	7867.36	1634.24	7924.03	1634.19	7954.67	1634.17
7969.13	1634.1	7971.43	1634.16	7974.46	1633.5	7984.36	1631.53	7990.27	1632.3
7994.03	1632.8	7994.06	1632.79	8018.6	1632.77	8080.89	1632.46	8087.09	1632.74
8097.25	1632.3	8102.82	1632.15	8111.13	1632.21	8112.69	1632.21	8115.57	1632.23
8140.33	1632.2	8142.04	1632.23	8146.19	1632.18	8149.01	1632.15	8150.82	1632.15
8155.94	1632.2	8162.1	1632.26	8196.76	1632.74	8198.49	1632.76	8201.93	1632.83
8211.62	1633	8232.35	1633.59	8244.54	1633.84	8255.56	1634.11	8273.49	1634.56
8274.85	1634.6	8276.54	1634.64	8293.58	1634.72	8304.49	1634.83	8311.37	1634.97
8362.48	1635.2	8372.76	1635.3	8381.95	1635.4	8405.04	1635.12	8433.15	1634.59
8438.83	1634.5	8439.8	1634.47	8442.33	1634.43	8507.68	1633.96	8520.08	1633.87
8520.95	1633.9	8521.23	1633.85	8540.28	1632.96	8544.04	1633	8565.14	1632.69
8572.28	1632.7	8583.25	1632.51	8599.27	1633.44	8609.42	1633.95	8614.21	1634.83
8615.39	1635	8654.77	1634.65	8659.3	1634.58	8680.73	1634.55	8721.04	1634.59
8725.15	1633.2	8725.54	1633.05	8756.13	1633.1	8783	1633.2	8802.63	1633.26
8821.78	1633.3	8837.2	1632.29	8845.95	1631.92	8857.39	1632.05	8879.22	1632.03
8886.46	1632.1	8889.27	1632.04	8892.91	1633.4	8893.58	1633.75	8894.66	1633.75
8896.58	1633.8	8903.91	1633.8	8913.63	1633.83	8923.88	1633.77	8939.84	1634.01
8987.35	1634.2	9005.28	1634.27	9014.14	1634.27	9042.42	1633.97	9075.3	1633.92
9080.22	1633.9	9094.32	1633.75	9101.12	1633.84	9107.95	1633.39	9116.55	1632.32
9122.12	1632.2	9127.44	1632.18	9164.54	1632.2	9167.88	1632.29	9173.94	1632.56
9181.02	1632.8	9186.29	1633.13	9211.66	1633.25	9230.93	1633.38	9240.88	1633.47
9257.59	1633.6	9269.65	1633.02	9271.91	1633.06	9283.23	1632.27	9286.56	1633.33
9291.8	1634.3	9297.86	1634.17	9311.27	1633.66	9322.66	1633.05	9328.69	1633.32
9331.42	1633.3	9361.95	1633.99	9366.65	1634.25	9374.71	1634.65	9379.44	1634.87
9382.85	1635.1	9389.15	1635.19	9393.83	1635.21	9435.85	1635.46	9454.62	1635.46
9458.47	1635.5	9480.68	1635.36	9480.81	1635.37	9481	1635.38	9483.47	1635.36
9490.94	1635.9	9493.5	1635.93	9494.64	1635.94	9496.41	1635.82	9497.85	1635.67
9501.4	1635.4	9503.73	1635.46	9506.08	1635.44	9518.12	1635.58	9532.19	1635.57
9572.97	1635.6	9577.39	1635.66	9586.36	1635.62	9593.54	1635.56	9599.16	1635.96
9605.16	1635.7	9606.85	1635.08	9613.56	1635	9651.71	1634.64	9655.15	1634.61
9660.51	1634.6	9662.19	1634.52	9680.36	1633.21	9681.25	1633.17	9686.52	1633.23
9693.08	1633.4	9694.81	1633.37	9705.17	1633.11	9719.19	1636.77	9719.89	1636.96
9720.5	1636.9	9727.11	1636	9733.3	1635.01	9754.18	1635.62	9776.15	1636.41
9776.38	1636.4	9783.04	1635.59	9784.85	1635.37	9835.89	1636.29	9839.85	1636.34
9851.14	1634.7	9855.79	1634.06	9856.34	1634.13	9858.51	1634.38	9871.02	1635.79
9877.79	1636.5	9888.4	1636.44	9906.83	1636.3	9916.41	1636.27	9925.37	1636.12
9938.02	1635.8	9938.48	1635.79	9938.58	1635.78	9938.79	1635.76	9947.15	1635.05
9951.96	1634.5	9963.14	1634.39	9973.21	1634.56	9983.27	1635.23	9996.84	1635.42
10014.05	1635.4	10019.88	1634.77	10033.01	1633.73	10046.05	1634.82	10051.24	1635.04
10057.73	1635.7	10057.87	1635.72	10058.73	1635.72	10078.09	1635.65	10091.32	1635.66
10095.68	1635.6	10095.96	1635.56	10101.99	1634.31	10108.59	1634.53	10122.33	1634.86

10136.83 1634.610149.01 1634.04 10158.5 1633.1610161.75 1632.8910166.91 1635.14
10179.06 1640.9

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6596.9	.15	9694.81	.068	9938.79	.04	10057.73	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9938.79	10057.73	260	371.74	350	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1635.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.148	0.045	0.068
W.S. Elev (ft)	1635.55	Reach Len. (ft)	260.00	371.74	350.00
Crit W.S. (ft)		Flow Area (sq ft)	4896.79	81.56	84.74
E.G. Slope (ft/ft)	0.010963	Area (sq ft)	4896.79	81.56	84.74
Q Total (cfs)	7577.00	Flow (cfs)	7138.03	223.93	215.04
Top Width (ft)	3235.95	Top Width (ft)	3049.13	115.04	71.78
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	1.46	2.75	2.54
Max Chl Dpth (ft)	4.02	Hydr. Depth (ft)	1.61	0.71	1.18
Conv. Total (cfs)	72364.2	Conv. (cfs)	68171.8	2138.6	2053.8
Length Wtd. (ft)	275.09	Wetted Per. (ft)	3052.09	115.27	72.54
Min Ch El (ft)	1633.73	Shear (lb/sq ft)	1.10	0.48	0.80
Alpha	1.07	Stream Power (lb/ft s)	1.60	1.33	2.03
Frctn Loss (ft)	2.60	Cum Volume (acre-ft)	1095.82	29.49	68.19
C & E Loss (ft)	0.01	Cum SA (acres)	676.90	12.71	57.48

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6596.90	7432.37	1435.43	1116.63	813.15	18.94	1.37	1.29
7432.37	8267.84	2591.11	1609.40	836.19	34.20	1.93	1.61
8267.84	9103.32	1889.51	1331.69	836.30	24.94	1.59	1.42
9103.32	9938.79	1221.98	839.07	566.45	16.13	1.48	1.46
LB 9938.79	RB 10057.73	223.93	81.56	115.27	2.96	0.71	2.75
10057.73	10179.06	215.04	84.74	72.54	2.84	1.18	2.54

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.462

INPUT
Description: RM.3.462. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR SIGNAL BUTTE RD. AREA BLOCKED OUT TO LT. OF STA.7150.

Station Elevation Data num= 268

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6404.21	1633.9	6418.29	1634.05	6426.22	1633.99	6435.65	1633.85	6456.77	1633.66
6466.46	1633.6	6483.24	1633.1	6489.29	1633.06	6493.32	1633.37	6496.1	1632.72
6501.79	1632.6	6511.26	1632.77	6518.61	1632.99	6522.99	1633.01	6538.14	1632.91
6544.98	1632.8	6572.22	1632.31	6576.07	1632.29	6626.13	1632.44	6632.21	1632.5
6642.48	1632.3	6700.68	1631.44	6711.26	1631.4	6729	1631.31	6737.54	1631.66
6780.36	1632	6800.54	1631.66	6807.39	1632.21	6815.99	1630.23	6819.01	1629.57
6819.59	1629.6	6822.95	1629.94	6825.1	1630.13	6844.59	1629.89	6846.73	1629.85
6847.41	1629.8	6849.82	1630.08	6863.59	1631.94	6895.68	1631.53	6912.25	1631.34
6925.63	1631.3	6948.21	1631.31	6983.31	1631.33	7053.54	1631.5	7110.79	1631.78
7115.27	1631.8	7163.13	1631.88	7163.34	1631.88	7163.45	1631.88	7163.58	1631.88
7164.14	1631.9	7205.11	1631.59	7231.79	1631.53	7246.9	1631.4	7267.24	1631.41
7288.4	1631.5	7299.99	1631.46	7335.99	1631.52	7339.81	1631.53	7379.14	1631.25
7404.45	1631.2	7416.91	1631.29	7453.01	1630.97	7491.86	1631.44	7520.16	1631.54
7537.29	1631.3	7565.05	1630.52	7565.74	1630.52	7571.59	1630.53	7593.21	1630.57
7596.72	1630.6	7598.53	1630.66	7610.01	1631.18	7613.12	1631.17	7615.83	1631.37
7678.18	1631.5	7737.93	1631.52	7780.99	1631.33	7818.56	1630.95	7850.35	1630.88
7864.79	1630.5	7889.38	1630.29	7894.05	1629.16	7898.23	1628.59	7906.89	1629.83
7908.26	1630	7957.42	1629.83	7971.76	1629.8	7976.6	1629.89	8007.48	1630.55
8008.83	1630.6	8011.14	1630.49	8020.1	1630.17	8037.7	1630.52	8051.65	1630.77
8062.81	1631.1	8069	1631.28	8073.79	1631.39	8091.14	1631.68	8107.81	1631.91
8160.24	1632.2	8171.11	1632.34	8192.38	1631.92	8193.4	1631.89	8211.05	1631.94
8284.95	1632.1	8294.58	1631.04	8300.31	1630.53	8301.89	1630.56	8336.73	1630.95
8341.11	1630.9	8342.32	1631.1	8343.49	1631.15	8345	1631.23	8354.85	1631.88
8376.24	1632	8387.05	1632.1	8403.77	1632.27	8412.43	1632.32	8423.38	1632.39
8445.87	1632	8473.67	1632.25	8480.66	1632.24	8480.98	1632.12	8487.56	1630.21
8488.71	1630.2	8491.12	1630.22	8560.27	1630.42	8590.31	1630.21	8594.04	1630.19
8596.63	1630.1	8606.51	1629.24	8606.96	1629.23	8635.13	1629.42	8639.06	1628.89
8640.65	1628.9	8642.14	1628.96	8646.52	1629.56	8677.75	1629.81	8681.23	1630.16
8688.42	1631.3	8690.31	1631.34	8695.63	1631.37	8700.63	1631.38	8703.24	1631.37
8744.8	1631.7	8759.95	1631.65	8774.1	1631.69	8778.76	1631.68	8807.14	1631.49
8820.34	1631.4	8851.88	1631.26	8855.04	1631.25	8864.13	1631.12	8872.58	1630.23
8875.87	1629.9	8886.1	1629.87	8891.03	1629.89	8896.65	1629.96	8920.22	1629.87
8923.43	1629.9	8940.81	1630.1	8944.45	1630.14	8945.68	1630.16	8948.2	1630.23
8988.99	1630.3	8997.55	1630.23	9013.63	1630.16	9053.58	1629.58	9055.99	1630.14
9059.71	1631.5	9081.41	1631.53	9088.21	1631.67	9111.03	1632.23	9144.49	1631.88
9172.64	1631.6	9180.98	1631.57	9186.06	1630.41	9186.81	1630.29	9189.94	1630.35
9220.96	1631	9222.42	1630.97	9227.47	1631.53	9232.06	1632.08	9250.24	1631.93
9280.64	1631.7	9286.95	1631.63	9316.12	1631.73	9316.14	1631.73	9316.29	1631.74
9316.47	1631.7	9332.8	1631.48	9352.27	1630.96	9354.59	1630.9	9356.06	1630.86
9376.42	1631	9385.31	1631.07	9398.73	1631.36	9403.58	1631.43	9406.84	1631.52
9415.05	1631.5	9415.9	1631.55	9416.3	1631.55	9425.53	1631.68	9426.17	1631.68
9426.74	1631.7	9427.08	1631.68	9427.42	1631.68	9436.46	1631.67	9444.1	1631.65
9455.53	1631.6	9468.68	1631.59	9484.74	1631.37	9488.29	1631.44	9495.1	1631.64
9506.08	1631.9	9513.37	1632.09	9513.75	1632.09	9520.53	1632.12	9523.15	1632.14
9532.7	1632.2	9546.05	1632.25	9554.45	1632.26	9555.86	1632.29	9569.92	1632.7
9576.78	1632.9	9585.46	1632.97	9591.22	1633.01	9630.2	1632.38	9669.99	1633.26
9678.1	1633.2	9705.44	1632.89	9726.82	1632.55	9742.94	1632.52	9745.35	1632.68
9752.31	1633.2	9772.7	1632.22	9785.42	1631.71	9795.56	1631.39	9796.63	1631.21
9806.09	1632	9813.87	1632.52	9816.72	1632.55	9822.61	1632.66	9844.22	1633.05
9868.63	1633.2	9871.69	1633.19	9876.87	1633.01	9878.35	1632.97	9935.39	1633.05
9941.71	1633.1	9966.25	1627.59	9966.51	1627.52	9968	1627.25	9970.19	1627.33
9989.33	1627.6	10007.52	1630.47	10011.41	1631.4	10026.68	1631.82	10041.71	1632.19
10073.3	1633.1	10081.64	1633.36	10091.03	1633.58	10102.65	1633.93	10103.77	1634
10104.34	1634	10106.12	1634.03	10167.53	1638.05				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6404.21	.15	9822.61	.068	9941.71	.045	10073.3	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9941.71	10073.3	400	399.38	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1632.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.150	0.045	
W.S. Elev (ft)	1632.86	Reach Len. (ft)	400.00	399.38	400.00
Crit W.S. (ft)		Flow Area (sq ft)	4906.13	304.01	
E.G. Slope (ft/ft)	0.008128	Area (sq ft)	4906.13	304.01	
Q Total (cfs)	7577.00	Flow (cfs)	5925.13	1651.87	
Top Width (ft)	3342.57	Top Width (ft)	3220.26	122.31	
Vel Total (ft/s)	1.45	Avg. Vel. (ft/s)	1.21	5.43	
Max Chl Dpth (ft)	5.61	Hydr. Depth (ft)	1.52	2.49	
Conv. Total (cfs)	84045.3	Conv. (cfs)	65722.5	18322.8	
Length Wtd. (ft)	399.87	Wetted Per. (ft)	3222.58	123.29	
Min Ch El (ft)	1627.25	Shear (lb/sq ft)	0.77	1.25	
Alpha	3.58	Stream Power (lb/ft s)	0.93	6.80	
Frctn Loss (ft)	3.29	Cum Volume (acre-ft)	1066.57	27.84	67.85
C & E Loss (ft)	0.00	Cum SA (acres)	658.19	11.70	57.19

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6404.21	7288.58	925.12	924.61	766.94	12.21	1.21	1.00
7288.58	8172.96	2059.71	1582.50	884.73	27.18	1.79	1.30
8172.96	9057.33	2287.36	1685.63	885.26	30.19	1.91	1.36
9057.33	9941.71	652.93	713.39	685.65	8.62	1.04	0.92
LB 9941.71	RB 10073.30	1651.87	304.01	123.29	21.80	2.49	5.43

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.386

INPUT
Description: RM. 3.386. BLOCKED INEFF. FLOW AREA USED BELOW EL1626 AND BETWEEN STA.8450 AND 8670 TO BLOCK OUT RET.BASIN. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.6911.28.

Station Elevation Data num= 296

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6177.65	1630.6	6204.47	1630.4	6260.31	1630.17	6315.77	1629.94	6331.51	1629.98
6340.18	1629.9	6363.04	1629.74	6384.72	1629.57	6386.61	1629.44	6396.67	1628.86
6398.19	1629	6405.25	1629.35	6418.88	1629.36	6424.03	1629.49	6439.84	1629.48
6444.11	1629.3	6445.73	1629.35	6466.06	1629.33	6469.69	1629.33	6472.94	1629.32

6488.93	1629.3	6513.31	1629.31	6549.51	1629.09	6552.17	1629.21	6556.68	1628.85
6560.8	1628.5	6564.53	1628.18	6576.77	1628.23	6593.83	1628.29	6599.27	1628.13
6600.28	1628.1	6606.04	1628.12	6644.15	1628.44	6676.2	1628.68	6694.83	1628.53
6697.96	1628.5	6700.59	1628.48	6700.88	1628.48	6701.02	1628.48	6702.66	1628.48
6708.15	1628.5	6742.99	1626.98	6775.67	1626.81	6777.22	1627.07	6784.54	1627.11
6807.17	1627.4	6807.4	1627.39	6810.27	1627.68	6815.41	1628.13	6818.18	1628.14
6880.59	1628.6	6901.75	1628.68	6906.97	1628.68	6911.28	1628.71	6920.24	1628.54
6938.68	1628.3	6972.89	1628.2	6973.53	1628.23	6975.15	1628.31	6979.3	1628.5
6980.9	1628.5	6982.29	1628.48	6984.3	1628.43	6987.91	1628.23	6988.65	1628.23
6991.02	1628.2	6993.33	1628.26	7019.08	1628.54	7020.62	1628.55	7023.28	1628.5
7025.4	1628.4	7027.26	1628.42	7029.37	1628.36	7032.31	1628.34	7048.79	1628.16
7108.89	1627.9	7122.96	1627.92	7127.19	1627.93	7140.2	1627.9	7155.55	1627.9
7190.99	1627.7	7192.62	1627.62	7195.67	1627.4	7199.9	1627.42	7232.49	1627.23
7235.31	1627.2	7237.09	1627.35	7241.73	1627.75	7245.57	1628.08	7250.45	1628
7346.36	1627.1	7363.33	1626.94	7374.54	1626.83	7404.18	1626.63	7406.93	1626.61
7413.29	1626.9	7415.5	1626.98	7416.97	1627.05	7443.77	1626.92	7446.86	1626.88
7448.7	1626.9	7453.8	1626.63	7483.96	1626.74	7534.75	1626.72	7561.67	1626.95
7579.65	1626.9	7585.28	1627.2	7594.97	1626.69	7599.74	1626.46	7608.23	1626.48
7625.04	1626.3	7627.27	1626.31	7630.02	1626.29	7636.12	1626.27	7643.68	1626.27
7648.72	1626.2	7649.38	1626.26	7650.1	1626.28	7651.62	1626.36	7652.53	1626.37
7664.9	1626.8	7665.29	1626.77	7671.62	1626.77	7700.23	1627.13	7767.55	1628.11
7791.94	1628.2	7846.52	1628.41	7849.79	1628.4	7895.45	1628.35	7923.69	1628.44
7926.05	1628.4	7929.13	1628.45	7931.62	1628.43	7932.81	1628.44	7941.2	1628.43
7942.09	1628.4	7978.67	1628.43	7998.02	1628.42	8000.07	1628.67	8001.54	1629.28
8002.1	1629.4	8004.84	1628.95	8005.47	1628.78	8020.09	1628.21	8029.42	1628.41
8034.23	1628.6	8036.79	1628.78	8073.09	1629.01	8091.74	1629.03	8112.78	1629.07
8157.07	1628.2	8159.09	1628.19	8159.95	1628.18	8162.27	1628.11	8217.42	1627.94
8226.28	1627.9	8227.45	1627.93	8236.42	1627.88	8261.2	1627.65	8300.28	1627.2
8308.24	1627.7	8311.77	1627.95	8314.65	1627.9	8319.88	1627.92	8323.54	1628.03
8361.12	1628.3	8367.22	1628.3	8405.92	1628.48	8411.82	1628.23	8426.19	1626.21
8450.12	1622.4	8460.1	1622.57	8470.24	1622.72	8524.36	1623.61	8534.46	1623.76
8573.34	1624	8577.18	1624.01	8598.91	1623.76	8600.83	1623.58	8621.5	1623.18
8631.49	1623	8635.98	1623.8	8649.33	1626.25	8652	1626.26	8672.94	1626.33
8678.95	1626.3	8708.17	1626.28	8713.26	1626.52	8720.27	1626.82	8744.55	1627.47
8746.27	1627.5	8747.66	1627.53	8748.13	1627.53	8750.79	1627.5	8772.03	1627.05
8783.39	1627	8794.1	1626.91	8795.95	1626.9	8806.79	1627.01	8814.11	1627.03
8825.45	1627.1	8834.11	1627.13	8841.84	1627.14	8846.75	1627.1	8872.11	1627.11
8875.97	1627.3	8877.92	1627.41	8890.17	1628.06	8905.85	1628.94	8914.2	1628.94
8917.39	1628.8	8922.98	1628.66	8929.36	1628.37	8948.54	1627.53	8949.37	1627.49
8949.49	1627.5	8949.64	1627.48	8949.77	1627.48	8971.82	1627.54	8984.69	1627.73
8993.18	1628	9003.19	1628.28	9040.1	1628.36	9057.89	1628.47	9073.89	1628.56
9088.7	1628.7	9089.43	1628.6	9107.24	1628.7	9121.77	1628.8	9125.55	1629.72
9128.4	1630.3	9136.86	1630.31	9156.57	1630.36	9162.46	1630.41	9201.12	1630.64
9221.99	1630.3	9230.56	1630.25	9232.3	1629.63	9233.3	1629.29	9234.82	1629.1
9240.54	1628.5	9244.9	1628.63	9251.79	1628.84	9265.18	1629.19	9278.15	1629.49
9312.25	1630.3	9332.4	1630.65	9335.62	1630.62	9362.62	1630.41	9392.11	1630.18
9399.66	1630.4	9415.28	1630.87	9424.84	1630.94	9454.47	1630.35	9465.15	1631.31
9480.83	1631.1	9496.77	1631.21	9523.65	1630.33	9550.56	1630.62	9563.72	1630.29
9585.87	1629.9	9622.89	1629.42	9653.41	1630.15	9658.36	1630.2	9675.32	1629.78
9717.06	1629.8	9727.86	1630.08	9755.6	1630.25	9761.78	1630.28	9762.36	1630.21
9790.85	1629.7	9855.16	1629.63	9880.56	1629.21	9883.25	1629.16	9893.41	1629.24
9902.61	1629.3	9903.09	1629.33	9914.39	1629.69	9920.41	1629.8	9921.82	1629.82
9942.96	1630	9967.41	1630.22	9972.82	1628.41	9987.58	1623.47	9992.37	1623.48
10006.07	1623.4	10015.25	1626.67	10023.32	1629.57	10041.78	1629.53	10047.69	1629.5
10049.35	1629.5	10076.89	1629.73	10129.81	1630.03	10181.45	1629.89	10210.73	1629.93
10228.1	1630.1								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6177.65	.15	9480.83	.068	9967.41	.045	10076.89	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9967.41	10076.89	450	404.63	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
6177.65	6911.28	1628.71	8450	8670	1626

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1629.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.150	0.045	
W.S. Elev (ft)	1629.53	Reach Len. (ft)	450.00	404.63	380.00
Crit W.S. (ft)	1628.89	Flow Area (sq ft)	4734.17	219.89	
E.G. Slope (ft/ft)	0.008310	Area (sq ft)	4734.17	219.89	
Q Total (cfs)	7577.00	Flow (cfs)	6095.89	1481.11	
Top Width (ft)	2910.53	Top Width (ft)	2846.88	63.64	
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)	1.29	6.74	
Max Chl Dpth (ft)	7.11	Hydr. Depth (ft)	1.66	3.46	
Conv. Total (cfs)	83115.9	Conv. (cfs)	66868.9	16247.0	
Length Wtd. (ft)	441.64	Wetted Per. (ft)	2851.75	65.69	
Min Ch El (ft)	1623.40	Shear (lb/sq ft)	0.86	1.74	
Alpha	4.36	Stream Power (lb/ft s)	1.11	11.70	
Frctn Loss (ft)	4.05	Cum Volume (acre-ft)	1022.30	25.44	67.85
C & E Loss (ft)	0.00	Cum SA (acres)	630.34	10.84	57.19

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6177.65	7125.09	449.32	606.72	739.82	5.93	0.82	0.74
7125.09	8072.53	2472.74	1863.80	947.80	32.63	1.97	1.33
8072.53	9019.97	3074.05	2127.27	951.65	40.57	2.25	1.45
9019.97	9967.41	99.79	136.38	212.47	1.32	0.64	0.73
LB 9967.41	RB 10076.89	1481.11	219.89	65.69	19.55	3.46	6.74

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.310**

INPUT
Description: RM. 3.310. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 6577.1.

Station Elevation Data num= 254

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6115.85	1625.1	6163.39	1625.02	6222.58	1624.92	6254.16	1624.83	6273.71	1624.88
6273.86	1624.9	6274.38	1624.94	6282.2	1625.7	6289.84	1626.31	6294.82	1626.37
6297.08	1626.4	6305.68	1625.78	6313.85	1624.83	6315.75	1624.79	6335.86	1624.76
6346	1624.9	6357.24	1624.96	6357.43	1624.97	6385.06	1625.02	6434.59	1624.81
6463.77	1624.8	6477.93	1624.64	6521.21	1624.34	6521.41	1624.34	6531.86	1624.32
6545.05	1624.2	6562.22	1624.3	6564.21	1624.37	6565.45	1624.47	6567.33	1624.59
6569.23	1624.7	6577.1	1625.22	6595	1624.93	6671.72	1624.23	6675.85	1624.23
6677.39	1624.2	6684.65	1624.18	6727.29	1624.25	6739.74	1624.11	6744.92	1624.04
6749.5	1623.7	6768.56	1623.42	6769.93	1623.86	6777.98	1624.07	6780.17	1624.04
6785.35	1623.9	6791.23	1624.17	6791.55	1624.17	6793.22	1624.17	6794.1	1624.17
6796.53	1624.2	6822.13	1624.16	6833.62	1624.15	6839.54	1624.19	6844.07	1624.18
6884.4	1623.7	6890.07	1623.66	6892.76	1623.61	6893.87	1623.61	6894.66	1623.6
6895.31	1623.6	6895.74	1623.6	6899.01	1623.56	6899.16	1623.56	6900.51	1623.56
6916.13	1623.5	6958.36	1623.44	6961.04	1623.38	6969.36	1623.16	6978.68	1623.32
7001.12	1623.5	7007.79	1623.81	7013.57	1624.01	7030.17	1623.97	7060.38	1624
7089.57	1623.7	7148.3	1623.53	7165.42	1623.39	7180.11	1623.36	7180.6	1623.3
7188.58	1622.3	7208.27	1622.34	7219.88	1622.48	7227.13	1622.76	7230.1	1622.85
7251.73	1623.2	7258.44	1623.32	7263.33	1623.38	7303.1	1623.61	7384.27	1623.93
7412.28	1623.8	7421.69	1623.7	7427.49	1623.68	7433.65	1623.75	7489.82	1624.15
7496.88	1624.2	7498.5	1624.18	7518.97	1624.46	7539.69	1624.46	7592.31	1624.31
7610.88	1624.3	7615.44	1624.29	7629.44	1624.24	7667.49	1624.17	7685.4	1624.03
7733.46	1623.7	7742.59	1623.71	7757.65	1623.83	7772.01	1623.99	7786.31	1624.05
7796.14	1624.2	7821.12	1624.34	7838.02	1624.4	7859.11	1624.55	7927.05	1623.98
7944.24	1623.9	7978.01	1624.29	7978.15	1624.25	7985.17	1623.26	8022.94	1624.22
8026.69	1624.3	8050.54	1624.18	8096.53	1623.78	8164.93	1623.76	8195.62	1623.89
8215.25	1624	8272.78	1624.26	8276.63	1624.18	8291.77	1623.93	8317.31	1623.52
8333.46	1623.1	8350.5	1623.14	8394.21	1623.22	8410.17	1623.21	8411.51	1623.31
8432.94	1624.1	8437.62	1624.17	8440.78	1624.15	8471.85	1623.74	8473.81	1623.76
8478.82	1623.8	8482.02	1623.66	8542.26	1623.9	8557.17	1623.79	8559.16	1623.73
8561.39	1623.8	8571.07	1623.73	8632.74	1623.52	8689.2	1623.89	8702.66	1623.94
8721.65	1623.9	8791.57	1624.14	8801.64	1624.22	8808.8	1624.17	8832.63	1624.53
8835.66	1624.5	8876.08	1624.64	8876.87	1624.64	8884.9	1624.71	8891.17	1627.27
8891.81	1627.4	8893.69	1626.85	8899.94	1625.05	8902.11	1625.02	8909.46	1624.78
8927.51	1624.6	9022.01	1623.99	9024.96	1623.96	9030.07	1623.58	9038.88	1622.91
9051.26	1623.8	9060.35	1624.66	9063.16	1624.72	9070.01	1624.62	9105.63	1624.87
9107.19	1625	9109.11	1625	9122.21	1625.13	9125.44	1624.81	9131.25	1624.18
9141.29	1624.5	9148.38	1624.75	9164.93	1625.33	9278.35	1626.44	9283.64	1626.48
9290.82	1626.5	9302.33	1626.63	9402.15	1627.32	9415.03	1627.45	9422.46	1627.18
9434.5	1626.8	9448.38	1626.43	9452.69	1626.31	9467.3	1626.77	9474.83	1627
9478.35	1627	9521.06	1626.74	9571.17	1626.81	9639.77	1626.36	9642.6	1626.33
9643.01	1626.3	9643.41	1626.32	9649.5	1626.32	9758.49	1626.17	9790.28	1626.17
9835.07	1626.5	9873.52	1626.68	9878.4	1626.56	9884.11	1626.48	9894.82	1626.29
9897.54	1626.2	9938.09	1625.87	9950.84	1629.16	9951.34	1629.3	9951.9	1629.3
9960.05	1629.3	9973.23	1625.01	9986.23	1620.77	9993.8	1620.89	10012.1	1621.2
10014.66	1622.1	10025.24	1623.87	10026.15	1624.05	10046.39	1626.83	10048.11	1626.85
10070.23	1627	10100.76	1626.95	10119.12	1626.82	10193.19	1625.84	10205	1626.01
10209.65	1626.1	10217.73	1626.27	10223.02	1626.38	10238.65	1626.19	10261.93	1626.04
10268.11	1626.3	10275.8	1626.66	10280.53	1626.87	10298.79	1627.76	10298.91	1627.77
10299.28	1627.8	10299.78	1627.76	10323.66	1627.46	10324.09	1627.46	10325.69	1627.46
10336.34	1627.4	10340.17	1627.44	10346.96	1627.43	10356.13	1627.44	10360.17	1627.53
10368.85	1627.4	10371.49	1627.38	10379.46	1627.77	10383.71	1627.76		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6115.85	.15	7303.1	.1	8571.07	.15	9070.01	.068	9973.23	.045
10046.39	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9973.23	10046.39	380	395.59	410	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
6115.85	6577.1	1625.22

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1625.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.118	0.045	
W.S. Elev (ft)	1625.45	Reach Len. (ft)	380.00	395.59	410.00
Crit W.S. (ft)	1625.08	Flow Area (sq ft)	3960.26	193.44	
E.G. Slope (ft/ft)	0.010203	Area (sq ft)	3960.26	193.44	
Q Total (cfs)	7577.00	Flow (cfs)	6231.47	1345.53	
Top Width (ft)	3085.69	Top Width (ft)	3022.55	63.14	
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.57	6.96	
Max Chl Dpth (ft)	4.68	Hydr. Depth (ft)	1.31	3.06	
Conv. Total (cfs)	75010.8	Conv. (cfs)	61690.3	13320.5	
Length Wtd. (ft)	381.92	Wetted Per. (ft)	3023.64	64.24	
Min Ch El (ft)	1620.77	Shear (lb/sq ft)	0.83	1.92	
Alpha	3.19	Stream Power (lb/ft s)	1.31	13.34	
Frctn Loss (ft)	3.81	Cum Volume (acre-ft)	977.39	23.52	67.85
C & E Loss (ft)	0.02	Cum SA (acres)	600.02	10.25	57.19

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6115.85	7080.20	751.04	826.43	935.92	9.91	0.88	0.91
7080.20	8044.54	2711.66	1518.49	964.53	35.79	1.57	1.79
8044.54	9008.89	2543.22	1455.38	952.79	33.56	1.53	1.75
9008.89	9973.23	225.56	159.96	170.39	2.98	0.94	1.41
LB 9973.23	RB 10046.39	1345.53	193.44	64.24	17.76	3.06	6.96

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.235

INPUT
Description: RM. 3.235. HORZ. N VALUES USED. AREA BLOCKED OUT, TO RT. OF STA. 10048.52.

Station Elevation Data num= 270

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5901.57	1621.9	5921.29	1621.96	5997.74	1621.34	6015.78	1621.24	6023.78	1621.43
6029.98	1621.6	6033.72	1621.62	6036.81	1621.43	6057.18	1621.25	6064.42	1621.14
6065.64	1621.2	6072.28	1621.6	6084.26	1622.31	6105.56	1621.93	6118.31	1621.72
6160.44	1621.3	6198.56	1620.86	6205.85	1620.8	6229	1620.58	6232.43	1620.55
6240.13	1620.7	6250.7	1620.99	6253.67	1621.08	6258.59	1621.04	6264.34	1621.04
6284.14	1621	6284.57	1621.03	6324.09	1620.91	6372.44	1620.72	6406.78	1620.8
6418.67	1621	6423.44	1620.86	6434.87	1621.07	6451.63	1621.52	6460.2	1621.48
6514.73	1621.6	6598.11	1621.6	6621.62	1621.16	6674.16	1620.54	6690.71	1620.3
6704.02	1620.2	6704.17	1620.21	6728.51	1620.35	6754.71	1620.49	6765.55	1620.32
6766.65	1620.4	6775.01	1621.18	6775.09	1621.18	6775.15	1621.18	6776.51	1621.21
6787.78	1621.4	6788.33	1621.41	6788.84	1621.39	6792.08	1621	6798.28	1619.73
6825.23	1619.8	6825.66	1619.95	6826.9	1619.92	6830.64	1619.64	6831.94	1620.05
6835.39	1620.2	6848.24	1620.6	6871.98	1620.37	6893.6	1620.13	6907.02	1620.11
6913.53	1620.1	6940.25	1619.53	6959.27	1619.19	6975.35	1619.67	6996.51	1620.49
6998.21	1620.5	7004.36	1620.65	7013.88	1620.69	7045.23	1621.09	7049.32	1621.14
7081.5	1620.3	7091.26	1620.07	7102.15	1619.89	7132.2	1619.5	7153.56	1619.39
7155.13	1619.4	7181.14	1619.11	7191.84	1619.2	7231.53	1619.43	7235.48	1619.45
7236.17	1619.5	7339.52	1620.48	7356.16	1620.5	7387.54	1619.78	7394.55	1619.63
7395.82	1619.6	7402.51	1620	7406.73	1619.95	7412.61	1619.93	7454.31	1620.07
7454.96	1620	7461.58	1620.02	7467.4	1620.16	7521.92	1620.51	7595.3	1620.38
7704.32	1621.3	7709.22	1621.28	7710.35	1621.26	7712.46	1621.22	7713.94	1621.19
7728.05	1620.9	7755.04	1620.94	7769.15	1620.11	7775.52	1620.18	7784.6	1620.26
7794.36	1620.3	7811.08	1620.27	7821.71	1620.23	7845.33	1620.11	7857.06	1620.15
7886.72	1620.2	7927.37	1620.26	7954.02	1620.51	7980.24	1620.87	7986.96	1620.84
8005.24	1620.9	8066.49	1621.01	8070.12	1621.01	8071.27	1621.01	8073.59	1621.02
8086.67	1620.7	8138.22	1619.48	8150.44	1619.49	8154.64	1619.5	8182.27	1619.55
8190.21	1619.5	8212.48	1619.32	8217.96	1619.15	8251.52	1619.45	8276.13	1619.38
8302.42	1619.5	8309.23	1619.59	8429.25	1619.42	8432.31	1619.42	8432.81	1619.42
8433.92	1619.4	8438.74	1619.43	8562.74	1619.83	8590.46	1620.3	8639.91	1620.75
8645.27	1620.8	8656.61	1620.95	8673.22	1621.61	8685.62	1621.65	8731.18	1621.9
8735.19	1621.9	8757.56	1621.21	8793.05	1620.62	8796.13	1620.59	8801.72	1620.56
8841.23	1620.4	8876.4	1621.37	8936.13	1621.35	8993.97	1621.37	8996.93	1621.35
8997.92	1621.4	8998.54	1621.38	9000.21	1621.38	9002.11	1621.38	9049.22	1621.59
9051.59	1621.6	9057.13	1621.72	9061.02	1621.8	9091.89	1622.75	9109.55	1622.88
9137.11	1623	9147.52	1622.89	9155.03	1622.98	9163.51	1623.09	9269.31	1624.08
9325.02	1624.6	9349.84	1625.07	9349.87	1625.07	9349.97	1625.07	9372.56	1623.91
9373.53	1623.9	9384.46	1624.48	9387.57	1624.75	9393.22	1624.74	9508.46	1623.97
9516.32	1623.9	9528.31	1623.74	9628.03	1622.79	9661.68	1622.6	9710.7	1622.75
9727.9	1622.7	9728.74	1622.72	9729.35	1622.72	9747.6	1622.77	9817.83	1622.73
9867.18	1622.7	9882.34	1622.75	9887.34	1622.83	9903.85	1623.12	9951.2	1624.19
9965.45	1624.4	9972.67	1624.77	9982.97	1621.36	9990.18	1618.99	10000.25	1618.92
10003.15	1618.91	0005.35	1618.89	10014.71	1619.16	10017.03	1619.07	10030.43	1623.81
10035.08	1625.31	0038.45	1625.41	10045.59	1625.53	10048.52	1625.62	10055.12	1624.38
10059.06	1623.21	0071.94	1623.31	0092.29	1623.34	10102.73	1623.31	10115.51	1623.37
10123.62	162	10129.22	1620.95	10142.89	1622.25	10143.04	1622.26	10143.09	1622.26
10151.93	1622.61	0157.18	1622.16	10159.34	1621.61	0160.55	1621.41	0173.88	1622.03
10180.06	1622.41	0183.55	1622.45	10185.94	1622.46	10215.89	1622.22	10231.71	1622.28
10233.9	1622.31	0234.65	1622.29	10240.37	1622.36	10256.79	1622.59	10267.32	1622.5
10276.2	1622.31	0283.62	1622.55	10296.17	1622.71	0303.18	1622.87	10314.95	1623.13
10328.48	1620.81	0329.96	1620.56	10331	1620.71	0336.97	1621.75	10348.87	1623.11
10351.22	1623.51	0359.37	1623.61	0368.35	1623.53	10383.22	1623.47	10390.48	1623.33
10402.36	1623.4	10413.7	1623.59	10419.26	1623.64	10422.95	1623.71	0448.87	1624.46

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10453.16  1624.610492.73 1624.4710523.98 1624.1810525.37 1624.1510529.62 1624.04
10542.18  1623.710546.82 1623.9810558.72 1624.5910565.55 1624.6610573.22 1624.78

Manning's n Values          num=       6
     Sta   n Val     Sta    n Val     Sta    n Val     Sta    n Val     Sta    n Val
 5901.57     .15 6913.53    .068 7794.36     .12 8685.62    .068 9972.67    .045
10035.08    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9972.6710035.08              375  388.39     390             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
10314.9510573.22 1623.13

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1621.78   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                  0.093      0.045      0.068
  W.S. Elev (ft)            1621.70   Reach Len. (ft)            375.00     388.39     390.00
  Crit W.S. (ft)                      Flow Area (sq ft)         3637.18      93.83       5.64
  E.G. Slope (ft/ft)       0.009769   Area (sq ft)              3637.18      93.83       5.64
  Q Total (cfs)             7577.00   Flow (cfs)                7059.35     511.96       5.69
  Top Width (ft)            3071.16   Top Width (ft)            3008.87      42.51      19.77
  Vel Total (ft/s)             2.03   Avg. Vel. (ft/s)             1.94       5.46       1.01
  Max Chl Dpth (ft)            2.81   Hydr. Depth (ft)             1.21       2.21       0.29
  Conv. Total (cfs)         76659.9   Conv. (cfs)               71422.6     5179.7       57.6
  Length Wtd. (ft)           375.96   Wetted Per. (ft)          3009.45      43.41      19.91
  Min Ch El (ft)            1618.89   Shear (lb/sq ft)             0.74       1.32       0.17
  Alpha                        1.34   Stream Power (lb/ft s)       1.43       7.19       0.17
  Frctn Loss (ft)              3.54   Cum Volume (acre-ft)       944.26      22.21      67.82
  C & E Loss (ft)              0.00   Cum SA (acres)             573.71       9.78      57.10

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                  (ft)     (ft/s)
  5901.57       6919.34         559.22     676.95     919.69       7.38       0.74       0.83
  6919.34       7937.12        4033.16    1520.24    1017.90      53.23       1.49       2.65
  7937.12       8954.89        2443.85    1413.70     970.60      32.25       1.46       1.73
  8954.89       9972.67          23.12      26.29     101.25       0.31       0.26       0.88
  LB 9972.67    RB 10035.08     511.96      93.83      43.41       6.76       2.21       5.46
  10035.08      10573.22          5.69       5.64      19.91       0.08       0.29       1.01

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.161**

INPUT
Description: RM. 3.161. HORZ. N VALUES USED. AREA BLOCKED OUT, AND TO RT. OF STA. 10319.66

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5468.62	1619.6	5499.49	1618.41	5544.71	1618.19	5577.7	1618.19	5589.85	1618.12
5626.7	1617.9	5640.03	1617.88	5651.59	1617.98	5654.66	1618.05	5657.05	1618.09
5657.95	1618.1	5680.26	1618.26	5687.96	1618.32	5706.25	1618.92	5708.7	1618.99
5712.17	1619	5784.92	1619.05	5788.44	1619.05	5790.06	1619.04	5792.5	1619.03
5821.05	1618.8	5860.47	1618.55	5862.81	1618.54	5877.55	1618.54	5893.38	1618.49
5906.76	1618.3	5908.45	1618.37	5961.35	1618.04	5977.01	1617.88	6002.36	1617.75
6002.78	1617.7	6024.09	1617.41	6024.51	1617.56	6040.49	1617.31	6043.46	1617.29
6045.89	1617.3	6063.18	1617.73	6066.59	1617.84	6072.44	1618.05	6072.48	1618.05
6072.5	1618.1	6072.74	1618.05	6118.98	1617.93	6143.42	1618.01	6149.07	1618.03
6180.18	1618.2	6187.01	1618.29	6198.77	1618.36	6210.74	1618.39	6238.23	1618.51
6257.53	1618.3	6260.78	1618.29	6264.34	1618.35	6283.67	1618.82	6284.11	1618.8
6284.81	1618.8	6295.33	1618.24	6302.3	1618.04	6345.19	1618.05	6352.88	1618.05
6381.78	1618	6396.45	1618	6401.6	1617.63	6406.63	1617.31	6408.51	1617.25
6411.28	1617.3	6441.23	1617.92	6441.94	1617.98	6442.81	1618.05	6450.49	1618.6
6490.21	1618.3	6504.34	1618.15	6507.11	1618.11	6510.7	1618.09	6512.7	1618.08
6605.53	1617.3	6617.99	1617.3	6620.69	1617.38	6626.77	1617.46	6627.94	1617.54
6645.75	1617.3	6660.73	1617.11	6665.59	1617.43	6668.43	1617.56	6684.6	1617.61
6698.64	1617.6	6701.61	1617.48	6721.16	1617.38	6722.75	1617.36	6723.1	1617.36
6724.88	1617.3	6766.64	1617.09	6772.99	1617.03	6806.37	1617.02	6841.54	1616.61
6844.54	1616.6	6857.21	1616.63	6867.34	1616.77	6875.58	1616.77	6920.64	1616.58
6946.3	1616.3	6983.79	1616.34	6996.9	1616.11	7002.22	1615.86	7017.2	1616.77
7022.24	1616.9	7027.82	1616.25	7044.8	1617.37	7057.3	1617.97	7067.11	1617.6
7106.03	1617.2	7143	1616.88	7199.4	1616.43	7221.37	1616.34	7232.38	1616.34
7251.34	1616.6	7260.55	1616.5	7307.88	1616.27	7310.6	1616.39	7346.24	1616.9
7374.77	1617	7417.67	1616.94	7466.34	1616.87	7476.95	1616.6	7570.15	1617.03
7586.44	1617.1	7598.23	1617.12	7706.54	1616.64	7748.66	1615.85	7750.69	1615.84
7772.12	1616.8	7779.03	1617.12	7797.56	1617.24	7810.45	1616.85	7825.03	1616.32
7841.11	1616.4	7946.96	1617.4	7952.27	1617.18	7955.93	1616.67	8035.74	1616.44
8051.57	1616.5	8053.42	1616.41	8082.78	1615.53	8099.84	1615.03	8124.59	1615.06
8134.75	1615.3	8143.76	1615.58	8165.53	1616.39	8183.06	1616.63	8186.82	1616.14
8195.99	1615	8204.96	1615.45	8209.33	1615.58	8224.93	1616.14	8232.29	1616.16
8242.19	1616.2	8279.81	1616.39	8304.25	1615.89	8309.2	1615.69	8310.66	1615.65
8324.17	1616.3	8328.5	1616.64	8341.87	1616.62	8361.05	1616.54	8362.72	1616.38
8379.51	1617	8387.4	1617.19	8425.65	1617.91	8437.5	1617.87	8465.58	1617.64
8488.2	1617.4	8512.74	1617.04	8525.34	1616.9	8547.25	1616.82	8622.77	1616.83
8643.34	1616.7	8643.8	1616.69	8644.71	1616.68	8645.29	1616.63	8668.57	1615.51
8673.56	1616.3	8684.76	1617.65	8692.3	1617.65	8714.41	1618.06	8728.2	1618.04
8740.58	1618	8743.25	1618	8787.45	1618.13	8862.15	1618.66	8907.55	1619.09
8997.74	1620	9027.65	1620.3	9031.45	1620.42	9033.93	1620.45	9040.49	1620.68
9059.96	1621.1	9081.57	1620.92	9147.76	1620.65	9186.67	1620.76	9223.28	1620.97
9243.07	1621.2	9272.53	1621.19	9278.03	1620.96	9280.15	1620.95	9282.53	1621.01
9286.24	1621	9289.93	1621.02	9297.12	1621.21	9308.15	1621.11	9318.25	1621.08
9350.12	1620.7	9390.95	1620.18	9413.59	1620.41	9416.41	1620.39	9416.76	1620.4
9516.31	1620.1	9584.4	1619.39	9613.06	1619.44	9623.35	1619.1	9652.28	1619.11
9748.26	1619.8	9753.61	1619.84	9754.86	1619.82	9756.98	1619.81	9758.86	1619.78
9761.34	1619.8	9763.83	1619.79	9794.75	1619.46	9799.07	1619.49	9802.53	1619.43
9807.61	1619.4	9837.01	1619.51	9868.37	1619.85	9903.21	1620.16	9915.3	1620.18
9934.17	1620.4	9938.15	1620.44	9939.81	1620.4	9944.61	1620.32	9948.32	1620.21
9950.86	1620.1	9956.1	1620.2	9961.1	1619.66	9964.7	1619.56	9964.97	1619.56
9965.69	1619.8	9978.5	1618.89	9981.21	1618.7	9982.06	1618.65	9982.5	1618.55
9992.27	1616.4	10003.2	1615.46	10004.86	1615.35	10007.61	1615.17	10016.1	1614.67
10018.09	1614.5	10021.08	1615.4	10028.53	1617.86	10042.14	1619.32	10044.99	1619.54

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10072.26  1619.410089.84 1619.2610092.09 1619.2610093.98 1619.2210105.34 1619.51
10110.56  1619.710117.86 1618.5610121.41 1617.9610122.93 1618.0710129.96 1619.51
10145.81    161910146.38 1618.9910147.49 1618.8110148.61 1618.53   10155 1617.35
 10159.9  1616.310161.76 1616.47 10173.5 1618.0110180.84 1618.2610185.93 1618.44
10196.02  1618.910206.93 1619.1710209.28 1618.28 10212.7 1617.0710220.64 1617.65
10224.12  1617.910245.27 1618.3510315.61 1619.9910318.91 1620.0710319.41 1620.08
10319.66  1620.110320.06 1620.0910320.11 1620.0910325.77 1619.9310373.14 1619.05
10377.17    161910377.52 1618.9510380.35 1619.1110382.12 1619.2310399.43 1619.19
10410.82  1619.310419.85 1619.3610440.19 1619.34 10441.9 1619.3310443.89 1619.33
10449.29  1619.310455.93 1619.5910467.51 1620.3210470.33 1620.5110473.64 1620.63
10486.78  1620.8 10498.7 1620.8310509.24 1620.6810526.95 1620.8410530.65 1620.88
10531.95  1620.910533.31  1620.9 10578.9 1620.4510592.36  1620.610596.89 1619.75
10599.72  1619.2 10605.6 1620.3910608.46 1621.0410613.56 1621.3610618.69 1621.63
10629.54  1621.910635.79 1622.1210640.61 1622.19

Manning's n Values          num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 5468.62     .15  6996.9    .068 9297.12    .068 9965.69    .04510044.99    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9965.6910044.99               425  416.26     375             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
10319.6610640.61  1620.1
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1618.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.074	0.045	0.068
W.S. Elev (ft)	1618.14	Reach Len. (ft)	425.00	416.26	375.00
Crit W.S. (ft)		Flow Area (sq ft)	3120.53	99.14	33.03
E.G. Slope (ft/ft)	0.009081	Area (sq ft)	3120.53	99.14	33.03
Q Total (cfs)	7577.00	Flow (cfs)	7015.46	508.71	52.83
Top Width (ft)	2833.77	Top Width (ft)	2731.58	46.80	55.40
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)	2.25	5.13	1.60
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)	1.14	2.12	0.60
Conv. Total (cfs)	79510.8	Conv. (cfs)	73618.1	5338.3	554.3
Length Wtd. (ft)	424.36	Wetted Per. (ft)	2732.41	47.60	55.93
Min Ch El (ft)	1614.50	Shear (lb/sq ft)	0.65	1.18	0.33
Alpha	1.19	Stream Power (lb/ft s)	1.46	6.06	0.54
Frctn Loss (ft)	3.96	Cum Volume (acre-ft)	915.17	21.35	67.65
C & E Loss (ft)	0.01	Cum SA (acres)	549.00	9.38	56.76

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5468.62	6592.89	57.98	146.44	535.51	0.77	0.27	0.40
6592.89	7717.16	2881.92	1431.37	1124.45	38.04	1.27	2.01
7717.16	8841.42	4075.57	1542.72	1072.45	53.79	1.44	2.64
8841.42	9965.69						
LB 9965.69	RB 10044.99	508.71	99.14	47.60	6.71	2.12	5.13
10044.99	10640.61	52.83	33.03	55.93	0.70	0.60	1.60

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.082**

INPUT
Description: RM. 3.082. HORZ. N VALUES USED. AREA BLOCKED OUT TO RT. OF STA.10406.06

Station Elevation Data num= 300

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5881.19	1615.1	5901.68	1615.27	5925.45	1614.84	5933.13	1614.81	5938.15	1614.79
5940.22	1614.7	5947.18	1614.72	5973.27	1614.4	5992.34	1614.65	6007.68	1614.55
6028.58	1614.7	6051.16	1614.47	6067.04	1614.81	6083.52	1614.6	6111	1614.25
6157.97	1613.4	6158.47	1613.53	6158.93	1613.78	6182.26	1613.77	6190.95	1613.71
6215.87	1613.8	6224.05	1613.88	6235.3	1613.93	6251.26	1613.56	6281.68	1613.98
6286.5	1614.4	6302.82	1614.45	6322.74	1614.32	6375.44	1614.11	6392.62	1613.52
6397.03	1613.4	6405.8	1613.57	6409	1613.6	6431.23	1613.87	6440.74	1613.94
6453.4	1614.1	6462.58	1614.29	6484.49	1613.89	6513.99	1613.65	6535.74	1613.45
6551.73	1613.6	6562.46	1613.52	6571.21	1613.54	6593.96	1613.4	6616.47	1613.33
6626.49	1613.5	6627.66	1613.31	6635.15	1613.27	6636.02	1613.26	6755.64	1612.44
6755.87	1612.4	6762.74	1612.56	6786.4	1613.15	6844.15	1613.01	6847.94	1613.07
6852.85	1613.3	6881.8	1613.15	6891.45	1613.15	6898.36	1612.88	6980.5	1612.11
6989.08	1612.1	6994.7	1612.03	7056	1611.89	7075.62	1611.82	7092.2	1612.38
7096.05	1612.6	7097.77	1612.46	7106.66	1612.55	7140.79	1612.38	7149.86	1612.4
7156.54	1612.4	7217.22	1612.52	7219.04	1612.46	7234.77	1612.29	7254.76	1612.12
7266.18	1612	7282.14	1611.74	7295.65	1611.68	7308.84	1612.01	7319.52	1612.31
7344.99	1612.1	7350.28	1612.08	7358.15	1612.18	7370.58	1612.25	7375.49	1610.67
7379.87	1608.3	7391.26	1612.07	7393.2	1612.83	7396.27	1612.79	7407.64	1612.68
7472.83	1612.2	7494.71	1612.35	7528.1	1612.47	7592.37	1612.34	7639.17	1611.96
7710.64	1612	7711.83	1612.03	7728.34	1612.12	7814.83	1613.56	7822.01	1613.69
7828.17	1613.7	7835.1	1611.9	7835.37	1611.77	7844.45	1612.22	7853.01	1612.18
7877.2	1611.8	7883.97	1611.86	7907.07	1612.15	7919.92	1611.78	7936.05	1611.28
7950.57	1611.1	7957.4	1610.86	7966.92	1610.04	7981.3	1610.7	7981.65	1610.71
7981.85	1610.7	7983.63	1610.73	8017.25	1611.01	8023.64	1610.99	8046.19	1610.86
8071.48	1610.7	8079.67	1610.69	8094.18	1610.66	8101.63	1610.58	8109.36	1610.62
8134.2	1611.3	8161.29	1611.8	8166.61	1611.38	8179.87	1610.26	8192.19	1610.75
8203.38	1611.5	8203.61	1611.55	8203.87	1611.55	8246.32	1611.98	8268.64	1612.39
8296.77	1612.9	8305.39	1613.1	8310.52	1613.12	8348.83	1613.13	8380.06	1613.5
8425.66	1614	8429.27	1613.98	8434.67	1613.99	8492.88	1613.83	8507.27	1613.79
8511.8	1613.8	8511.91	1613.75	8515.59	1613.69	8525.36	1613.81	8586.75	1614.39
8607.58	1614.3	8614.4	1614.34	8619.06	1614.35	8624.18	1614.39	8625.85	1614.4
8626.09	1614.4	8626.78	1614.4	8629.05	1614.4	8631.61	1614.41	8660.33	1614.63
8673.09	1614.7	8679.77	1614.85	8681.5	1614.81	8694.21	1614.66	8710.45	1615.15
8728.07	1615.4	8731.26	1615.46	8731.77	1615.47	8732.52	1615.48	8733.76	1615.52
8783.91	1615.5	8787.85	1615.54	8791.31	1615.5	8796.16	1615.47	8805.86	1615.5
8867.12	1615.7	8907.23	1615.7	8988.4	1615.86	9011.58	1615.96	9026.77	1616.04
9083.82	1616.2	9146.3	1616.68	9152.27	1616.67	9170.93	1616.7	9196.92	1616.67
9257.91	1616.4	9264.83	1616.3	9353.47	1614.75	9379.01	1614.6	9391.58	1614.54
9407.12	1614.4	9422.2	1614.46	9436.54	1614.57	9442.84	1614.43	9445.34	1614.61
9496.83	1614.9	9519.83	1614.97	9534.35	1615.01	9554.28	1615.22	9562.94	1615.22
9576.93	1615.5	9618.22	1616.07	9625.79	1616.08	9634.9	1616.16	9647.47	1616.08
9712.04	1616	9720.67	1615.96	9736.26	1615.97	9737.28	1615.97	9738.48	1615.98
9739.47	1616	9744.42	1616.02	9748.04	1616.05	9759.13	1616.13	9765.97	1616.14
9772.32	1616.2	9774.03	1616.24	9782.42	1616.13	9783.57	1616.11	9785.29	1616.07

9787.81	1616	9791.08	1615.98	9843.16	1615.72	9865.28	1615.75	9877.85	1616.35
9878.64	1616.4	9879.13	1616.37	9914.72	1616.04	9926.54	1615.96	9937.23	1616.67
9944.29	1617.1	9945.94	1617.13	9952.17	1617.02	9989.24	1616.52	9992.75	1616.6
9993.69	1616.1	9997.36	1612.65	10009.9	1612.69	10017.97	1612.71	10026.75	1614.34
10031.06	1615.11	10050.71	1615.71	10059.47	1615.97	10068.61	1615.66	10096.02	1615
10100.32	1614.91	10103.34	1614.69	10106.85	1614.52	10115.46	1615.11	10121.56	1615.55
10125.49	1615.61	10155.56	1615.98	10156.33	1615.99	10156.55	1615.95	10156.86	1615.92
10179.53	1612.91	10187.76	1613.61	10188.86	1613.68	10196.86	1614.23	10200.18	1614.48
10202.05	1614.6	10203.8	1614.67	10212.02	1614.96	10228.19	1615.55	10232.55	1615.62
10242.35	1615.71	10253.36	1615.57	10275.34	1615.11	10303.03	1615.11	10311.42	1615.12
10313.3	1615.11	10318.83	1615.59	10320.44	1615.68	10321.34	1615.68	10323.42	1615.69
10367.78	1615.91	10380.19	1616.19	10384.31	1616.37	10392.53	1616.53	10396.14	1616.3
10396.6	1616.31	10397.76	1616.27	10406.06	1616.46	10411.37	1615.78	10418.86	1614.95
10424.53	1615.4	10427.6	1615.81	10435.65	1614.31	10437.98	1613.82	10438.37	1613.85
10441.66	1614.11	10461.23	1616.18	10462.21	1616.04	10471.92	1615.14	10473.34	1615.03
10474.97	1614.91	10477.29	1614.67	10482.95	1614.97	10501.05	161	610503.52	1616.21

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5881.19	.15	7396.27	.068	7907.07	.12	9791.08	.068	9945.94	.045
10050.71	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9945.94	10050.71	370	403.32	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10406.06	10503.52	1615.7

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1614.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.107	0.045	0.068
W.S. Elev (ft)	1614.20	Reach Len. (ft)	370.00	403.32	390.00
Crit W.S. (ft)	1612.91	Flow Area (sq ft)	3787.15	38.73	16.79
E.G. Slope (ft/ft)	0.009597	Area (sq ft)	3787.15	38.73	16.79
Q Total (cfs)	7577.00	Flow (cfs)	7405.58	145.16	26.27
Top Width (ft)	2433.76	Top Width (ft)	2376.73	30.31	26.73
Vel Total (ft/s)	1.97	Avg. Vel. (ft/s)	1.96	3.75	1.56
Max Chl Dpth (ft)	5.90	Hydr. Depth (ft)	1.59	1.28	0.63
Conv. Total (cfs)	77342.8	Conv. (cfs)	75593.0	1481.7	268.1
Length Wtd. (ft)	371.08	Wetted Per. (ft)	2379.06	31.07	26.86
Min Ch El (ft)	1612.65	Shear (lb/sq ft)	0.95	0.75	0.37
Alpha	1.03	Stream Power (lb/ft s)	1.87	2.80	0.59
Frctn Loss (ft)	3.51	Cum Volume (acre-ft)	881.47	20.70	67.43
C & E Loss (ft)	0.00	Cum SA (acres)	524.08	9.01	56.41

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5881.19	6897.38	429.33	537.03	707.28	5.67	0.76	0.80
6897.38	7913.57	4564.93	1968.29	1018.13	60.25	1.94	2.32

7913.57	8929.75	2411.32	1281.84	653.65	31.82	1.96	1.88
8929.75	9945.94						
LB 9945.94	RB 10050.71	145.16	38.73	31.07	1.92	1.28	3.75
10050.71	10503.52	26.27	16.79	26.86	0.35	0.63	1.56

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.006**

INPUT
Description: RM. 3.006. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR UNIVERSITY DR. AREA BLOCKED OUT TO LT. OF STA.6706.65

Station Elevation Data num= 307

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5622.28	1612.1	5624.12	1612.11	5626.1	1612.08	5639.1	1612.09	5669.38	1611.87
5669.44	1611.9	5669.47	1611.87	5669.48	1611.87	5700.86	1611.88	5706.36	1611.9
5710.94	1611.87	5722.79	1611.76	5779.55	1611.1	5795.49	1611.04	5806.25	1611
5850.72	1610.83	5909.28	1610.66	5943.75	1610.65	5990.95	1610.49	6029.17	1610.2
6031.99	1610.18	6032.07	1610.19	6036.82	1610.62	6079.15	1610.53	6086.59	1610.5
6089.95	1610.54	6101.05	1610.61	6103.22	1610.6	6105.51	1610.62	6134.3	1610.7
6137.74	1610.66	6140.71	1610.68	6184.39	1611.25	6205	1611.66	6226.06	1611.5
6245.17	1611.36	6252.91	1611.23	6266.24	1611.09	6266.82	1610.94	6295.76	1610.8
6299.4	1610.86	6300.53	1610.97	6307.64	1611.03	6310.82	1611.14	6319.22	1611.6
6325.65	1611.5	6328.51	1611.46	6331.06	1611.28	6332.74	1611.26	6381.81	1610.5
6388.86	1610.48	6392.29	1610.47	6394.04	1610.45	6398.81	1610.41	6415.8	1610.3
6494.6	1609.85	6505.59	1609.93	6516.4	1609.45	6516.47	1609.45	6521.03	1611.2
6521.55	1611.45	6546.46	1611.02	6589.03	1610.03	6594.25	1610.06	6610.78	1610.4
6624.58	1610.51	6628.65	1610.47	6686.38	1610.82	6706.65	1610.85	6741.37	1610.3
6753.92	1610.08	6813.69	1609.27	6827.19	1609.31	6840.89	1609.54	6854.56	1609.5
6868.45	1609.77	6938.31	1608.79	6977.61	1607.52	6980.39	1607.43	6999.4	1606.8
6999.95	1606.86	7001.28	1607.12	7007.97	1608.42	7080.62	1608.29	7097.49	1608.2
7105.84	1608.17	7112.88	1608.26	7114.32	1608.27	7118.83	1608.4	7128.82	1608.6
7160.15	1609.49	7163.89	1609.61	7184.2	1609.61	7207.35	1609.74	7240.85	1609.6
7277.44	1609.28	7307.06	1608.6	7338.01	1608.35	7354.7	1609.83	7358.4	1610.2
7360.15	1610.32	7365.62	1610.37	7400.16	1610.69	7417.47	1609.97	7422.23	1609.8
7438.37	1609.3	7445.47	1608.84	7457.97	1608.57	7474.98	1608.15	7476.81	1608.1
7495.34	1608.31	7525.74	1608.65	7570.3	1609.09	7576.56	1609.13	7580.13	1609.1
7589.78	1609.11	7605.87	1609.02	7606.48	1609.08	7663.37	1608.48	7690.06	1607.9
7705.49	1607.57	7761.27	1607.14	7815.71	1607.24	7828.55	1607.34	7850.86	1607.5
7947.51	1608.49	7978.72	1608.77	8025.9	1609.29	8067.4	1609.72	8115.53	1610.1
8119.41	1610.12	8148.29	1609.67	8153.79	1609.57	8160.4	1609.54	8174.56	1609.5
8189.21	1609.6	8193.98	1609.94	8209.76	1610.38	8212.25	1610.47	8218.03	1610.4
8220.32	1610.4	8254.84	1610.27	8289.88	1610.39	8320.06	1610.36	8326.94	1610.4
8333.24	1610.28	8335	1610.2	8354.75	1609.84	8368.18	1609.94	8398.42	1610.7
8402.07	1610.81	8409.36	1610.76	8414.03	1610.74	8430.86	1610.56	8434.84	1610.6
8468.41	1610.79	8527.66	1611.34	8542.04	1611.46	8549.07	1611.52	8553.33	1611.5
8573.02	1611.81	8603.1	1611.98	8623.14	1612.14	8630.1	1612.12	8666.88	1612
8702.31	1611.72	8742.92	1611.48	8775.64	1611.3	8790.61	1611.33	8807.61	1611.4
8832.38	1611.48	8878.32	1611.71	8908.87	1611.83	8915.93	1611.81	8931.4	1611.2
8945.7	1610.76	8960.9	1610.76	8968.55	1610.78	8985.3	1610.76	8998.21	1610.8
9007.25	1610.81	9022.16	1610.88	9044.48	1610.96	9051.69	1611.31	9065.93	1611.5
9116.69	1611.37	9119.88	1611.28	9122.11	1611.23	9124.18	1611.18	9149.01	1611

9154.28	1611	9170.02	1611.21	9176.09	1610.43	9181.22	1609.78	9192.27	1611.2
9193.92	1611.3	9201.05	1611.3	9224.57	1611.29	9238.22	1611.31	9276.52	1611.5
9282.19	1611.3	9304.13	1610.63	9319.1	1610.36	9319.21	1610.36	9334.83	1610.7
9345.66	1610.88	9354.82	1611.01	9366.03	1610.75	9379.3	1610.49	9395.28	1611.1
9416.95	1611.97	9417.13	1611.98	9417.25	1611.98	9417.33	1611.98	9424.75	1611.8
9429.09	1611.28	9437.41	1610.16	9442.62	1610.44	9450.48	1610.93	9470.07	1610.9
9478.84	1611	9480.01	1611.02	9493.57	1611.36	9498.79	1611.49	9513.05	1611.5
9517.15	1611.53	9523.36	1611.52	9541.44	1611.54	9557.4	1611.63	9562.69	1611.7
9574.74	1611.77	9586.65	1611.89	9599.98	1611.84	9602.17	1611.82	9614.25	1611.9
9627.63	1611.87	9639.41	1611.62	9645.18	1611.71	9658.17	1611.36	9662.35	1611.4
9663.96	1611.25	9676.47	1611.63	9683.5	1611.87	9687.85	1612.05	9700.02	1612
9702.59	1612.08	9713.42	1612.17	9716.98	1612.19	9718	1612.21	9730.66	1612.2
9734.03	1612.09	9755.83	1612.03	9759.27	1612.03	9788.19	1611.95	9788.71	1612
9790.54	1612.04	9792.88	1612	9813.24	1611.81	9826.54	1611.45	9828.15	1611.4
9854.48	1611.4	9869.15	1611.44	9880.16	1611.42	9899.58	1611.09	9899.72	1611.1
9920.83	1611.31	9930.46	1611.43	9945.44	1610.81	9948.7	1610.62	9950.34	1610.7
9952.97	1610.45	9959.29	1609.81	9978.76	1609.51	10033.42	1609.41	10033.69	1609.4
10034.13	1609.39	10035.55	1609.47	10047.65	1610.05	10054.55	1611.09	10067.73	1612.6
10080.18	1612.91	10091.81	1613.07	10098.68	1613.23	10106.65	1613.18	10108.67	1613.1
10109.26	1613.16	10113.36	1613.02	10131.26	1612.74	10134.22	1612.63	10139.87	1612.2
10146.19	1612.11	10154.2	1612.04	10155.78	1612.05	10156.55	1612.05	10171.16	1611.8
10241.83	1612.17	10243.24	1612.18	10244.01	1612.19	10245.73	1612.27	10253.63	1612.6
10262	1612.98	10271.24	1613.26	10276.37	1613.26	10292.01	1613.41	10302.36	1613.5
10305.41	1613.51	10317.26	1613.57						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5622.28	.068	6101.05	.15	6854.56	.068	7761.27	.1	9930.46	.045
10067.73	.1								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930.46	10067.73	300	382.27	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1610.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.077	0.045	
W.S. Elev (ft)	1610.65	Reach Len. (ft)	300.00	382.27	400.00
Crit W.S. (ft)		Flow Area (sq ft)	2865.27	103.18	
E.G. Slope (ft/ft)	0.009240	Area (sq ft)	2865.27	103.18	
Q Total (cfs)	7577.00	Flow (cfs)	7247.14	329.86	
Top Width (ft)	2283.61	Top Width (ft)	2181.66	101.96	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	2.53	3.20	
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)	1.31	1.01	
Conv. Total (cfs)	78826.2	Conv. (cfs)	75394.5	3431.6	
Length Wtd. (ft)	304.72	Wetted Per. (ft)	2182.55	102.07	
Min Ch El (ft)	1609.39	Shear (lb/sq ft)	0.76	0.58	
Alpha	1.01	Stream Power (lb/ft s)	1.92	1.86	
Frctn Loss (ft)	2.61	Cum Volume (acre-ft)	853.22	20.04	67.36
C & E Loss (ft)	0.00	Cum SA (acres)	504.72	8.40	56.29

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5622.28	6699.32	64.31	123.43	420.78	0.85	0.29	0.52
6699.32	7776.37	5610.08	1845.08	1052.44	74.04	1.75	3.04
7776.37	8853.42	1565.42	882.41	641.69	20.66	1.38	1.77
8853.42	9930.46	7.33	14.35	67.64	0.10	0.21	0.51
LB 9930.46	RB 10067.73	329.86	103.18	102.07	4.35	1.01	3.20

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.933

INPUT
Description: RM. 2.933. HORZ. N VALUES USED. AREA TO LT. OF STA. 6631.42 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5354.28	1609	5361.54	1609.19	5365.08	1609.25	5366.6	1609.34	5370.2	1609.45
5371.55	1609.4	5384.2	1609.86	5394.48	1610.33	5399.42	1610.88	5455.93	1610.14
5473.04	1610.1	5486.59	1610.17	5508.66	1609.89	5545.73	1608.17	5601.97	1608.2
5641.51	1609.5	5658.31	1609.98	5666.07	1610.34	5730.16	1610.17	5732.54	1610.16
5733.6	1610.1	5734.55	1610.05	5737.67	1609.83	5748.01	1609.13	5753.29	1608.71
5758.63	1608.4	5768.44	1607.7	5781.68	1606.33	5782.47	1606.1	5789.29	1606.52
5795.9	1606.9	5810.08	1607.81	5820.51	1608.58	5828.89	1609.08	5833.48	1609.18
5840.83	1609.7	5863.29	1609.56	5908.58	1609.29	5918.56	1608.64	5922.37	1608.15
5930.26	1607.9	5939.45	1606.54	5943.18	1605.48	5949.03	1606.52	5954.39	1607.67
5955.59	1608.1	5956.58	1608.08	5958.11	1608.17	5963.65	1608.29	5986.98	1608.76
5989.17	1608.7	5990.86	1608.77	5993.53	1608.76	5996	1608.76	6095.37	1608.4
6123.28	1608.9	6124.39	1608.92	6151.41	1608.81	6209.4	1608.28	6224.99	1608.2
6253.73	1608.1	6260.22	1608.21	6264.96	1608.15	6273.95	1608.29	6319.19	1607.73
6325.51	1607.8	6361.12	1607.79	6368.72	1607.63	6385.87	1607.52	6391.95	1607.46
6419.39	1607.1	6424.95	1607.11	6435.53	1607.34	6452.34	1607.53	6478.87	1607.5
6482.03	1607.5	6494.79	1607.43	6584.91	1607.36	6588.04	1607.37	6602.74	1607.34
6631.42	1607.8	6667.64	1607.65	6704.5	1607.51	6708.67	1607.52	6717.11	1607.45
6802.39	1606.6	6823.17	1606.44	6838.83	1606.39	6850.65	1606.13	6852.75	1606.02
6856.65	1605.9	6902.74	1604.73	6911.69	1605.82	6922.95	1606.36	6936.4	1606.26
6944.87	1606.3	6951.5	1604.79	6954.8	1604.34	6960.18	1604.93	6970.6	1605.28
6994.33	1605.4	7016.69	1605.48	7028.45	1604.86	7031.37	1604.66	7048.69	1605.48
7050.31	1605.6	7066.17	1605.54	7085.55	1605.63	7134.92	1605.33	7177.44	1605.12
7205.84	1605.3	7206.19	1605.29	7206.74	1605.29	7209.05	1605.32	7326.96	1606.24
7352.31	1606.6	7375.76	1606.66	7376	1606.59	7377.12	1606.37	7380.52	1605.55
7389.59	1604.1	7406.25	1604.95	7409.14	1605.1	7424.31	1604.99	7457.64	1604.86
7481.4	1605	7493.04	1605.06	7517.76	1604.84	7551.33	1604.97	7588.66	1605.55
7603.68	1605.9	7621.35	1605.96	7682.68	1606.27	7695.37	1606.31	7701.17	1605.82
7715.92	1606.2	7751.55	1606.72	7771.67	1606.77	7793.63	1606.82	7798.97	1606.68
7810.77	1606.7	7857.61	1606.8	7870.55	1606.81	7874.1	1606.77	7881.32	1606.83
7902.04	1606.8	7914.35	1606.79	7929.57	1606.26	7974.23	1606.76	7985.72	1606.66
7987.64	1606.7	8013.56	1606.82	8013.95	1606.82	8036.66	1606.87	8061.9	1606.83
8068.42	1606.8	8101.87	1606.95	8143.64	1607.11	8171.88	1607.33	8211.61	1608.11
8222.19	1608.3	8226.68	1608.36	8228.11	1608.96	8229	1609.24	8231.79	1609.26

8242.37	1609.5	8242.64	1609.46	8242.91	1609.4	8245.54	1608.55	8253.8	1608.4
8266.26	1608.2	8272.49	1608.05	8289.31	1607.85	8292.58	1607.83	8297.26	1607.91
8397.61	1608.6	8417.28	1608.69	8424.3	1608.44	8435.5	1608.6	8439.89	1608.52
8457.63	1608.6	8461.25	1608.69	8514.97	1609.03	8538.01	1609.05	8556.6	1609.1
8569.2	1609	8596.34	1608.6	8598.2	1608.56	8598.43	1608.56	8598.49	1608.56
8600.36	1608.5	8643.72	1608.14	8648.87	1608.22	8656.56	1608.29	8674.12	1608.43
8701.28	1608.4	8742.05	1608.32	8765.22	1608.18	8772.62	1608.13	8783.57	1608.15
8785.24	1608.2	8816.13	1608.24	8896.1	1608.44	8994.69	1608.54	9008.86	1608.51
9015.98	1608.4	9029.31	1608.56	9036.39	1608.51	9057.31	1608.5	9063.95	1608.56
9066.33	1608.3	9074.54	1607.13	9075.73	1607.23	9083.01	1607.88	9085.3	1608
9109.44	1607.9	9111.58	1607.83	9111.7	1607.85	9114.65	1607.9	9140.68	1608.22
9143.84	1608.3	9150.69	1607.95	9158.84	1607.84	9161.28	1607.78	9173.68	1607.67
9181.11	1607.4	9184.89	1607.3	9197.78	1607.38	9214.59	1607.54	9217.11	1607.54
9221.81	1607.5	9237.93	1607.31	9248.28	1607.08	9251.17	1607.13	9253.97	1607.13
9256.17	1607.1	9264.01	1607.43	9268.22	1607.58	9270.17	1607.63	9272.29	1607.71
9283.39	1608.4	9283.73	1608.42	9285.08	1608.45	9303.8	1608.49	9304.93	1608.51
9312.94	1608.5	9324.51	1608.31	9335.89	1608.51	9343.49	1608.6	9355.01	1608.75
9363.91	1608.8	9378.61	1608.65	9389.24	1608.74	9394.45	1608.56	9416.16	1608.63
9440.71	1608.8	9449.29	1608.8	9450.46	1608.8	9456.46	1608.75	9462.34	1608.75
9464.06	1608.7	9498.9	1608.47	9505.93	1608.3	9559.17	1608.33	9560.3	1608.34
9569.64	1608.4	9574.34	1608.34	9582.57	1608.96	9611.07	1608.2	9645.16	1607.19
9653.96	1607.8	9654.95	1607.88	9655.34	1607.9	9655.74	1607.89	9662.09	1607.4
9678.3	1607.5	9703.91	1607.92	9721.29	1608.17	9732.09	1608.3	9744.03	1608.34
9756.96	1608.5	9764.27	1608.59	9764.58	1608.59	9777.35	1608.66	9804.71	1608.25
9840.92	1608	9853.75	1608.01	9862.02	1608.13	9903.85	1607.69	9906.94	1607.64
9909.58	1607.5	9921.07	1607	9927.03	1607.32	9931.43	1607.52	9938.93	1607.1
9950.62	1606.2	9957.12	1607.67	9959.94	1608.14	9978.97	1608	9979.02	1607.99
9979.04	1608	9990.74	1604.83	10004.55	1604.71	10007.82	1604.71	10011.42	1605.35
10027.77	1608.21	10055.25	1608.19	10076.39	1608.22	10100.66	1609.05	10101.01	1609.06
10101.15	1609.11	10101.55	1609.06	10120.57	1608.93	10132.24	1608.61	10146.51	1609.17
10149.6	1609.51	10150.26	1609.41	10150.57	1609.36	10192.72	1609.47	10203.29	1609.57
10225.56	1609.71	10234.14	1609.61	10246	1609.72	10253.1	1609.95	10266.09	1610.44
10269.36	1610.61	10289.41	1610.85	10295.46	1610.89				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5354.28	.068	7409.14	.15	8061.9	.1	9611.07	.068	9979.04	.045
10027.77	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9979.04	10027.77	360	404.67	390	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1608.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.090	0.045	
W.S. Elev (ft)	1608.05	Reach Len. (ft)	360.00	404.67	390.00
Crit W.S. (ft)		Flow Area (sq ft)	3441.69	107.23	
E.G. Slope (ft/ft)	0.008076	Area (sq ft)	3441.69	107.23	
Q Total (cfs)	7577.00	Flow (cfs)	7037.68	539.32	
Top Width (ft)	2493.36	Top Width (ft)	2445.48	47.88	
Vel Total (ft/s)	2.14	Avg. Vel. (ft/s)	2.04	5.03	
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)	1.41	2.24	
Conv. Total (cfs)	84314.0	Conv. (cfs)	78312.6	6001.3	
Length Wtd. (ft)	363.37	Wetted Per. (ft)	2447.43	48.59	
Min Ch El (ft)	1604.70	Shear (lb/sq ft)	0.71	1.11	
Alpha	1.25	Stream Power (lb/ft s)	1.45	5.60	

Frctn Loss (ft)	3.38	Cum Volume (acre-ft)	831.50	19.12	67.36
C & E Loss (ft)	0.01	Cum SA (acres)	488.79	7.74	56.29

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5354.28	6510.47	257.92	188.08	297.75	3.40	0.63	1.37
6510.47	7666.66	5885.96	2380.58	1156.88	77.68	2.06	2.47
7666.66	8822.85	726.20	691.67	587.38	9.58	1.18	1.05
8822.85	9979.04	167.60	181.36	405.42	2.21	0.45	0.92
LB 9979.04	RB 10027.77	539.32	107.23	48.59	7.12	2.24	5.03

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.857**

INPUT
Description: RM.2.857. HORZ. N VALUES USED. AREA TO LT. OF STA. 5571.95.

Station Elevation Data num= 329

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5248.42	1604.1	5269.19	1604.52	5274.82	1604.54	5303.67	1604.59	5346.54	1604.71
5403.29	1604.8	5442.77	1604.85	5467.1	1604.97	5581.95	1605.15	5591.59	1605.11
5711.63	1604.5	5725.14	1604.27	5726.98	1604.41	5738.68	1603.43	5744.58	1602.88
5754.99	1604.2	5757.68	1604.58	5781.74	1604.4	5833.2	1604.23	5858.05	1605.06
5868.22	1605.3	5875.77	1605.3	5899.6	1604.86	5907.68	1604.74	5910.38	1604.63
5924.23	1604.3	5926.35	1604.28	5948.87	1604.86	5952.25	1604.97	5953.59	1605.04
5974.99	1605.1	6013.21	1604.91	6026.28	1604.85	6029.33	1604.86	6035.25	1604.86
6056.1	1604.1	6060.22	1604.13	6071.93	1604.2	6108.27	1604.71	6138.69	1604.61
6153.45	1605.6	6176.67	1606.65	6188.6	1606.7	6206.82	1606.62	6240.47	1606.47
6261.24	1606.3	6272.76	1605.46	6282.36	1604.75	6305.86	1606.08	6306.34	1606.11
6306.93	1606.1	6307.74	1606.18	6325.35	1607.14	6342.38	1606.72	6350.28	1606.73
6379.68	1606.1	6401.88	1605.86	6437.98	1605.49	6451.92	1605.5	6470.86	1605.55
6558.03	1605.2	6613.39	1603.97	6672.57	1602.93	6676.6	1603.15	6705.97	1602.91
6729.66	1603	6753.91	1603.17	6766.61	1603.74	6768.51	1603.86	6776.76	1603.28
6780.7	1603	6781.76	1602.96	6794.1	1602.99	6833.87	1604.07	6864.88	1604.79
6869.08	1604.8	6888.22	1604.27	6911.22	1603.16	6911.36	1603.16	6931.64	1603.08
6939.76	1603	6946.99	1603.03	6951.02	1603.07	6980.16	1603.09	6987.12	1603.11
6995.15	1603	7026.82	1602.92	7031.96	1603.38	7042.03	1603.4	7047.56	1602.38
7055.65	1600.7	7069.43	1603.37	7069.45	1603.37	7069.46	1603.37	7069.46	1603.4
7094.86	1603.2	7100.03	1603.23	7101.18	1602.97	7106.2	1602.3	7118.56	1602.1
7122.13	1602.16	7125.29	1602.07	7129.08	1602.03	7133.45	1602.09	7169.72	1602.8
7195.67	1602.72	7200.93	1602.6	7231.17	1602.36	7234.38	1602.36	7240.04	1602.4
7315.25	1602.61	7316.48	1602.6	7338.11	1602.42	7389.24	1601.97	7392.3	1602
7395.9	1601.93	7430.36	1601.45	7430.99	1601.44	7431.08	1601.44	7431.14	1601.4
7431.16	1601.44	7431.23	1601.44	7431.64	1601.44	7501.1	1602.12	7509.95	1602.1
7517.62	1601.85	7538.8	1601.74	7560.18	1602.32	7595.16	1602.64	7612.54	1602.7
7628.25	1602.75	7633.5	1602.75	7665.31	1602.58	7679.69	1602.24	7701.61	1602.1

7717.04	1602.26	7730.66	1602.16	7761.47	1602.39	7763.74	1602.4	7777.34	1602.5
7792.8	1602.64	7818.77	1602.77	7829.59	1602.86	7837.81	1602.92	7857.32	1603
7882.08	1603.27	7885.49	1603.16	7890.7	1603.14	7966.29	1602.94	7969.23	1602.9
7996.13	1603.08	7999.73	1603.11	8027.64	1603.32	8033.06	1603.44	8046.4	1603.5
8079.04	1603.84	8084.38	1603.91	8110.71	1604.08	8147.02	1603.87	8157.23	1603.8
8163.89	1603.79	8171.02	1603.73	8180.18	1603.72	8202.33	1603.64	8247.82	1604
8249.31	1604.01	8250.61	1603.99	8251.38	1603.99	8253.36	1603.99	8258.42	1603.9
8279.17	1603.66	8288.39	1603.71	8328.2	1603.78	8356.36	1603.82	8390.58	1603.9
8439.3	1604.3	8465.11	1604.46	8470.62	1604.47	8489.39	1604.38	8505.82	1604.3
8523.68	1604.43	8539.42	1604.81	8544.26	1604.76	8609.36	1604.67	8609.94	1604.7
8610.54	1604.67	8611.73	1604.65	8682.9	1603.98	8732.53	1603.85	8745.05	1603.9
8753.04	1603.88	8767.04	1603.84	8774.56	1603.69	8783.78	1603.63	8796.22	1603.7
8814.01	1604.4	8831.71	1604.35	8844.19	1604.02	8847.26	1604.06	8870.63	1604.5
8896.11	1604.19	8915.35	1604.04	8934.52	1604.04	8959.16	1603.86	8982.29	1603.5
8990.86	1603.54	8999.38	1603.53	9032.01	1603.22	9048.05	1603.08	9049.13	1603.1
9053.51	1603.21	9063.06	1603.6	9081.05	1603.2	9091.61	1603.49	9091.7	1603.5
9101.45	1603.21	9102.94	1603.15	9119.16	1603.27	9131.92	1603.35	9147.3	1603.4
9148.46	1603.44	9150.33	1603.41	9162.64	1603.14	9183.47	1603.38	9212.74	1603.7
9215.72	1603.76	9216.78	1603.76	9224.07	1603.81	9225.49	1603.82	9228.15	1603.8
9233	1603.84	9237.19	1603.84	9249.53	1604.02	9258.05	1603.91	9270.51	1603.9
9279.4	1603.9	9286.28	1603.95	9303.81	1604.14	9321.87	1604.56	9325.93	1604.6
9332.35	1604.79	9343.68	1604.66	9347.18	1604.71	9362.35	1604.77	9371.03	1604
9375.53	1603.5	9379.01	1603.94	9380.5	1604.07	9383.61	1603.98	9387.82	1603.8
9392.05	1604.01	9412.21	1604.58	9412.76	1604.56	9446.24	1604.38	9482.62	1604
9487.17	1603.86	9490.49	1603.97	9522.39	1603.95	9529.24	1604.02	9534.08	1604
9546.74	1603.81	9570.64	1603.63	9578.04	1603.54	9588.5	1602.6	9589.66	1602.5
9590.4	1602.56	9604.39	1604.39	9615.17	1604.42	9628.69	1604.46	9659.63	1604.5
9677.35	1604.53	9682.87	1604.53	9698.13	1604.28	9709.85	1604.13	9720.63	1604.2
9744.55	1604.38	9746.92	1604.36	9819.82	1604.6	9839.32	1604.57	9843.89	1604.7
9851.55	1604.63	9862.68	1604.54	9875.2	1604.48	9877.47	1604.48	9884.05	1604.4
9912.65	1604.43	9927.31	1604.46	9943.89	1604.42	9946.06	1604.44	9973.71	1604.3
9983.4	1604.29	9984.53	1604.02	9994.89	1601.52	9997.39	1601.54	10009.36	1601.6
10014.27	1602.43	10016.47	1602.88	10026.34	1603.29	10046.72	1604.21	10065.88	1604
10075	1603.87	10082.61	1603.98	10095.68	1604.09	10103.83	1604.11	10115.58	1604.1
10118.17	1604.17	10134.81	1604.31	10165.71	1604.36	10227.15	1604.58	10246.47	1604.6
10265.27	1605.29	10271.62	1605.43	10288.08	1605.31	10292.15	1605.31	10300.5	1605.3
10321.52	1605.31	10347.51	1605.18	10353.26	1605.14	10368.58	1605.28	10391.66	1605.3
10397.25	1605.69	10411.27	1606.22	10421.24	1605.65	10429.35	1605.32	10437.32	1605.5
10445.51	1605.65	10452.06	1605.61	0462.67	1605.59	10467.75	1605.59		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5248.42	.068	7122.13	.15	8544.26	.1	9303.81	.068	9946.06	.045
10046.72	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9946.06	10046.72	320	336.06	320	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5248.42	5571.95	1605.15

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1604.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.113	0.045	0.068
W.S. Elev (ft)	1604.69	Reach Len. (ft)	320.00	336.06	320.00

Crit W.S. (ft)		Flow Area (sq ft)	4082.17	131.00	79.69
E.G. Slope (ft/ft)	0.010945	Area (sq ft)	4082.17	131.00	79.69
Q Total (cfs)	7577.00	Flow (cfs)	6941.31	537.75	97.94
Top Width (ft)	3859.58	Top Width (ft)	3556.75	100.66	202.17
Vel Total (ft/s)	1.77	Avg. Vel. (ft/s)	1.70	4.10	1.23
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)	1.15	1.30	0.39
Conv. Total (cfs)	72424.3	Conv. (cfs)	66348.1	5140.0	936.2
Length Wtd. (ft)	322.05	Wetted Per. (ft)	3558.23	101.13	202.17
Min Ch El (ft)	1601.52	Shear (lb/sq ft)	0.78	0.89	0.27
Alpha	1.24	Stream Power (lb/ft s)	1.33	3.63	0.33
Frctn Loss (ft)	2.85	Cum Volume (acre-ft)	800.41	18.01	67.00
C & E Loss (ft)	0.00	Cum SA (acres)	463.99	7.05	55.38

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5248.42	6422.83	101.09	96.20	297.88	1.33	0.32	1.05
6422.83	7597.24	4199.74	1905.04	1004.47	55.43	1.90	2.20
7597.24	8771.65	1558.42	1310.63	1112.55	20.57	1.18	1.19
8771.65	9946.06	1082.06	770.30	1143.33	14.28	0.67	1.40
LB 9946.06	RB 10046.72	537.75	131.00	101.13	7.10	1.30	4.10
10046.72	10467.75	97.94	79.69	202.17	1.29	0.39	1.23

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.793**

INPUT
Description: RM.2.793. HORZ. N VALUES USED. AREA TO LT. OF STA. 5350.41 BLOCKED OUT DUE TO RIDGE .

Station Elevation Data num= 374

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5011.3	1601	5109.26	1601.42	5127.7	1601.4	5163.69	1601.18	5231.86	1601.14
5245.82	1601.3	5272.65	1601.06	5287.85	1600.91	5298.86	1601.18	5327.97	1602.21
5336.56	1602.4	5346.48	1602.67	5347.89	1602.68	5350.41	1602.69	5419.33	1602.19
5470.98	1602.1	5490.08	1602.07	5508.23	1601.56	5554.34	1601.26	5556.83	1601.33
5570.91	1601.6	5591.56	1601.89	5635.46	1602.02	5712.13	1601.98	5808.89	1601.54
5842.62	1601.7	5855.49	1601.76	5879.6	1601.82	5923.63	1602.17	5953.29	1602.07
5995.67	1601.9	6058.58	1601.48	6067.29	1601.46	6072.69	1601.52	6093.55	1601.69
6113.32	1601.6	6117.78	1601.6	6121.35	1601.65	6149.35	1601.84	6153.77	1601.87
6177.05	1602.1	6196.42	1602.27	6209.12	1602.28	6228.94	1602.56	6279.99	1602.56
6288.86	1602.6	6290.82	1602.56	6292.03	1602.56	6308.41	1602.85	6311.57	1602.92
6348.87	1603.1	6390.69	1603.07	6395.99	1603.07	6409.3	1603.07	6410.45	1603.01
6412.56	1603	6418.43	1603	6423.77	1602.96	6430.3	1602.96	6434.1	1602.96
6436.83	1603	6441.26	1602.93	6442.26	1602.93	6445.16	1603	6470.5	1603.1
6540.65	1603.4	6553.14	1603.34	6564.23	1603.2	6571.99	1603.24	6588.24	1603.09
6589.61	1603.1	6600.9	1602.58	6610.16	1602.33	6615.01	1602.48	6638.25	1602.98

6656.96	1602.7	6715.94	1601.75	6719.25	1601.83	6722.51	1601.85	6729.1	1601.94
6731.81	1601.7	6738.8	1601.26	6740.68	1601.01	6745.29	1601.33	6745.72	1601.46
6757.09	1601.2	6770.61	1600.9	6797.32	1600.77	6878.15	1599.9	6913.59	1599.73
6914.98	1599.7	6930.61	1599.98	6979.95	1599.71	7004.27	1599.81	7005.06	1599.81
7039.97	1599.8	7071.3	1600.15	7077.18	1600.19	7078.22	1600.15	7080.05	1600.16
7081.67	1600.2	7099.02	1600.01	7108.49	1599.79	7130.77	1599.57	7147.33	1599.2
7151.19	1599.2	7154.32	1598.99	7157.22	1599.05	7163.47	1598.88	7179.88	1599.04
7200.59	1599.3	7205.62	1599.24	7212.37	1599.18	7229.31	1599.07	7241.99	1598.88
7256.41	1598.9	7291.33	1599.09	7292.04	1599.12	7292.82	1599.12	7315.17	1599.27
7330.44	1599.7	7343.06	1599.96	7390.77	1599.08	7393.63	1599.05	7394.02	1599.07
7411.93	1599.2	7426.27	1599.03	7492.65	1599.85	7513.14	1599.99	7514.58	1599.96
7519.24	1599.9	7557.44	1599.7	7600.72	1599.6	7605.94	1599.56	7630.8	1599.51
7631.22	1599.5	7633.72	1599.54	7635.37	1599.55	7657.9	1599.76	7665.57	1599.75
7716.98	1599.9	7718.01	1599.92	7736.11	1599.96	7796.11	1599.48	7804.77	1599.38
7808.61	1599.4	7835.33	1600.07	7838.19	1600.09	7843.8	1600.1	7873.75	1600
7874.98	1600	7880.27	1600.04	7938.61	1600.38	7951.37	1600.28	7968.21	1600.31
8010.16	1600.1	8034.76	1600.11	8059.61	1600.37	8066.1	1600.39	8076.44	1600.41
8092.57	1600.5	8119.11	1600.59	8163.66	1600.72	8172.54	1600.71	8226.94	1600.62
8233.68	1600.6	8266	1601.1	8275.22	1600.96	8298.38	1600.5	8337.61	1600.69
8362.92	1600.8	8375.47	1600.74	8393.28	1600.66	8491.1	1600.24	8496.83	1600.26
8502.89	1600.2	8516.53	1600.4	8534.45	1600.64	8574.6	1600.56	8605.95	1600.52
8627.92	1600.6	8653.93	1600.59	8701.23	1600.51	8702.35	1600.5	8711.36	1600.47
8724	1600.6	8727.19	1600.57	8733.04	1600.55	8740.02	1600.57	8741.41	1600.59
8748.01	1600.6	8750.5	1600.58	8759.54	1600.6	8762.48	1600.55	8767.45	1600.54
8770.32	1600.5	8781.4	1600.23	8783.81	1600.21	8788.77	1599.87	8800.21	1599.97
8802.29	1600.1	8808.93	1600.32	8811.6	1600.26	8815.88	1600.11	8826.43	1599.84
8835.9	1599.7	8845.66	1599.81	8857.19	1599.81	8868.37	1599.79	8875.76	1599.83
8877.69	1599.9	8882.19	1599.99	8893.36	1600.12	8894.69	1600.13	8904.77	1600.24
8911.7	1600.4	8947.6	1601.08	8953.03	1601.04	8960.16	1601.15	8971.4	1601.06
8987.54	1600.8	8996.71	1600.62	9002.77	1600.55	9011.28	1600.55	9016.37	1600.57
9037.15	1600.3	9038.37	1600.27	9054.97	1600.49	9058.79	1600.46	9065.86	1600.48
9072.16	1600.5	9085.66	1600.53	9100.28	1600.66	9100.33	1600.66	9100.39	1600.66
9100.41	1600.7	9109.37	1600.85	9130.24	1601.01	9141.47	1601.07	9153.11	1600.9
9156.91	1600.9	9208	1601.63	9230.24	1601.65	9236.15	1602.32	9238.4	1602.37
9242.93	1602.3	9245.1	1602.14	9248.5	1602.19	9259.21	1602.2	9286.46	1602.18
9304.14	1602.2	9312.93	1602.29	9315.41	1602.31	9345.64	1601.99	9348.15	1601.96
9350.27	1601.9	9351.33	1601.77	9356.33	1601.33	9365.17	1601.09	9372.91	1600.88
9378.66	1600.9	9388.71	1600.88	9394.6	1600.94	9403.61	1600.7	9406.3	1600.32
9414.85	1600.4	9426.7	1600.55	9449.92	1600.63	9458.15	1600.66	9463.5	1600.61
9475.15	1600.5	9481.36	1600.99	9486.88	1601.18	9493.87	1601.37	9505.53	1601.21
9529.94	1600.5	9542.97	1600.48	9546.3	1600.54	9548.5	1600.54	9567.45	1600.69
9583.14	1600.7	9608.39	1600.87	9635.88	1600.68	9651	1600.63	9657.1	1600.67
9680.27	1600.6	9690.41	1600.57	9700.73	1600.54	9714.58	1600.35	9723.52	1600.29
9726.03	1600.3	9733.8	1600.27	9775.6	1600.45	9795.55	1600.62	9808.4	1600.91
9814.53	1601	9817.04	1601.16	9824.29	1601.06	9828.4	1601.02	9835.16	1601.01
9853	1601.2	9869.04	1601.23	9883.28	1601.46	9887.33	1601.51	9889.69	1601.5
9897.28	1601.5	9906.04	1601.36	9921.81	1601.15	9925.03	1600.85	9929.83	1600.01
9940.3	1599.8	9948.53	1599.55	9956.16	1599.35	9963.23	1599.15	9965.88	1599.11
9967.54	1599.1	9969.18	1599.06	9971.62	1599.27	9988.94	1599.05	10009.57	1598.87
10023.77	1598.9	10024.51	1598.87	10024.74	1598.87	10025.15	1598.91	10025.81	1598.92
10037.29	1599	10039.61	1599.17	10041.91	1599.47	10062.81	1601.03	10070.68	1601.59
10078.93	1601.4	10101.3	1600.86	10105.49	1600.72	10110.42	1600.65	10116.13	1600.91
10124.34	1601.3	10147.02	1601.29	10153.71	1601.3	10155.7	1601.92	10157.84	1602.46
10159.07	1600.8	10162.38	1598.11	10165.15	1598.11	10166.51	1598.81	10171.03	1601.56
10173.2	1601.2	10175.01	1601.41	10178.13	1601.31	10179.08	1601.51	10184.09	1601.05
10185	1600.7	10235.54	1601.13	10241.41	1601.17	10307.41	1600.97	10310.49	1600.96
10315.77	160	110315.98	1601.02	10316.2	1601.01	10316.53	1601.02	10317.75	1601.04

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10348.24  1601.710354.09 1601.3810372.41 1601.3410386.48 1601.3410400.16 1601.27
10431.78  1601.310432.27  1601.310432.67 1601.3110434.24  1601.310435.94 1601.51
10447.27  1602.710454.14 1602.7410463.75 1602.6210464.22 1602.75

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
  5011.3    .068 5591.56     .15 8882.19      .1 9948.53    .04510041.91    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9948.5310041.91              380     384     440              .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
  5011.3 5350.41 1602.69

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1601.90   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.11   Wt. n-Val.                 0.139      0.045      0.068
  W.S. Elev (ft)            1601.79   Reach Len. (ft)           380.00     384.00     440.00
  Crit W.S. (ft)                      Flow Area (sq ft)        4715.19     253.72     283.31
  E.G. Slope (ft/ft)        0.007330  Area (sq ft)             4715.19     253.72     283.31
  Q Total (cfs)             7577.00   Flow (cfs)               5756.26    1396.15     424.59
  Top Width (ft)            3917.27   Top Width (ft)           3430.24      93.38     393.64
  Vel Total (ft/s)             1.44   Avg. Vel. (ft/s)            1.22       5.50       1.50
  Max Chl Dpth (ft)            3.68   Hydr. Depth (ft)            1.37       2.72       0.72
  Conv. Total (cfs)         88502.6   Conv. (cfs)              67235.6    16307.7     4959.4
  Length Wtd. (ft)           388.96   Wetted Per. (ft)         3430.73      93.43     396.41
  Min Ch El (ft)            1598.87   Shear (lb/sq ft)            0.63       1.24       0.33
  Alpha                        3.29   Stream Power (lb/ft s)      0.77       6.84       0.49
  Frctn Loss (ft)              4.02   Cum Volume (acre-ft)      768.09      16.52      65.67
  C & E Loss (ft)              0.02   Cum SA (acres)            438.32       6.30      53.19

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)            (cfs)    (sq ft)      (ft)                  (ft)     (ft/s)
  5011.30       6245.61         29.42      60.38    328.05       0.39       0.18       0.49
  6245.61       7479.92       2093.49    1542.67    753.41      27.63       2.05       1.36
  7479.92       8714.22       2093.46    1879.45   1234.34      27.63       1.52       1.11
  8714.22       9948.53       1539.90    1232.68   1114.92      20.32       1.11       1.25
  LB 9948.53    RB 10041.91   1396.15     253.72     93.43      18.43       2.72       5.50
  10041.91      10464.22       424.59     283.31    396.41       5.60       0.72       1.50

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.720**

INPUT
Description: RM.2.720. HORZ. N VALUES USED. AREA BLOCKED OUT TO RT. OF STA. 10434.6 DUE TO RIDGE.

Station Elevation Data num= 457

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4895.17	1598	4948.42	1598.54	4955.14	1598.61	5036.32	1598.18	5068.25	1597.96
5073.77	1598	5126.14	1597.38	5189.65	1597.04	5223.8	1596.74	5231.69	1596.86
5252.45	1597.3	5254.34	1597.31	5254.86	1597.36	5264.23	1598.05	5274.24	1596.78
5277.1	1596.3	5288.21	1599.11	5293.83	1600.64	5299.08	1599.98	5307.48	1599.33
5310.66	1598.5	5327.64	1598.53	5419.86	1598.16	5435.59	1598.13	5443.07	1598.16
5449.71	1598	5453.73	1597.98	5477.47	1598.21	5497.73	1598.51	5534.46	1598.66
5536.78	1598.5	5547.78	1597.6	5552.96	1597.56	5555.86	1597.51	5596.66	1597.33
5651.28	1597.2	5653.42	1597.33	5674.09	1597.48	5732.1	1597.78	5765.17	1597.68
5805.42	1597.4	5876.03	1597.57	5878.6	1597.6	5879.37	1597.6	5880.71	1597.62
5885.82	1597.7	5942.58	1598.32	5949.82	1597.74	5957.21	1597.45	5975.37	1597.09
5977.32	1597.6	5979.75	1597.57	5989.3	1598.17	5989.63	1598.22	5992.96	1598.49
6027.26	1598.5	6027.71	1598.5	6042.23	1598.19	6053.66	1598.35	6088.55	1598.28
6099.9	1598.5	6115.62	1598.81	6150.65	1597.78	6170.19	1597.33	6174.07	1597.24
6178.32	1597.3	6204.98	1597.84	6208.63	1597.89	6221.83	1597.66	6240.3	1597.71
6241.39	1597.7	6252.91	1597.46	6257.1	1597.53	6280.84	1597.56	6338.27	1598.04
6349.97	1597.9	6362.83	1597.71	6372.62	1597.7	6418.88	1597.07	6457.82	1596.9
6495.55	1596.6	6500.83	1596.5	6512.79	1596.55	6521.28	1596.49	6571.1	1595.91
6587.99	1595.7	6594.34	1595.74	6596.61	1595.72	6610.97	1595.68	6632.54	1595.87
6661.37	1596	6682.45	1595.97	6701.75	1595.97	6724.33	1596.12	6725	1596.12
6726.67	1596.1	6726.67	1596.12	6773.39	1596.88	6787.57	1597.24	6822.48	1597.76
6838.27	1597.8	6839.29	1597.77	6858.72	1597.9	6865.4	1597	6869.01	1596.9
6871.81	1596.7	6875.12	1596.8	6886.18	1596.9	6896.89	1596.96	6924.18	1597.3
6933.47	1597.8	6942.63	1598.16	6943.33	1598.13	6949.54	1598.07	6964.66	1597.69
6979.53	1597.6	6997.68	1597.69	7023.16	1597.87	7024.81	1597.86	7074.13	1597.9
7075.46	1597.9	7075.85	1597.92	7081.31	1597.9	7086.55	1597.6	7091.17	1597.29
7095.55	1596.6	7102.32	1596.56	7110.54	1596.08	7115.65	1595.74	7126.71	1596.1
7142.64	1596.3	7143.87	1596.3	7149.93	1596.3	7165.09	1596.51	7218.21	1596.54
7231.44	1596.2	7236.15	1596.43	7240.47	1596.28	7248.36	1594.92	7251.79	1595.22
7252.2	1595.2	7252.59	1595.15	7256.65	1595.2	7261.92	1595.15	7266.99	1595.17
7278.02	1595.2	7286.7	1595.29	7316.36	1595.82	7327.04	1595.97	7333.53	1595.74
7334.97	1595.7	7370.95	1595.82	7388.58	1595.87	7411.6	1595.91	7430.82	1595.9
7460.82	1596.3	7499.52	1595.9	7520.46	1595.93	7545.41	1595.84	7546.86	1595.85
7549.78	1595.8	7574.22	1595.97	7600.6	1596.01	7610.8	1596.04	7630.57	1595.91
7641.39	1595.8	7673.95	1595.66	7687.16	1595.61	7706.05	1595.62	7728.35	1595.4
7736.51	1595.5	7760.23	1595.88	7765.9	1596	7781.44	1596.03	7810.73	1596.02
7818.22	1596.1	7855.55	1596.11	7873.24	1596.12	7893.5	1596.25	7921.1	1596.38
7954.18	1596.4	7969.92	1596.45	7998.13	1596.51	8003.18	1596.56	8007.28	1596.59
8013.28	1596.6	8059.28	1596.76	8073.69	1596.76	8085.32	1596.84	8090.83	1596.84
8093.58	1596.8	8099.68	1596.74	8104.77	1596.67	8110.44	1596.66	8113.63	1596.7
8118.42	1596.8	8124.7	1596.92	8129.84	1596.84	8134.77	1596.7	8167.62	1596.53
8196.13	1596.3	8209.56	1596.38	8211.37	1596.33	8235.77	1596.31	8242.34	1596.32
8247.73	1596.3	8296.54	1596.32	8318.98	1596.34	8321.6	1596.34	8331.14	1596.36
8425.11	1596.5	8444.73	1596.94	8453.32	1597.13	8454.76	1597.11	8456.31	1597.16
8505.15	1596.6	8547.96	1596.6	8549.83	1596.64	8573.98	1596.71	8576.79	1596.74
8582.71	1596.7	8668.69	1597.03	8681.73	1597.07	8681.8	1597.07	8681.89	1597.07
8683.43	1597.1	8722.01	1596.94	8735.05	1596.87	8739.01	1596.8	8744.94	1596.93
8748.71	1596.9	8752.02	1596.76	8752.15	1596.74	8753.84	1596.72	8754.6	1596.71

8757.85	1596.8	8786.97	1597.53	8803.38	1597.67	8823.31	1597.41	8836.83	1597.3
8840.22	1597.2	8842.51	1597.23	8855.53	1597.02	8855.64	1597.02	8855.74	1597.02
8855.81	1597	8860.54	1597.1	8862.12	1597.09	8863.23	1597.07	8863.97	1597.02
8869.12	1596.6	8885.53	1596.85	8902.9	1596.92	8910.69	1596.98	8918.83	1596.96
8933.53	1597.3	8937.83	1597.3	8951.89	1597.69	8966.4	1597.39	8982.16	1597.71
8986.66	1597.7	8994.48	1597.69	9021.32	1597.28	9040.44	1596.99	9041.81	1596.98
9042.53	1597	9043.24	1596.99	9044.06	1596.98	9045.6	1596.99	9046.05	1597
9051.77	1597.3	9068.48	1597.28	9072.23	1597.32	9105.47	1597.09	9137.31	1596.95
9137.38	1597	9137.42	1596.95	9167.78	1597.18	9169.18	1597.32	9197.8	1597.51
9208.26	1597.4	9213.24	1597.61	9221.06	1597.66	9227.45	1597.69	9247.32	1597.74
9258.96	1597.8	9263.18	1597.74	9264.44	1597.75	9274.78	1597.43	9283.23	1597.19
9290.37	1597.3	9293.59	1597.27	9295.68	1597.39	9312.95	1597.64	9325.21	1597.82
9327.29	1597.9	9330.68	1597.4	9334.74	1597.38	9336.07	1597.62	9340.17	1597.9
9343.48	1597.9	9349.55	1597.76	9369.37	1597.99	9378.7	1597.98	9386.71	1597.79
9396.33	1597.6	9405.91	1597.74	9415.81	1597.68	9461.68	1597.9	9469.92	1597.74
9478.66	1597.8	9483.59	1597.8	9510.14	1597.75	9516.53	1597.76	9531.29	1598.12
9540.04	1597.8	9544.35	1597.8	9556.08	1598.06	9570.95	1598.29	9576.38	1597.37
9581.11	1596.6	9585.54	1597.01	9589.09	1597.52	9606.26	1597.43	9618.85	1597.28
9624.16	1597.7	9625.3	1597.73	9628.93	1597.55	9633.25	1597.2	9637.08	1597.01
9644.29	1596.6	9651.95	1596.42	9655.59	1596.54	9681.68	1596.12	9683.67	1596.11
9684.18	1596.1	9690.26	1596.09	9690.29	1596.09	9698.27	1596.83	9699.46	1596.86
9707.7	1596.9	9713.23	1597.13	9748.84	1597.26	9751.65	1597.26	9760.41	1597.26
9793.56	1597.3	9805.79	1597.35	9815.16	1597.35	9826.08	1597.43	9830.79	1597.4
9844.8	1597.4	9868.21	1597.1	9872.78	1597.08	9876.61	1597.05	9881.63	1596.81
9883.8	1596.8	9901.85	1596.85	9906.3	1597.06	9908.23	1597.18	9913.47	1597.1
9918.96	1597	9931.65	1596.88	9943.44	1597.23	9952.14	1597.44	9964.54	1597.32
9981.01	1597	9993.56	1594.1	9999	1592.82	10000.73	1592.89	10021.37	1593.49
10022.5	1593.71	0032.74	1595.38	10040.06	1594.82	10042.28	1594.79	10043.71	1594.3
10045.56	1594.71	0056.67	1596.84	10059.72	1596.57	10067.69	1596.66	10069.96	1596.64
10079.32	1596.71	0092.31	1597.48	10093.43	1597.59	10094.96	1596.93	10097.81	1595.86
10098.71	1595.31	0099.38	1595.26	10105.23	159	310112.27	1594.64	10120.07	1596.01
10122.39	1596.41	0125.87	1597.31	0129.34	1597.65	10154.27	1596.37	10185.51	1596.02
10188.94	159	610193.15	1595.87	10197.03	1595.88	10262.27	1595.84	10302.23	1595.79
10305.02	1596.51	0305.17	1596.51	10308.75	1594.76	10309.96	1594.72	10311.87	1595.03
10316.17	1597.11	0317.97	1596.49	10319.1	1595.73	10320.12	1595.68	10342.37	1595.88
10348.16	1595.91	0349.29	1595.93	10350.05	1596.01	10357.08	1596.47	10360.66	1596.26
10370.09	1596.41	0375.48	1596.51	10394.82	1597.06	10417.11	1597.59	10420.57	1597.66
10426.65	1597.81	0431.92	1598.74	10434.56	1599.17	10435.59	1598.93	10438.48	1598.41
10445.5	1597.21	0455.87	1597.01	10457.46	1597.01	10459.77	1596.99	10471.6	1596.05
10475.01	1595.71	0481.54	1596.12	10484.65	1596.39	10507.33	1596.43	10525.93	1596.43
10534.65	1596.41	0577.26	1596.76	10614.27	1596.78	10621.8	1596.81	10629.34	1596.82
10649.35	1596.81	0655.29	1596.81	0667.37	1596.83	10712.21	1597.03	10751.44	1597.14
10794.74	159	710822.43	1596.78	10823.54	1596.77	10840.22	1596.97	10894.82	1597.55
10902.85	1597.61	0919.99	1597.83	10927.06	1597.89	10930.65	1597.92	10948.56	1598.31
10953.73	1598.31	0956.68	1598.29						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4895.17	.068	6150.65	.15	8668.69	.1	9655.59	.068	9981.01	.045
10056.67	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9981.01	10056.67	380	410.52	380	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10434.61	0956.68	1599.17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1597.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.140	0.045	0.068
W.S. Elev (ft)	1597.51	Reach Len. (ft)	380.00	410.52	380.00
Crit W.S. (ft)		Flow Area (sq ft)	2909.95	231.34	475.58
E.G. Slope (ft/ft)	0.015349	Area (sq ft)	2909.95	231.34	475.58
Q Total (cfs)	7577.00	Flow (cfs)	3985.73	1976.45	1614.82
Top Width (ft)	3780.08	Top Width (ft)	3352.60	75.66	351.82
Vel Total (ft/s)	2.09	Avg. Vel. (ft/s)	1.37	8.54	3.40
Max Chl Dpth (ft)	4.69	Hydr. Depth (ft)	0.87	3.06	1.35
Conv. Total (cfs)	61159.2	Conv. (cfs)	32171.5	15953.3	13034.3
Length Wtd. (ft)	385.93	Wetted Per. (ft)	3353.71	76.66	354.62
Min Ch El (ft)	1592.82	Shear (lb/sq ft)	0.83	2.89	1.29
Alpha	5.12	Stream Power (lb/ft s)	1.14	24.71	4.36
Frctn Loss (ft)	3.97	Cum Volume (acre-ft)	734.84	14.39	61.84
C & E Loss (ft)	0.07	Cum SA (acres)	408.74	5.56	49.43

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4895.17	6166.63	101.11	91.42	364.57	1.33	0.25	1.11
6166.63	7438.09	1435.57	1021.73	863.03	18.95	1.18	1.41
7438.09	8709.55	2034.28	1461.23	1271.50	26.85	1.15	1.39
8709.55	9981.01	414.77	335.57	854.62	5.47	0.39	1.24
LB 9981.01	RB 10056.67	1976.45	231.34	76.66	26.08	3.06	8.54
10056.67	10956.68	1614.82	475.58	354.62	21.31	1.35	3.40

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.643

INPUT
Description: RM. 2.643. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.4941.83

Station Elevation Data num= 442

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4784.71	1593.6	4786.79	1593.45	4797.34	1594.52	4818.03	1595.14	4821.33	1595.26
4844.11	1595.2	4847.46	1595.22	4852.12	1595.23	4872.45	1595.28	4887.13	1595.23
4895.74	1595.2	4908.09	1595.25	4931.32	1595.41	4937.95	1595.43	4939.43	1595.43

4940.35	1595.4	4941.83	1595.43	4951.45	1595.37	4955.79	1593.64	4958.76	1592.05
4970.47	1592.1	4975.05	1592.17	4982.33	1592.2	4996.02	1594.11	4996.59	1594.23
4996.6	1594.2	4996.97	1594.22	5019.52	1593.82	5037.37	1593.59	5043.7	1593.44
5057.34	1593.7	5058.32	1593.67	5058.68	1593.66	5058.97	1593.65	5059.38	1593.62
5060.19	1593.6	5072.64	1593	5084.54	1593.84	5087.92	1594.13	5095.34	1594.84
5101.01	1594.6	5108.47	1594.39	5118.94	1594.37	5142.87	1594.25	5158.14	1594.18
5205.67	1594.1	5244.07	1594.27	5289.53	1594.29	5357.82	1594.39	5415.48	1594.14
5451.85	1594	5471.56	1593.93	5517.98	1593.42	5573.86	1593.06	5578.11	1593.07
5585.79	1593	5591.68	1593.51	5593.84	1593.67	5594.17	1593.69	5644.61	1593.81
5668.07	1593.8	5678.94	1592.46	5679.49	1592.41	5689.18	1593.04	5690.57	1593.11
5691.29	1593.2	5692.43	1593.3	5693.2	1593.27	5740.74	1593.49	5779.39	1593.68
5780.45	1593.7	5781.21	1593.7	5781.49	1593.71	5781.63	1593.71	5782.1	1593.72
5785.93	1593.9	5801.55	1594.45	5806.06	1594.41	5817.42	1593.76	5818.31	1594.3
5819.24	1594.2	5833.68	1593.52	5835.95	1593.56	5836.77	1593.56	5840.16	1593.55
5871.75	1593.6	5893.55	1593.68	5901.3	1593.69	5949.29	1593.5	5953.52	1593.6
5957.1	1593.7	5960.58	1593.7	5963.82	1593.69	5984.98	1593.99	6002.13	1593.94
6017.51	1593.9	6043.54	1593.9	6056.2	1594.12	6059.92	1593.94	6061.11	1593.83
6089.97	1593.7	6092.03	1593.72	6094.02	1593.76	6106.33	1593.89	6110.69	1593.87
6114.23	1594	6114.76	1593.97	6178.71	1593.46	6179.45	1593.47	6179.83	1593.47
6180.42	1593.5	6181.75	1593.5	6181.86	1593.49	6231.53	1593.73	6232.02	1593.7
6256.43	1592.9	6258.41	1592.92	6265.31	1592.83	6301.74	1593.05	6322.42	1593.19
6352.71	1593.6	6422.81	1594.86	6479.21	1596.03	6484.8	1596.01	6530.08	1595.43
6540.34	1595.3	6541.94	1595.32	6543.89	1595.26	6545.4	1595.22	6546.88	1595.18
6559.54	1594.9	6642.91	1593.25	6670.31	1592.54	6696.92	1592.2	6697.4	1592.24
6699.51	1592.2	6700.41	1592.14	6724.83	1591.7	6741.09	1591.33	6772.29	1590.65
6782.98	1590.4	6802.95	1590.03	6811.66	1589.89	6835.08	1590.16	6862.16	1590.41
6883.15	1590.6	6897.08	1590.94	6899.21	1590.7	6918.19	1590.88	6978.5	1591.37
7028.17	1591.9	7035.7	1591.96	7062.25	1591.97	7113.95	1592.19	7149.24	1592.36
7185.92	1592.7	7239.66	1592.82	7262.58	1592.93	7265.13	1592.96	7273.52	1593.04
7289.6	1593.1	7339.02	1593.23	7361.29	1593.65	7372.51	1593.85	7373.14	1593.86
7375.99	1593.1	7390.3	1589.28	7391.23	1589.27	7392.97	1589.25	7401	1589.15
7402.18	1589.2	7402.88	1589.08	7404.48	1589.27	7411.09	1593.79	7451.31	1593.69
7460.34	1593.5	7460.81	1593.53	7461.25	1593.52	7461.63	1593.53	7463.33	1593.52
7524.81	1593.5	7531.24	1593.52	7552.34	1592.13	7561.15	1591.48	7577.82	1593.5
7579.21	1593.7	7579.95	1593.73	7581.38	1593.87	7581.4	1593.87	7581.8	1593.85
7585.34	1593.8	7602.56	1593.59	7605.5	1593.67	7625.25	1593.78	7642	1593.9
7657.25	1593.8	7659.26	1593.64	7660.21	1593.6	7678.86	1593.3	7707.83	1593.24
7715.25	1592.1	7716.14	1591.98	7720.38	1591.58	7722.62	1591.42	7723.7	1591.38
7730.03	1590.9	7734.12	1590.61	7737.48	1590.35	7745.88	1591.09	7755.08	1591.92
7759.97	1591.9	7765.52	1591.95	7767.25	1591.96	7795.97	1592.19	7805.54	1592.24
7833.54	1592.4	7882.4	1592.43	7974.1	1592.34	7978.23	1592.33	7998.74	1592.36
8054.54	1592	8063.46	1591.95	8075.56	1591.86	8101.18	1591.7	8105.03	1591.73
8105.99	1591.7	8108.99	1591.75	8117.93	1591.98	8123.49	1591.99	8128.49	1591.84
8135.14	1591.8	8141.93	1591.76	8165.1	1591.74	8218.49	1591.96	8221.99	1592.01
8255.87	1591.9	8256.68	1591.87	8257.14	1591.87	8259.46	1591.88	8409.22	1592.5
8440.58	1592.4	8451	1592.68	8456.81	1592.88	8461.34	1592.97	8506.44	1592.88
8525.58	1593.1	8553.14	1593.47	8616.39	1593.14	8626.56	1593.14	8628.75	1593.39
8632.52	1593.3	8638.49	1593.31	8654.54	1592.55	8660.25	1592.39	8677.92	1592.77
8692.19	1592.9	8699.69	1592.99	8727.76	1593.1	8752.54	1592.99	8785.61	1593.04
8822.09	1593.1	8832.57	1593.1	8836.66	1593.07	8843.1	1593.09	8844.61	1593.08
8874.85	1592.6	8882.54	1592.5	8891.16	1592.53	8894.49	1592.55	8908.69	1592.56
8919.51	1592.6	8924.47	1592.63	8931.73	1592.48	8932.41	1592.5	8932.58	1592.51
8932.93	1592.5	8942.14	1593.01	8944.55	1592.93	8951.15	1592.64	8960.09	1592.55
8971.66	1592.4	8981.65	1592.36	8990.91	1592.38	8991.19	1592.5	8992.41	1592.49
8997.76	1592.6	9001.68	1592.51	9019.66	1592.46	9058.05	1592.52	9061.34	1592.57
9076.99	1592.8	9079.55	1592.83	9109.36	1593.09	9124.16	1593.03	9128.19	1592.98
9137.29	1592.8	9144.36	1592.74	9154.69	1592.83	9167.04	1592.49	9168.59	1592.46

9174.1	1592.5	9179.81	1592.48	9184.73	1592.57	9193.2	1592.58	9194.11	1592.71
9215.29	1593.2	9230.35	1593.69	9236.49	1593.7	9254.6	1594.1	9259.31	1594.19
9261.8	1594.2	9263.68	1594.13	9289.32	1593.85	9303.01	1593.95	9303.83	1593.99
9319.31	1593.9	9321.42	1594.25	9329.25	1594.28	9347.7	1594.26	9363.57	1594.24
9376.78	1595.8	9379.37	1596.64	9390.92	1594.94	9391.3	1594.88	9395.73	1594.61
9398.1	1594.3	9405.64	1594.29	9417.27	1594.44	9431.74	1594.36	9436.97	1594.18
9445.33	1594	9458.88	1593.95	9467.34	1593.94	9493.05	1593.74	9519.26	1593.63
9522.83	1593.6	9533.78	1593.49	9539.68	1593.51	9539.99	1593.57	9540.26	1593.7
9540.28	1593.7	9542.72	1593.82	9546.59	1593.95	9554.94	1593.83	9565.44	1594.09
9570.02	1594.1	9585.82	1593.93	9594.41	1593.82	9607.71	1593.84	9619.56	1593.9
9622.2	1593.8	9634.09	1593.77	9641.14	1593.78	9659.74	1594.07	9661.94	1594.01
9669.34	1593.9	9681.11	1593.8	9701.82	1593.38	9705.21	1593.28	9706.35	1593.26
9713.6	1593	9720.13	1592.86	9721.94	1592.79	9721.97	1592.78	9722.98	1592.75
9723.03	1592.6	9729.77	1592.58	9739.14	1592.72	9768.94	1592.82	9775.58	1592.64
9779.39	1592.7	9783.16	1592.72	9784.8	1592.7	9789.84	1592.62	9807.9	1592.38
9815.32	1592.4	9834.62	1592.79	9855.52	1592.96	9857.58	1592.81	9862.46	1592.42
9864.77	1592.2	9870.31	1592.33	9890.52	1593.01	9901.98	1592.98	9906.02	1592.95
9920.8	1592.7	9938.31	1592.68	9938.69	1592.68	9938.99	1592.73	9939.63	1592.68
9940.1	1592.7	9950.96	1592.72	9978.16	1592.84	9978.84	1592.82	9985.02	1593.39
9985.51	1593.4	9985.6	1593.41	9997.7	1589.81	10001.9	1589.78	10008.41	1589.64
10024.19	1590	10029.51	1590.16	10038.85	1593.36	10039.74	1593.51	10041.45	1593.54
10046.4	1593.7	10061.26	1592.19	10062.31	1592.06	10079.72	1593.53	10082.39	1593.89
10099.4	1592.2	10103.81	1591.6	10138.73	1591.91	10140.27	1591.96	10140.43	1591.96
10173.76	1592.3	10188.38	1592.28	10211.21	1592.33	10218.97	1592.45	10238.67	1592.49
10256.16	1592.4	10271.67	1592.46	10275.64	1591.91	10281.75	1591.04	10294.01	1591.66
10294.93	1591.7	10297.21	1591.71	10301.98	1591.72	10354.91	1591.87	10368.39	1591.88
10397.14	1591.8	10443.32	1592.18	10455.44	1592.38	10479.6	1592.59	10488.98	1592.69
10544.73	1592.9	10552.79	1592.9	10553.78	1592.9	10554.2	1592.91	10554.79	1592.91
10588.37	1592.9	10596.3	1592.89						

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4784.71	.15	5037.37	.068	5871.75	.15	8259.46	.1	9329.25	.15
9789.84	.068	9985.51	.045	10041.45	.068				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.51	10041.45	400	468.72	400	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
4784.71	4941.83	1595.43

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1593.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.130	0.045	0.068
W.S. Elev (ft)	1593.71	Reach Len. (ft)	400.00	468.72	400.00
Crit W.S. (ft)		Flow Area (sq ft)	3890.97	167.30	775.08
E.G. Slope (ft/ft)	0.007473	Area (sq ft)	3890.97	167.30	775.08
Q Total (cfs)	7577.00	Flow (cfs)	4745.75	978.80	1852.46
Top Width (ft)	4122.63	Top Width (ft)	3515.01	55.94	551.68
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.22	5.85	2.39
Max Chl Dpth (ft)	4.63	Hydr. Depth (ft)	1.11	2.99	1.40
Conv. Total (cfs)	87650.4	Conv. (cfs)	54898.6	11322.7	21429.1
Length Wtd. (ft)	407.06	Wetted Per. (ft)	3518.66	57.02	552.90
Min Ch El (ft)	1589.64	Shear (lb/sq ft)	0.52	1.37	0.65
Alpha	2.75	Stream Power (lb/ft s)	0.63	8.01	1.56

Frctn Loss (ft)	3.30	Cum Volume (acre-ft)	705.17	12.51	56.38
C & E Loss (ft)	0.01	Cum SA (acres)	378.78	4.93	45.49

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4784.71	6084.91	137.09	154.30	451.07	1.81	0.34	0.89
6084.91	7385.11	1689.34	1429.60	965.91	22.30	1.48	1.18
7385.11	8685.31	1849.98	1532.45	1209.99	24.42	1.27	1.21
8685.31	9985.51	1069.34	774.62	891.70	14.11	0.87	1.38
LB 9985.51	RB 10041.45	978.80	167.30	57.02	12.92	2.99	5.85
10041.45	10596.30	1852.46	775.08	552.90	24.45	1.40	2.39

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.554

INPUT
Description: RM. 2.554. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA.5045.46.

Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4444.79	1591.7	4454.3	1591.65	4478.65	1591.63	4489.69	1591.11	4492.88	1591.01
4504.26	1590.4	4509.49	1590.46	4532.72	1590.58	4535.85	1590.65	4541.63	1590.8
4547.67	1590.9	4556.23	1591.03	4561.4	1591.03	4631.71	1591.21	4649.85	1591.26
4651.02	1591.3	4652.06	1591.27	4653.53	1591.27	4656.27	1591.25	4696.01	1590.89
4697.24	1590.8	4705.55	1590.44	4708.14	1590.4	4715	1590.11	4721.5	1590.22
4743.17	1590.5	4759.88	1591.14	4762.35	1591.18	4766.23	1591.15	4769.2	1591.14
4823.71	1590.9	4870.64	1590.7	4872.8	1590.7	4873.67	1590.7	4874.97	1590.7
4879.09	1590.7	4897.77	1590.57	4904.11	1590.33	4925.76	1589.86	4948.36	1589.89
4953.84	1589.9	4958.95	1590.01	4960.32	1590.07	4967.18	1590.23	4977.86	1590.48
5000.99	1590.5	5021.62	1590.67	5030.41	1590.68	5044.65	1590.72	5045.46	1590.72
5046.79	1590.7	5047.02	1590.4	5048.39	1589.04	5056.07	1588.61	5060.73	1588.18
5061.72	1588.4	5071.8	1590.72	5075.38	1590.4	5094.28	1589.46	5101.12	1589.91
5101.31	1589.9	5140.44	1589.77	5142.44	1589.77	5185.09	1589.83	5197.16	1590.89
5202.03	1591.2	5203.84	1591.27	5221.67	1591.47	5224.59	1591.04	5235.1	1589.84
5242.62	1589.9	5248.13	1589.89	5269.01	1590.02	5288.26	1590.1	5312.98	1590.18
5327.8	1590.2	5354.24	1590.32	5362.24	1589.94	5379.11	1589.14	5379.97	1589.08
5380.61	1589	5381	1589.02	5382.29	1588.98	5386.64	1589.04	5421.71	1589.36
5435.49	1589.9	5445.04	1590.19	5455.55	1590.08	5459.12	1590.16	5467.63	1590.61
5477.32	1590.9	5489.7	1590.97	5494.03	1591.01	5497.95	1590.94	5507.27	1591.01
5532.07	1591	5544.07	1591.01	5558.68	1590.72	5577.94	1590.47	5583.9	1590.44
5593.3	1590.4	5615.19	1590.35	5621.23	1590.31	5651.25	1589.97	5653.5	1589.91
5665.21	1589.7	5686.25	1589	5708	1588.88	5740.14	1588.98	5749.61	1589.31

5753.77	1589.4	5756.31	1589.43	5762.88	1589.67	5772.43	1590.18	5782.2	1590.21
5782.9	1590.2	5824.22	1589.91	5826.73	1589.93	5831.06	1590.01	5839.41	1590.1
5865.55	1589.9	5893.29	1589.94	5910.26	1589.85	5914.46	1589.83	5923.41	1589.92
5931.07	1590.2	5953.71	1590.31	5958.23	1590.36	5961.58	1590.4	5964.06	1590.42
5970.79	1590.4	6053.16	1590.16	6070.28	1590.21	6074.52	1590.01	6076.58	1589.87
6089.23	1589.1	6089.58	1589.1	6092.42	1589	6095.03	1588.74	6100.1	1588.34
6132.67	1588.2	6142.16	1588.28	6148.31	1588.49	6168.56	1588.77	6174.47	1588.51
6190.95	1588.4	6212.31	1588.51	6229.27	1588.5	6316.9	1589.82	6320.42	1589.89
6322.38	1589.9	6322.48	1589.87	6332.62	1589.87	6335.91	1589.87	6343.49	1589.95
6349.57	1590	6362.31	1590.02	6433.15	1590.11	6445.39	1590.05	6449.45	1590.11
6475.94	1590.5	6481.58	1590.55	6525.41	1591.07	6530.35	1591.06	6544.25	1590.96
6567.91	1590.6	6663	1591.72	6690.45	1591.86	6750.81	1591.13	6812.98	1590.37
6822.55	1590.3	6836.08	1590.07	6906.24	1589.54	6923.29	1589.62	6951.82	1589.59
6960.69	1589.6	6966.75	1589.59	6982.17	1589.45	6996.12	1589.05	6998.33	1589
6999.51	1589	7014.07	1589.54	7023.45	1589.89	7024.03	1589.9	7024.2	1589.9
7037.33	1589.9	7074.64	1590.05	7078.81	1590.05	7080.5	1589.98	7090.45	1589.49
7095.62	1589.8	7103.19	1590.35	7109.42	1589.92	7115.34	1589.73	7128.69	1588.91
7168.54	1589.1	7177.93	1589.21	7177.97	1589.08	7180.44	1588.91	7181.23	1588.93
7181.84	1589	7201.76	1589.81	7210.72	1589.35	7234.76	1588.42	7236.65	1588.4
7303.07	1588	7355.25	1587.92	7384.73	1588.82	7403.43	1589.51	7462.06	1587.87
7496.81	1588	7516.35	1588.16	7531.15	1588.31	7542.7	1590.57	7545.56	1591.14
7546.41	1591.3	7561.51	1590.45	7574.05	1590.71	7581.49	1590.6	7656.27	1590.13
7664.72	1590	7669.96	1589.97	7682.45	1589.65	7687.82	1589.94	7701.74	1591.07
7717.46	1591.1	7732.65	1590.92	7740.43	1590.45	7752.86	1590.37	7807.54	1590.07
7808.74	1590	7809.3	1590	7810.6	1589.94	7819.96	1589.58	7835.64	1589.03
7842.03	1589	7863.94	1588.54	7868	1588.69	7891.51	1589.49	7893.71	1589.57
7893.94	1589.6	7894.18	1589.59	7894.35	1589.59	7917.51	1590.41	7944.21	1590
7981.39	1589.4	7986.28	1588.96	7989.03	1589.13	8000.25	1589.15	8003.3	1589.1
8021.28	1588.9	8032.97	1589.29	8043.35	1589.4	8046.22	1589.29	8084.89	1588.34
8131.88	1588.8	8160.75	1589.43	8172.03	1589.38	8220.56	1589.44	8257.28	1589.45
8283.27	1589.5	8327.02	1589.45	8393.1	1589.66	8400.14	1589.67	8406.04	1589.67
8410.23	1589.7	8468.57	1589.56	8473.95	1589.71	8484.97	1589.7	8488.77	1589.87
8530.64	1589.8	8542.86	1589.62	8544.77	1589.59	8549.42	1589.57	8551.94	1589.53
8573.8	1589.2	8621.83	1588.86	8631.27	1588.88	8657.13	1588.81	8665.84	1588.83
8685.88	1588.9	8710.18	1588.63	8721.65	1588.56	8727.01	1588.6	8736.68	1589.01
8741.59	1589.1	8749.01	1589	8763.71	1589.4	8767.65	1589.46	8776.5	1589.4
8809.14	1589.3	8817.33	1588.94	8824.45	1589.36	8828.91	1588.92	8833.34	1589.44
8835.77	1589.8	8837.63	1589.72	8838.13	1589.62	8845.77	1589.67	8863.53	1589.82
8876.26	1589.9	8879.69	1589.97	8885.71	1590.06	8896.17	1590.37	8897.87	1590.39
8913.88	1590.8	8916.44	1590.79	8927.03	1590.82	8940.52	1590.71	8945.92	1590.84
8959.15	1590.9	8966.83	1590.95	8970.76	1590.97	8991.5	1590.99	9001.27	1590.92
9010.68	1591	9028.92	1590.97	9031.02	1590.94	9038.46	1590.7	9044.18	1590.46
9051.19	1590.3	9051.35	1590.38	9059.35	1590.26	9067.63	1590.61	9096.52	1590.62
9096.82	1590.4	9096.84	1590.38	9105.78	1590.57	9110.78	1590.51	9126.7	1590.64
9140.66	1590.7	9148.32	1590.61	9154.42	1590.65	9168.33	1590.67	9173.78	1590.7
9174.41	1590.7	9177.22	1590.7	9203.53	1590.69	9214.96	1590.71	9224.8	1590.42
9232.19	1590.3	9252.92	1589.55	9257.74	1589.5	9276.29	1589.14	9304.43	1589.12
9309.5	1589.3	9321.21	1589.48	9333.44	1589.42	9341.77	1589.29	9345.42	1589.36
9356.22	1589.4	9366.41	1589.34	9381.28	1589.25	9389.87	1589.21	9406.52	1588.58
9409.36	1588.5	9409.88	1588.5	9440.79	1588.86	9441.12	1588.85	9447.85	1589.01
9451.68	1589.1	9466.26	1589.52	9493.85	1589.3	9495.95	1589.27	9502.15	1589.27
9516.44	1589.4	9520.56	1589.39	9530.86	1586.92	9535.75	1585.78	9541.41	1587.03
9549.17	1588.8	9556.56	1588.73	9565.45	1588.35	9571.46	1588.39	9573.29	1588.4
9590.37	1589	9624.12	1588.88	9626.5	1588.87	9632.37	1588.96	9643.39	1588.71
9646.56	1588.7	9647.47	1588.66	9651.6	1588.67	9671.95	1588.21	9684.04	1588.22
9690.7	1588.3	9697.15	1588.27	9709.04	1588.42	9712.09	1588.54	9730.01	1588.66
9764.6	1589	9766.65	1589	9780.2	1588.76	9783.4	1588.71	9784.14	1588.7

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 9796.43  1588.7 9821.99 1588.66 9831.32 1588.74 9836.37 1588.74  9851.2 1588.68
 9852.64  1588.6 9865.97 1588.22 9872.18 1588.04 9872.39 1588.17 9872.78 1588.22
  9898.1  1588.1 9904.69 1588.02 9904.74 1588.02 9912.48 1588.27 9920.81 1588.58
 9925.46  1588.6 9926.73 1588.57 9934.39 1588.57 9948.79 1588.83 9958.83 1588.71
 9966.91  1588.7 9970.88 1588.65 9974.71 1588.69 9978.72 1588.75 9997.96 1589.11
10009.53  1586.610010.52 1586.12 10012.5 1586.0710019.01 1586.0410028.05 1590.08
 10032.8  1591.610047.84 1590.8810052.13 1590.17 10062.8 1588.7310072.73 1587.81
10103.98  1587.410110.61 1587.3110114.55 1587.3510156.37 1586.6510170.45 1586.43
10176.11    158610183.97 1585.5510192.35 1585.8510237.16 1586.8810251.81 1586.93
10255.25  1586.910257.89 1586.8910277.43 1588.67 10285.5 1589.0910297.48 1588.79
10300.97  1588.710306.85 1588.6710313.95 1588.8110320.35 1589.1510334.16 1589.26
10339.58  1589.410352.17 1589.5610357.81 1589.6110361.97 1589.5810363.52 1589.63
10378.79  1589.610381.13 1589.6410392.07 1589.5310405.89 1589.4410420.75 1589.71
10426.49  1589.710433.62  1589.710452.64  1589.810457.14 1589.7910461.07 1589.85
10465.47  1589.910470.29 1589.8610480.15 1589.6310486.82 1589.5810491.22 1589.52
10504.22  1589.510505.59 1589.4410506.13 1589.4310508.04 1589.4410517.39 1589.41
10521.74  1589.410542.64 1588.8610546.73 1588.84 10548.1 1588.8410562.94 1588.77
10601.52  1588.810608.93 1588.8110611.89 1588.81 10621.1 1588.5810634.57 1588.57
10648.15  1588.710659.12 1589.15

Manning's n Values         num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4444.79     .15 7863.94      .1 8809.14     .15 9997.96    .045 10032.8     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9997.96 10032.8              400  529.54     400             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 4444.79 5045.46 1590.72

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1590.50   Element                   Left OB    Channel   Right OB
  Vel Head (ft)                0.07   Wt. n-Val.                  0.135      0.045      0.150
  W.S. Elev (ft)            1590.44   Reach Len. (ft)            400.00     529.54     400.00
  Crit W.S. (ft)                      Flow Area (sq ft)         4432.36      92.68    1223.64
  E.G. Slope (ft/ft)       0.008797   Area (sq ft)              4432.36      92.68    1223.64
  Q Total (cfs)             7577.00   Flow (cfs)                5191.88     577.24    1807.89
  Top Width (ft)            4673.83   Top Width (ft)            4034.03      31.20     608.60
  Vel Total (ft/s)             1.32   Avg. Vel. (ft/s)             1.17       6.23       1.48
  Max Chl Dpth (ft)            4.89   Hydr. Depth (ft)             1.10       2.97       2.01
  Conv. Total (cfs)         80782.9   Conv. (cfs)               55353.7     6154.3    19275.0
  Length Wtd. (ft)           413.39   Wetted Per. (ft)          4037.01      32.50     610.24
  Min Ch El (ft)            1586.04   Shear (lb/sq ft)             0.60       1.57       1.10
  Alpha                        2.54   Stream Power (lb/ft s)       0.71       9.76       1.63
  Frctn Loss (ft)              4.31   Cum Volume (acre-ft)       666.96      11.11      47.20
  C & E Loss (ft)              0.01   Cum SA (acres)             344.12       4.47      40.16

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1
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Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4444.79	5833.08	292.55	411.50	624.28	3.86	0.66	0.71
5833.08	7221.38	716.63	868.12	1052.62	9.46	0.83	0.83
7221.38	8609.67	2052.23	1547.90	1274.39	27.08	1.22	1.33
8609.67	9997.96	2130.46	1604.84	1085.72	28.12	1.48	1.33
LB 9997.96	RB 10032.80	577.24	92.68	32.50	7.62	2.97	6.23
10032.80	10659.12	1807.89	1223.64	610.24	23.86	2.01	1.48

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.454**

INPUT
Description: RM. 2.454. HORZ. N VALUES USED. INEFFECTIVE AREA USED TO RIGHT OF STA. 10500 TO IMPROVE THE FLOW DISTRIBUTION BY FORCING SOME FLOW TO LEFT. AND TO LT. OF STA.7066.08.

Station Elevation Data num= 485

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4639.26	1588.7	4642.64	1588.71	4681.32	1587.61	4701.19	1587.45	4711.47	1587.43
4732.19	1588	4742.15	1588.22	4746.23	1588.28	4774.34	1588.72	4778.44	1588.74
4780.72	1588.7	4844.29	1588.74	4845	1588.71	4869.86	1588.11	4907.52	1587.41
4923.63	1587.5	4940.65	1587.57	4958.62	1588.26	4958.94	1588.27	4959.48	1588.26
4961.43	1588.3	5009.37	1588.05	5027.56	1588.5	5037.36	1589.04	5041.08	1588.95
5043.19	1585.9	5044.96	1584.85	5057.03	1585.57	5061.61	1585.29	5072.91	1588.46
5094.2	1587.5	5097.03	1587.26	5103.5	1587.24	5134.62	1587.42	5165.01	1587.7
5174.42	1587.6	5181.58	1587.66	5192.54	1588.2	5200.65	1588.65	5223.88	1589.9
5230.73	1590.3	5233.33	1590.2	5234.2	1590.19	5257.15	1589.67	5267.07	1589.47
5286.1	1589.1	5308.64	1588.59	5317.11	1588.41	5326.05	1587.83	5343.53	1587.82
5345.4	1587.7	5347.55	1587.65	5364.64	1587.21	5372.79	1587.01	5382.62	1586.97
5387.29	1587	5397.41	1587.12	5412.47	1587.23	5413.18	1587.22	5414.07	1587.29
5429.13	1588.5	5433.38	1588.48	5456.52	1588.46	5462.34	1588.46	5464.51	1588.49
5517.86	1588.5	5532.96	1588.38	5548.03	1588.32	5559.41	1588.44	5588.12	1588.55
5597.7	1588	5622.85	1586.03	5626.89	1586.02	5652.37	1585.9	5666.74	1585.78
5682.36	1585.7	5696.55	1585.73	5716.68	1586.85	5734.99	1587.83	5744.53	1587.55
5752.12	1587.5	5799.9	1587.14	5817.7	1586.99	5821.61	1586.95	5823.44	1586.94
5828.85	1586.9	5885.72	1586.36	5899.75	1586.15	5904.22	1585.97	5921.78	1585.16
5925.28	1585.1	5929.24	1585.09	5950.06	1584.87	5964.74	1584.78	5973.15	1585.37
5979.25	1585.9	5992.44	1586.71	6004.16	1586.55	6024.7	1586.64	6050.52	1586.85
6054.38	1586.6	6064	1586.68	6070.47	1586.62	6104.13	1587.37	6111.76	1587.52
6112.58	1587.5	6142.85	1587.32	6179.35	1587.09	6182.48	1587.09	6183.81	1587.08
6184.24	1587.1	6185.08	1587.08	6187.15	1587.05	6250.99	1586.85	6268.55	1587.02
6270.05	1587	6293.06	1586.04	6300.27	1585.77	6305.28	1585.54	6327.31	1585.57
6341	1585.6	6351.99	1586.02	6374.41	1586.15	6383.02	1586.49	6388.77	1586.76
6398.04	1587.2	6407.9	1587.1	6439.17	1586.89	6448.82	1586.77	6467.18	1587.12
6478.83	1587	6492.07	1587.02	6529.62	1586.9	6535.86	1586.89	6540.99	1586.9
6547.18	1586.7	6548.87	1586.73	6555.98	1586.44	6566.33	1586.1	6568.4	1586.01
6571.94	1585.9	6579.63	1585.75	6610.81	1585.29	6624.83	1586.01	6636.04	1586.58
6645.88	1586.6	6702.8	1586.9	6742.49	1587.04	6745.19	1586.95	6768.35	1586.15
6776.09	1586	6778.22	1585.89	6785.81	1585.59	6796.89	1585.55	6841.75	1585.6
6865.65	1586.7	6869.61	1586.81	6874.25	1586.84	6898.75	1586.68	6905.32	1586.63

6905.61	1586.6	6905.97	1586.63	6906.65	1586.63	6946.77	1586.72	6960.88	1586.67
6970.14	1586.7	6996.1	1586.43	7004.26	1586.46	7029.41	1586.43	7044.98	1586.51
7053.98	1586.5	7056.65	1586.51	7064.87	1587.28	7066.08	1587.44	7091.66	1586.1
7095.04	1585.9	7095.13	1585.9	7095.24	1585.9	7095.48	1585.9	7118.64	1586.06
7141.06	1586.3	7145.31	1586.7	7160.86	1586.9	7161.15	1586.9	7161.68	1586.89
7168.29	1586.6	7202.96	1586.47	7258.44	1585.87	7262.84	1585.83	7264.27	1585.81
7270.4	1585.8	7278.38	1585.95	7299.21	1584.96	7311.3	1584.36	7316.55	1584.35
7349.48	1584.9	7358.67	1585.13	7388.07	1586.66	7409.46	1586.81	7441.26	1586.71
7470.47	1586	7551.14	1584.5	7555.37	1584.48	7577.43	1584.39	7602.02	1584.28
7607.21	1584.2	7609.04	1584.33	7616.47	1584.49	7627.61	1584.56	7629.11	1584.56
7631.73	1584.6	7710.12	1584.51	7749.64	1584.65	7759.95	1584.47	7799.57	1584.68
7832.92	1585.3	7846.72	1585.62	7858.25	1585.85	7874.11	1585.86	7885.29	1585.41
7915.19	1585.4	7917.81	1585.39	7921.01	1585.29	7930.56	1585.16	7935.75	1585.24
7965.52	1585.2	7976.71	1585.15	7978.46	1585.08	7981.97	1584.93	7990.61	1584.61
8005.37	1585	8010.35	1585.16	8014.53	1585.16	8029.23	1585.39	8049.25	1585.55
8067.31	1585.7	8082.06	1585.84	8085.34	1585.62	8099.67	1584.47	8113.96	1584.99
8119.02	1585.2	8135.95	1585.15	8156.76	1585.14	8159.02	1585.15	8161	1585.15
8172.15	1582.6	8183.16	1580.51	8199.92	1580.64	8213.36	1583.48	8219.37	1583.89
8227.02	1585	8231.93	1584.68	8245.26	1584.17	8247.79	1583.88	8251.11	1583.43
8251.49	1578.6	8252.09	1578.31	8269.36	1582.13	8274.17	1583.33	8276.54	1583.31
8284.54	1583.3	8291.72	1583.51	8297.43	1583.65	8323.87	1584.67	8349.27	1585.03
8352.24	1585.1	8383.42	1585.17	8472.74	1585.74	8506.85	1585.84	8526.69	1586.36
8538.82	1585.9	8559.81	1586.72	8594.97	1586.3	8627.61	1585.73	8628.85	1585.72
8652.45	1586.1	8668.88	1585.17	8669.31	1585.17	8679.01	1584.44	8694.22	1586.26
8695.61	1586.3	8710.92	1586.2	8744.04	1586.02	8754.74	1585.84	8762.24	1585.75
8770.62	1585.8	8804.07	1585.39	8804.36	1585.4	8804.5	1585.34	8804.92	1585.37
8828.9	1584.7	8829.44	1584.73	8840.43	1585.27	8857.47	1585.77	8860.24	1585.77
8862.06	1585.8	8895.06	1585.76	8921.13	1585.77	8956	1585.65	8963.88	1585.82
8988.59	1585.7	9053.71	1586.28	9065.83	1586.34	9071.67	1586.2	9078.55	1586.16
9094.47	1586	9113.32	1586.16	9116.17	1586	9118.42	1586.12	9118.99	1586.12
9121.02	1586.1	9123.87	1586.13	9177.05	1585.35	9193.92	1585.44	9219.83	1585.46
9226.96	1585.5	9232.16	1585.3	9243.74	1584.3	9253.33	1583.76	9268.36	1583.46
9272.11	1583.4	9277.59	1583.91	9284.1	1584.67	9299.77	1585.53	9305.96	1585.64
9308.66	1585.6	9325.03	1585.8	9336.36	1585.54	9342.18	1585.52	9352.41	1585.51
9367.8	1585.6	9385.94	1585.42	9386.45	1585.42	9387.88	1585.41	9405.26	1585.59
9423.19	1586.2	9426.21	1586.18	9428.92	1586.18	9442.85	1585.86	9447.18	1585.76
9455.85	1583.8	9461.77	1582.58	9468.07	1583.65	9475.44	1585.12	9478.33	1585.08
9515.39	1584.9	9522.27	1584.88	9552.43	1584.88	9566.39	1584.46	9577.54	1584.5
9578.11	1584.1	9607.38	1584.33	9609	1584.34	9610.44	1584.34	9632.62	1584.32
9640.93	1584.5	9659.94	1584.98	9692.93	1585.24	9700.76	1585.32	9709.29	1585.28
9728.12	1585.3	9751.64	1585.19	9773.29	1585.13	9776.36	1585.06	9794.04	1584.55
9794.43	1584.4	9794.46	1584.21	9806.04	1584.27	9826.31	1584.24	9826.4	1583.98
9826.52	1584.1	9829.48	1584.22	9841.95	1584.48	9842.47	1584.48	9843.15	1584.5
9906.55	1585	9913.95	1585.02	9926.37	1585.2	9931.74	1585.16	9935.7	1585.07
9948.88	1584.8	9964.99	1586.85	9966.38	1586.94	9969.23	1585.68	9980.13	1580.99
9991.52	1583.2	9994.32	1583.7	10012.45	1584.08	10020.32	1584.17	10024.19	1584.17
10051.81	1584.2	10061.54	1584.25	10066.46	1584.34	10067.43	1584.33	10082.74	1584.41
10089.83	1584.3	10103.8	1584.11	10118.48	1583.99	10121.58	1583.97	10129.92	1583.9
10141.86	1583.7	10156.47	1583.61	10160.13	1583.63	10163.61	1583.66	10165.64	1583.64
10191.26	1583.5	10199.79	1583.54	10210.36	1583.6	10222.61	1583.53	10237.41	1583.79
10249.84	1583.8	10260.68	1583.97	10271.8	1584.06	10277.21	1584.2	10286.51	1584.23
10297.52	1584.2	10311.11	1583.87	10314.09	1583.83	10315.89	1583.75	10320.2	1583.86
10334.13	1584.2	10344.03	1584.15	10352.06	1584.15	10363	1584.17	10370.92	1584.19
10377.64	1584.1	10396.64	1583.75	10416.11	1583.46	10427.87	1583.46	10430.39	1583.11
10456.41	1583.1	10478.51	1583.42	10484.29	1583.54	10491.65	1583.47	10500.73	1583.8
10516.24	1584.3	10520.91	1584.42	10524.35	1584.48	10556.7	1584.41	10567.29	1584.41
10570.66	1584.4	10613.52	1584.16	10637.03	1584.03	10642.88	1584	10652.79	1584.08

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10658.01  1584.110658.92 1584.1410691.76 1584.3210693.86 1584.3310698.51  1584.4
10723.31  1583.210728.67 1582.9310729.77 1582.9110745.24 1582.6210773.82 1584.04
10783.01  1583.610785.33 1583.4510798.71 1583.7210800.98 1583.7510803.53 1583.43
10805.35    1583   10810 1583.0110849.35 1583.8610851.32 1584.0310851.47 1584.03
10851.71    1584 10861.6 1584.2510893.14 1585.5910893.81 1585.6110894.29 1585.63
10895.16  1585.610927.11 1585.5510935.18  1585.610955.12 1585.78 10966.8 1585.99
10993.11  1585.811021.32 1586.4411029.18 1586.5211053.16 1586.1511054.68 1586.17
11057.17  1586.211083.47 1586.7511087.96 1586.7211105.89 1586.8111109.96  1586.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4639.26     .15 9966.38    .04510024.19     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9966.3810024.19              480  399.74     360             .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1586.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.150	0.045	0.150
W.S. Elev (ft)	1586.07	Reach Len. (ft)	480.00	399.74	360.00
Crit W.S. (ft)		Flow Area (sq ft)	2750.57	144.84	1924.25
E.G. Slope (ft/ft)	0.012326	Area (sq ft)	2750.57	144.84	1924.25
Q Total (cfs)	7577.00	Flow (cfs)	3274.28	986.94	3315.79
Top Width (ft)	3859.81	Top Width (ft)	2823.10	55.84	980.87
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.19	6.81	1.72
Max Chl Dpth (ft)	7.76	Hydr. Depth (ft)	0.97	2.59	1.96
Conv. Total (cfs)	68247.7	Conv. (cfs)	29492.1	8889.5	29866.0
Length Wtd. (ft)	430.40	Wetted Per. (ft)	2831.70	57.15	981.17
Min Ch El (ft)	1580.99	Shear (lb/sq ft)	0.75	1.95	1.51
Alpha	3.22	Stream Power (lb/ft s)	0.89	13.29	2.60
Frctn Loss (ft)	4.27	Cum Volume (acre-ft)	633.98	9.67	32.75
C & E Loss (ft)	0.00	Cum SA (acres)	312.64	3.94	32.86

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4639.26	5971.04	76.52	97.19	171.57	1.01	0.57	0.79
5971.04	7302.82	67.02	113.53	308.69	0.88	0.37	0.59
7302.82	8634.60	2013.94	1487.21	1163.72	26.58	1.28	1.35
8634.60	9966.38	1116.80	1052.64	1187.72	14.74	0.89	1.06
LB 9966.38	RB 10024.19	986.94	144.84	57.15	13.03	2.59	6.81
10024.19	11109.96	3315.79	1924.25	981.17	43.76	1.96	1.72

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.378

INPUT
Description: RM. 2.378. HORZ. N VALUES USED.

Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4470.09	1582.3	4470.98	1582.29	4480.23	1582.54	4485.95	1582.28	4504.07	1582.37
4545.73	1581.9	4568.5	1582.32	4576.85	1582.32	4585.52	1582.29	4643.63	1582.03
4656.83	1582.1	4670.74	1582.21	4693.67	1582.26	4706.35	1583.11	4723.05	1582.85
4728.45	1583.1	4730.89	1582.88	4739.71	1582.7	4745.73	1581.58	4747.22	1581.7
4750.24	1582.5	4834.72	1581.89	4875.69	1581.88	4876.7	1581.87	4877.89	1581.77
4899.74	1580.3	4906.92	1580.23	4923.37	1580.01	4933.35	1579.79	4942.04	1579.75
4963.8	1579.7	4984.65	1580.96	4988.22	1581.25	5004.48	1581.15	5047.36	1580.95
5068.47	1580.9	5072.85	1580.83	5076.04	1580.83	5081.63	1580.8	5095.23	1580.71
5113.32	1580.6	5165.08	1580.33	5191.45	1580.07	5192.14	1580.19	5193.75	1580.42
5209.81	1583.2	5216.35	1583.13	5242.88	1582.92	5284.87	1582.38	5300.55	1582.26
5323.45	1581.6	5359.24	1581.54	5401.76	1581.23	5409.36	1580.65	5416.48	1580.17
5418.68	1580	5422.31	1579.71	5439.83	1579.73	5465.02	1579.77	5473.43	1580.14
5476.75	1580.4	5485.74	1581.01	5495.73	1581.46	5503.33	1581.36	5506.55	1581.35
5558.48	1581.2	5566.97	1581.19	5567.61	1581.19	5568.08	1581.19	5568.31	1581.19
5571.28	1581.2	5610.74	1581.47	5619.17	1582.53	5628.74	1583.13	5646.88	1582.79
5660.09	1582.6	5683.91	1582.26	5697.4	1582.1	5703.24	1581.97	5734.94	1581.91
5743.8	1581.8	5766.27	1581.49	5780.5	1581.45	5782.8	1581.46	5805.84	1580.06
5821.06	1579.2	5830.95	1579.13	5876.95	1579.28	5896.27	1580.25	5903.05	1580.48
5908.35	1580.8	5917.86	1581.47	5927.97	1581.5	5931.15	1581.49	5945.51	1581.25
5972.99	1581.2	5986.44	1581.13	5994.29	1581.15	6015.29	1581.05	6042.84	1581.17
6052.14	1581.2	6072.15	1581.27	6074.12	1581.28	6082.44	1581.28	6089.72	1580.9
6120.13	1579.4	6141.9	1579.71	6185.76	1579.85	6197.25	1580.49	6201.44	1580.69
6208.02	1581.1	6214.55	1581.47	6218.48	1581.69	6228.72	1581.67	6241.32	1581.73
6289.78	1581.5	6293.1	1581.52	6301.7	1581.56	6317.78	1581.64	6336.54	1581.75
6359.69	1581.9	6374.84	1581.98	6376.49	1581.99	6378.18	1581.98	6382.5	1582
6399.51	1581.4	6411.02	1581.09	6425.29	1580.8	6436.58	1580.76	6448.47	1580.88
6460.47	1581.5	6462.2	1581.61	6464.16	1581.69	6483.09	1581.85	6490.5	1581.76
6545.26	1581.9	6578.24	1581.47	6598.8	1581.49	6619.41	1581.49	6659.78	1581.96
6661.65	1582	6663.23	1582.03	6664.16	1582.17	6670.53	1583.09	6680.41	1583.38
6686.49	1583.6	6728.82	1583.35	6785.84	1582.74	6787.81	1582.72	6788.57	1582.71
6789.15	1582.7	6790.11	1582.7	6807.71	1582.64	6810.05	1582.52	6823.45	1581.87
6827.25	1581.9	6831.66	1581.53	6845.35	1581.62	6871.12	1581.13	6881.61	1582.19
6882.9	1582.3	6889.93	1582.22	6892.37	1582.19	6937.22	1581.46	6960.07	1581.25
6976.05	1581.2	6988.48	1582.38	6995.92	1583.09	7002.58	1583.24	7007.06	1583.17
7020.45	1583.3	7054.25	1583.11	7082.59	1582.65	7093.17	1582.55	7119.58	1582.39
7121.45	1582.4	7122.09	1582.35	7131.58	1582.28	7140.26	1582.11	7172.29	1580.47
7204.18	1580.5	7218.76	1580.45	7226.98	1580.53	7251.27	1581.28	7270.84	1581.96
7289.38	1581.8	7294.94	1581.78	7325.5	1581.27	7341.18	1580.95	7348.52	1580.94
7369.31	1580.8	7378.59	1580.78	7397.47	1580.66	7411.51	1580.48	7422.39	1581.19
7430.74	1581.7	7439.29	1582.25	7447.79	1582.2	7459.61	1582.08	7510.21	1581.44
7515.93	1581.4	7527.37	1581.32	7571.11	1581.1	7579.54	1581.1	7586.73	1581.1
7592.31	1581.1	7612.69	1579.77	7614.89	1579.59	7617.86	1579.33	7618.62	1579.34
7620.83	1579.3	7625.36	1579.31	7648.44	1579.52	7653.61	1579.23	7665.56	1579.75
7667.26	1579.8	7670.43	1579.93	7715.8	1580.31	7767.08	1580.6	7791.47	1581.01
7801.45	1581.3	7802.39	1577.24	7804.2	1574.82	7817.3	1578.3	7821.44	1578.97
7823.24	1579.9	7838.61	1579.75	7842.91	1579.7	7847.7	1579.81	7872.3	1580
7875.48	1580	7885.8	1579.94	7898.22	1580.28	7902.66	1580.54	7903.28	1580.58
7904.84	1580.6	7988.43	1580.11	7991.2	1580.12	7996.39	1580.34	8008.2	1580.73
8019.35	1580.7	8038.29	1580.83	8042	1580.89	8052.85	1580.92	8080.17	1581
8104.[illegible]5	1581.2	8113.4	1581.03	8135.38	1581.16	8137.54	1581.16	8147.04	1580.63
8156.[illegible]5	1580.3	8162.1	1580.33	8167.68	1580.48	8180.25	1580.55	8191.4	1580.75
8209.63	1580.8	8212.4	1580.83	8218.73	1580.89	8241.06	1581.09	8243.86	1581.12

8246.2	1581.2	8247.59	1581.21	8261.95	1581.58	8284.67	1581.64	8292.97	1581.74
8297.4	1581.7	8308.42	1581.96	8313.42	1582.26	8325.4	1582.1	8364.66	1581.58
8377.24	1581.5	8387.59	1581.45	8391.79	1581.47	8393.03	1581.46	8407.7	1581.31
8419.83	1581.3	8424.99	1581.26	8442.48	1581.14	8465.78	1580.94	8467.23	1580.94
8476.29	1580.8	8484.49	1580.8	8506.46	1580.99	8508.39	1581	8509.3	1580.99
8589.32	1580.3	8607.83	1580.24	8620.31	1580.29	8656.14	1580.33	8682.9	1580.46
8693.33	1580.4	8706.11	1580.69	8714.37	1580.84	8740.3	1581.62	8765.44	1581.98
8768.82	1580.6	8785.99	1580.88	8795.26	1581.1	8796.29	1581.09	8796.79	1581.08
8828.83	1580.6	8847.84	1580.29	8876.44	1579.8	8924.37	1582.15	8935.7	1582.67
8939.86	1582.8	8941.83	1582.94	8949.38	1583.31	8952.34	1583.25	8986.79	1583.27
8993.87	1583.2	9003.11	1583.24	9011.03	1583.27	9047.92	1583	9088.36	1582.16
9113.27	1582.1	9140.04	1582.09	9154.31	1582.07	9181.55	1579.68	9192.6	1578.93
9195.91	1579	9198.75	1579.18	9216.24	1579.95	9227.08	1580.55	9238.23	1580.99
9250.92	1581.4	9257.55	1581.8	9278.39	1581.52	9285.77	1581.46	9299.31	1581.36
9305.35	1581.2	9326.25	1580.92	9332.63	1580.75	9334.74	1580.65	9342.47	1579.7
9357.43	1577.9	9359.19	1578.13	9360.64	1578.16	9385.81	1580.57	9395.16	1580.57
9404.8	1580.6	9406.66	1580.66	9407.48	1580.66	9426.5	1580.62	9431.54	1580.62
9447.88	1580.5	9469.76	1580.45	9495.17	1580.4	9504.6	1580.35	9514.93	1580.38
9522.21	1580.4	9554.56	1580.48	9572.43	1580.49	9578.91	1580.48	9593.09	1580.6
9613.86	1580.8	9630.1	1580.88	9653.46	1581.18	9658.43	1581.26	9661.59	1581.32
9668.43	1581.4	9706.83	1581.52	9709.03	1581.52	9713.32	1581.54	9714.47	1581.51
9716.67	1581.5	9728.25	1581.22	9743.12	1580.88	9750.03	1580.56	9759.99	1580.44
9764.57	1580.4	9777.08	1580.03	9802.58	1579.55	9815.12	1579.32	9841.52	1580.11
9849.88	1580.1	9864.23	1579.94	9868.25	1580.14	9874.18	1580.54	9882.89	1581.1
9893.84	1580.8	9902.25	1580.77	9926.25	1580.75	9946.44	1580.2	9948.27	1580.2
9950.45	1580.2	9964.87	1580.4	9972.62	1580.53	9985.72	1580.46	9995.96	1577.95
10004.63	1576.2	10015.8	1579.02	10021.25	1579.79	10041.76	1579.53	10059.07	1579.77
10064.19	1579.8	10081.45	1580.03	10105.93	1579.91	10114.45	1580	10129.16	1580.2
10129.76	1580.2	10130.05	1580.23	10132.14	1580.21	10144.42	1580.17	10145.23	1580.19
10160.99	1580.2	10178.47	1580.74	10192.83	1580.96	10209.87	1580.75	10218.57	1580.74
10259.03	1580.5	10308.01	1580.24	10310.04	1580.28	10319.25	1580.74	10327.25	1580.72
10331.04	1580.6	10333.72	1580.54	10338.88	1580.22	10352.08	1580.09	10398.36	1580.39
10406.57	1580.5	10416.27	1580.75	10416.95	1580.84	10422.8	1580.83	10439.43	1580.27
10484.93	1580.4	10496.83	1580.01	10508.86	1580.07	10520.32	1579.97	10523.56	1580.06
10527.92	1580.1	10545.37	1579.91	10553.93	1580.09	10560.87	1579.85	10565.82	1579.73
10580.1	1579.2	10598.02	1578.99	10604.97	1579.05	10633.83	1580.29	10645.72	1580.74
10649.89	1580.6	10663.51	1580.31	10670.86	1579.71	10680.27	1579.91	10682.37	1580.19
10690.33	1580.2	10703.17	1580.24	10715.14	1580.52	10729.02	1580.93	10741.84	1580.92
10775.13	1581.1	10779	1580.88	10789.71	1580.17	10793.94	1580.13	10797.35	1580.2
10804.09	1580.4	10819.7	1580.46	10836.22	1580.77	10853.2	1583.66	10861.76	1584.44
10869.66	1584.5	10877	1584.19	10890.82	1582.04	10914.67	1581.86	10919.35	1581.98
10925.1	1581.8	10928.54	1581.76	10968.56	1581.23	10982.85	1581.16	10988.16	1581.15
10993.98	1580.9	10999.11	1580.71	11008.24	1580.81	11028.47	1580.53	11029.97	1580.52
11032.11	1580.7	11051.68	1581.97	11054.67	1582.06				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4470.09	.15	7823.24	.1	8589.32	.15	9802.58	.068	9985.72	.045
10059.07	.15								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.72	10059.07	520	402.78	320	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1581.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.128	0.045	0.150

W.S. Elev (ft)	1581.81	Reach Len. (ft)	520.00	402.78	320.00
Crit W.S. (ft)		Flow Area (sq ft)	4279.93	209.59	1268.06
E.G. Slope (ft/ft)	0.008140	Area (sq ft)	4279.93	209.59	1268.06
Q Total (cfs)	7577.00	Flow (cfs)	4876.92	1247.32	1452.76
Top Width (ft)	5014.11	Top Width (ft)	4032.81	73.35	907.95
Vel Total (ft/s)	1.32	Avg. Vel. (ft/s)	1.14	5.95	1.15
Max Chl Dpth (ft)	6.99	Hydr. Depth (ft)	1.06	2.86	1.40
Conv. Total (cfs)	83979.3	Conv. (cfs)	54053.1	13824.6	16101.6
Length Wtd. (ft)	469.97	Wetted Per. (ft)	4039.97	74.24	908.32
Min Ch El (ft)	1576.20	Shear (lb/sq ft)	0.54	1.43	0.71
Alpha	3.99	Stream Power (lb/ft s)	0.61	8.54	0.81
Frctn Loss (ft)	5.01	Cum Volume (acre-ft)	595.24	8.04	19.56
C & E Loss (ft)	0.03	Cum SA (acres)	274.87	3.34	25.06

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4470.09	5849.00	752.81	785.72	732.01	9.94	1.07	0.96
5849.00	7227.90	532.01	695.74	909.15	7.02	0.77	0.76
7227.90	8606.81	1684.78	1385.85	1270.62	22.24	1.10	1.22
8606.81	9985.72	1907.32	1412.62	1128.20	25.17	1.25	1.35
LB 9985.72	RB 10059.07	1247.32	209.59	74.24	16.46	2.86	5.95
10059.07	11054.67	1452.76	1268.06	908.32	19.17	1.40	1.15

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.302

INPUT
Description: RM.2.302 . HORZ. N VALUES USED.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4327.1	1576.6	4330.78	1576.65	4338.25	1576.69	4344.63	1576.7	4358.84	1576.79
4368.5	1576.9	4375.49	1576.79	4402.45	1576.7	4469.44	1576.27	4482.03	1576.24
4485.85	1576.3	4494.3	1576.2	4498.01	1576.2	4501.43	1576.17	4515.57	1575.63
4517.44	1575.7	4548.31	1576.08	4563.65	1576.09	4576.09	1576.11	4595.55	1576.07
4612.07	1576.2	4650.01	1575.86	4666.93	1575.67	4675.99	1575.74	4687.8	1575.9
4695.5	1574.6	4697.8	1574.2	4713.25	1574.92	4725.98	1575.45	4740.71	1575.83
4743.45	1575.9	4761.5	1576.9	4763.56	1576.97	4770.06	1577.13	4786.09	1577.46
4795.54	1577.3	4822.33	1577	4829.67	1576.93	4854.93	1576.14	4859.48	1576.01
4862.1	1576	4867.05	1575.98	4872.71	1575.94	4888.42	1575.83	4913.44	1575.84
4918.04	1575.6	4922.42	1575.65	4929.44	1575.52	4942.86	1575.39	4967.7	1575.15
4979.7	1575.2	4982.52	1575.28	5000.56	1575.57	5024.64	1576.28	5065.37	1575.82
5076.38	1575.9	5085.76	1575.92	5094.96	1575.86	5102.52	1575.83	5116.8	1575.82
5132.29	1575.8	5140.69	1574.15	5152.65	1574.34	5153.65	1574.97	5166.97	1574.75
5182.33	1573.2	5184.58	1573.85	5186.99	1574.41	5189.93	1574.49	5226.15	1574.97
5230.88	1575	5235.01	1574.96	5247.68	1574.98	5277.33	1574.72	5288.5	1574.79

5342.28	1575	5342.64	1574.97	5343.29	1574.95	5344.34	1574.92	5358.39	1574.51
5368.05	1573.6	5370.87	1573.68	5372.67	1573.29	5381.82	1573.23	5423.75	1572.82
5433.31	1572.9	5438.9	1573.08	5445.99	1573.47	5468.27	1574.47	5473.41	1574.71
5492.66	1574.7	5506.5	1574.47	5551.36	1575.07	5557.34	1575.1	5576.93	1575.26
5592.29	1575.3	5599.31	1575.04	5604.42	1575.04	5614.51	1575.36	5618.35	1575.61
5621.12	1575.6	5632.27	1576.13	5637.65	1576.63	5641.3	1576.55	5656.2	1576.36
5670.18	1576.3	5721.09	1575.86	5725.35	1575.84	5731.92	1575.85	5749.92	1575.79
5778.7	1575.8	5793.48	1575.75	5797.69	1575.7	5806.22	1575.46	5820.31	1574.85
5830.45	1574.4	5862.69	1573.92	5881.79	1573.95	5884.83	1574.03	5906.81	1574.15
5910.46	1574.2	5915.58	1574.29	5936.29	1574.79	5954.68	1574.82	5966.36	1575.02
5982.72	1575	5995.02	1574.98	6000.3	1574.85	6005.34	1575.56	6008.1	1575.33
6012.8	1576	6025.05	1575.31	6041.4	1576.8	6058.5	1576.45	6121.64	1578.08
6126.52	1578.3	6126.91	1577.96	6151.67	1578.07	6157.9	1578.65	6160.61	1578.64
6162.93	1578.2	6197.96	1576.56	6200.24	1576.51	6201.21	1576.41	6215.17	1574.62
6220.29	1575.1	6232.48	1575.37	6252.29	1575.66	6269.26	1577.49	6271.87	1577.72
6272.86	1577.9	6273.69	1577.87	6288.33	1577.8	6365.8	1577.35	6368	1577.46
6380.75	1576.7	6386.55	1576.08	6393.68	1575.89	6416.91	1576.06	6425.76	1576.07
6431.68	1576.3	6444.53	1576.98	6448.79	1577	6467.53	1576.99	6500.43	1577.27
6511.37	1577.3	6544.6	1577.03	6609.15	1576.89	6624.83	1576.94	6639.68	1576.98
6667.25	1575.1	6667.25	1575.08	6667.26	1575.08	6667.27	1575.08	6694.75	1574.95
6699.17	1575.2	6703.44	1575.63	6709.52	1576.46	6714.35	1576.55	6724.11	1576.53
6739.68	1576.9	6761.33	1577.17	6785.05	1577.02	6806.02	1577.08	6812.65	1577
6854.93	1576.3	6866.72	1576.41	6870.79	1576.51	6882.77	1576.58	6936.06	1577.01
6939.34	1576.8	6944.75	1576.6	6962.19	1575.64	6963.1	1575.7	6964.86	1575.68
6968.74	1575.5	6989.21	1575.26	7001.67	1575.09	7005.02	1574.98	7007.1	1575.1
7007.56	1575.1	7008.91	1575.17	7011.85	1575.24	7022.01	1575.76	7033.4	1576.27
7053.29	1576.2	7073.34	1576.22	7104.4	1576.28	7143.95	1577.01	7160.89	1576.89
7161.01	1573.4	7165.8	1570.44	7167.78	1573.45	7168.57	1570.85	7174.36	1573.1
7178.81	1575.2	7189.35	1574.91	7193.64	1574.82	7194.7	1574.75	7198.85	1574.71
7203.14	1575	7215.71	1575.4	7237.06	1575.91	7252.33	1576.48	7258.26	1576.37
7263.19	1576.4	7271.95	1576.61	7283.42	1576.7	7318.95	1576.5	7341.17	1576.45
7356.73	1576.3	7363.29	1576.26	7381.2	1576.22	7478.56	1575.91	7508.44	1575.74
7548.52	1575.5	7603.28	1575.51	7715.85	1575.51	7723.42	1575.52	7727.27	1575.54
7733.93	1575.5	7739.24	1575.48	7810.09	1575.42	7827.58	1575.54	7850.23	1575.69
7859.09	1575.4	7869.48	1574.57	7882.49	1574.9	7902.1	1575.04	7908.38	1575.31
7921.93	1574.9	7929.06	1575.44	7956.26	1575.82	8004.84	1576.04	8034.53	1575.9
8048.39	1576.1	8073.28	1575.91	8078.35	1575.87	8095.24	1576.05	8125.91	1576.35
8126.93	1576.4	8136.37	1576.36	8169.15	1576.17	8173.63	1576.17	8175.51	1576.17
8236.55	1576.2	8271.7	1576.23	8271.92	1576.24	8285.1	1576.24	8293.25	1576.26
8294.19	1576.3	8318.22	1576.34	8335.4	1576.45	8340.48	1576.46	8370.82	1576.85
8379.23	1576.8	8393.68	1576.61	8408.63	1576.47	8424.16	1576.35	8432.76	1576.35
8434.45	1576.3	8445.61	1576.37	8471.48	1576.38	8512.34	1576.48	8550.68	1577.11
8554.31	1577.1	8558.94	1577.08	8563.37	1577.08	8599.83	1577.12	8605.66	1577.18
8612.06	1577.2	8649.6	1576.98	8652.07	1576.93	8663.76	1576.8	8671.98	1576.78
8700.76	1576.6	8714.55	1576.48	8728.26	1576.42	8733.35	1576.4	8734.57	1576.4
8754.4	1576.2	8754.92	1576.19	8769.78	1575.79	8782.84	1575.88	8788.09	1575.87
8811.59	1575.4	8814.02	1575.41	8817.99	1575.42	8831.64	1575.27	8873.08	1575.03
8874.09	1575	8875.16	1575.03	8881.21	1575.04	8890.21	1575.17	8902.38	1575.58
8909.67	1575.8	8917.56	1575.74	8923.45	1576.12	8944.52	1576.67	8957.51	1577.05
8978.4	1577.5	9005.36	1578.24	9018.54	1577.87	9024.37	1578.35	9054.86	1579.88
9056.16	1579.9	9059.84	1579.93	9072.42	1579.23	9100.01	1575.85	9157.8	1576.49
9166.49	1576.8	9201.08	1576.51	9224.74	1576.53	9230.59	1576.42	9238.35	1576.75
9245.21	1577	9248.28	1576.97	9319.38	1576.68	9330.45	1576.73	9338.42	1576.81
9350.11	1576.8	9365.87	1576.93	9379.29	1576.76	9384.69	1576.79	9419.53	1577.54
9422.57	1577.6	9423.07	1577.61	9426.89	1577.59	9485.8	1577.36	9514.83	1575.91
9524.19	1575.7	9537.45	1575.2	9545.74	1574.83	9551.85	1575.34	9563.69	1576.87
9574.14	1577.5	9575.34	1577.35	9575.82	1577.32	9594.73	1577.09	9601.58	1577.01

9617.27	1576.7	9620.22	1576.78	9625.46	1576.81	9633.82	1576.63	9640.62	1576.53
9640.79	1576.5	9641.42	1576.44	9650.13	1575.88	9661.07	1575.27	9677.44	1575.04
9678.9	1575	9685.81	1575.04	9725.32	1575.64	9731.82	1575.87	9737.75	1576.56
9749.99	1576.6	9770.18	1576.31	9781.51	1576.24	9794.53	1576.15	9817.44	1576.4
9822.39	1576.4	9839.17	1576.17	9841.89	1576.16	9858.54	1575.78	9864.07	1575.74
9888.35	1574.9	9904.65	1574.53	9912.47	1574.41	9916.61	1574.56	9928.84	1574.39
9953.02	1572.7	9964.83	1572.12	9972.91	1571.72	9983.03	1571.86	9988.82	1571.94
9991.76	1572.4	10016.18	1576.74	10024.56	1576.8	10044.5	1577.06	10054.04	1577.41
10065.94	157	10077.61	1578.12	10081.56	1578.04	10097.56	1577.62	10105.91	1577.62
10118.5	1577.6	10131.99	1577.29	10138.98	1577.24	10155.7	1577.03	10172.86	1576.93
10188.23	1576.8	10201.03	1576.8	10215.22	1576.87	10255.55	1577.18	10256.27	1577.19
10263.57	1578.1	10271.97	1573.96	10276.75	1573.06	10290.35	1575.26	10293.01	1575.42
10294.96	1575.4	10301.45	1574.91	10304.64	1575.25	10305.03	1575.86	10312.99	1575.77
10320.62	1576.2	10324.71	1576.2	10335.23	1576.87	10336.59	1576.97	10354.08	1577
10365.32	1576.7	10377.94	1576.35	10388.21	1576.02	10399.24	1576.21	10407.41	1576.22
10413.42	1576.2	10424.65	1576.54	10452.02	1576.78	10465.02	1576.66	10470.94	1576.62
10483.27	1576.8	10494.44	1576.78	10512.67	1576.69	10524.22	1576.67	10549.59	1576.63
10560.18	1576.6	10562.44	1576.59	10568.24	1576.62	10577.46	1576.97	10580.33	1577.18
10607.33	1576.9	10619.18	1576.75	10627.13	1576.58	10638.42	1576.64	10652.98	1576.53
10663.87	1576.9	10665.18	1577.15	10672.52	1577.19	10678.9	1577.18	10691.35	1576.61
10711.16	157	10712.16	1577.01	10714.42	1577.06	10724.93	1577.23	10740.34	1577.09
10741.09	1577.1	10759.15	1577.51	10760.93	1577.55	10791.19	1577.81	10804.66	1577.89
10815.62	157	10827.79	1578.1	10837.84	1578.14	10847.83	1578.26	10877.59	1577.69
10887.1	1577.6	10894.41	1577.49	10898.94	1577.61	10905.07	1577.65	10927.25	1578.16
10934.81	1578.3	10955.96	1578.38						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4327.1	.1	5226.15	.15	7160.89	.1	8004.84	.15	9928.84	.045
10016.18	.15								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9928.84	10016.18	280	118.36	118	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1576.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.129	0.045	0.150
W.S. Elev (ft)	1576.45	Reach Len. (ft)	280.00	118.36	118.00
Crit W.S. (ft)	1576.45	Flow Area (sq ft)	3289.25	286.56	90.40
E.G. Slope (ft/ft)	0.014565	Area (sq ft)	3289.25	286.56	90.40
Q Total (cfs)	7577.00	Flow (cfs)	4916.67	2544.26	116.07
Top Width (ft)	3822.33	Top Width (ft)	3627.81	85.69	108.82
Vel Total (ft/s)	2.07	Avg. Vel. (ft/s)	1.49	8.88	1.28
Max Chl Dpth (ft)	6.01	Hydr. Depth (ft)	0.91	3.34	0.83
Conv. Total (cfs)	62782.3	Conv. (cfs)	40739.1	21081.5	961.7
Length Wtd. (ft)	247.84	Wetted Per. (ft)	3638.17	86.17	110.07
Min Ch El (ft)	1571.72	Shear (lb/sq ft)	0.82	3.02	0.75
Alpha	6.54	Stream Power (lb/ft s)	1.23	26.85	0.96
Frctn Loss (ft)	3.04	Cum Volume (acre-ft)	550.06	5.75	14.57
C & E Loss (ft)	0.11	Cum SA (acres)	229.14	2.61	21.32

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4327.10	5727.54	2314.68	1359.52	1181.29	30.55	1.15	1.70
5727.54	7127.97	893.72	694.69	670.81	11.80	1.04	1.29
7127.97	8528.41	1227.68	778.62	1190.91	16.20	0.66	1.58
8528.41	9928.84	480.60	456.42	595.17	6.34	0.77	1.05
LB 9928.84	RB 10016.18	2544.26	286.56	86.17	33.58	3.34	8.88
10016.18	10955.96	116.07	90.40	110.07	1.53	0.83	1.28

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.279

INPUT
Description: RM.2.279. BLOCKED OUT INEFF. AREA BELOW EL.1570 AND BETWEEN STA. 5994 AND 6170 AT RET. BASIN. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 5891.39.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4265.03	1573.9	4268.87	1573.75	4287.66	1573.56	4288.69	1573.53	4289.44	1573.51
4298.34	1573.6	4303.69	1573.83	4315.59	1573.8	4330.1	1573.63	4334.29	1573.69
4338.84	1573.9	4340.61	1573.93	4348.57	1574.18	4351.65	1574.27	4356.66	1574.3
4373.5	1574.3	4380.22	1574.36	4434.76	1573.96	4474.83	1573.61	4481.99	1573.55
4492.63	1573	4493.55	1572.99	4495.54	1573.03	4540.04	1573.72	4553.5	1573.69
4554.34	1573.7	4557.8	1573.66	4586.72	1573.58	4590.46	1573.53	4602.05	1573.54
4615.83	1573.6	4631.18	1573.63	4636.53	1572.81	4641.11	1572.14	4660.56	1573.06
4671.07	1573.5	4680.03	1573.62	4729.16	1573.83	4729.26	1573.83	4729.45	1573.83
4740.7	1573.6	4743.97	1573.63	4756.63	1573.58	4765.51	1573.42	4784.85	1573.42
4796.97	1573.5	4805.73	1573.53	4808.3	1573.46	4818.19	1573.16	4868.53	1572.42
4901.2	1572.2	4913.37	1572.19	4920.65	1571.89	4927.91	1571.79	4933.85	1571.89
4938.87	1571.9	4947.91	1571.52	4952.96	1571.51	4959.59	1571.67	4961.55	1571.75
4990.49	1572.2	4993.97	1572.2	5002.56	1572.24	5012.22	1572.25	5020.96	1572.35
5025.28	1572.4	5038.05	1572.52	5044.34	1572.61	5051.27	1572.66	5112.34	1572.87
5118.72	1572.9	5135.47	1572.67	5145.9	1572.64	5146.41	1572.63	5149.16	1572.55
5163.33	1572.1	5164.32	1572.07	5165.75	1571.98	5166.87	1571.99	5169.33	1571.98
5170.94	1572	5186.12	1572.24	5192.75	1572.45	5197.35	1572.5	5212.96	1572.22
5230.28	1572.4	5236.67	1572.53	5243.14	1572.67	5250.71	1572.88	5270.89	1573.09
5317.04	1572.9	5353.24	1572.44	5356.54	1572.6	5360.6	1572.93	5365.06	1572.75
5371.62	1572.2	5374.91	1571.96	5385.22	1569.08	5390.98	1567.31	5392.38	1567.44

5410.85	1572.7	5411.21	1572.78	5424.49	1572.5	5430.17	1572.55	5445.28	1572.66
5481.83	1572.3	5486.91	1572.28	5502.22	1572.27	5515.88	1572.25	5535.4	1572.19
5547.71	1572.2	5550.9	1572.17	5569.54	1572.19	5579.35	1571.67	5593.89	1571
5604.44	1570.6	5608.78	1570.43	5612.24	1570.41	5614.89	1570.37	5660.4	1570.54
5669.93	1571.3	5677.33	1571.84	5682.42	1571.75	5693.48	1571.58	5695.98	1571.63
5697.48	1571.6	5723.1	1571.97	5734.02	1572.2	5747.91	1572.75	5757.57	1572.93
5762.84	1572.7	5768.17	1572.66	5775	1572.53	5781.18	1572.3	5787.75	1572.01
5796.61	1572.1	5807.43	1572.22	5826.74	1572.42	5845.62	1572.59	5855.45	1573.03
5877.44	1573.6	5882.05	1573.77	5884.63	1573.82	5891.39	1573.87	5893.16	1573.82
5894.83	1573.8	5908.62	1573.74	5911.97	1573.74	5916.64	1573.67	5923.32	1573.61
5943.84	1573.4	5961.14	1573.15	5978.13	1572.93	5994	1570.18	6032.47	1563.13
6045.5	1563.3	6105.44	1563.75	6107.66	1563.77	6113.81	1563.83	6124.62	1564.15
6152.2	1568.1	6187.85	1572.85	6190.06	1573.48	6199.13	1575.36	6234.23	1575.38
6240.78	1575.4	6245.43	1575.4	6249.85	1575.44	6293.33	1575.04	6316.47	1574.82
6332.62	1573.9	6338.59	1573.56	6344.67	1573.26	6364.4	1573.19	6382.37	1573.1
6395.53	1573.6	6413.38	1574.19	6427.06	1574.15	6444.68	1574.1	6492.68	1573.96
6548.68	1573.5	6574.23	1573.08	6581.39	1573.06	6585.7	1572.77	6603.5	1571.73
6614.24	1572	6624.23	1571.98	6642.38	1571.87	6654.55	1572.29	6671.24	1572.93
6671.74	1572.9	6672.18	1572.94	6751.56	1573.88	6753.76	1572.48	6760.82	1571.49
6770.04	1573.7	6793.1	1573.46	6793.16	1573.31	6797.09	1571.71	6800.61	1572.85
6805.21	1572.7	6813.96	1572.43	6818.29	1572.44	6823.27	1572.41	6829.03	1572.39
6831.02	1572.3	6832.56	1572.3	6833.47	1572.32	6837.25	1572.31	6842.97	1572.3
6867.03	1572.2	6867.27	1572.54	6877.61	1574.04	6882.67	1574.56	6885.5	1574.21
6904.48	1572.1	6909.13	1572.51	6921.34	1573.34	6938.98	1573.54	6960.89	1573.8
6967.16	1573.9	6992.4	1574.04	7103.92	1573.66	7111.58	1573.64	7117.32	1573.63
7183.05	1573	7242.27	1573.4	7254.09	1573.53	7270.75	1573.5	7336.42	1573.47
7351.45	1573.3	7374.28	1573.15	7384.69	1573.17	7408.6	1572.95	7420.9	1572.88
7427.08	1572.4	7438.36	1571.82	7440.32	1571.82	7441.82	1571.83	7466.25	1572
7484.05	1571.6	7486.87	1571.6	7499.11	1571.48	7505.03	1571.83	7518.99	1572.77
7528.11	1572.7	7546.9	1572.42	7604.41	1572.51	7617.07	1572.5	7654.79	1572.4
7741.99	1572.2	7769.86	1572.18	7831.94	1572.6	7834.2	1572.47	7837.63	1572.56
7850.94	1572.4	7870.34	1572.43	7873.4	1572.41	7873.83	1572.4	7887.4	1572.22
7906.57	1572.1	7909.16	1572	7916.71	1571.79	7931.95	1571.12	7933.08	1571.29
7936.79	1571.9	7945.34	1573.16	7948.43	1573.47	7964.36	1572.96	7972.98	1572.21
8000.84	1572.3	8031.51	1572.41	8046.04	1572.52	8051.79	1572.52	8055.81	1572.57
8065.82	1572.5	8073.44	1572.42	8074.22	1572.41	8076.18	1572.39	8097.58	1571.95
8109.13	1571.8	8113.3	1571.8	8120.99	1571.73	8143.06	1572.08	8167.9	1572.51
8182.69	1572.6	8213.02	1573.77	8224	1573.71	8250.37	1573.67	8251.66	1573.7
8259.55	1573.7	8276.9	1573.73	8288.16	1573.71	8296.58	1573.73	8331.24	1573.62
8342.31	1573.4	8343.79	1573.7	8357.82	1573.55	8373.55	1573.47	8392.89	1573.35
8469.05	1572.6	8477.22	1572.71	8481.59	1572.67	8513.79	1572.86	8513.88	1572.6
8529.93	1573.2	8536.85	1573.4	8582.51	1573.02	8602.19	1572.85	8606.52	1572.8
8608.3	1572.8	8613.27	1572.67	8621.99	1572.71	8653.24	1572.73	8663.28	1572.7
8665.51	1572.7	8692.2	1572.09	8694.38	1572.14	8717.8	1572.02	8732.13	1571.95
8734.45	1571.9	8752.5	1571.84	8769.24	1572.02	8780.44	1572.17	8802.42	1572.4
8804.67	1572.4	8829.9	1572.43	8835.06	1572.45	8850.35	1572.51	8862.3	1572.62
8872.24	1572.6	8880.55	1572.59	8900.72	1572.66	8904.58	1572.67	8925.04	1572.83
8926.06	1572.8	8929.64	1572.86	8944.83	1572.82	8950.58	1572.87	8971.27	1573.12
8977.73	1573.2	8981.52	1573.24	9013.99	1573.43	9019.84	1573.26	9045.96	1573.24
9052.53	1573.2	9065.07	1573.39	9067.45	1573.35	9069.56	1573.56	9071.41	1573.58
9088.51	1573.6	9101.67	1573.29	9105.57	1573.48	9115.81	1573.73	9118.95	1573.78
9120.62	1573.8	9138.79	1573.74	9146.48	1573.68	9167.6	1573.65	9199.91	1573.3
9211.23	1573.2	9217.39	1573.22	9220.23	1573.21	9230.09	1573.86	9233.44	1573.74
9278.65	1573.5	9280.44	1573.52	9288.44	1573.5	9290.76	1573.59	9317.87	1573.99
9321.61	1574	9322.06	1574.03	9329.75	1574.02	9416.34	1573.53	9422.19	1573.53
9429.27	1573.5	9438.03	1573.42	9490.03	1573.45	9509.41	1574.34	9521.03	1575.17
9534.66	1575.2	9561.3	1575.24	9578.83	1574.2	9586.7	1573.96	9594.02	1573.65

9603.08	1574.7	9616.2	1576.04	9617.46	1576.08	9621.47	1576.31	9622.98	1576.35
9658.17	1575.6	9667.41	1575.42	9679.8	1574.24	9686.57	1573.65	9689.45	1574.31
9703.33	1577.5	9708.72	1577.25	9733.93	1577.45	9754.74	1577.38	9769.84	1577.18
9784.2	1577.1	9845.72	1576.9	9875.65	1576.12	9881.9	1575.94	9887.1	1575.75
9911.99	1575.1	9931.99	1574.95	9970.15	1574.23	9975.79	1572.28	9977.5	1571.68
9986.13	1571.2	10000.13	1570.42	10008.25	1572.13	10019.65	1575.25	10039.26	1576.05
10039.39	1576.1	10040.56	1576.07	10082.21	1576.41	10088.17	1576.5	10089.6	1576.6
10107.29	1578.2	10110.49	1578.31	10117.09	1577.34	10118.87	1577.08	10126.74	1576.21
10135.68	1575.9	10148.81	1575.85	10163.62	157	610200.91	1576.33	10225.21	1576.55
10229.41	1576.6	10235.38	1575.44	10238.94	1574.73	10240.43	1574.51	10252.36	1570.58
10254.58	1569.9	10255.1	1569.98	10255.54	1570.07	10271.73	1574.02	10275.12	1574.13
10286	1574.1	10315.31	1574.62	10334.42	1575.15	10336.99	1575.29	10341.25	1575.46
10358.42	1575.7	10364.56	1575.15	10372.18	1574.87	10375.27	1574.99	10400.1	1576.29
10401.47	1576.4	10401.51	1576.36	10401.66	1576.36	10448.4	1574.99	10450.33	1575
10453.89	1575.1	10456.72	1575.11	10461.37	1575.09	10481.87	1575.44	10485.3	1575.48
10486.7	1575.5	10511.35	1575.99	10541.3	1576.41	10543.26	1576.46	10561.89	1575.78
10568.97	1575.3	10577.05	1575.61	10579.21	1575.69	10579.92	1575.71	10620.24	1575.7
10631.43	1575.8	10643.59	1575.94	10650.57	1576.07	10665.92	1576.79	10668.76	1576.97
10682.34	1577.2	10696.74	1574.92	10696.96	1574.91	10697.05	1574.87	10697.53	1574.89
10717.05	1576	10739.3	1576.07						

Manning's n Values num= 8

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4265.03	.1	5410.85	.15	6800.61	.1	8055.81	.15	8481.59	.1
9101.67	.15	9911.99	.045	10039.39	.15				

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9911.99	10039.39	800	96.77	96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1573.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.140	0.045	0.150
W.S. Elev (ft)	1573.06	Reach Len. (ft)	800.00	96.77	96.00
Crit W.S. (ft)	1568.88	Flow Area (sq ft)	3361.03	64.20	36.83
E.G. Slope (ft/ft)	0.010494	Area (sq ft)	3361.03	64.20	36.83
Q Total (cfs)	7577.00	Flow (cfs)	7222.52	304.51	49.97
Top Width (ft)	2834.46	Top Width (ft)	2773.41	38.10	22.95
Vel Total (ft/s)	2.19	Avg. Vel. (ft/s)	2.15	4.74	1.36
Max Chl Dpth (ft)	9.93	Hydr. Depth (ft)	1.21	1.69	1.60
Conv. Total (cfs)	73964.3	Conv. (cfs)	70504.0	2972.6	487.8
Length Wtd. (ft)	781.82	Wetted Per. (ft)	2778.47	38.67	23.82
Min Ch El (ft)	1570.42	Shear (lb/sq ft)	0.79	1.09	1.01
Alpha	1.11	Stream Power (lb/ft s)	1.70	5.16	1.37
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	528.69	5.27	14.40
C & E Loss (ft)	0.02	Cum SA (acres)	208.57	2.44	21.14

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4265.03	5676.77	1240.10	789.93	873.94	16.37	0.91	1.57
5676.77	7088.51	4786.44	1726.40	616.53	63.17	2.81	2.77

7088.51	8500.25	901.36	618.74	873.71	11.90	0.71	1.46
8500.25	9911.99	294.62	225.95	414.28	3.89	0.55	1.30
LB 9911.99	RB 10039.39	304.51	64.20	38.67	4.02	1.69	4.74
10039.39	10739.30	49.97	36.83	23.82	0.66	1.60	1.36

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.261**

INPUT
Description: RM. 2.261. HORZ. N VALUES USED. UPSTREAM EDGE OF CAP CANAL. RAS.I.D.3 =SEC. STA.49+50=CAP STA.479+00=(5) 72"DIA. RAS. I.D.2=SEC. STA.58+10=CAP STA.471+03=(3) 72"DIA RAS.I.D.1=SEC.STA. 73+00=CAP STA.456+50=(2)60" DIA RAS.I.D.4&5=SEC.STA.100+00&102+30=CAP STA.429+20&427+15 =(3) 72"DIA/EA.

Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71
5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77
5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53

6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24
7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89
7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48
7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19
8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76
9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.4	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06

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10199.79  1571.210216.14 1572.5310238.57 1571.1610244.57 1571.1510247.77 1571.17
10292.94  1576.610314.28 1576.7510322.46 1576.7810330.24 1576.8510331.52 1576.85
10342.54    157710353.36 1576.87 10363.5 1576.8410377.66 1576.7810386.92 1576.78
10404.98  1576.110417.27  1576.9 10420.3 1576.9310421.82 1576.8610442.08 1575.88
 10444.5  1575.810445.01 1575.7510470.55 1575.3310472.82 1575.3910487.11 1575.25
10501.53  1575.110515.54 1575.2310535.23 1576.5410540.36 1576.5410553.28 1575.48
10567.76  1575.410591.47 1575.5210596.97 1575.6310602.07 1575.59

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4349.26      .1 9192.94     .15  9949.1    .04510039.47     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9949.110039.47              200  200.58    200             .1        .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1573.06   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.00   Wt. n-Val.                0.100      0.045     0.150
  W.S. Elev (ft)            1573.06   Reach Len. (ft)          200.00     200.58    200.00
  Crit W.S. (ft)            1561.53   Flow Area (sq ft)      30127.43     126.33    240.92
  E.G. Slope (ft/ft)       0.000019   Area (sq ft)           30127.43     126.33    240.92
  Q Total (cfs)             7577.00   Flow (cfs)              7539.98      26.15     10.88
  Top Width (ft)            4781.19   Top Width (ft)          4484.76      72.41    224.03
  Vel Total (ft/s)             0.25   Avg. Vel. (ft/s)           0.25       0.21      0.05
  Max Chl Dpth (ft)           15.66   Hydr. Depth (ft)           6.72       1.74      1.08
  Conv. Total (cfs)        1742762.9  Conv. (cfs)            1734247.3     6013.8    2501.9
  Length Wtd. (ft)           200.58   Wetted Per. (ft)        4493.72      72.98    224.45
  Min Ch El (ft)            1570.01   Shear (lb/sq ft)           0.01       0.00      0.00
  Alpha                        1.01   Stream Power (lb/ft s)     0.00       0.00      0.00
  Frctn Loss (ft)                     Cum Volume (acre-ft)     221.17       5.06     14.09
  C & E Loss (ft)                     Cum SA (acres)           141.92       2.32     20.87

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta        Flow       Area       W.P.    % Conv.    Hydr D.   Velocity
  (ft)         (ft)             (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  4349.26      5749.22         273.03    2247.74    799.97       3.60       2.82       0.12
  5749.22      7149.18        2401.13   10312.26   1382.86      31.69       7.48       0.23
  7149.18      8549.14        4563.80   15243.62   1402.00      60.23      10.89       0.30
  8549.14      9949.10         302.02    2323.83    908.88       3.99       2.56       0.13
  LB 9949.10   RB 10039.47      26.15     126.33     72.98       0.35       1.74       0.21
  10039.47     10602.07         10.88     240.92    224.45       0.14       1.08       0.05
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CULVERT **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.252**

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INPUT
Description: CULVERTS ACROSS CAP CANAL
Distance from Upstream XS =      25
Deck/Roadway Width        =     160
Weir Coefficient          =     2.8
Bridge Deck/Roadway Skew  =
Upstream  Deck/Roadway Coordinates
    num=      36
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

3778.9	1573.16	3935.44	1573.66	4002.7	1574
4172.27	1574.22	4291.03	1574.26	4357.67	1574.2
4390.75	1572.8	4414.56	1568.95	4491.44	1568.9
4526.71	1572.71	4562.88	1573.8	4856.47	1573.83
5266.74	1573.83	5303.49	1574.9	5398.9	1575
5460.86	1573.67	5714.85	1573.19	5801.62	1572.03
5824.78	1571.9	5855.78	1572.91	6153.43	1572.93
6347.31	1572.9	6588.98	1572.93	7286.17	1572.93
7403.63	1573.25	7905.82	1573.3	8097.17	1573.11
8300.29	1573.14	8306.43	1572.8	8410.8	1572.82
8508.59	1573.79	9436.01	1573.8	9530.22	1574.31
9716.23	1575.51	9730.42	1577.18	10431.6	1577.28

Upstream Bridge Cross Section Data
Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71
5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77
5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53
6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24

7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89
7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48
7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19
8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76
9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.4	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06
10199.79	1571.2	10216.14	1572.53	10238.57	1571.16	10244.57	1571.15	10247.77	1571.17
10292.94	1576.6	10314.28	1576.75	10322.46	1576.78	10330.24	1576.85	10331.52	1576.85
10342.54	157	7 10353.36	1576.87	10363.5	1576.84	10377.66	1576.78	10386.92	1576.78
10404.98	1576.1	10417.27	1576.9	10420.3	1576.93	10421.82	1576.86	10442.08	1575.88
10444.5	1575.8	10445.01	1575.75	10470.55	1575.33	10472.82	1575.39	10487.11	1575.25

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10501.53  1575.110515.54 1575.2310535.23 1576.5410540.36 1576.5410553.28 1575.48
10567.76  1575.410591.47 1575.5210596.97 1575.6310602.07 1575.59
Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4349.26      .1 9192.94     .15  9949.1    .04510039.47     .15

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9949.110039.47             .1       .3

Downstream  Deck/Roadway Coordinates
    num=      36
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
  3778.9 1572.66         3935.44 1573.16          4002.7  1573.5
 4172.27 1573.72         4291.03 1573.76         4357.67  1573.7
 4390.75  1572.3         4414.56 1568.45         4491.44  1568.4
 4526.71 1572.21         4562.88  1573.3         4856.47 1573.33
 5266.74 1573.33         5303.49  1574.4          5398.9  1574.5
 5460.86 1573.17         5714.85 1572.69         5801.62 1571.53
 5824.78  1571.4         5855.78 1572.41         6153.43 1572.43
 6347.31  1572.4         6588.98 1572.43         7286.17 1572.43
 7403.63 1572.75         7905.82  1572.8         8097.17 1572.61
 8300.29 1572.64         8306.43  1572.3          8410.8 1572.32
 8508.59 1573.29         9436.01  1573.3         9530.22 1573.81
 9716.23 1575.01         9730.42 1576.68         10431.6 1576.78

Downstream Bridge Cross Section Data
Station Elevation Data    num=     492
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 3625.97  1565.5 3632.59 1565.55 3656.69 1565.43 3670.32 1565.61 3685.64 1565.83
 3703.88  1565.8 3715.98 1565.84 3731.62 1569.85 3766.14 1568.83 3779.77  1565.5
 3790.08  1565.4 3803.14 1565.47 3851.91 1565.64  3856.4 1565.67 3873.41 1565.52
 3899.75    1565 3925.19 1565.02  3959.9 1570.78 3965.15 1571.13 4006.22 1567.56
  4008.3  1567.6 4012.16 1567.58 4020.39 1567.33 4049.92 1564.77 4078.79 1564.81
 4108.82  1564.7 4133.24 1571.32 4140.44 1571.65 4165.95 1564.07 4166.01 1564.07
 4166.38  1564.1 4208.01 1569.06 4215.59 1568.67 4241.71    1571 4247.24 1570.97
 4253.51  1570.9 4267.78 1570.92 4278.31 1571.37 4292.05 1571.22 4309.15 1569.92
 4323.38  1570.7 4325.23 1570.75 4343.13 1566.91 4362.37 1567.88 4376.85 1567.95
 4401.99  1568.1 4417.09 1567.21 4445.07 1567.73 4469.07 1568.11 4484.02 1567.93
 4492.99  1567.7 4521.03 1568.78 4528.85 1568.41 4539.23 1568.96 4570.77 1572.62
 4571.53  1572.6 4573.76  1572.6  4590.5 1573.89 4613.75 1571.72 4618.83 1571.28
 4622.04  1571.3 4642.73 1572.53 4643.94  1572.5 4645.31 1572.38 4646.77 1572.43
 4663.49  1572.2 4667.67 1572.12 4694.25  1570.5 4704.93 1570.51 4719.91 1571.95
 4729.86  1571.8 4745.36 1572.39  4749.8 1572.43 4762.47 1572.52 4772.53 1572.27
 4774.87  1572.2  4786.1 1572.18 4800.75 1570.65 4808.38  1572.1 4829.71  1571.4
 4838.11  1571.6 4845.85 1571.56 4889.44 1570.56 4889.72 1570.55 4889.81 1570.56
 4921.94  1572.6 4943.64 1571.21 4955.75 1570.45 4970.46 1571.48 4982.07 1572.68
 4988.87  1572.9 4991.39 1572.99 4992.29 1572.97 5005.11 1572.36  5051.7 1569.27
 5073.44  1572.5 5101.78 1572.66 5104.71 1572.83 5108.73 1573.09 5109.43 1573.08
 5112.37  1573.1  5116.5 1572.79 5173.45 1572.91  5175.9 1573.14 5202.46 1573.03
 5218.29     1573 5224.66 1572.58 5236.09 1572.53 5273.97 1572.27 5282.08  1572.4
 5303.03  1572.3 5310.71 1572.19 5324.72 1572.25 5343.71 1572.33 5361.65  1572.1
 5378.57  1572.1 5418.95 1575.17 5433.29 1575.26 5459.13    1575 5493.99  1574.9
 5501.97  1574.9 5509.68 1574.44 5523.68  1573.5 5543.04 1572.13 5557.18 1571.95
 5584.82  1571.4 5598.88 1571.52 5613.49 1571.07 5623.01 1570.67 5626.04 1570.54
 5634.22  1569.7 5655.07 1561.31 5656.41 1560.84 5657.57 1560.81 5660.38 1560.78
 5694.92  1560.9 5702.53 1561.05 5717.56 1566.72 5723.51 1569.79 5746.38 1570.67
 5755.66  1570.8  5758.3 1570.68 5773.84 1569.13 5780.45 1568.87 5807.63 1569.17
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5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96
6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49
6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7
6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
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8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87
8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
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8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
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8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
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9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
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 9727.97  1573.9 9734.41 1573.94 9737.25 1573.91 9742.93 1573.85 9779.14 1575.73
 9781.05  1575.8 9781.25 1575.72 9782.91 1575.88 9813.37  1568.4 9817.33 1568.12
  9822.3  1567.6 9832.96  1568.6 9854.98 1566.21 9855.44 1566.21 9860.61 1566.22
 9877.06    1567 9878.67 1567.04 9898.07 1568.33 9911.74 1569.02 9923.22 1569.07
 9941.11    1569 9948.16 1569.71 9965.35 1570.68 9977.72 1575.36  9985.5  1575.6
 9988.16  1575.6  9994.4 1575.2110016.91 1569.6610021.29 1569.5410040.06 1577.33
 10045.4  1577.410051.38 1577.2810065.78  1576.710076.98 1576.66 10113.7 1576.53
10138.07  1576.610147.19 1576.8810169.12 1576.7810170.27 1576.5310171.93 1575.99
10174.76  1575.210188.98 1569.9110194.75  1569.810209.58 1574.9710220.06 1574.76
10237.94    157510241.72  1575.210244.41 1575.1310249.36 1575.1910270.25 1575.77
10299.93  1575.310305.03 1575.2310308.94 1575.1610309.74 1575.1210333.08 1574.77
10348.08  1574.410348.82 1574.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 3625.97     .08  9994.4    .04510040.06     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9994.410040.06             .1       .3

Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 3625.97    7300  1560.5    850010348.82  1560.5

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  5

Culvert Name     Shape      Rise    Span
Culvert #3      Circular       6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 19     162       .012                   .9                1
Number of Barrels =  5
Upstream   Elevation =  1561
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4920    4928    4936    4944    4952
Downstream Elevation =  1560
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4860    4868    4876    4884    4892

Culvert Name     Shape      Rise    Span
Culvert #2      Circular       6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
```

```
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                10     180       .012                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1560
Centerline Stations
    Sta.    Sta.    Sta.
    5790    5798    5806
Downstream Elevation =  1558.7
Centerline Stations
    Sta.    Sta.    Sta.
    5680    5688    5696

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 5     190       .012                   .9                1
Number of Barrels =  2
Upstream   Elevation =  1555.2
Centerline Stations
    Sta.    Sta.
    7300    7306
Downstream Elevation =  1554.4
Centerline Stations
    Sta.    Sta.
    7200    7206

Culvert Name     Shape      Rise    Span
Culvert #4      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.8
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006
Downstream Elevation =  1567
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006

Culvert Name     Shape      Rise    Span
Culvert #5      Circular       6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.7
Centerline Stations
    Sta.    Sta.    Sta.
```

10220 10228 10236
Downstream Elevation = 1567
Centerline Stations
Sta. Sta. Sta.
10170 10178 10186

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.223**

INPUT
Description: RM. 2.223 . OWNSTREAM EDGE OF CAP CANAL.

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3625.97	1565.5	3632.59	1565.55	3656.69	1565.43	3670.32	1565.61	3685.64	1565.83
3703.88	1565.8	3715.98	1565.84	3731.62	1569.85	3766.14	1568.83	3779.77	1565.5
3790.08	1565.4	3803.14	1565.47	3851.91	1565.64	3856.4	1565.67	3873.41	1565.52
3899.75	1565	3925.19	1565.02	3959.9	1570.78	3965.15	1571.13	4006.22	1567.56
4008.3	1567.6	4012.16	1567.58	4020.39	1567.33	4049.92	1564.77	4078.79	1564.81
4108.82	1564.7	4133.24	1571.32	4140.44	1571.65	4165.95	1564.07	4166.01	1564.07
4166.38	1564.1	4208.01	1569.06	4215.59	1568.67	4241.71	1571	4247.24	1570.97
4253.51	1570.9	4267.78	1570.92	4278.31	1571.37	4292.05	1571.22	4309.15	1569.92
4323.38	1570.7	4325.23	1570.75	4343.13	1566.91	4362.37	1567.88	4376.85	1567.95
4401.99	1568.1	4417.09	1567.21	4445.07	1567.73	4469.07	1568.11	4484.02	1567.93
4492.99	1567.7	4521.03	1568.78	4528.85	1568.41	4539.23	1568.96	4570.77	1572.62
4571.53	1572.6	4573.76	1572.6	4590.5	1573.89	4613.75	1571.72	4618.83	1571.28
4622.04	1571.3	4642.73	1572.53	4643.94	1572.5	4645.31	1572.38	4646.77	1572.43
4663.49	1572.2	4667.67	1572.12	4694.25	1570.5	4704.93	1570.51	4719.91	1571.95
4729.86	1571.8	4745.36	1572.39	4749.8	1572.43	4762.47	1572.52	4772.53	1572.27
4774.87	1572.2	4786.1	1572.18	4800.75	1570.65	4808.38	1572.1	4829.71	1571.4
4838.11	1571.6	4845.85	1571.56	4889.44	1570.56	4889.72	1570.55	4889.81	1570.56
4921.94	1572.6	4943.64	1571.21	4955.75	1570.45	4970.46	1571.48	4982.07	1572.68
4988.87	1572.9	4991.39	1572.99	4992.29	1572.97	5005.11	1572.36	5051.7	1569.27
5073.44	1572.5	5101.78	1572.66	5104.71	1572.83	5108.73	1573.09	5109.43	1573.08
5112.37	1573.1	5116.5	1572.79	5173.45	1572.91	5175.9	1573.14	5202.46	1573.03
5218.29	1573	5224.66	1572.58	5236.09	1572.53	5273.97	1572.27	5282.08	1572.4
5303.03	1572.3	5310.71	1572.19	5324.72	1572.25	5343.71	1572.33	5361.65	1572.1
5378.57	1572.1	5418.95	1575.17	5433.29	1575.26	5459.13	1575	5493.99	1574.9
5501.97	1574.9	5509.68	1574.44	5523.68	1573.5	5543.04	1572.13	5557.18	1571.95
5584.82	1571.4	5598.88	1571.52	5613.49	1571.07	5623.01	1570.67	5626.04	1570.54
5634.22	1569.7	5655.07	1561.31	5656.41	1560.84	5657.57	1560.81	5660.38	1560.78
5694.92	1560.9	5702.53	1561.05	5717.56	1566.72	5723.51	1569.79	5746.38	1570.67
5755.66	1570.8	5758.3	1570.68	5773.84	1569.13	5780.45	1568.87	5807.63	1569.17
5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96
6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49

6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7
6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
7867.2	1559.1	7886.38	1559.95	7912.54	1560.36	7912.67	1560.37	7935.49	1560.59
7949.09	1560.5	7954.1	1560.5	7958.26	1560.57	7970.55	1560.53	7994.48	1566.17
8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87
8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
8270.5	1554.3	8288.83	1555.7	8295.32	1555.89	8307.63	1558.89	8310.76	1560.59
8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
8377.18	1561.6	8380.27	1561.66	8404.61	1561.91	8415.47	1562.14	8436.55	1562.05
8438.21	1562.1	8459.8	1562.89	8461.09	1562.91	8481.78	1562.83	8484.82	1563.14
8503.98	1563.6	8505.95	1563.6	8510.97	1563.65	8551.82	1564.36	8557.83	1564.44
8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
8825.79	1567.4	8836.1	1567.34	8848.28	1567.13	8856.1	1567.16	8883.37	1567.63
8889.52	1567.8	8894.81	1567.75	8901.15	1567.52	8912.17	1567.35	8927.49	1567.78
8935.05	1567.9	8949.24	1568.22	8956.34	1568.22	8978.6	1568.38	8982.37	1568.66
9012.09	1568.8	9030.23	1568.57	9049.15	1569.91	9055.98	1570.57	9081.9	1571.86
9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
9599.89	1572.8	9603.16	1572.75	9609.05	1572.62	9632.08	1573.43	9644.83	1572.95
9675.34	1573.1	9684.59	1573.3	9687.16	1573.46	9695.67	1573.48	9716.26	1573.95
9727.97	1573.9	9734.41	1573.94	9737.25	1573.91	9742.93	1573.85	9779.14	1575.73
9781.05	1575.8	9781.25	1575.72	9782.91	1575.88	9813.37	1568.4	9817.33	1568.12
9822.3	1567.6	9832.96	1568.6	9854.98	1566.21	9855.44	1566.21	9860.61	1566.22
9877.06	1567	9878.67	1567.04	9898.07	1568.33	9911.74	1569.02	9923.22	1569.07
9941.11	1569	9948.16	1569.71	9965.35	1570.68	9977.72	1575.36	9985.5	1575.6
9988.16	1575.6	9994.4	1575.21	10016.91	1569.66	10021.29	1569.54	10040.06	1577.33
10045.4	1577.41	0051.38	1577.28	10065.78	1576.71	0076.98	1576.66	10113.7	1576.53
10138.07	1576.61	0147.19	1576.88	10169.12	1576.78	10170.27	1576.53	10171.93	1575.99
10174.76	1575.21	0188.98	1569.91	10194.75	1569.81	0209.58	1574.97	10220.06	1574.76
10237.94	157	10241.72	1575.21	0244.41	1575.13	10249.36	1575.19	10270.25	1575.77
10299.93	1575.31	0305.03	1575.23	10308.94	1575.16	10309.74	1575.12	10333.08	1574.77
10348.08	1574.41	0348.82	1574.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3625.97	.08	9994.4	.04	5100	40.06	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
9994.41	40.06	400	1069.12	900	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
3625.97	7300	1560.5	8500	10348.82	1560.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1563.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.080		
W.S. Elev (ft)	1563.03	Reach Len. (ft)	400.00	1069.12	900.00
Crit W.S. (ft)	1560.75	Flow Area (sq ft)	3438.93		
E.G. Slope (ft/ft)	0.003730	Area (sq ft)	3438.93		
Q Total (cfs)	7577.00	Flow (cfs)	7577.00		
Top Width (ft)	1403.91	Top Width (ft)	1403.91		
Vel Total (ft/s)	2.20	Avg. Vel. (ft/s)	2.20		
Max Chl Dpth (ft)	10.03	Hydr. Depth (ft)	2.45		
Conv. Total (cfs)	124058.4	Conv. (cfs)	124058.4		
Length Wtd. (ft)	402.89	Wetted Per. (ft)	1408.93		
Min Ch El (ft)	1569.54	Shear (lb/sq ft)	0.57		
Alpha	1.00	Stream Power (lb/ft s)	1.25		
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	144.11	4.77	13.54
C & E Loss (ft)	0.00	Cum SA (acres)	128.40	2.15	20.36

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5218.08	6810.19	205.91	111.66	57.76	2.72	1.96	1.84
6810.19	8402.29	7328.00	3277.14	1269.68	96.71	2.59	2.24
8402.29	9994.40	43.09	50.13	81.49	0.57	0.62	0.86

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.020

INPUT
Description: RM. 2.020 HYDRAULIC BASELINE CROSSES NEAR APACHE TRAIL.

Station Elevation Data num= 497

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4416.03	1564.7	4419.76	1564.68	4427.4	1564.64	4478.38	1564.37	4487.59	1564.26
4512.93	1564.1	4528.39	1564.09	4531.87	1564.42	4536.52	1564.52	4543.78	1564.77
4551.69	1565.8	4564.13	1566.02	4580.37	1566.02	4581.22	1565.98	4582.47	1565.98
4632.37	1565.3	4651.33	1564.52	4651.47	1564.51	4651.58	1564.51	4651.85	1564.5
4663.64	1564.2	4668.38	1563.98	4675.87	1563.66	4696.32	1564.08	4699.99	1564.17
4707.97	1564	4719.09	1563.86	4725.98	1563.82	4727.53	1563.83	4804.25	1563.5
4824.99	1563.1	4836.57	1563.21	4870.07	1562.71	4873.06	1562.62	4883.14	1561.74
4883.67	1561.7	4883.8	1561.69	4901.53	1562.5	4908.73	1562.63	4940.66	1562.54
4969.42	1562.5	5012.29	1562.15	5022.34	1562.06	5025.97	1562.62	5048.24	1565.68
5054.13	1565.6	5072.06	1565.45	5080.52	1565.42	5101.59	1565.09	5113.22	1564.86
5118.64	1564.3	5127.53	1562.98	5132.7	1562.43	5184.75	1562.05	5206.87	1562
5228.41	1562.1	5236.62	1561.86	5237.16	1561.84	5237.94	1561.88	5242.23	1562.12
5261.11	1563.1	5271.58	1562.89	5293.88	1562.42	5300.62	1562.4	5310.37	1562.45
5319.79	1562.7	5332.69	1562.95	5344.87	1562.7	5366.12	1562.29	5413.64	1561.57
5439.89	1561.1	5456.03	1561.16	5459.38	1561.1	5471.54	1561.15	5483.08	1561.19
5517.43	1561.3	5526.3	1561.41	5569.71	1562.12	5579.31	1562.3	5582.62	1562.34
5593.06	1562.4	5622.23	1562.39	5635.67	1561.27	5642.42	1560.86	5646.08	1560.47
5654.72	1560.3	5659.38	1560.48	5660.17	1560.47	5669.61	1560.46	5712.05	1560.34
5721.16	1559	5725.68	1558.12	5731.78	1559.4	5738.32	1561.07	5752.6	1561.41
5772.83	1561.4	5789.07	1561.01	5808.36	1562.06	5834.45	1563.46	5847.45	1562.8
5852.59	1562.6	5859.1	1562.45	5903.95	1562.01	5934.26	1561.58	5945.12	1561.4
5962.01	1561.3	6008.96	1560.78	6019.74	1561.29	6049.6	1562.7	6052.87	1562.83
6073.49	1563.1	6107.82	1562.85	6145.96	1562.11	6182.97	1561.94	6184.27	1561.93
6185.89	1561.9	6191.97	1561.94	6242.7	1562.22	6263.54	1562.06	6266.24	1562.06
6271.41	1562.2	6287.57	1562	6301.58	1561.95	6307.39	1561.96	6340.53	1562.57
6379.1	1563.5	6409.55	1562.43	6429.48	1561.97	6436.61	1562.11	6481.23	1563.42
6497.46	1563.9	6512.13	1564.17	6512.56	1564.17	6528.06	1561.99	6535.33	1560.93
6555.96	1563.1	6556.71	1563.15	6557.11	1563.15	6597.45	1562.79	6610.75	1562.9
6624.53	1563.1	6628.57	1563.07	6652.13	1563.18	6659.71	1563.21	6666.11	1563.17
6695.65	1563.1	6708.51	1563.14	6728.89	1563.27	6730.52	1563.3	6751.65	1563.51
6767.88	1563.7	6802.96	1563.97	6804.89	1563.99	6840.18	1563.18	6853.92	1562.91
6891.71	1563.2	6897.73	1563.14	6901.62	1563.22	6904.2	1563.3	6904.99	1563.31
6906.68	1563.3	6911.08	1563.3	6934.2	1563.38	6939.88	1562.65	6960.12	1562.41
6967.4	1563.5	6997.8	1563.83	7003.54	1563.81	7006.74	1563.8	7036.76	1563.73
7042.45	1563.8	7068.93	1563.64	7085.04	1563.62	7090.07	1563.49	7098.84	1563.46
7119.04	1563.5	7132.08	1563.42	7142.8	1563.31	7155.49	1563.26	7177.52	1562.82
7183.47	1562.8	7205.68	1562.13	7212.72	1562.1	7224.16	1561.79	7231.82	1561.72
7261.2	1562	7281.11	1561.75	7288.92	1561.68	7305.12	1561.46	7320.57	1561.01
7324.32	1561	7328.21	1560.96	7344.46	1561.01	7349.29	1561.25	7373.9	1560.66
7381.67	1560.4	7401.74	1560.3	7408.27	1560.93	7417.42	1562.23	7440.46	1563.42
7441.68	1563.5	7443.91	1563.56	7448.94	1562.55	7458.24	1560.82	7465.48	1560.68
7484.34	1560.2	7538.29	1559.36	7563.41	1559.19	7617.81	1559.01	7634.77	1559.28
7638.55	1559.3	7650.23	1559.32	7661.22	1559.38	7675.85	1558.7	7694.35	1558.73
7711.09	1559.3	7731.88	1559.29	7734.08	1559.41	7739.34	1559.26	7762.81	1559.34
7767.51	1559.4	7781.64	1558.92	7789.61	1558.78	7793.19	1558.86	7794.39	1558.87
7803.71	1559.1	7827.63	1559.93	7839.51	1560.25	7846.92	1562.16	7850.54	1562.76
7865.35	1557	7867.04	1556.07	7872.06	1556.06	7914.63	1555.73	7915.76	1556.27
7925.26	1560.7	7926.95	1561.49	7943.88	1561.77	7948.8	1561.8	7974.14	1561.98
8002.17	1561.6	8011.3	1561.76	8025.62	1561.5	8029.53	1561.45	8033.6	1561.3
8042.88	1559.7	8069.25	1559.5	8071.56	1559.38	8074.05	1559.28	8081.25	1559.46
8087.89	1559.5	8090.8	1559.69	8091.04	1559.69	8091.32	1559.69	8112.61	1558.85
8122.6	1558.9	8136.87	1558.57	8145.51	1558.62	8166.35	1558.19	8169.19	1558.2
8173.24	1558.2	8183.14	1558.6	8189.88	1558.69	8198.4	1558.08	8209.99	1557.9
8228.93	1558.2	8232.41	1558.24	8235.05	1558.27	8247.7	1558.3	8253.43	1558.32
8254.23	1558.3	8272.17	1558.61	8273.58	1558.61	8277.31	1558.62	8298.11	1559.09

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 8314.21  1558.7 8329.54 1558.99 8340.69 1559.07 8349.78 1558.95 8359.56 1559.16
 8369.87  1559.2 8403.57 1560.53 8415.35 1560.89  8420.7 1560.84 8436.23 1560.04
 8442.36     1560 8448.83 1559.65 8458.26 1559.53 8466.34 1559.28 8514.84 1558.96
 8527.37  1558.9 8540.77 1558.71 8557.29 1559.36 8574.95 1559.38 8587.84 1558.67
 8614.95  1558.7 8619.29 1558.74 8624.34 1558.93 8630.51 1559.22 8642.77 1559.81
 8645.14  1559.9 8660.68 1559.87 8668.92 1559.97 8677.86 1560.06 8735.41 1560.04
 8744.07     1560 8754.97 1559.91 8766.22 1559.88  8807.9 1560.03 8815.29 1559.85
 8826.38  1560.2 8835.26 1559.72 8841.77 1559.79 8850.74  1559.8 8854.03 1559.71
 8868.57  1559.2 8878.75  1558.8 8881.32 1558.69 8888.14  1558.7    8902 1558.43
  8909.5  1558.4 8918.97 1558.25 8921.82 1558.15  8923.1 1558.21 8931.77 1558.27
 8937.66  1558.4 8943.98 1558.22 8952.65 1558.27 8965.17 1558.31 9004.26 1558.85
 9008.41  1558.9 9008.86 1558.91  9009.3 1558.92 9009.77 1558.92 9010.52 1558.94
 9065.04  1560.1 9069.96 1560.21 9075.38  1560.4 9084.27 1560.68 9104.21 1560.86
  9108.4     1561 9114.67 1561.02 9150.47  1561.6 9160.82 1561.77 9163.69 1561.82
 9189.84     1562 9234.74 1562.22  9240.3 1562.26 9245.64  1562.3 9249.02 1562.33
 9252.21  1562.3 9270.21 1562.41 9272.06 1562.42 9294.74 1562.42  9301.9 1562.42
 9329.43  1562.2 9359.25 1562.15 9372.12 1562.02 9385.27 1562.13 9396.02 1561.86
 9408.48  1561.7 9416.71 1561.88 9433.04 1562.35  9442.2 1562.61 9473.44 1562.78
 9497.73  1562.7 9501.59 1562.65 9505.34 1562.62  9534.3 1562.51 9561.11 1562.48
 9563.95  1562.5  9568.6 1562.56 9577.56 1562.61 9592.98  1562.7 9612.57 1562.83
 9624.12  1562.9 9635.21 1563.11  9641.9 1562.91 9648.37 1562.67 9657.52 1562.24
 9666.44  1562.1 9669.93  1562.4 9685.73 1563.15 9701.34 1563.26 9730.48 1563.46
  9730.6  1563.5 9730.67 1563.46 9730.99 1563.45 9752.33 1563.06 9753.78  1563.1
 9771.17  1563.5 9788.67 1563.43 9809.78  1563.5 9822.43 1563.36 9829.57 1563.55
 9831.42  1563.6 9863.72 1564.07 9895.44 1564.38 9904.13 1564.49 9912.86 1564.43
 9929.31  1564.5 9959.35 1564.47 9980.27 1563.98 9996.46 1563.0410000.98 1561.55
10007.24  1559.310024.99 1563.7110025.45 1563.8310026.29  1563.810053.97 1562.81
10060.39  1562.810062.63 1562.6710107.32  1563.110122.28 1563.7810129.23    1564
10143.42  1564.510146.04 1564.4810153.09 1564.3810170.67 1563.4810177.98 1563.64
10188.63  1563.710193.55  1563.710204.41 1563.9210215.68 1563.3410216.65 1563.32
10224.76  1563.410242.98 1563.4110264.07 1563.6910268.96 1563.5410280.26 1563.55
10293.39    156410309.12 1564.23 10310.9 1564.2410328.53 1564.4910346.01 1564.32
 10349.7  1564.310352.72 1564.0610374.27    156310376.77 1563.0310380.57  1563.1
   10392  1563.410401.67 1563.7710410.54 1563.2110410.89 1563.19 10418.5 1563.35
 10442.7  1563.910443.45 1563.9210445.29 1563.8910454.58 1563.8110457.78 1563.98
10471.52  1564.110482.78 1564.1310485.83 1564.1210494.29 1564.2710513.91 1564.39
10528.86  1564.310540.81 1563.9810574.84 1563.9810590.15 1563.8810601.09 1564.11
10624.42  1564.310634.43 1564.2910654.42 1564.3110665.38 1564.2910669.94 1564.22
10681.93  1564.310687.01 1564.3110690.85 1564.3610699.96  1564.810711.65 1565.21
 10749.2  1565.210755.36 1565.1210767.07 1565.1210801.02 1563.1610805.77 1562.82
10826.67  1564.210843.54 1564.9310845.62 1564.98 10846.3 1564.9510848.87  1564.9
10853.38  1564.810895.48 1564.2610907.08  1562.710913.98 1560.3210925.13 1559.71
10936.63  1560.910949.32 1563.1710973.86 1565.9810974.35 1566.03 10974.9 1565.96
10986.28  1564.510995.21 1564.4311007.73 1565.3211020.06 1566.1711021.46 1566.33
 11026.1  1566.211026.78 1566.19

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4416.03     .08 9929.31    .04510025.45     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9929.3110025.45              500  646.55     500             .1       .3

Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    8100    8400    1560
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1561.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1561.48	Reach Len. (ft)	500.00	646.55	500.00
Crit W.S. (ft)	1560.01	Flow Area (sq ft)	3793.75	16.15	32.69
E.G. Slope (ft/ft)	0.004017	Area (sq ft)	3793.75	16.15	32.69
Q Total (cfs)	7577.00	Flow (cfs)	7501.07	34.78	41.15
Top Width (ft)	2099.30	Top Width (ft)	2055.23	14.83	29.24
Vel Total (ft/s)	1.97	Avg. Vel. (ft/s)	1.98	2.15	1.26
Max Chl Dpth (ft)	5.75	Hydr. Depth (ft)	1.85	1.09	1.12
Conv. Total (cfs)	119550.9	Conv. (cfs)	118352.9	548.7	649.3
Length Wtd. (ft)	501.49	Wetted Per. (ft)	2059.12	15.47	29.56
Min Ch El (ft)	1559.30	Shear (lb/sq ft)	0.46	0.26	0.28
Alpha	1.00	Stream Power (lb/ft s)	0.91	0.56	0.35
Frctn Loss (ft)	3.50	Cum Volume (acre-ft)	110.91	4.57	13.20
C & E Loss (ft)	0.00	Cum SA (acres)	112.52	1.97	20.06

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4416.03	5794.35	152.43	170.00	273.50	2.01	0.62	0.90
5794.35	7172.67	17.85	30.85	95.73	0.24	0.32	0.58
7172.67	8550.99	5131.59	2444.39	1097.77	67.73	2.23	2.10
8550.99	9929.31	2199.20	1148.51	592.11	29.02	1.94	1.91
LB 9929.31	RB 10025.45	34.78	16.15	15.47	0.46	1.09	2.15
10025.45	11026.78	41.15	32.69	29.56	0.54	1.12	1.26

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 1.898

INPUT
Description: RM .1.898

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4844.98	1559.8	4853.05	1559.81	4868.58	1559.9	4871.63	1559.82	4881.93	1559.91
4891.47	1559.9	4913.16	1559.71	4938.3	1559.77	4951.15	1559.75	4955.54	1559.77

4962.12	1559.7	4963.86	1559.52	4969.01	1559.4	4991.64	1558.63	4997.02	1558.74
5003.56	1558.9	5009.1	1558.94	5020.05	1558.87	5024.48	1558.95	5028.6	1559
5041.07	1559	5048.47	1559.11	5077.56	1558.92	5079.15	1558.91	5086.68	1558.82
5094.78	1558.9	5096.83	1558.9	5114.98	1559.32	5130.87	1559.51	5140.39	1559.62
5157.29	1559.7	5162.12	1559.66	5190.51	1559.89	5191.99	1559.88	5193.84	1559.88
5206.76	1559.9	5208.91	1559.89	5232.07	1559.77	5262.76	1559.99	5264.07	1560
5271.31	1560.1	5273.65	1560.07	5280.87	1560.06	5292.09	1559.92	5295.51	1559.85
5302.67	1559.5	5304.33	1559.54	5311.57	1559.38	5318.04	1559.22	5325.47	1558.97
5342.29	1558.4	5353.02	1558.42	5404.06	1557.89	5415.79	1555.21	5422.97	1553.45
5425.95	1553.4	5433.08	1553.52	5455.19	1557.8	5455.35	1557.83	5455.6	1557.82
5472.63	1557.6	5478.73	1557.38	5482.9	1557.65	5492.59	1557.98	5496.46	1557.97
5533.95	1557.9	5535.27	1557.82	5535.84	1557.8	5545.03	1557.23	5548.42	1557.04
5548.72	1557	5550.05	1557.05	5553.38	1557.14	5572.82	1557.62	5578.03	1557.51
5582.61	1557.4	5596.96	1557	5611.01	1556.89	5611.15	1556.9	5626.23	1557.21
5629.93	1557.2	5630.92	1557.24	5664.04	1557.3	5675.75	1557.4	5685.06	1557.43
5691.57	1557.5	5700.46	1557.57	5755.17	1556.61	5756.4	1556.59	5756.64	1556.59
5764.6	1556.7	5806.21	1556.79	5824.09	1556.79	5827.56	1556.77	5832.65	1556.81
5901.84	1557.2	5924.44	1557.32	5952.42	1557.07	5972.72	1556.94	6003.79	1556.69
6062.2	1556.3	6079.37	1556.31	6080.31	1556.2	6089.66	1555.38	6091.83	1555.56
6095.41	1555.8	6100.93	1556.1	6102.61	1556.16	6106.62	1556.3	6108.59	1556.26
6113.93	1556.2	6186.62	1556.49	6187.15	1556.49	6187.32	1556.49	6187.34	1556.49
6187.38	1556.5	6187.67	1556.49	6235.88	1556.87	6235.89	1556.87	6235.95	1556.87
6236.3	1556.9	6250.68	1556.99	6255.64	1557.08	6270.87	1557.31	6290.18	1557.62
6303.45	1557.9	6316.34	1558.1	6327.48	1557.86	6351.01	1557.43	6370.91	1557.43
6381.94	1557.5	6395.91	1557.45	6429.42	1557.37	6475.23	1557.09	6542.35	1556.92
6547.1	1556.8	6547.98	1556.79	6552.93	1556.35	6565.86	1557	6590.71	1558.63
6601.18	1558.7	6604.87	1558.74	6610.52	1558.87	6618.52	1558.96	6627.93	1558.88
6637.74	1559	6644.15	1558.97	6649.1	1558.96	6664.8	1559.06	6670.33	1559.07
6674.5	1559	6678.69	1558.91	6701.21	1558.98	6715.08	1559.11	6735.16	1558.31
6780.65	1557	6794.4	1557.15	6814.09	1557.35	6829.13	1557.55	6850.77	1557.63
6869.08	1557.2	6881.15	1557.26	6888.35	1555.59	6890.31	1555.03	6893.6	1555.54
6902.7	1557.6	6908.77	1557.74	6927.7	1557.79	6940.28	1557.8	6941.88	1557.79
6942.79	1557.8	6947.6	1557.77	6965.31	1557.74	6979.95	1557.66	6985.96	1557.93
7009.46	1559.3	7026.72	1559.45	7050.52	1559.67	7074.47	1558.94	7075.42	1558.91
7076.77	1558.9	7155.78	1558.62	7194.82	1558.61	7252.02	1558.78	7278.03	1558.7
7282.61	1558.7	7314.16	1558.35	7322.41	1558.47	7351.68	1558.93	7376.25	1559.23
7389.08	1559.3	7394.16	1559.4	7410.62	1559.41	7429.48	1559.36	7518.97	1558.88
7537.55	1558.5	7581.35	1558.13	7590.84	1558.12	7603.09	1558.45	7619.65	1558.89
7621.43	1558.8	7640.02	1558.62	7709.83	1558.39	7754.63	1557.33	7766.02	1557.5
7788.58	1558.1	7799.39	1558.29	7810.49	1558.46	7821.18	1558.67	7836.86	1558.93
7850.69	1558.7	7872.21	1558.14	7882.24	1558.39	7889.02	1558.64	7893.49	1558.73
7900.96	1558.9	7921.43	1559.08	7983.31	1558.81	8007.16	1558.22	8046.86	1557.43
8052.88	1557.3	8056.28	1557.27	8061.51	1557.18	8082.85	1556.87	8091.25	1556.99
8097.87	1556.9	8108.52	1556.9	8121.9	1556.95	8122.86	1556.94	8131.17	1557.01
8153.49	1557.4	8161.24	1557.43	8168.99	1557.6	8178	1557.68	8183	1557.48
8184.12	1557.5	8188.5	1557.61	8197.29	1557.95	8224.71	1558.27	8230.22	1558.34
8233.72	1558.4	8242.54	1558.59	8248.34	1558.7	8250.42	1558.72	8268.4	1556.67
8279.25	1555.3	8290.14	1556.58	8296.86	1557.25	8301.63	1557.79	8304.49	1558.05
8304.9	1558.1	8310.74	1557.84	8317.04	1557.53	8331.71	1555.83	8332.25	1555.77
8332.65	1555.8	8332.73	1555.77	8346.53	1555.78	8352.87	1555.73	8364.66	1555.87
8372.54	1556.2	8378.85	1556.57	8383.16	1556.74	8387.58	1556.8	8389.29	1556.77
8469	1556.7	8487.25	1556.69	8487.82	1556.68	8488.53	1556.69	8489.03	1556.69
8491.63	1556.7	8492.99	1556.72	8496.61	1556.75	8537.09	1556.99	8553.04	1557.01
8594.81	1557	8611.6	1557.04	8615.64	1557.03	8616.47	1557	8637.31	1556.32
8643.02	1556.2	8648.72	1556.36	8653.43	1556.44	8670.97	1556.87	8685.36	1557.16
8694.59	1557.4	8697.67	1557.38	8710.11	1557.56	8712.43	1557.59	8712.78	1557.59
8713.22	1557.6	8728.75	1557.27	8740.77	1556.98	8746.59	1556.82	8807.12	1556.85

8828.69	1556.9	8841.88	1556.98	8843.52	1556.96	8845.46	1556.98	8861.98	1556.9
8867.01	1556.8	8880.73	1556.71	8964.21	1556.74	8973.01	1556.71	8986.68	1556.85
9002.33	1556.9	9070.12	1557.07	9084.44	1557.12	9088.58	1557.05	9117.8	1556.76
9126.36	1556.8	9128.85	1556.76	9189.62	1556.57	9201.39	1556.56	9212.14	1556.54
9244.68	1556.4	9249.74	1556.39	9254.13	1556.68	9257.22	1556.57	9279.41	1557.1
9283.38	1557.3	9288.05	1557.29	9358.31	1556.89	9373.35	1556.94	9393.24	1556.84
9408.78	1556.9	9416.7	1556.6	9424.72	1556.37	9433.76	1556.74	9449.8	1557.55
9460.37	1557.7	9492.41	1557.77	9493.48	1557.73	9494	1557.7	9495.02	1557.65
9509.45	1557	9509.55	1557	9512.28	1557.16	9524.08	1557.87	9524.76	1557.91
9546.3	1558.1	9546.44	1558.12	9546.54	1558.11	9555.93	1557.66	9563.55	1557.38
9572.27	1557.3	9623.15	1557.5	9637.31	1557.56	9638.63	1557.6	9641.41	1558
9645.64	1558	9650.33	1557.48	9651.65	1557.31	9660.17	1557.39	9669.31	1557.73
9669.43	1557.7	9676.77	1557.99	9685.32	1557.7	9695.71	1557.61	9703.71	1557.4
9718.69	1557.2	9719.49	1557.22	9720.1	1557.23	9721.74	1557.25	9733.59	1556.3
9737.15	1556.3	9743.25	1556.33	9747.19	1556.85	9747.78	1556.98	9747.97	1557
9754.68	1558	9757.07	1558.41	9763.64	1557.8	9771.54	1556.85	9773.2	1556.95
9780.27	1557.3	9787.74	1557.04	9795.71	1557.3	9808.82	1557.19	9811.22	1556.74
9813.54	1556.3	9816.68	1557.08	9817.76	1557.38	9819.29	1557.39	9822.38	1557.35
9832.27	1557.3	9837.66	1557.28	9892.77	1557.69	9897.49	1557.72	9898.65	1557.74
9932.47	1557.8	9904.66	1557.81	9936.19	1558.1	9952.79	1558.17	9964.49	1558
9972.28	1558.3	9979.87	1558.71	9985.7	1559.84	9987.91	1560.24	9990.07	1559.03
9997.02	1554.6	10004.22	1557.56	10010.42	1559.94	10014.83	1559.3	10018.94	1558.29
10019.99	1558.3	10025.38	1558.25	10036.63	1558.58	10061.93	1558.71	10070.51	1558.78
10074.17	1558.8	10088.42	1558.85	10092.56	1558.66	10102.88	1558.46	10128.47	1558.45
10143.52	1558.2	10176.79	1557.98	10187.07	1557.92	10200.87	1557.84	10206.79	1557.84
10213.49	1557.8	10227.79	1557.86	10271.11	1557.83	10310.06	1557.73	10335.02	1557.73
10340.76	1557.7	10347.95	1557.68	10372.98	1557.7	10386.46	1557.78	10410.78	1557.53
10427.24	1557.3	10432.13	1557.38	10440.66	1557.37	10493.46	1557.43	10511.5	1557.36
10543.31	1557.4	10547.37	1557.38	10555.4	1557.35	10571.86	1557.48	10620.33	1557.82
10657.56	1557.4	10657.63	1557.36	10659.03	1557.37	10677.45	1557.5	10679.4	1557.45
10681.43	1557.5	10683.51	1557.46	10692.04	1557.29	10692.41	1557.29	10695.79	1557.15
10707.26	1556.7	10720.37	1555.88	10724.2	1555.95	10736.26	1556.68	10743.48	1556.8
10750.94	1556.9	10775.5	1556.93	10803.56	1556.92	10816.6	1556.89	10824.65	1557.01
10847.39	1557.1	10850.05	1557.13	10860.07	1557.2	10867.95	1557.28	10882.2	1557.3
10895.02	1557.4	10933.86	1557.68	10951.76	1557.56	10956.47	1557.6	10967.75	1557.97
11020.59	1557.8	11026.16	1557.73	11034.85	1557.8	11038.2	1558.06	11047.5	1558.96
11061.66	1555.3	11062.57	1555.07	11075.53	1558.43	11078.83	1559.1	11091.75	1558.57
11097.54	1558.7	11104.24	1558.67	11126.2	1558.85	11155.34	1558.85	11158.16	1558.99
11177.58	1559.2	11179.15	1559.24	11180.68	1559.23	11196.3	1559.8	11203.96	1560.04
11214.06	156	11216.87	1560.01						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4844.98	.08	9987.91	.045	10010.42	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9987.91	10010.42	500	542.03	500	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1558.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1557.95	Reach Len. (ft)	500.00	542.03	500.00
Crit W.S. (ft)		Flow Area (sq ft)	2992.97	22.50	451.22
E.G. Slope (ft/ft)	0.015100	Area (sq ft)	2992.97	22.50	451.22
Q Total (cfs)	7577.00	Flow (cfs)	6750.14	118.99	707.87
Top Width (ft)	4130.52	Top Width (ft)	3245.46	13.48	871.58

Vel Total (ft/s)	2.19	Avg. Vel. (ft/s)	2.26	5.29	1.57
Max Chl Dpth (ft)	4.55	Hydr. Depth (ft)	0.92	1.67	0.52
Conv. Total (cfs)	61661.6	Conv. (cfs)	54932.6	968.3	5760.7
Length Wtd. (ft)	503.84	Wetted Per. (ft)	3248.41	15.12	872.41
Min Ch El (ft)	1554.60	Shear (lb/sq ft)	0.87	1.40	0.49
Alpha	1.09	Stream Power (lb/ft s)	1.96	7.42	0.76
Frctn Loss (ft)	5.09	Cum Volume (acre-ft)	71.96	4.28	10.42
C & E Loss (ft)	0.00	Cum SA (acres)	82.09	1.76	14.89

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4844.98	6130.71	1897.86	768.87	719.64	25.05	1.07	2.47
6130.71	7416.45	984.75	504.87	672.72	13.00	0.75	1.95
7416.45	8702.18	1603.59	676.30	672.34	21.16	1.01	2.37
8702.18	9987.91	2263.93	1042.94	1183.70	29.88	0.88	2.17
LB 9987.91	RB 10010.42	118.99	22.50	15.12	1.57	1.67	5.29
10010.42	11216.87	707.87	451.22	872.41	9.34	0.52	1.57

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 1.795

INPUT
Description: RM 1.795

Station Elevation Data num= 462

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4479.61	1554.9	4490.24	1554.7	4504.08	1554.4	4507.84	1554.34	4512.4	1554.43
4513.34	1554.4	4515.48	1553.5	4517.78	1552.75	4520.22	1552.48	4543.75	1552.66
4634.43	1552.9	4659.27	1552.87	4697.2	1552.73	4729.91	1553.03	4737.15	1552.99
4756.53	1553	4774.75	1552.85	4804.97	1552.78	4831.66	1553.12	4860.29	1553.5
4862.16	1553.5	4873.86	1553.63	4875.9	1553.64	4878.62	1553.68	4979.06	1553.93
4979.53	1553.9	4993.96	1552.74	4995.4	1552.68	4997.3	1552.66	5020.17	1552.32
5022.7	1552.2	5030.04	1550.89	5032.64	1550.45	5035.63	1550.65	5047.99	1551.46
5050.71	1551.9	5058.83	1552.76	5090.69	1552.26	5094.38	1552.22	5096.24	1552.28
5110.14	1552.7	5190.37	1553.01	5197.59	1553.05	5199.79	1553.05	5209.36	1552.94
5235.19	1552.7	5242.61	1552.71	5251.58	1552.75	5266.84	1552.79	5275.91	1552.79
5277.07	1552.8	5278.66	1552.84	5295	1552.7	5316.69	1552.51	5321.18	1552.44
5329.96	1552.3	5335.31	1552.34	5339.59	1552.25	5358.89	1552.34	5359.2	1552.34
5359.6	1552.3	5375.38	1552.52	5376.68	1552.46	5383.3	1552.41	5458.14	1551.5
5460.89	1551.5	5461.12	1551.46	5494.91	1551.46	5496.42	1551.46	5498.68	1551.41
5516.05	1551.1	5521.4	1551.19	5523.27	1551.25	5547.93	1551.77	5550.6	1551.8
5559.37	1551.9	5581.63	1552.29	5585.07	1552.37	5588.92	1552.48	5589.41	1552.42

5623.19	1552.1	5634.52	1552.12	5653.74	1552.13	5695.13	1551.88	5733.25	1551.64
5742.79	1551.6	5748.32	1551.55	5754.55	1551.22	5763.35	1550.99	5767.09	1551.1
5776.05	1551.3	5809.89	1551.17	5843.64	1551.17	5853.8	1550.84	5856.79	1550.71
5859.96	1550.9	5866.17	1551.07	5867.65	1551.18	5917.29	1551.57	5969.13	1550.85
5975.97	1550.7	6007.22	1551.15	6025.13	1551.12	6061.93	1551.57	6093.71	1552
6094.9	1552	6117.03	1552.04	6118.3	1552.04	6119.12	1551.99	6130.63	1551.23
6136.64	1551.4	6137.83	1551.46	6185.14	1551.46	6221.62	1551.53	6247.81	1551.5
6258.64	1551.5	6272.7	1551.86	6277.52	1551.94	6327.98	1552.24	6364.64	1552.18
6367.66	1552.2	6376.73	1552.19	6383.7	1552.02	6411.2	1551.12	6435.07	1549.89
6440.32	1549.2	6442.98	1548.67	6450.65	1550.13	6454.45	1551.15	6456.31	1551.2
6460.19	1551.3	6465.81	1551.16	6527.07	1551.32	6587.91	1551.54	6602.17	1551.7
6605.56	1551.7	6609.39	1551.71	6613.07	1551.71	6616.71	1551.74	6625.69	1551.84
6635.77	1552	6684.81	1552.33	6706.87	1552.75	6711.56	1552.81	6715.18	1552.72
6726.77	1552.4	6731.82	1552.36	6746.66	1552.14	6760.75	1552	6770.7	1552.17
6779.06	1552.4	6799.63	1552.84	6809.69	1553.06	6816.58	1553.28	6821.5	1553.31
6826.86	1553.3	6858.75	1553.48	6860.53	1553.51	6873.25	1553.61	6877.61	1553.64
6877.88	1553.6	6880.77	1553.64	6920.15	1553.64	6927	1553.06	6940.52	1552.3
6951.43	1552.6	6957.59	1552.84	6962.6	1552.95	6975.12	1553.27	6988.35	1553.33
7041.64	1554.3	7076.26	1553.41	7137.42	1552.76	7152.24	1553.08	7185.55	1552.93
7190.14	1552.4	7192.56	1552.5	7204.25	1552.76	7212.26	1552.95	7220.69	1553.14
7238.39	1552.2	7249.97	1551.53	7253.26	1551.63	7285.13	1552.84	7311.59	1551.79
7313.08	1551.7	7320.46	1551.73	7333.89	1551.87	7354.18	1552.39	7370.89	1550.96
7373.64	1550.5	7384.09	1549.45	7389.61	1549.01	7395.6	1549.05	7405.97	1547.63
7409.74	1547.9	7412.54	1548.26	7424.63	1549.52	7435.97	1550.26	7443.35	1551.31
7448.91	1551.8	7457.79	1553.04	7457.85	1553.05	7457.98	1553.06	7480.59	1553.04
7483.72	1553.1	7489.86	1553.06	7514.19	1553.06	7519.69	1552.99	7525.13	1553.04
7556.53	1552.7	7561.85	1552.74	7575.11	1552.54	7583.81	1554.64	7594.76	1557.43
7595.53	1557.4	7596.01	1557.43	7618.37	1557.31	7624.85	1557.25	7649.55	1556.5
7652.81	1555.5	7654.5	1554.73	7661.2	1552.33	7669.22	1552.3	7676.78	1552.35
7678.81	1552.7	7752.25	1553.4	7789.27	1553.67	7807.08	1553.19	7812.73	1553.12
7834.61	1552.9	7917.1	1552.36	7925.67	1552.36	7944.35	1551.98	7948.8	1551.83
7956.08	1552.1	7976.57	1551.59	8003.78	1552.53	8005.67	1552.59	8023.45	1552.08
8053.01	1552	8077.13	1552.32	8097.86	1552.52	8163.97	1552.95	8170.6	1553
8175.1	1553	8179.33	1553.07	8181.26	1553.08	8187.47	1553.1	8196.69	1553.11
8215.03	1553.1	8221.65	1552.49	8226.58	1552.07	8245.33	1550.31	8249.1	1549.85
8253.83	1550.6	8265.83	1552.37	8272.65	1553.01	8276.08	1553.25	8278.92	1553.58
8319.69	1553.5	8323.86	1553.45	8361.76	1553.07	8377.2	1552.28	8383.06	1551.97
8387.66	1551.8	8405.09	1552.19	8422.56	1552.48	8429.85	1552.46	8464.18	1551.95
8469.75	1551.9	8478.91	1551.59	8480.35	1551.6	8491.77	1549.9	8502.42	1552.48
8502.49	1552.5	8502.61	1552.53	8502.86	1552.54	8535.84	1553.08	8540.37	1552.98
8545.84	1552.8	8558.77	1552.57	8563.13	1552.52	8576.11	1552.32	8591.32	1551.95
8593.59	1551.9	8614.49	1551.75	8620.72	1551.7	8647.39	1551.9	8683.93	1552.09
8721.45	1552.6	8743.21	1552.45	8744.73	1552.46	8754.17	1552.58	8779.28	1552.6
8796.69	1552.9	8798.21	1552.67	8800.12	1552.76	8827.58	1552.87	8845.06	1552.78
8854.24	1552.8	8859.81	1552.81	8870.45	1552.88	8871.86	1552.89	8881.66	1552.88
8895.54	1552.9	8907.8	1552.98	8912.7	1552.98	8928.05	1552.91	8964.12	1552.74
8967.68	1552.8	8980.32	1552.6	9003.03	1552.33	9062.99	1552.64	9070.67	1552.66
9092.94	1552.4	9097.57	1552.39	9105.4	1552.23	9182.14	1552.98	9215.62	1552.7
9218.96	1552.7	9219.03	1552.67	9220.53	1552.62	9221.79	1552.92	9229.5	1552.48
9242.38	1552	9243.74	1552.03	9251.99	1552.16	9255.93	1552.34	9269.01	1551.78
9282.98	1552.1	9309.37	1552.57	9354.31	1552.6	9369.07	1552.6	9371.36	1552.59
9371.95	1552.6	9372.09	1552.63	9372.31	1552.64	9381.59	1553.26	9382.36	1553.32
9382.71	1553.3	9408.78	1553.12	9453.55	1552.79	9453.86	1552.79	9453.97	1552.79
9454.24	1552.8	9454.33	1552.79	9454.51	1552.79	9497.73	1552.94	9504.4	1552.86
9511.24	1552.8	9523.22	1552.64	9531.17	1552.36	9534.36	1552.32	9542.42	1552.26
9548.86	1552.3	9559.22	1552.36	9604.67	1552.53	9608.22	1552.49	9610.88	1552.44
9616.24	1552.5	9672.02	1552.61	9740.74	1552.89	9743.34	1552.9	9743.68	1552.9

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 9744.79  1552.9  9748.1 1552.91  9751.1 1552.89 9798.59 1552.84 9809.71 1552.81
 9811.35  1552.8 9827.51  1549.2 9839.04 1552.72  9860.3 1552.28 9860.43 1552.28
 9860.72  1552.3 9878.33 1551.04 9901.96 1549.82 9903.07 1549.83 9904.21 1549.81
 9949.44  1549.3 9949.94 1549.35 9953.19 1549.38 9959.43  1549.6 9963.65 1549.68
 9965.01  1549.7 9969.76 1549.46 9975.67 1549.68 9982.47 1549.78 9993.78 1548.11
 9994.14    1548 9994.71 1547.9510008.91    154810017.95 1547.95   10031  1551.4
10032.14  1551.710032.97 1551.7310046.02 1552.3310054.72 1552.7310055.41 1552.77
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   10148  1552.210154.08 1552.48 10162.8 1552.4110169.12 1552.36   10178 1552.38
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 10720.3  1553.610721.45 1553.7910739.12 1553.3410754.13 1553.2110766.23 1553.36
10788.15  1553.710806.66 1553.5110832.15 1553.1810857.38 1553.1710863.99 1553.13
10867.04  1553.710870.11 1554.3310878.55 1554.4110879.99 1554.4110891.72 1554.38
10898.73  1554.410905.95 1554.5710911.12 1554.5510919.02 1554.4610935.67  1554.6
10978.87 1554.9111004.65 1555.03

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4479.61     .08 9982.47    .04510054.72     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.4710054.72               520  524.67     500             .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1552.93   Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.13   Wt. n-Val.                  0.080      0.045     0.080
  W.S. Elev (ft)            1552.81   Reach Len. (ft)            520.00     524.67    500.00
  Crit W.S. (ft)                      Flow Area (sq ft)         3222.38     216.16    421.77
  E.G. Slope (ft/ft)       0.007388   Area (sq ft)              3222.38     216.16    421.77
  Q Total (cfs)             7577.00   Flow (cfs)                5730.25    1266.22    580.53
  Top Width (ft)            4325.68   Top Width (ft)            3724.32      72.25    529.11
  Vel Total (ft/s)             1.96   Avg. Vel. (ft/s)             1.78       5.86      1.38
  Max Chl Dpth (ft)            5.18   Hydr. Depth (ft)             0.87       2.99      0.80
  Conv. Total (cfs)         88153.0   Conv. (cfs)              66667.5    14731.5    6754.0
  Length Wtd. (ft)           518.89   Wetted Per. (ft)          3728.10      72.90    529.77
  Min Ch El (ft)            1547.95   Shear (lb/sq ft)             0.40       1.37      0.37
  Alpha                        2.15   Stream Power (lb/ft s)       0.71       8.01      0.51
  Frctn Loss (ft)              4.64   Cum Volume (acre-ft)        36.28       2.80      5.41
  C & E Loss (ft)              0.00   Cum SA (acres)              42.09       1.23      6.85

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta       Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)         (ft)            (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  4479.61      5855.32       1005.23     650.66     895.21      13.27      0.73       1.54
  5855.32      7231.04       2405.21    1147.13     998.26      31.74      1.15       2.10
  7231.04      8606.75       1305.39     743.10     843.22      17.23      0.88       1.76
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8606.75	9982.47	1014.43	681.49	991.42	13.39	0.69	1.49
LB 9982.47	RB 10054.72	1266.22	216.16	72.90	16.71	2.99	5.86
10054.72	11004.65	580.53	421.77	529.77	7.66	0.80	1.38

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 1.696**

INPUT
Description: RM 1.696 . DOWNSTREAM END OF STUDY. SECTION I.D.NO.'S ARE IN RIVER MILES ALONG HYDRAULIC BASELINE WITH R.M. 5.00 ASSUMED AT UPSTREAM END OF PROJECT AT SPILLWAY. CROSS-SECTIONS ARE CODED FROM LT. TO RT., LOOKING DOWNSTREAM WITH STA. 10,000 AT THE HYDRAULIC BASELINE. STARTING D/S WSEL BASED ON NORMAL DEPTH (SLOPE AREA METHOD) WITH 0.011 FT./FT SLOPE.

Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4413	1551	4425.04	1550.94	4437.83	1550.57	4442.29	1550.52	4449.88	1550.43
4452.11	1550.4	4457.96	1550.41	4460.25	1550.33	4465.96	1550.31	4501.97	1550.44
4550.8	1550.7	4553.36	1550.58	4556.28	1550.47	4561.86	1550.21	4567.75	1548.08
4579.92	1549.6	4612.64	1550.09	4617.28	1550.21	4626.38	1550.36	4628.82	1550.41
4659.48	1551.2	4664.15	1551.13	4679.26	1550.96	4699.13	1550.25	4699.94	1550.21
4701.62	1550.1	4705.35	1550.1	4748.3	1549.6	4796.19	1549.21	4828.49	1549.22
4862.4	1549.1	4873.56	1549.21	4884.8	1549.16	4923.57	1549.79	4968.43	1548.96
4989.62	1548.9	4994.46	1548.96	5001.32	1549.04	5021.72	1549.12	5060.43	1549.19
5096.01	1549	5107.84	1549	5127.86	1548.98	5132.21	1549.06	5143.39	1549.09
5202.31	1549	5235.78	1549	5269.68	1548.73	5318.34	1548.76	5343.85	1548.56
5346.75	1548.6	5347.97	1548.56	5363.86	1548.76	5370.64	1548.77	5380.01	1548.67
5410.62	1548.4	5430.2	1548.21	5440.8	1548.12	5449.46	1547.4	5456.49	1546.8
5457.5	1546.9	5458.42	1546.91	5466.29	1547.31	5479.5	1547.18	5494.13	1546.87
5497.27	1546.8	5498.42	1546.65	5507.6	1545.21	5515.68	1546.29	5518.86	1546.74
5530.55	1547.4	5533.68	1547.47	5564.47	1547.25	5582.57	1547.07	5586.98	1546.02
5594.63	1546	5605.87	1547.36	5617.28	1547.47	5622.24	1547.32	5630.09	1547.33
5645.45	1547.5	5662.84	1547.39	5668.87	1547.39	5674.33	1547.35	5696.11	1547.57
5708.81	1547.5	5713.28	1547.45	5717.42	1547.21	5722.88	1547.01	5729.34	1546.96
5731.48	1547	5731.94	1546.97	5732.82	1546.92	5738.2	1547.23	5751.11	1547.8
5774.28	1548	5780.29	1548.06	5787.65	1547.59	5807.99	1547.28	5814.56	1547.05
5822.29	1546.8	5824.31	1546.98	5834.27	1547.47	5843.83	1547.44	5845.84	1547.47
5891.47	1548	5905.97	1548.27	5931.37	1549.19	5933.12	1549.25	5934.14	1549.29
5953.62	1549.4	5956.53	1549.44	5970.12	1549.82	5972.5	1549.77	5982.91	1549.24
5991.28	1549	5992.56	1549.01	5994.15	1548.98	6014.69	1548.39	6020.82	1548.2
6028.31	1547.9	6098.54	1546.55	6099.38	1546.52	6099.73	1546.52	6099.95	1546.45
6103.51	1545.4	6107.99	1544.06	6109.1	1544.22	6124.96	1546.6	6133.04	1546.58
6139.15	1546.6	6148.78	1546.7	6158.6	1547.33	6170.14	1547.82	6186.7	1547.53
6196.13	1547.5	6199.03	1547.52	6213.06	1547.42	6228.15	1547.11	6259.46	1546.89
6264.71	1546.8	6267.57	1546.79	6273.55	1546.7	6306.93	1547.09	6316.45	1547.3
6322.04	1547.3	6334.42	1547.06	6337.61	1546.58	6340.8	1547.01	6341.47	1546.81
6357.92	1547.1	6362.57	1547.23	6366.26	1547.3	6397.7	1547.71	6405.23	1547.93
6427.98	1548.7	6433.87	1548.7	6439.41	1548.7	6458.31	1548.7	6467.54	1547.72
6475.65	1546.9	6483.6	1545.94	6492.62	1545.05	6511.77	1543.17	6524.31	1544.27
6540.17	1545.5	6558.95	1547.34	6568.66	1547.52	6574.02	1547.57	6598.48	1547.78
6615.12	1548	6632.78	1548.41	6659.94	1548.66	6664.62	1548.73	6675.9	1549.33
6678.93	1549.8	6684.45	1550.41	6702.31	1551.14	6710.51	1552.59	6715.56	1552.46
6721.42	1552.3	6732.92	1551.93	6734.44	1551.59	6744.59	1550	6752.92	1548.66

6753.55	1548.6	6778.93	1548.93	6818.11	1548.49	6826.68	1548.42	6845.23	1548.22
6846.62	1548.2	6848.14	1548.18	6851.33	1548.14	6852.56	1548.15	6894.04	1548.15
6941.92	1548.2	6951.75	1548.12	6985.98	1548.22	6993.98	1548.18	6995.51	1548.2
7060.73	1546.9	7062.68	1546.9	7066.04	1546.83	7067.72	1546.77	7078.71	1546.33
7087.54	1546.5	7099.63	1546.69	7110.5	1546.69	7129.61	1546.7	7185.65	1546.86
7242.88	1547	7299.42	1546.92	7310.78	1546.81	7318.51	1546.78	7354.73	1547.25
7387.72	1547.7	7396.37	1547.76	7418.36	1547.73	7424.04	1547.75	7425.72	1547.71
7429.4	1547.7	7456.28	1547.88	7533	1548.28	7567.26	1548.25	7568.18	1548.25
7568.71	1548.3	7600.95	1548.32	7664.85	1548.36	7672.44	1548.31	7681.17	1548.22
7752.88	1547.2	7769.65	1546.85	7769.85	1546.85	7776.36	1546.69	7787.1	1547.26
7807.98	1547.6	7832.55	1547.65	7836.89	1547.7	7858.8	1547.9	7860.81	1547.9
7861.47	1547.8	7865.13	1546.95	7874.56	1544.76	7876.1	1544.4	7884.1	1545.87
7886.66	1546.4	7891.35	1546.52	7905.85	1546.72	7915.14	1547.1	7927.84	1547.24
7983.64	1548	7987.37	1547.99	7989.96	1547.95	8009.09	1548.25	8012.46	1548.32
8017.16	1548.4	8022.05	1548.66	8025.58	1548.75	8063.24	1548.51	8076.71	1548.49
8098.23	1548	8116.6	1548.06	8142.22	1547.89	8145.69	1547.91	8151.71	1547.98
8154	1548	8155.7	1548.04	8156.59	1548.04	8192.13	1547.98	8209.95	1547.94
8229.56	1547.8	8247.38	1547.69	8287.09	1547.58	8288.65	1547.57	8290.7	1547.43
8299.38	1547.1	8305.16	1546.83	8310.47	1546.76	8318.45	1546.77	8330.92	1546.72
8353.37	1546.9	8376.89	1547.08	8387.04	1547.3	8392.74	1547.12	8399.02	1546.71
8400.29	1546.8	8427.78	1546.89	8435.89	1546.87	8437.1	1546.87	8438.94	1546.92
8469.6	1547.7	8515.12	1547.07	8520.39	1546.98	8521.44	1546.98	8523.81	1546.99
8552.58	1546.9	8552.79	1546.9	8557.79	1547.14	8561.95	1547.17	8566.68	1547.05
8573.38	1546.6	8577.49	1546.94	8581.67	1547.29	8585.11	1547.6	8645.13	1547.41
8646.05	1547.4	8648.66	1547.42	8663.24	1547.49	8676.3	1547.47	8684.26	1547.33
8693.53	1547.3	8726.67	1547.44	8733.33	1547.47	8734.57	1547.47	8760.72	1547.36
8778.64	1547.4	8783.22	1547.44	8798.75	1547.92	8825.4	1548.54	8837.75	1548.4
8847.43	1548.4	8859.37	1548.47	8867.12	1548.39	8877.93	1548.29	8911.89	1548.14
8930.43	1547.9	8953.99	1547.56	8955.61	1546.49	8967.16	1547.03	8996.31	1546.86
9009.21	1547	9014.79	1545.57	9023.95	1544.93	9027.36	1545.1	9036.12	1546.52
9041.79	1547.3	9065.84	1547.03	9079.22	1547.1	9121.99	1547.3	9140.65	1546.74
9141.1	1546.7	9152.66	1547.41	9176.3	1547.44	9184.8	1547.44	9202.51	1547.44
9252.37	1547.5	9253.83	1547.55	9292.42	1547.62	9355.99	1547.99	9367.45	1548.03
9386.34	1548.1	9387.8	1548.1	9409.89	1548.23	9419.49	1548.43	9439.6	1548.26
9446.97	1548.3	9457.45	1548.28	9461.22	1548.9	9462.33	1548.88	9463.96	1549.05
9471.46	1548.3	9481.45	1549.53	9488.02	1549.52	9502.83	1549.5	9524.55	1549.41
9531.19	1549.4	9547.26	1549.09	9552.78	1549.12	9572.57	1548.92	9585.46	1548.84
9600.19	1548.8	9601.14	1548.78	9604.83	1548.78	9617.99	1548.43	9641.88	1547.92
9654.02	1548	9655.26	1548.06	9656.08	1548.04	9656.96	1548.04	9659.77	1547.95
9676.81	1547.5	9690.45	1548.27	9691.55	1548.35	9702.79	1548.49	9708.3	1548.55
9729.95	1548.7	9735.16	1548.75	9758.39	1548.69	9766.86	1548.69	9773.19	1548.64
9782.5	1548.6	9783.85	1548.54	9789.19	1548.44	9793.76	1548.49	9818.04	1548.29
9830.72	1548.1	9847.77	1547.88	9851.15	1547.85	9860.97	1547.71	9876.97	1548.18
9880.39	1548.3	9882.2	1548.23	9896.38	1547.98	9907.41	1548.06	9930.46	1548.07
9934.85	1548.1	9936.1	1548.08	9938.42	1548.05	9952.13	1547.92	9970.42	1547.6
9977.41	1547.6	9986.7	1545.56	9991.92	1544.33	9995.05	1544.44	10000.99	1544.39
10004.83	1544.4	10009.78	1544.57	10030.5	1545.49	10039.92	1545.77	10051.75	1546.13
10069.72	1548	10078.77	1548.37	10083.66	1548.34	10088.58	1548.34	10091.43	1548.33
10097.26	1548.3	10134.25	1550.59	10146.07	1548.92	10146.45	1548.93	10147.33	1548.93
10165.19	1549.7	10181.5	1548.59	10191.27	1548.63	10206.68	1548.42	10215.07	1546.93
10221	1545.9	10225.82	1545.18	10234.58	1546.41	10243	1547.17	10261.91	1547.22
10271.74	1547.1	10280.85	1546.86	10295.99	1547.25	10300.1	1547.19	10305.55	1547.25
10306.66	1547.3	10315.31	1547.81	10328.23	1547.15	10333.19	1546.89	10346.97	1547.03
10408.19	1547.6	10430.23	1547.61	10442.25	1547.66	10449.47	1547.78	10454.5	1547.22
10459.31	1546.7	10465.72	1547.61	10468.75	1547.86	10480.59	1547.62	10500.17	1547.48
10503.51	1546.8	10509.41	1545.71	10517.74	1546.71	10529.27	1547.59	10529.63	1547.55
10534.29	1547.5	10598.6	1547.31	10623.28	1547.45	10625.13	1547.45	10659.99	1547.8

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10673.24    154810678.13 1548.0310684.71 1547.2810686.02 1547.1410686.33 1547.15
10694.92  1547.510717.08 1547.3910746.64 1547.4610768.23  1547.410779.18  1547.4
10787.29  1547.4 10791.7 1547.4910801.25 1547.6310845.25 1548.0110860.13 1548.15
10904.64  1548.310926.23 1548.3810933.68 1548.3310969.34 1549.5110998.36 1551.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4413     .08 9938.42    .04510069.72     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9938.4210069.72                0       0       0              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1548.29   Element                   Left OB    Channel   Right OB
  Vel Head (ft)                0.12   Wt. n-Val.                  0.080      0.045      0.080
  W.S. Elev (ft)            1548.18   Reach Len. (ft)
  Crit W.S. (ft)            1547.86   Flow Area (sq ft)        2856.72     248.28     521.27
  E.G. Slope (ft/ft)       0.011006   Area (sq ft)             2856.72     248.28     521.27
  Q Total (cfs)             7577.00   Flow (cfs)               5398.43    1311.91     866.66
  Top Width (ft)            4123.09   Top Width (ft)           3328.01     131.30     663.78
  Vel Total (ft/s)             2.09   Avg. Vel. (ft/s)            1.89       5.28       1.66
  Max Chl Dpth (ft)            5.01   Hydr. Depth (ft)            0.86       1.89       0.79
  Conv. Total (cfs)         72223.4   Conv. (cfs)              51457.5    12505.0     8260.9
  Length Wtd. (ft)                    Wetted Per. (ft)         3331.43     131.80     664.67
  Min Ch El (ft)            1544.33   Shear (lb/sq ft)            0.59       1.29       0.54
  Alpha                        1.76   Stream Power (lb/ft s)      1.11       6.84       0.90
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.    % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  4413.00       5794.35         642.99     331.26     361.67       8.49       0.92       1.94
  5794.35       7175.71        2159.52    1000.79     932.25      28.50       1.07       2.16
  7175.71       8557.06        1605.32     902.85    1124.37      21.19       0.80       1.78
  8557.06       9938.42         990.60     621.83     913.14      13.07       0.68       1.59
  LB 9938.42    RB 10069.72    1311.91     248.28     131.80      17.31       1.89       5.28
  10069.72      10998.36        866.66     521.27     664.67      11.44       0.79       1.66

Warning: Divided flow computed for this cross-section.
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SUMMARY OF MANNING'S N VALUES
River:SIGNAL BUTTE

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8
SPILLWAY	5.000	.03	.03	.03					
SPILLWAY	4.994	.013	.013	.013					
SPILLWAY	4.991	.013	.15	.013					
SPILLWAY	4.986	.03	.09	.03					
SPILLWAY	4.968	.03	.03	.03					
SPILLWAY	4.929	.03	.03	.03					
SPILLWAY	4.914	.068	.03	.03					
SPILLWAY	4.902	.068	.045	.068					
SPILLWAY	4.852	.068	.045	.068					
SPILLWAY	4.776	.068	.045	.068					
SPILLWAY	4.697	.068	.045	.068					
SPILLWAY	4.620	.068	.045	.068					
SPILLWAY	4.575	.068	.045	.068					
SPILLWAY	4.518	.068	.045	.068					
SPILLWAY	4.443	.068	.045	.068					
SPILLWAY	4.367	.068	.045	.068					
SPILLWAY	4.311	.068	.045	.068					
SPILLWAY	4.239	.068	.045	.068					
SPILLWAY	4.171	.068	.045	.068					
SPILLWAY	4.101	.068	.045	.068					
SPILLWAY	4.026	.15	.068	.045	.068				
SPILLWAY	3.956	.15	.068	.045	.068				
SPILLWAY	3.885	.15	.068	.045	.068				
SPILLWAY	3.817	.15	.068	.045	.068				
SPILLWAY	3.747	.15	.068	.045	.068				
SPILLWAY	3.674	.15	.068	.045	.068				
SPILLWAY	3.603	.15	.068	.045	.068				
SPILLWAY	3.532	.15	.068	.045	.068				
SPILLWAY	3.462	.15	.068	.045	.068				
SPILLWAY	3.386	.15	.068	.045	.068				
SPILLWAY	3.310	.15	.1	.15	.068	.045	.068		
SPILLWAY	3.235	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.161	.15	.068	.068	.045	.068			
SPILLWAY	3.082	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.006	.068	.15	.068	.1	.045	.1		
SPILLWAY	2.933	.068	.15	.1	.068	.045	.068		

SPILLWAY	2.857	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.793	.068	.15	.1	.045	.068			
SPILLWAY	2.720	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.643	.15	.068	.15	.1	.15	.068	.045	.068
SPILLWAY	2.554	.15	.1	.15	.045	.15			
SPILLWAY	2.454	.15	.045	.15					
SPILLWAY	2.378	.15	.1	.15	.068	.045	.15		
SPILLWAY	2.302	.1	.15	.1	.15	.045	.15		
SPILLWAY	2.279	.1	.15	.1	.15	.1	.15	.045	.15
SPILLWAY	2.261	.1	.15	.045	.15				
SPILLWAY	2.252	Culvert							
SPILLWAY	2.223	.08	.045	.08					
SPILLWAY	2.020	.08	.045	.08					
SPILLWAY	1.898	.08	.045	.08					
SPILLWAY	1.795	.08	.045	.08					
SPILLWAY	1.696	.08	.045	.08					

SUMMARY OF REACH LENGTHS
River: SIGNAL BUTTE

Reach	River Sta.	Left	Channel	Right
SPILLWAY	5.000	33.7	33.7	33.7
SPILLWAY	4.994	12.96	12.96	12.96
SPILLWAY	4.991	27.8	27.8	27.8
SPILLWAY	4.986	92.6	92.6	92.6
SPILLWAY	4.968	208.34	208.34	208.34
SPILLWAY	4.929	120	76.23	25
SPILLWAY	4.914	120	67.17	25
SPILLWAY	4.902	280	261.94	230
SPILLWAY	4.852	380	402.55	425
SPILLWAY	4.776	420	418.55	365
SPILLWAY	4.697	425	406.56	380
SPILLWAY	4.620	160	235.25	230
SPILLWAY	4.575	275	300.41	290
SPILLWAY	4.518	370	394.81	390
SPILLWAY	4.443	380	401.96	390
SPILLWAY	4.367	275	294.8	290
SPILLWAY	4.311	325	379.86	380
SPILLWAY	4.239	225	363.96	440
SPILLWAY	4.171	290	364.78	370
SPILLWAY	4.101	450	400.93	315
SPILLWAY	4.026	340	365.6	370
SPILLWAY	3.956	310	377.63	300
SPILLWAY	3.885	320	359.41	280
SPILLWAY	3.817	400	370.17	365
SPILLWAY	3.747	390	385.69	400
SPILLWAY	3.674	430	372.11	425
SPILLWAY	3.603	375	374.47	300
SPILLWAY	3.532	260	371.74	350
SPILLWAY	3.462	400	399.38	400
SPILLWAY	3.386	450	404.63	380
SPILLWAY	3.310	380	395.59	410
SPILLWAY	3.235	375	388.39	390
SPILLWAY	3.161	425	416.26	375
SPILLWAY	3.082	370	403.32	390
SPILLWAY	3.006	300	382.27	400
SPILLWAY	2.933	360	404.67	390
SPILLWAY	2.857	320	336.06	320
SPILLWAY	2.793	380	384	440
SPILLWAY	2.720	380	410.52	380
SPILLWAY	2.643	400	468.72	400
SPILLWAY	2.554	400	529.54	400
SPILLWAY	2.454	480	399.74	360
SPILLWAY	2.378	520	402.78	320
SPILLWAY	2.302	280	118.36	118
SPILLWAY	2.279	800	96.77	96
SPILLWAY	2.261	200	200.58	200
SPILLWAY	2.252	Culvert		
SPILLWAY	2.223	400	1069.12	900
SPILLWAY	2.020	500	646.55	500
SPILLWAY	1.898	500	542.03	500
SPILLWAY	1.795	520	524.67	500
SPILLWAY	1.696	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: SIGNAL BUTTE

Reach	River Sta.	Contr.	Expan.
SPILLWAY	5.000	.1	.3
SPILLWAY	4.994	.1	.3
SPILLWAY	4.991	.1	.3
SPILLWAY	4.986	.1	.3
SPILLWAY	4.968	.1	.3
SPILLWAY	4.929	.1	.3
SPILLWAY	4.914	.1	.3
SPILLWAY	4.902	.1	.3
SPILLWAY	4.852	.1	.3
SPILLWAY	4.776	.1	.3
SPILLWAY	4.697	.1	.3
SPILLWAY	4.620	.1	.3
SPILLWAY	4.575	.1	.3
SPILLWAY	4.518	.1	.3
SPILLWAY	4.443	.1	.3
SPILLWAY	4.367	.1	.3
SPILLWAY	4.311	.1	.3
SPILLWAY	4.239	.1	.3
SPILLWAY	4.171	.1	.3
SPILLWAY	4.101	.1	.3
SPILLWAY	4.026	.1	.3
SPILLWAY	3.956	.1	.3
SPILLWAY	3.885	.1	.3
SPILLWAY	3.817	.1	.3
SPILLWAY	3.747	.1	.3
SPILLWAY	3.674	.1	.3
SPILLWAY	3.603	.1	.3
SPILLWAY	3.532	.1	.3
SPILLWAY	3.462	.1	.3
SPILLWAY	3.386	.1	.3
SPILLWAY	3.310	.1	.3
SPILLWAY	3.235	.1	.3
SPILLWAY	3.161	.1	.3
SPILLWAY	3.082	.1	.3
SPILLWAY	3.006	.1	.3
SPILLWAY	2.933	.1	.3
SPILLWAY	2.857	.1	.3
SPILLWAY	2.793	.1	.3
SPILLWAY	2.720	.1	.3
SPILLWAY	2.643	.1	.3
SPILLWAY	2.554	.1	.3
SPILLWAY	2.454	.1	.3
SPILLWAY	2.378	.1	.3
SPILLWAY	2.302	.1	.3
SPILLWAY	2.279	.1	.3
SPILLWAY	2.261	.1	.3
SPILLWAY	2.252	Culvert	
SPILLWAY	2.223	.1	.3
SPILLWAY	2.020	.1	.3
SPILLWAY	1.898	.1	.3
SPILLWAY	1.795	.1	.3
SPILLWAY	1.696	.1	.3

Profile Output Table - Standard Table 1

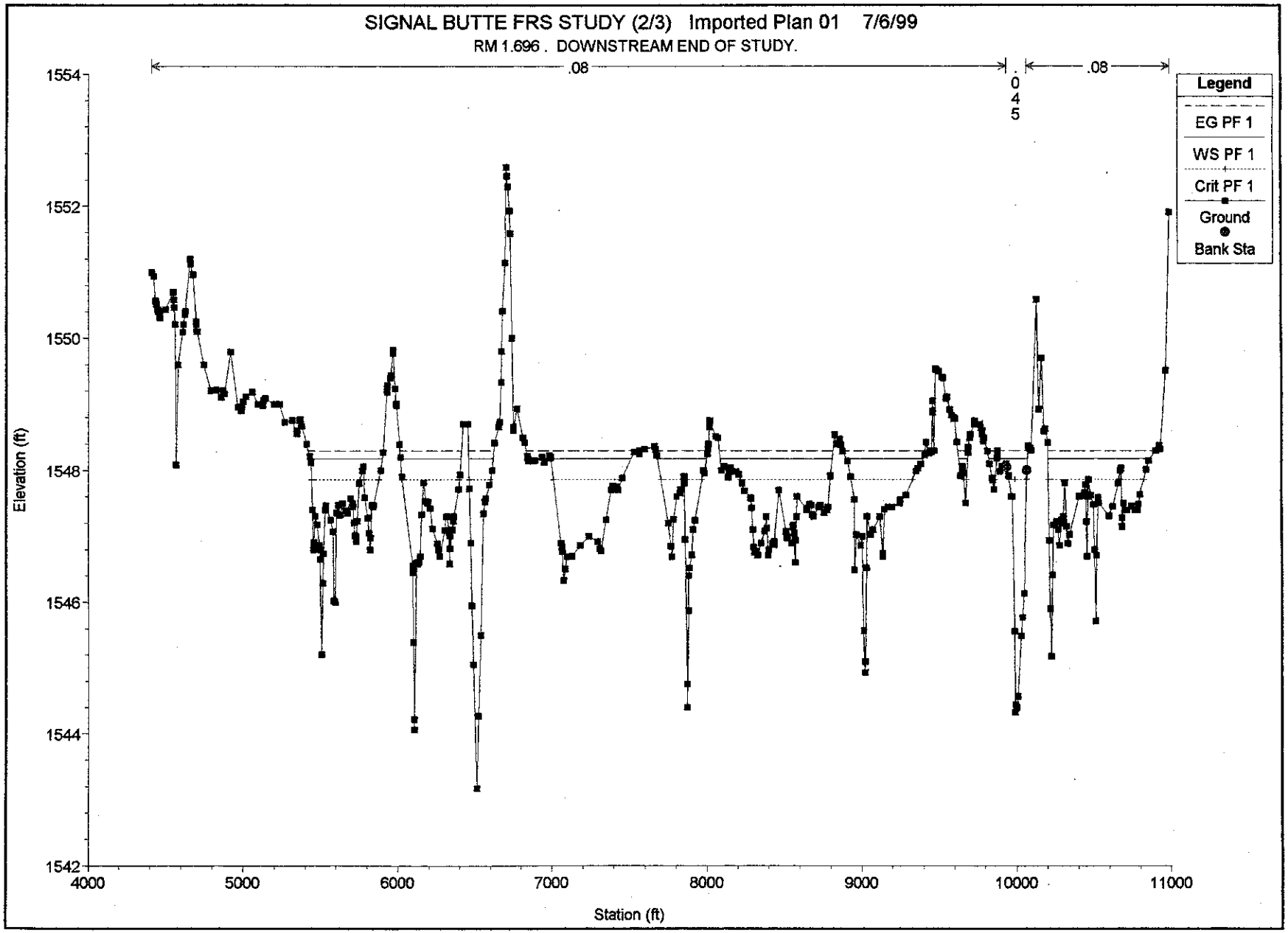
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude# Chl
SPILLWAY	5.000	7577.00	1709.00	1719.32	1713.31	1719.49	0.000268	3.26	2324.36	285.51	0.20
SPILLWAY	4.994	7577.00	1712.15	1717.01	1717.01	1719.26	0.001603	12.04	629.53	140.08	1.00
SPILLWAY	4.991	7577.00	1711.45	1716.48	1716.81	1719.15	0.264593	13.10	578.20	136.43	1.12
SPILLWAY	4.986	7577.00	1696.37	1699.46	1701.61	1707.74	0.631283	23.08	328.28	137.34	2.63
SPILLWAY	4.968	7577.00	1695.93	1704.25	1700.44	1704.69	0.000874	5.33	1420.64	201.71	0.35
SPILLWAY	4.929	7577.00	1695.98	1703.68		1704.42	0.001632	6.91	1096.18	168.02	0.48
SPILLWAY	4.914	7577.00	1695.98	1703.71	1700.88	1704.25	0.001263	5.91	1293.58	471.56	0.42
SPILLWAY	4.902	7577.00	1695.20	1702.45		1703.97	0.010158	9.90	781.88	174.30	0.77
SPILLWAY	4.852	7577.00	1692.70	1699.86		1701.13	0.010886	9.88	1003.45	320.22	0.79
SPILLWAY	4.776	7577.00	1688.02	1695.60	1695.60	1696.56	0.011214	9.92	1436.05	755.06	0.80
SPILLWAY	4.697	7577.00	1685.90	1691.74	1690.88	1692.17	0.005636	6.80	1969.43	1269.60	0.56
SPILLWAY	4.620	7577.00	1682.19	1687.48	1687.35	1688.59	0.015831	9.67	1129.90	570.88	0.90
SPILLWAY	4.575	7577.00	1679.69	1684.41		1685.16	0.013595	8.99	1342.28	631.54	0.84
SPILLWAY	4.518	7577.00	1674.88	1681.93		1682.44	0.006461	7.37	2120.21	1306.12	0.60
SPILLWAY	4.443	7577.00	1672.10	1678.16		1678.78	0.015368	9.52	1818.93	1551.01	0.89
SPILLWAY	4.367	7577.00	1667.22	1674.33	1674.05	1674.60	0.007578	7.96	2873.70	2185.76	0.65
SPILLWAY	4.311	7577.00	1667.54	1670.96	1670.96	1671.49	0.017222	8.57	1886.42	1690.10	0.91
SPILLWAY	4.239	7577.00	1662.74	1667.55	1666.76	1667.68	0.006879	5.05	3037.74	2190.23	0.56
SPILLWAY	4.171	7577.00	1659.67	1665.35		1665.63	0.008647	7.30	2509.82	1963.93	0.67
SPILLWAY	4.101	7577.00	1656.34	1662.85	1662.46	1663.11	0.007571	7.88	3016.53	2442.92	0.65
SPILLWAY	4.026	7577.00	1653.97	1659.03		1659.34	0.010608	8.26	2709.80	2345.76	0.74
SPILLWAY	3.956	7577.00	1650.81	1655.48		1655.64	0.010236	6.97	3228.51	2510.98	0.70
SPILLWAY	3.885	7577.00	1648.10	1652.68		1652.78	0.008065	5.19	3634.46	2639.63	0.60
SPILLWAY	3.817	7577.00	1646.11	1650.06		1650.26	0.007820	5.97	3263.39	2450.75	0.62
SPILLWAY	3.747	7577.00	1643.34	1646.70		1646.87	0.009950	4.61	2607.01	2045.69	0.63
SPILLWAY	3.674	7577.00	1640.73	1642.99		1643.07	0.009509	3.18	3503.56	2699.33	0.57
SPILLWAY	3.603	7577.00	1636.85	1639.13		1639.18	0.008722	4.03	4485.55	2935.54	0.58
SPILLWAY	3.532	7577.00	1633.73	1635.55		1635.59	0.010963	2.75	5063.10	3235.95	0.57
SPILLWAY	3.462	7577.00	1627.25	1632.86		1632.98	0.008128	5.43	5210.14	3342.57	0.61
SPILLWAY	3.386	7577.00	1623.40	1629.53	1628.89	1629.68	0.008310	6.74	4954.05	2910.53	0.64
SPILLWAY	3.310	7577.00	1620.77	1625.45	1625.08	1625.62	0.010203	6.96	4153.70	3085.69	0.70
SPILLWAY	3.235	7577.00	1618.89	1621.70		1621.78	0.009769	5.46	3736.65	3071.16	0.65
SPILLWAY	3.161	7577.00	1614.50	1618.14		1618.24	0.009081	5.13	3252.70	2833.77	0.62
SPILLWAY	3.082	7577.00	1612.65	1614.20	1612.91	1614.27	0.009597	3.75	3842.67	2433.76	0.58
SPILLWAY	3.006	7577.00	1609.39	1610.65		1610.75	0.009240	3.20	2968.45	2283.61	0.56

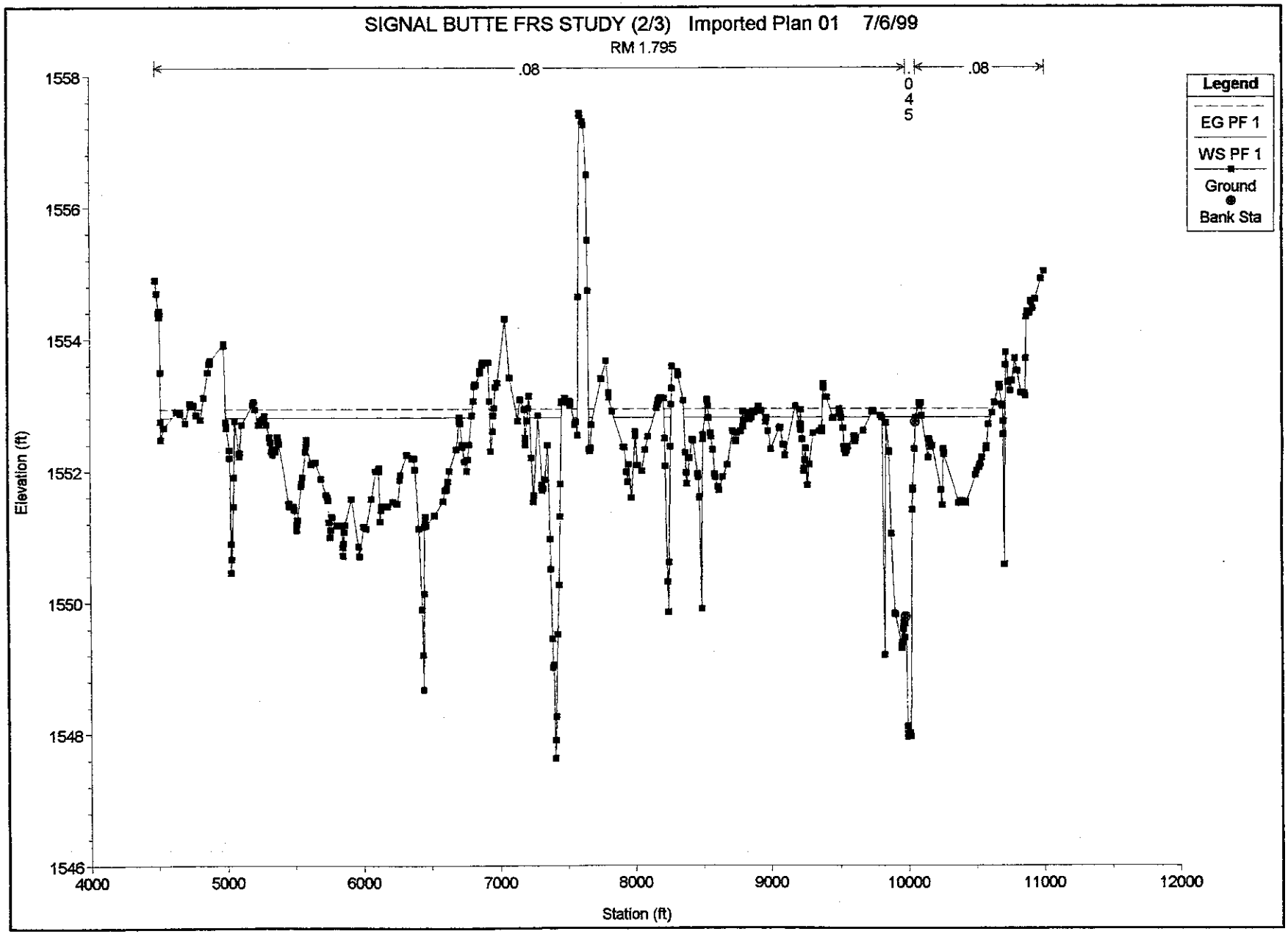
SPILLWAY	2.933	7577.00	1604.70	1608.05		1608.14	0.008076	5.03	3548.92	2493.36	0.59
SPILLWAY	2.857	7577.00	1601.52	1604.69		1604.75	0.010945	4.10	4292.86	3859.58	0.63
SPILLWAY	2.793	7577.00	1598.87	1601.79		1601.90	0.007330	5.50	5252.22	3917.27	0.59
SPILLWAY	2.720	7577.00	1592.82	1597.51		1597.86	0.015349	8.54	3616.88	3780.08	0.86
SPILLWAY	2.643	7577.00	1589.64	1593.71		1593.81	0.007473	5.85	4833.36	4122.63	0.60
SPILLWAY	2.554	7577.00	1586.04	1590.44		1590.50	0.008797	6.23	5748.68	4673.83	0.64
SPILLWAY	2.454	7577.00	1580.99	1586.07		1586.19	0.012326	6.81	4819.66	3859.81	0.75
SPILLWAY	2.378	7577.00	1576.20	1581.81		1581.92	0.008140	5.95	5757.58	5014.11	0.62
SPILLWAY	2.302	7577.00	1571.72	1576.45	1576.45	1576.88	0.014565	8.88	3666.21	3822.33	0.86
SPILLWAY	2.279	7577.00	1570.42	1573.06	1568.88	1573.14	0.010494	4.74	3462.06	2834.46	0.64
SPILLWAY	2.261	7577.00	1570.01	1573.06	1561.53	1573.06	0.000019	0.21	30494.68	4781.19	0.03
SPILLWAY	2.252	Culvert									
SPILLWAY	2.223	7577.00	1569.54	1563.03	1560.75	1563.11	0.003730		3438.93	1403.91	0.00
SPILLWAY	2.020	7577.00	1559.30	1561.48	1560.01	1561.54	0.004017	2.15	3842.59	2099.30	0.36
SPILLWAY	1.898	7577.00	1554.60	1557.95		1558.03	0.015100	5.29	3466.69	4130.52	0.72
SPILLWAY	1.795	7577.00	1547.95	1552.81		1552.93	0.007388	5.86	3860.31	4325.68	0.60
SPILLWAY	1.696	7577.00	1544.33	1548.18	1547.86	1548.29	0.011006	5.28	3626.27	4123.09	0.68

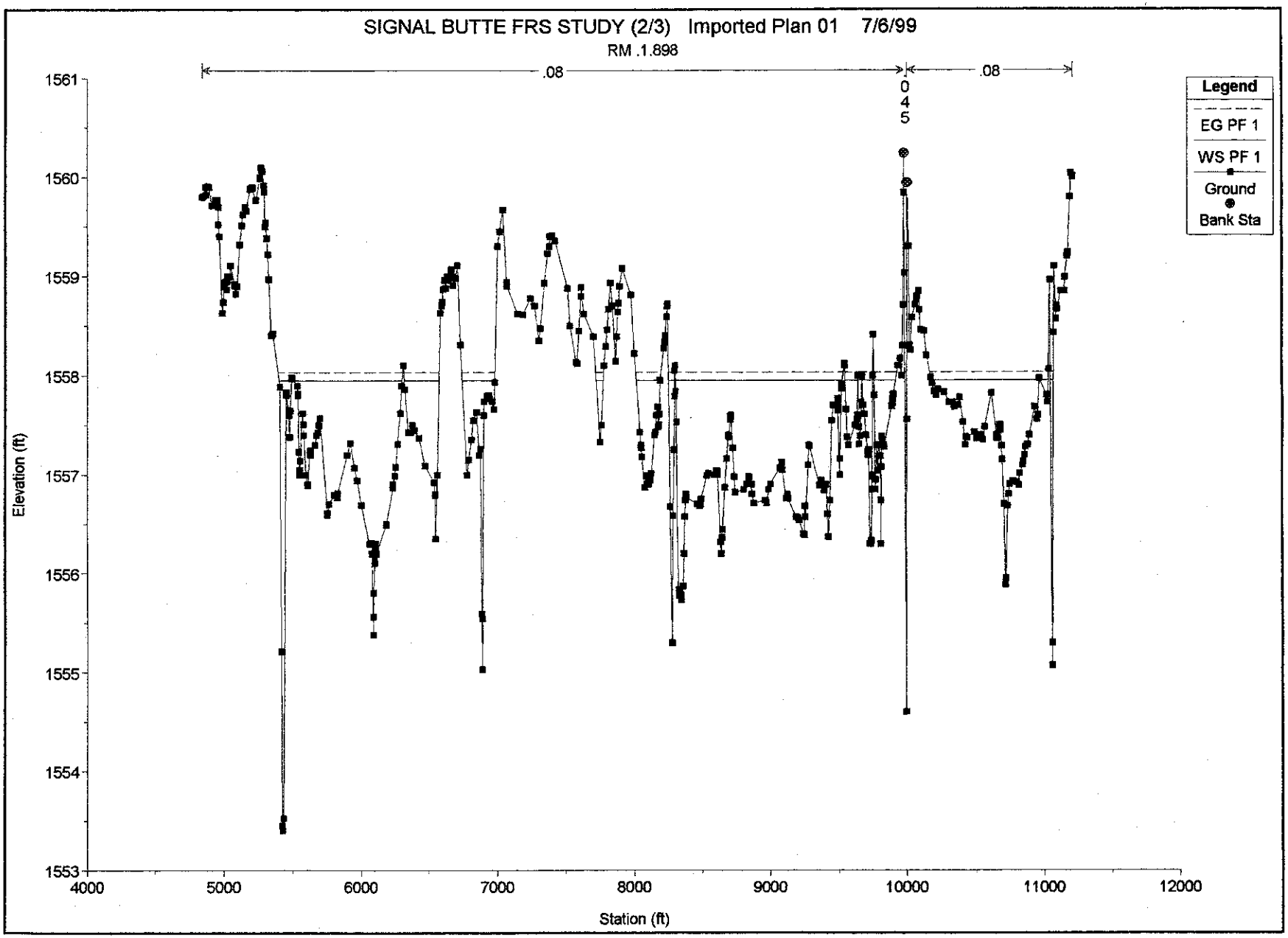
Profile Output Table - Standard Table 2

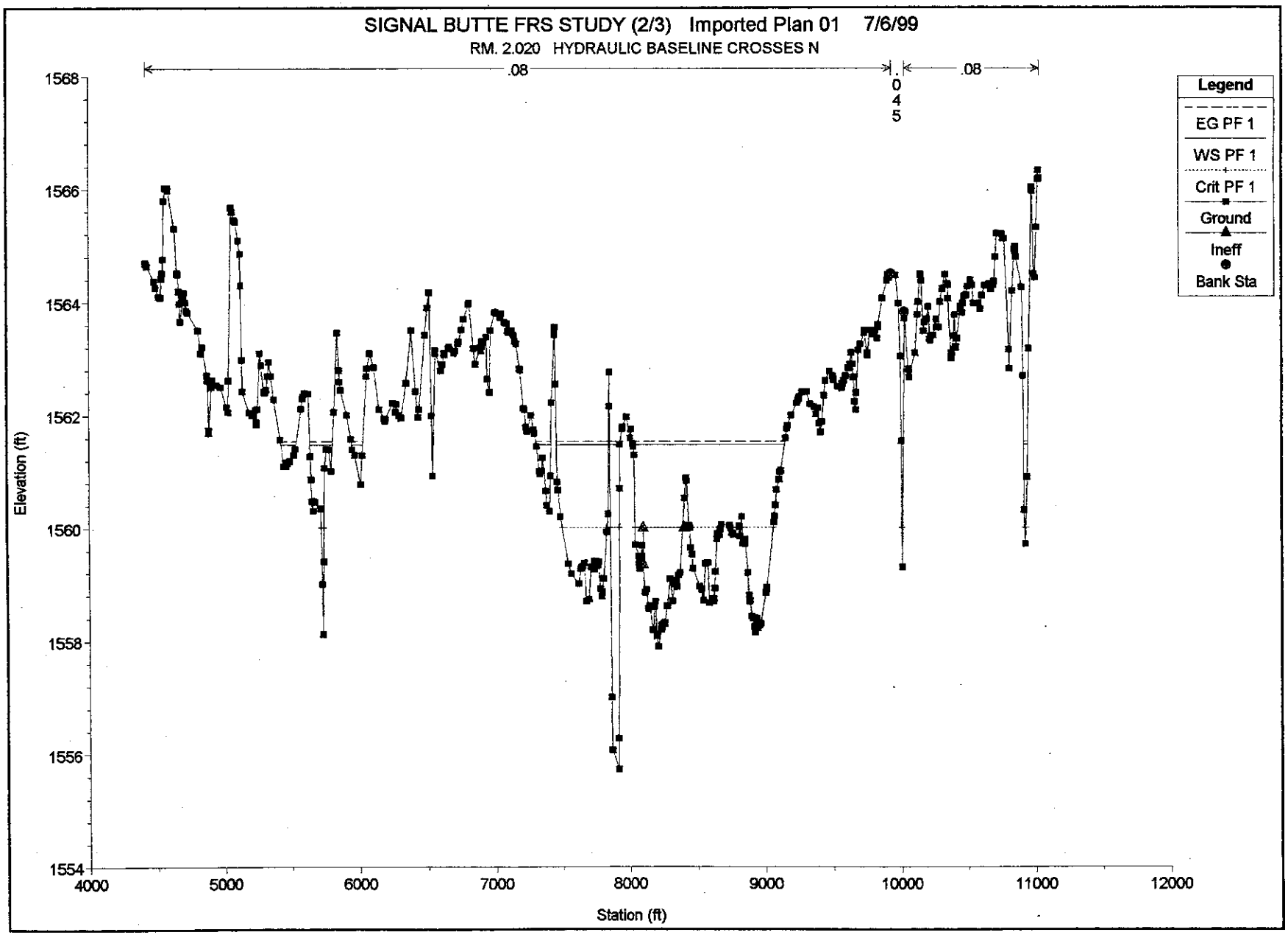
Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
SPILLWAY	5.000	1719.49	1719.32	0.17	0.02	0.21		7577.00		285.51
SPILLWAY	4.994	1719.26	1717.01	2.25	0.07	0.01		7577.00		140.08
SPILLWAY	4.991	1719.15	1716.48	2.67	0.07	0.04		7577.00		136.43
SPILLWAY	4.986	1707.74	1699.46	8.27	10.85	0.56		7577.00		137.34
SPILLWAY	4.968	1704.69	1704.25	0.44	0.24	0.03		7577.00		201.71
SPILLWAY	4.929	1704.42	1703.68	0.74	0.11	0.06		7577.00		168.02
SPILLWAY	4.914	1704.25	1703.71	0.54	0.19	0.10	31.80	7545.20		471.56
SPILLWAY	4.902	1703.97	1702.45	1.52	2.76	0.07	37.91	7539.09		174.30
SPILLWAY	4.852	1701.13	1699.86	1.27	4.47	0.09	1228.33	6080.80	267.87	320.22
SPILLWAY	4.776	1696.56	1695.60	0.96	3.06	0.16	248.53	4446.22	2882.25	755.06
SPILLWAY	4.697	1692.17	1691.74	0.43	3.51	0.07	137.80	3953.86	3485.34	1269.60
SPILLWAY	4.620	1688.59	1687.48	1.11	3.32	0.11	823.12	5460.62	1293.25	570.88
SPILLWAY	4.575	1685.16	1684.41	0.74	2.64	0.07	511.69	3490.61	3574.70	631.54
SPILLWAY	4.518	1682.44	1681.93	0.51	3.65	0.01	3026.17	4296.06	254.77	1306.12
SPILLWAY	4.443	1678.78	1678.16	0.62	4.08	0.11	2945.53	2738.35	1893.12	1551.01
SPILLWAY	4.367	1674.60	1674.33	0.27	3.08	0.03	4798.80	1619.34	1158.86	2185.76
SPILLWAY	4.311	1671.49	1670.96	0.53	3.54	0.12	4503.10	2997.02	76.88	1690.10
SPILLWAY	4.239	1667.68	1667.55	0.12	2.03	0.02	5806.48	978.47	792.06	2190.23
SPILLWAY	4.171	1665.63	1665.35	0.28	2.52	0.01	5610.11	1854.50	112.39	1963.93
SPILLWAY	4.101	1663.11	1662.85	0.26	3.76	0.01	5364.07	1572.59	640.34	2442.92
SPILLWAY	4.026	1659.34	1659.03	0.31	3.66	0.05	4560.39	1772.40	1244.21	2345.76
SPILLWAY	3.956	1655.64	1655.48	0.16	2.84	0.02	4539.15	905.81	2132.04	2510.98
SPILLWAY	3.885	1652.78	1652.68	0.10	2.51	0.01	3726.18	652.58	3198.24	2639.63
SPILLWAY	3.817	1650.26	1650.06	0.20	3.39	0.01	4226.86	2218.56	1131.58	2450.75
SPILLWAY	3.747	1646.87	1646.70	0.17	3.77	0.03	4179.19	2179.54	1218.27	2045.69
SPILLWAY	3.674	1643.07	1642.99	0.08	3.88	0.01	5230.02	683.91	1663.06	2699.33
SPILLWAY	3.603	1639.18	1639.13	0.05	3.59	0.01	6207.43	265.48	1104.09	2935.54
SPILLWAY	3.532	1635.59	1635.55	0.04	2.60	0.01	7138.03	223.93	215.04	3235.95
SPILLWAY	3.462	1632.98	1632.86	0.12	3.29	0.00	5925.13	1651.87		3342.57
OPILLWAY	3.386	1629.68	1629.53	0.16	4.05	0.00	6095.89	1481.11		2910.53
SPILLWAY	3.310	1625.62	1625.45	0.17	3.81	0.02	6231.47	1345.53		3085.69
SPILLWAY	3.235	1621.78	1621.70	0.09	3.54	0.00	7059.35	511.96	5.69	3071.16
SPILLWAY	3.161	1618.24	1618.14	0.10	3.96	0.01	7015.46	508.71	52.83	2833.77
SPILLWAY	3.082	1614.27	1614.20	0.06	3.51	0.00	7405.58	145.16	26.27	2433.76
SPILLWAY	3.006	1610.75	1610.65	0.10	2.61	0.00	7247.14	329.86		2283.61
SPILLWAY	2.933	1608.14	1608.05	0.09	3.38	0.01	7037.68	539.32		2493.36

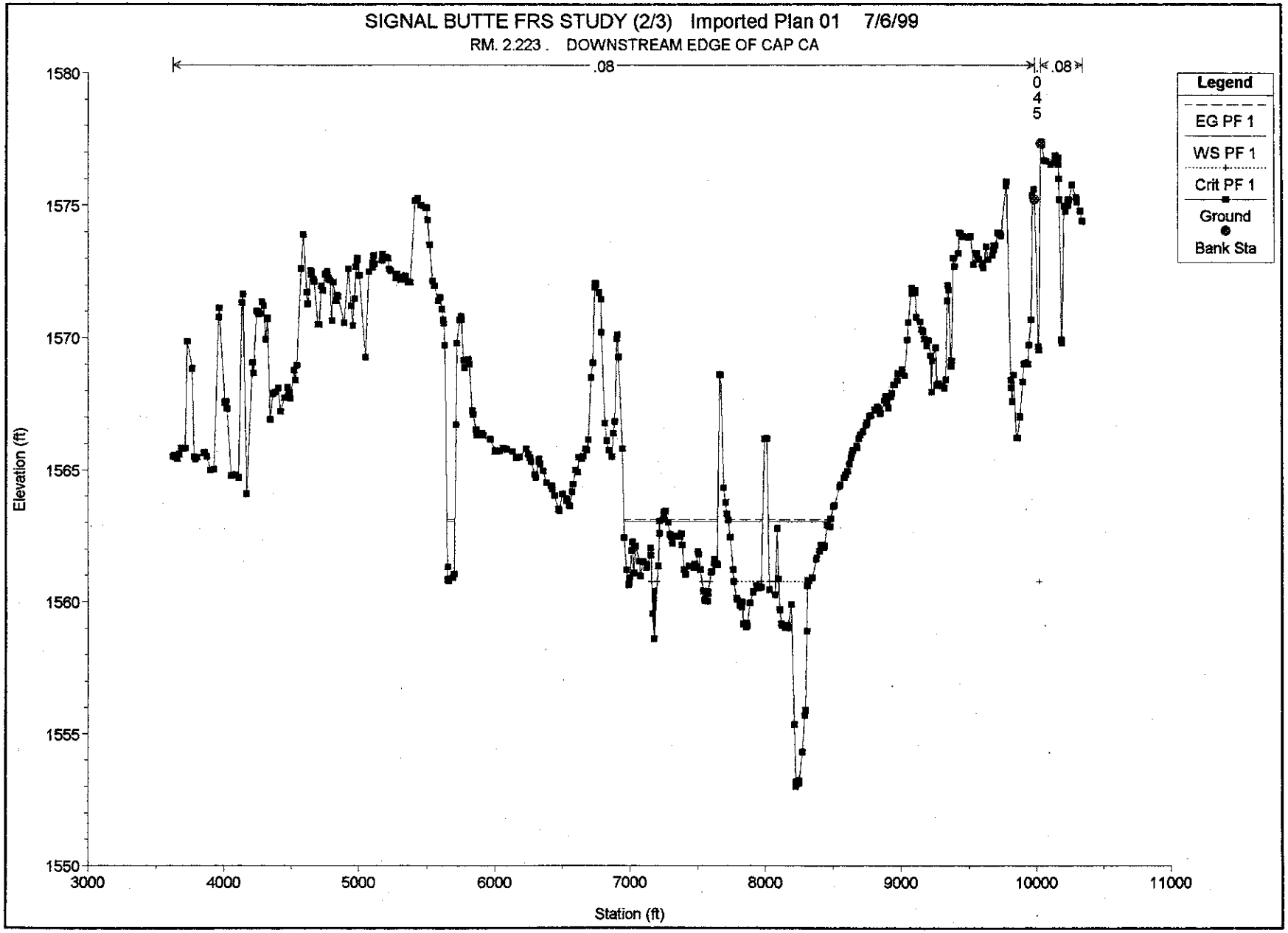
SPILLWAY	2.857	1604.75	1604.69	0.06	2.85	0.00	6941.31	537.75	97.94	3859.58
SPILLWAY	2.793	1601.90	1601.79	0.11	4.02	0.02	5756.26	1396.15	424.59	3917.27
SPILLWAY	2.720	1597.86	1597.51	0.35	3.97	0.07	3985.73	1976.45	1614.82	3780.08
SPILLWAY	2.643	1593.81	1593.71	0.10	3.30	0.01	4745.75	978.80	1852.46	4122.63
SPILLWAY	2.554	1590.50	1590.44	0.07	4.31	0.01	5191.88	577.24	1807.89	4673.83
SPILLWAY	2.454	1586.19	1586.07	0.12	4.27	0.00	3274.28	986.94	3315.79	3859.81
SPILLWAY	2.378	1581.92	1581.81	0.11	5.01	0.03	4876.92	1247.32	1452.76	5014.11
SPILLWAY	2.302	1576.88	1576.45	0.43	3.04	0.11	4916.67	2544.26	116.07	3822.33
SPILLWAY	2.279	1573.14	1573.06	0.08	0.05	0.02	7222.52	304.51	49.97	2834.46
SPILLWAY	2.261	1573.06	1573.06	0.00			7539.98	26.15	10.88	4781.19
SPILLWAY	2.252	Culvert								
SPILLWAY	2.223	1563.11	1563.03	0.08	1.56	0.00	7577.00			1403.91
SPILLWAY	2.020	1561.54	1561.48	0.06	3.50	0.00	7501.07	34.78	41.15	2099.30
SPILLWAY	1.898	1558.03	1557.95	0.08	5.09	0.00	6750.14	118.99	707.87	4130.52
SPILLWAY	1.795	1552.93	1552.81	0.13	4.64	0.00	5730.25	1266.22	580.53	4325.68
SPILLWAY	1.696	1548.29	1548.18	0.12			5398.43	1311.91	866.66	4123.09

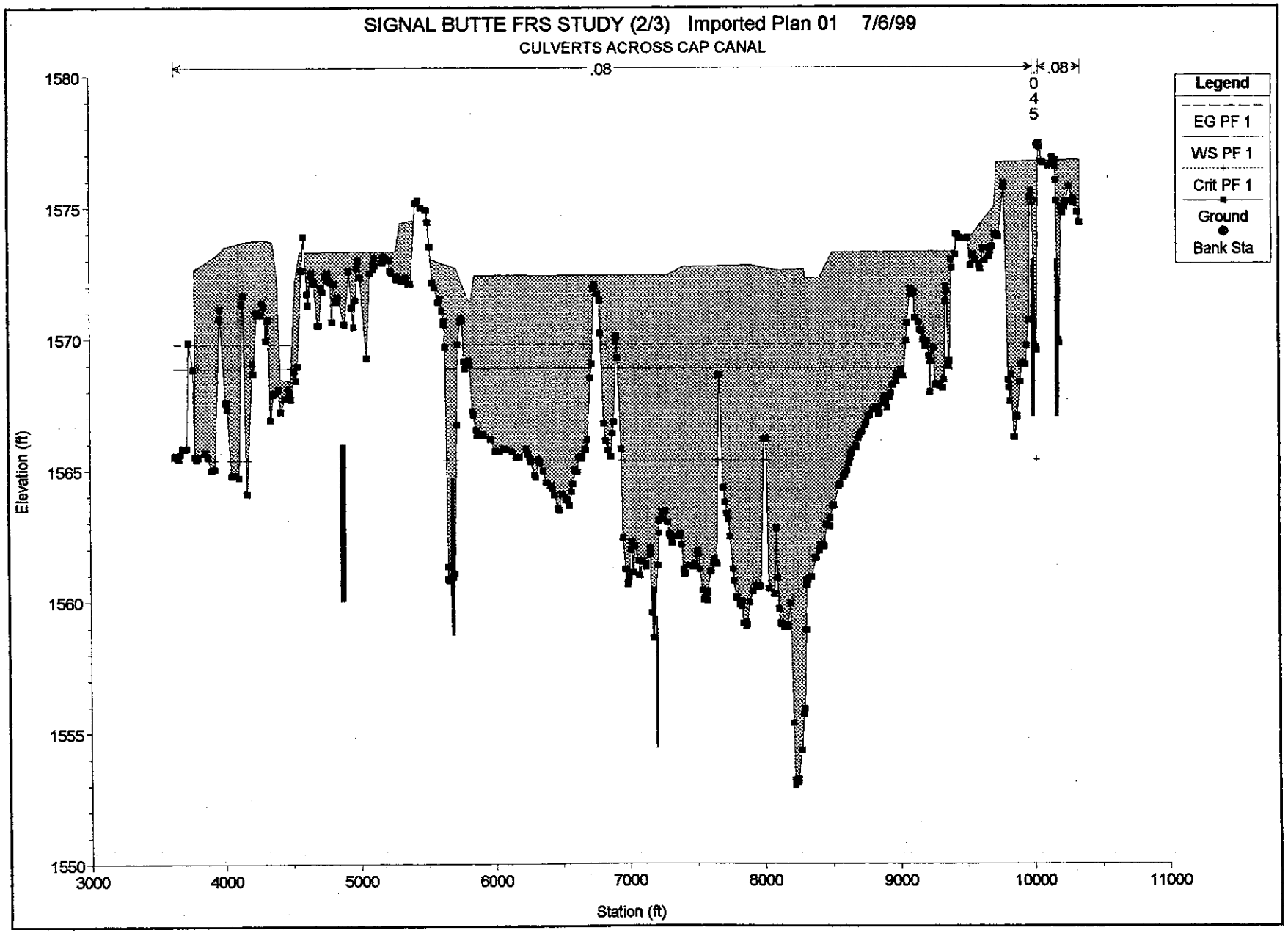

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM 1.696 . DOWNSTREAM END OF STUDY.
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1554
1552
1550
1548
1546
1544
1542
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

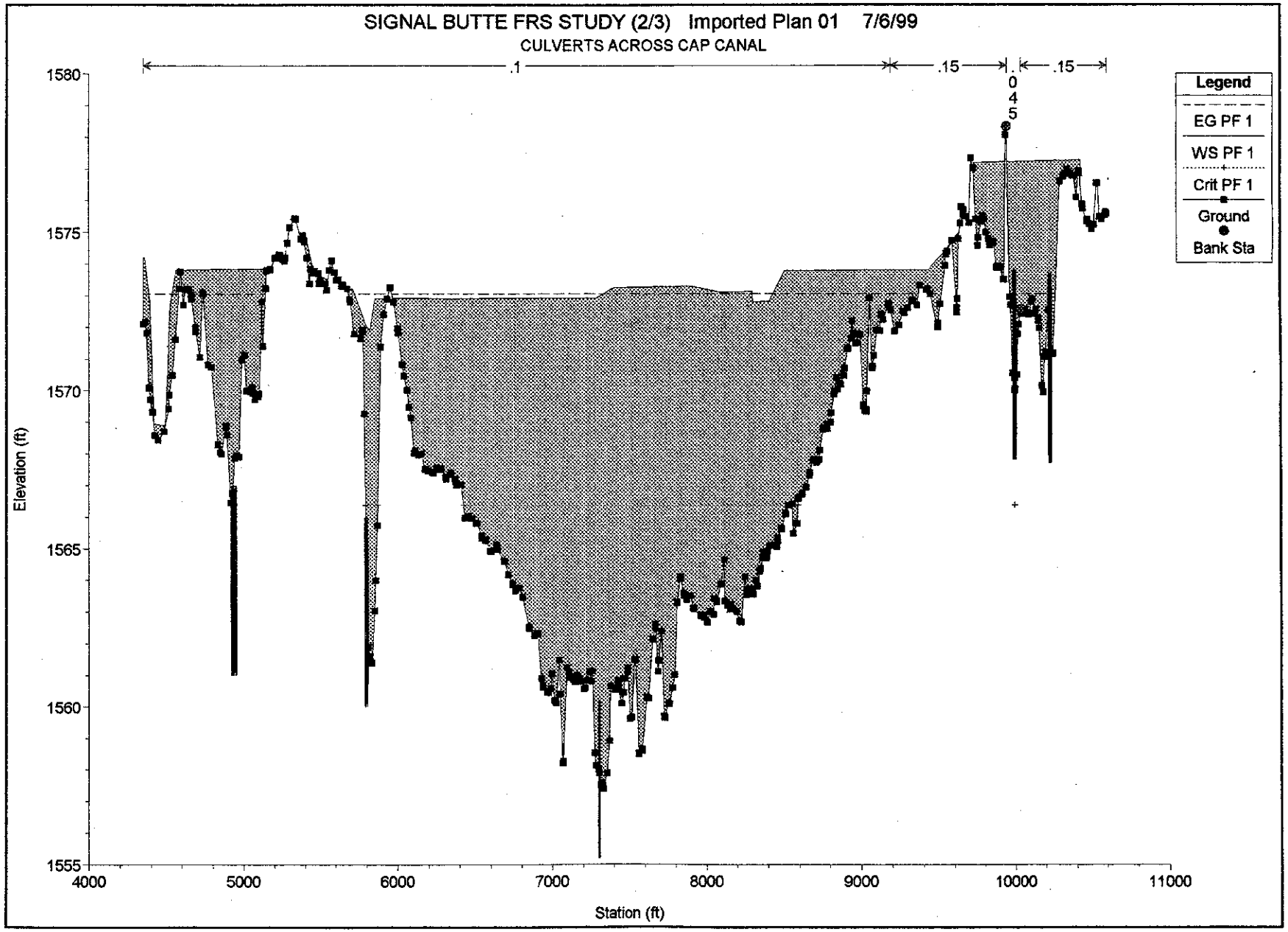

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM 1.795
.08
.045
.08
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1558
1556
1554
1552
1550
1548
1546
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

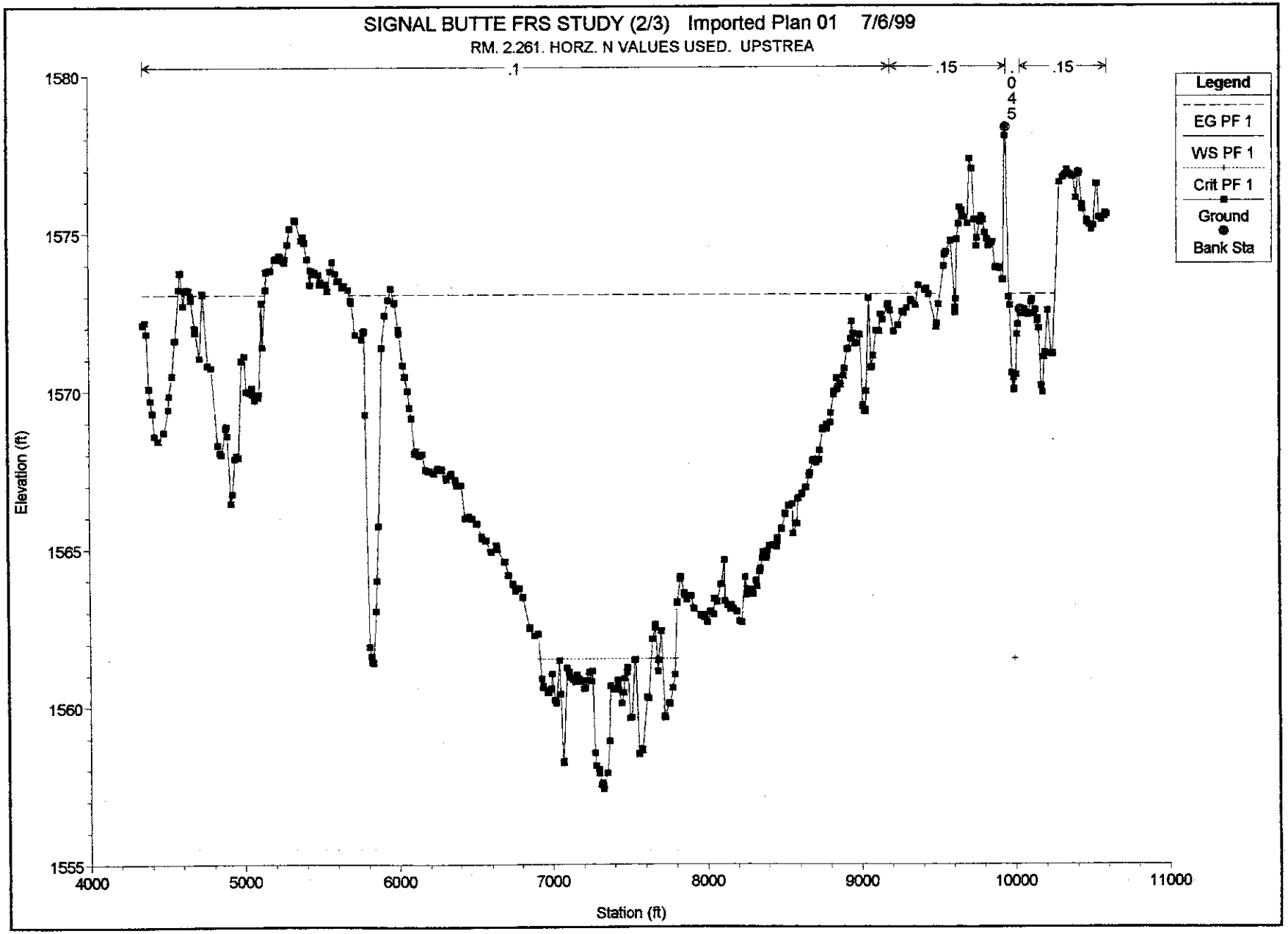

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM .1.898
.08
.08
045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1561
1560
1559
1558
1557
1556
1555
1554
1553
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

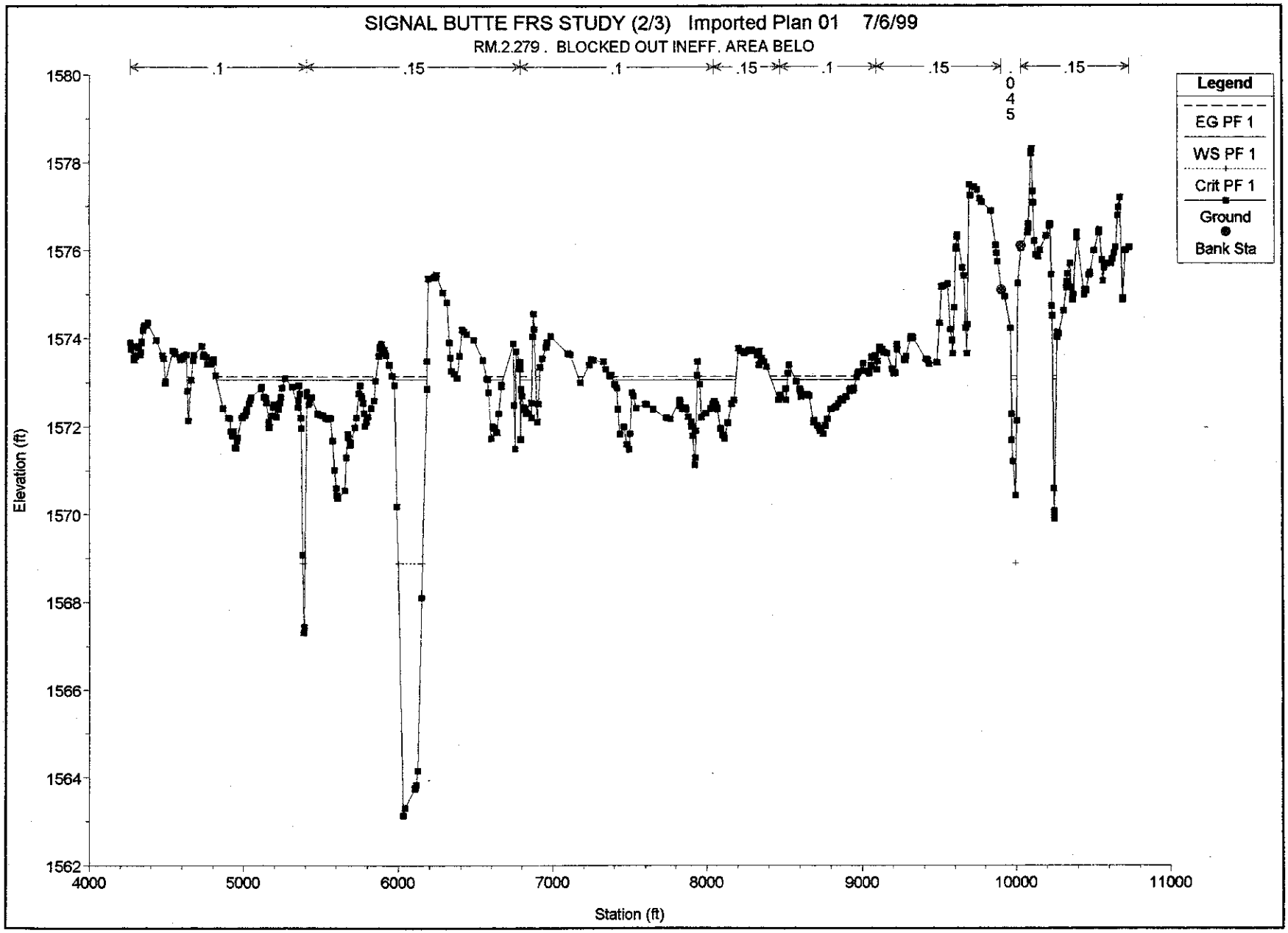

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.020 HYDRAULIC BASELINE CROSSES N
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1568
1566
1564
1562
1560
1558
1556
1554
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

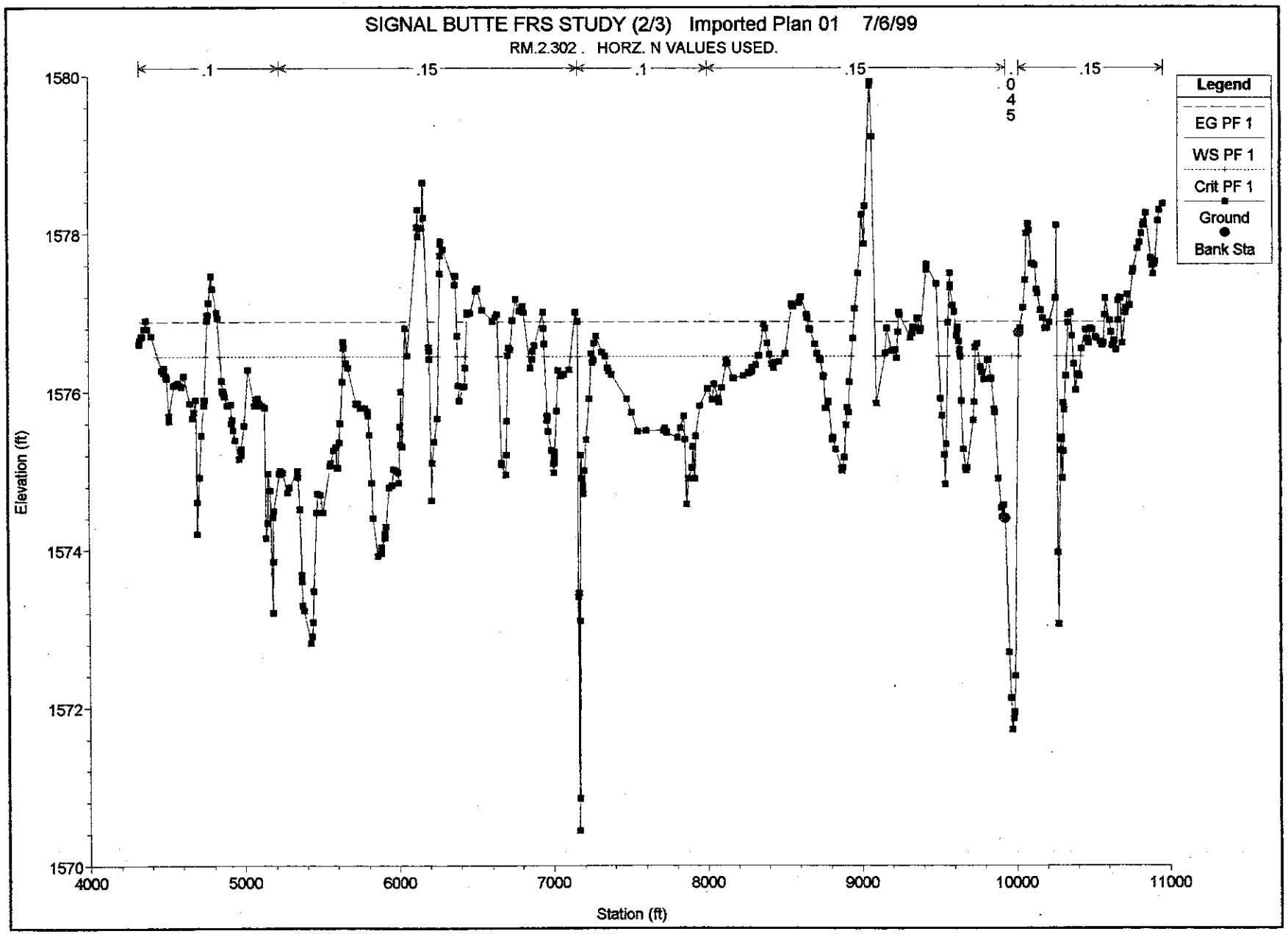

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.223 . DOWNSTREAM EDGE OF CAP CA
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

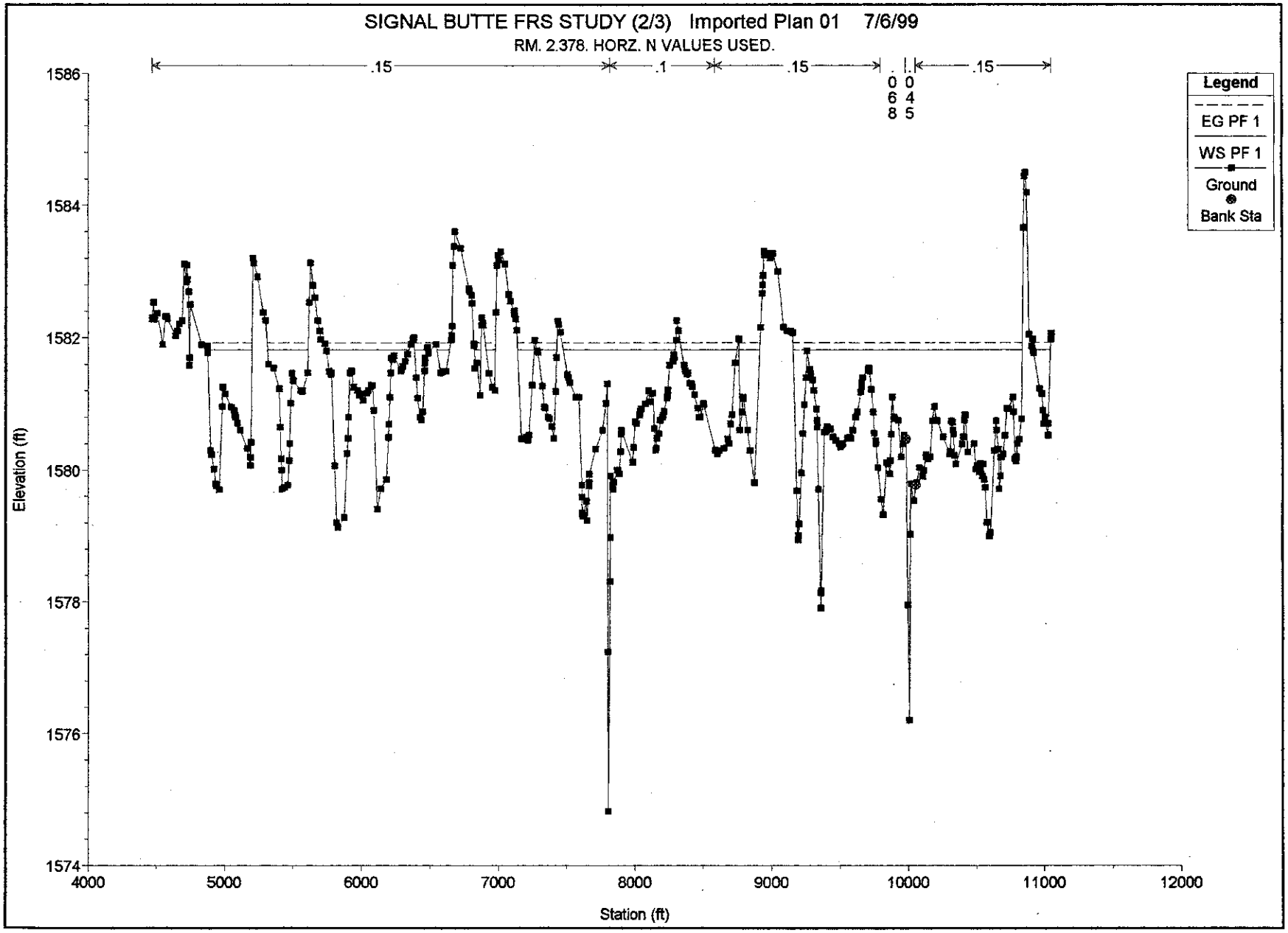

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

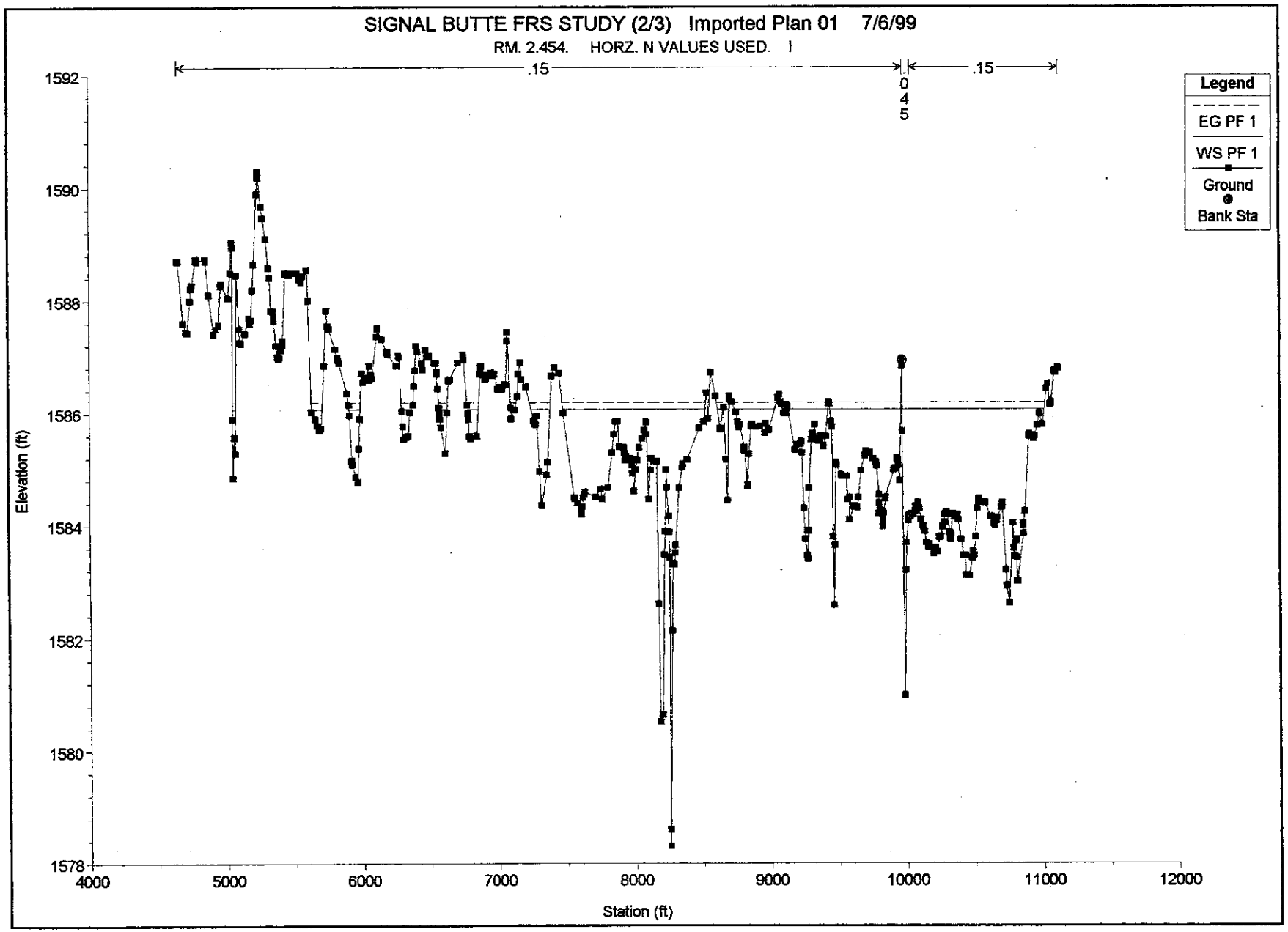

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

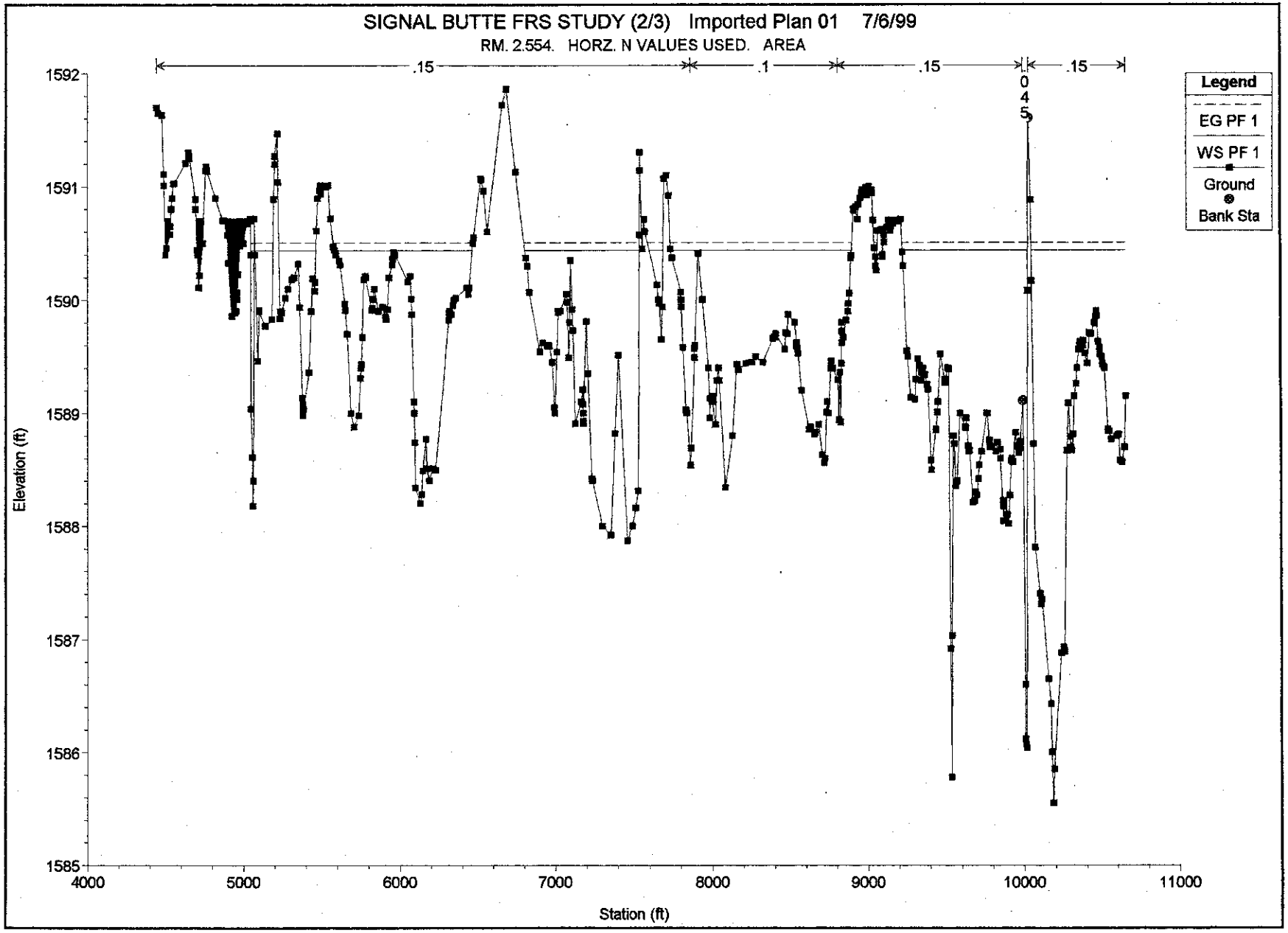

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.261. HORZ. N VALUES USED. UPSTREA
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

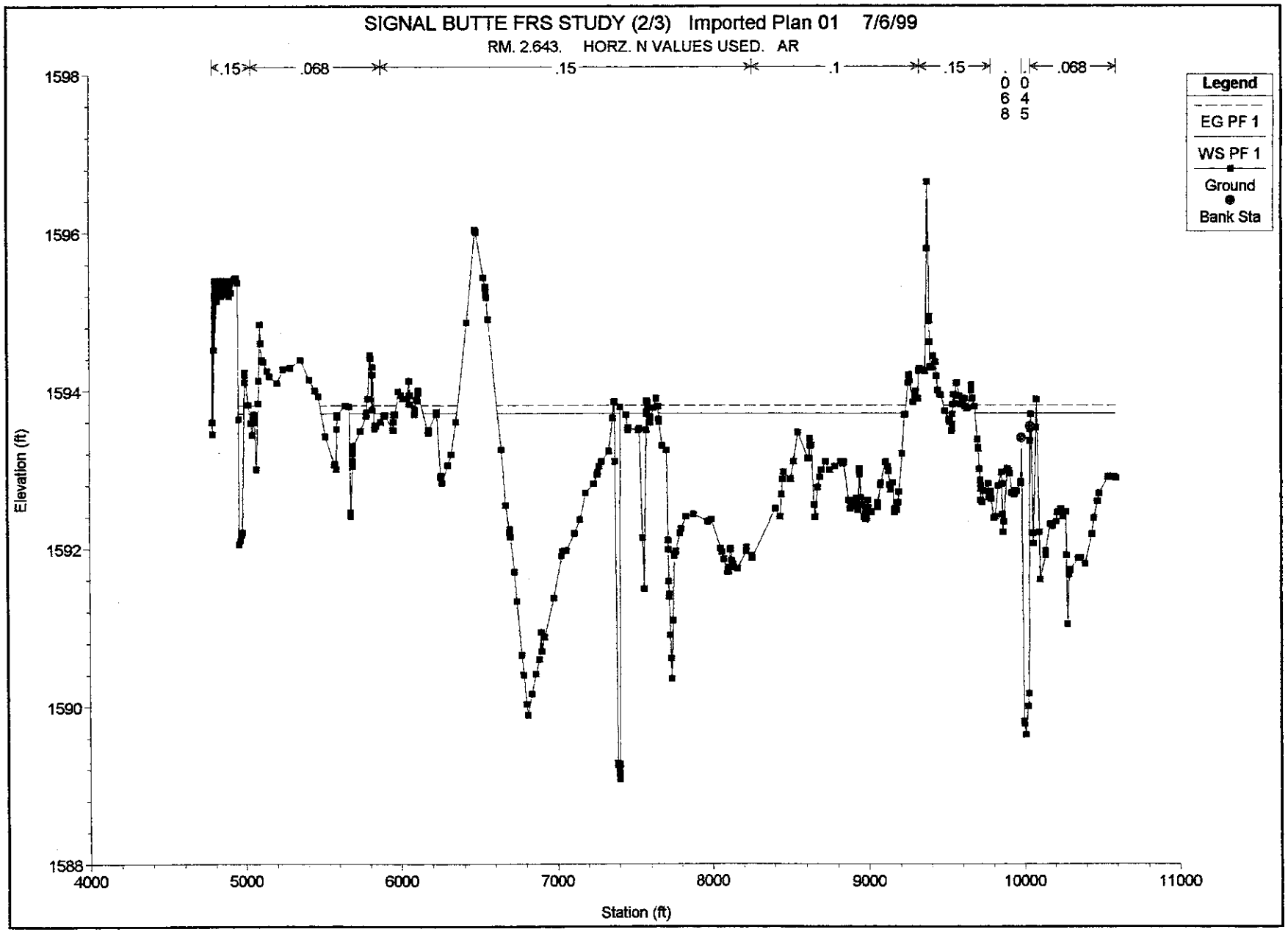

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.2.279 . BLOCKED OUT INEFF. AREA BELO
.1
.15
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
1568
1566
1564
1562
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

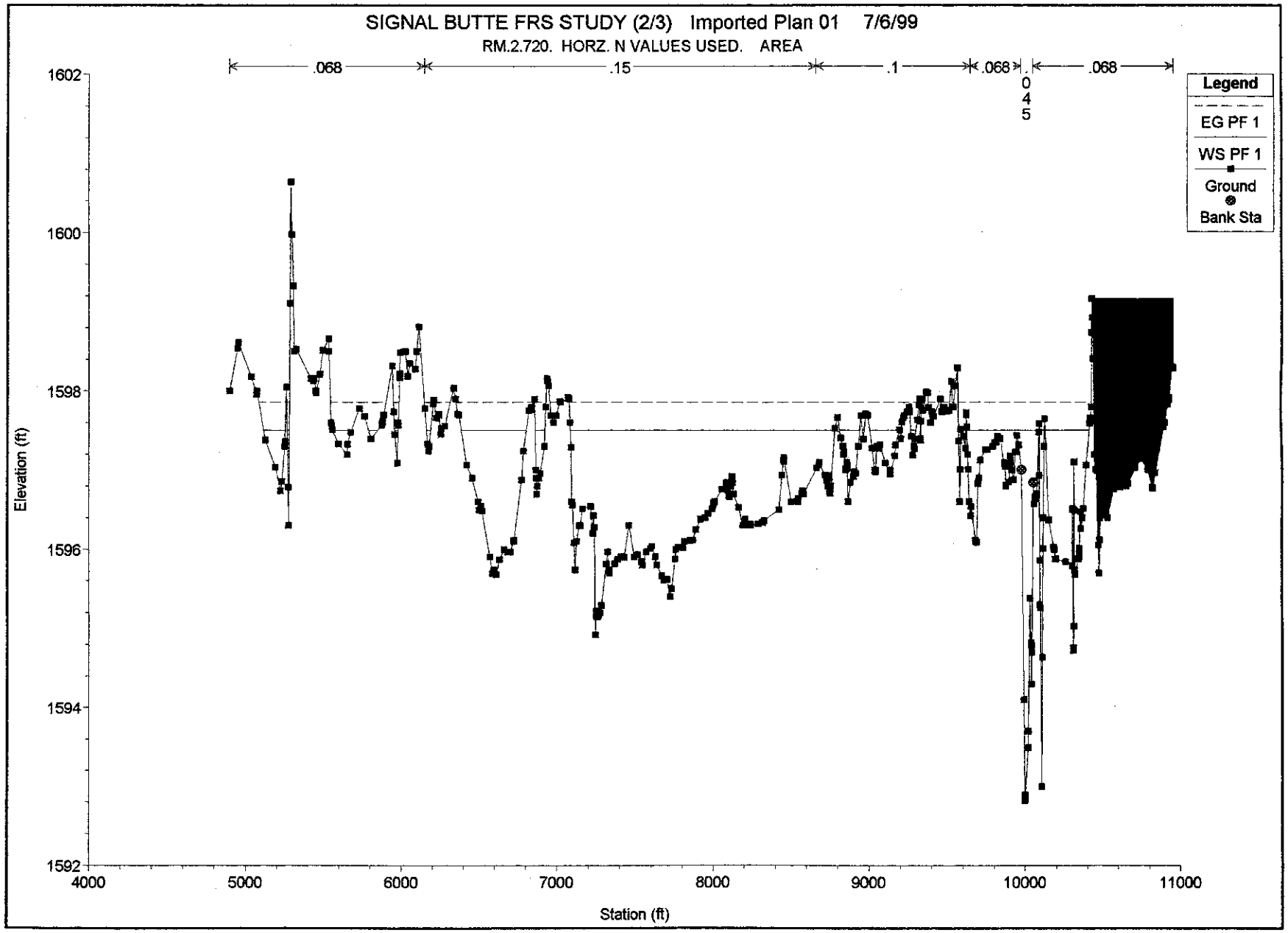

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.2.302 . HORZ. N VALUES USED.
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

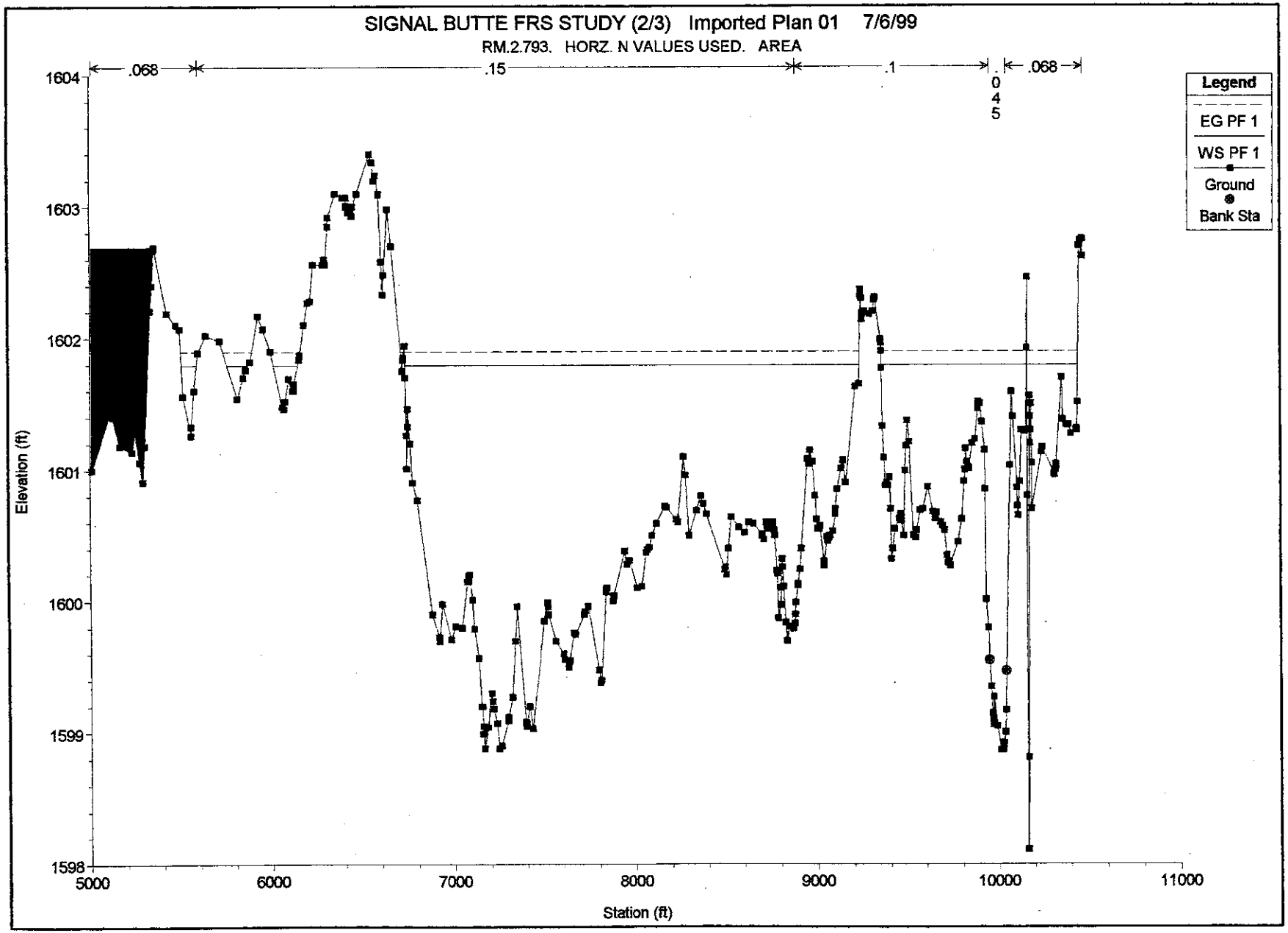

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.378. HORZ. N VALUES USED.
.15
.1
.15
.15
0 0
6 4
8 5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1586
1584
1582
1580
1578
1576
1574
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

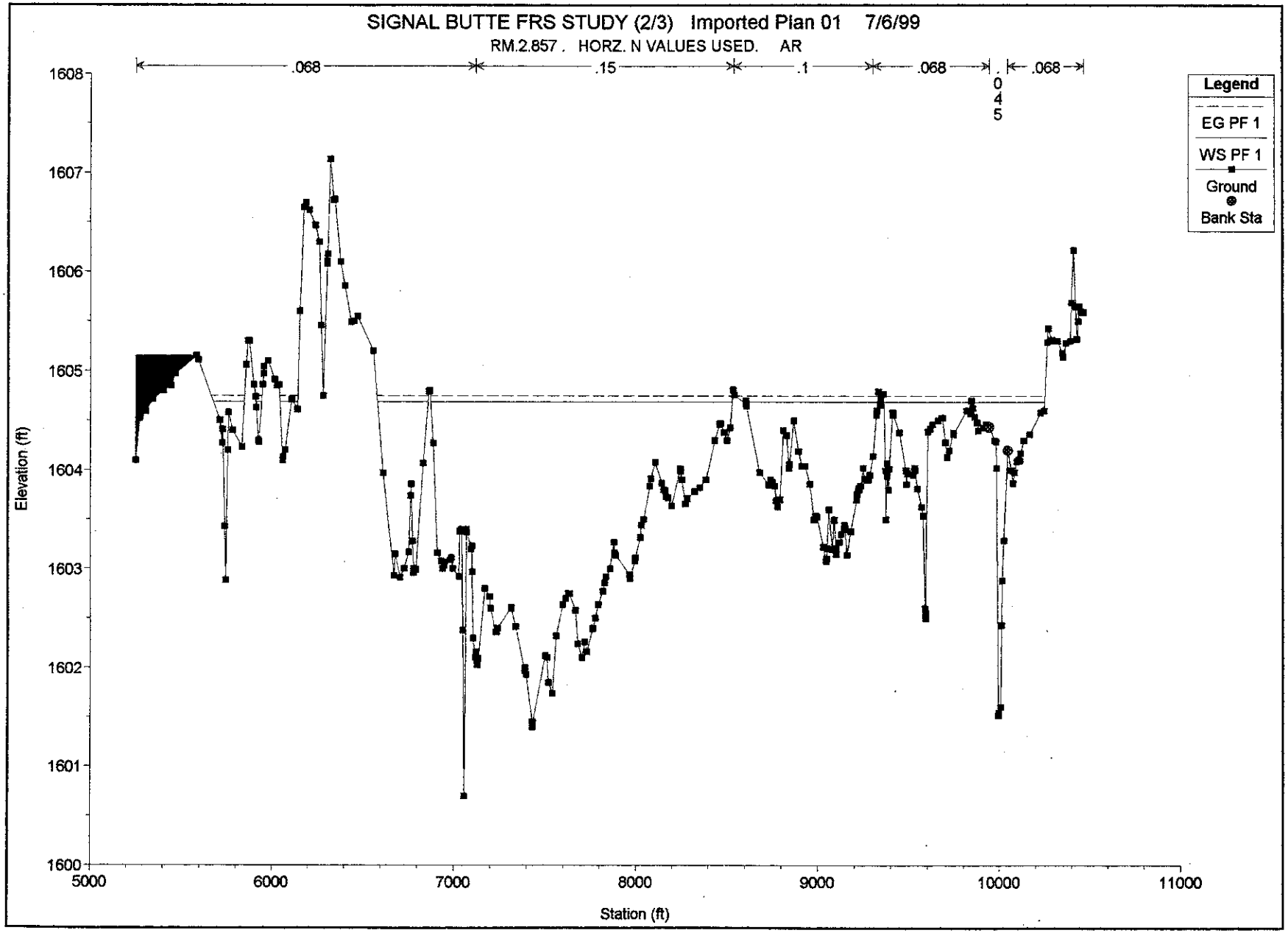

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.454. HORZ. N VALUES USED. 1
.15
0
4
5
.15
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1592
1590
1588
1586
1584
1582
1580
1578
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

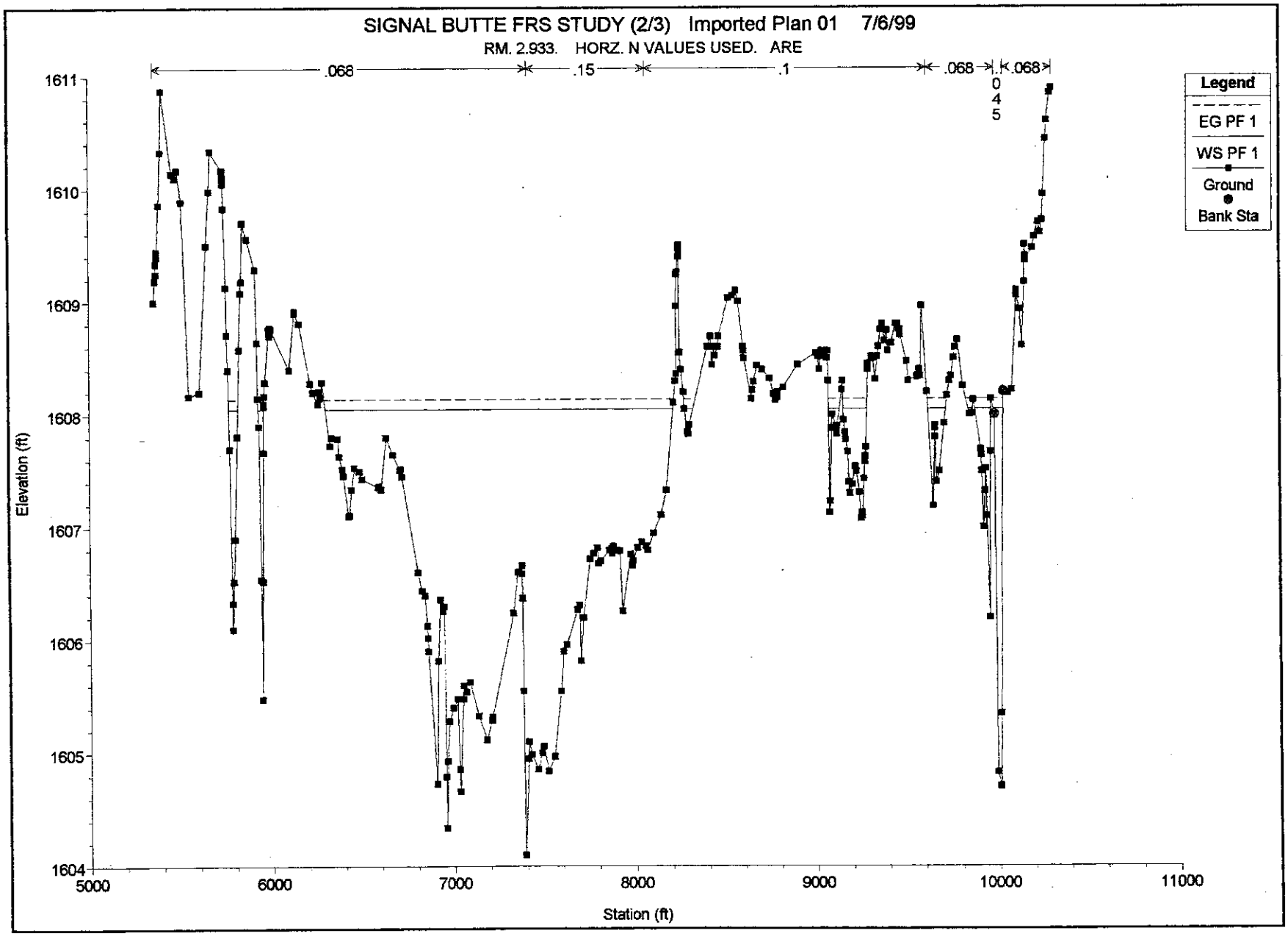

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.554. HORZ. N VALUES USED. AREA
.15
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1592
1591
1590
1589
1588
1587
1586
1585
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

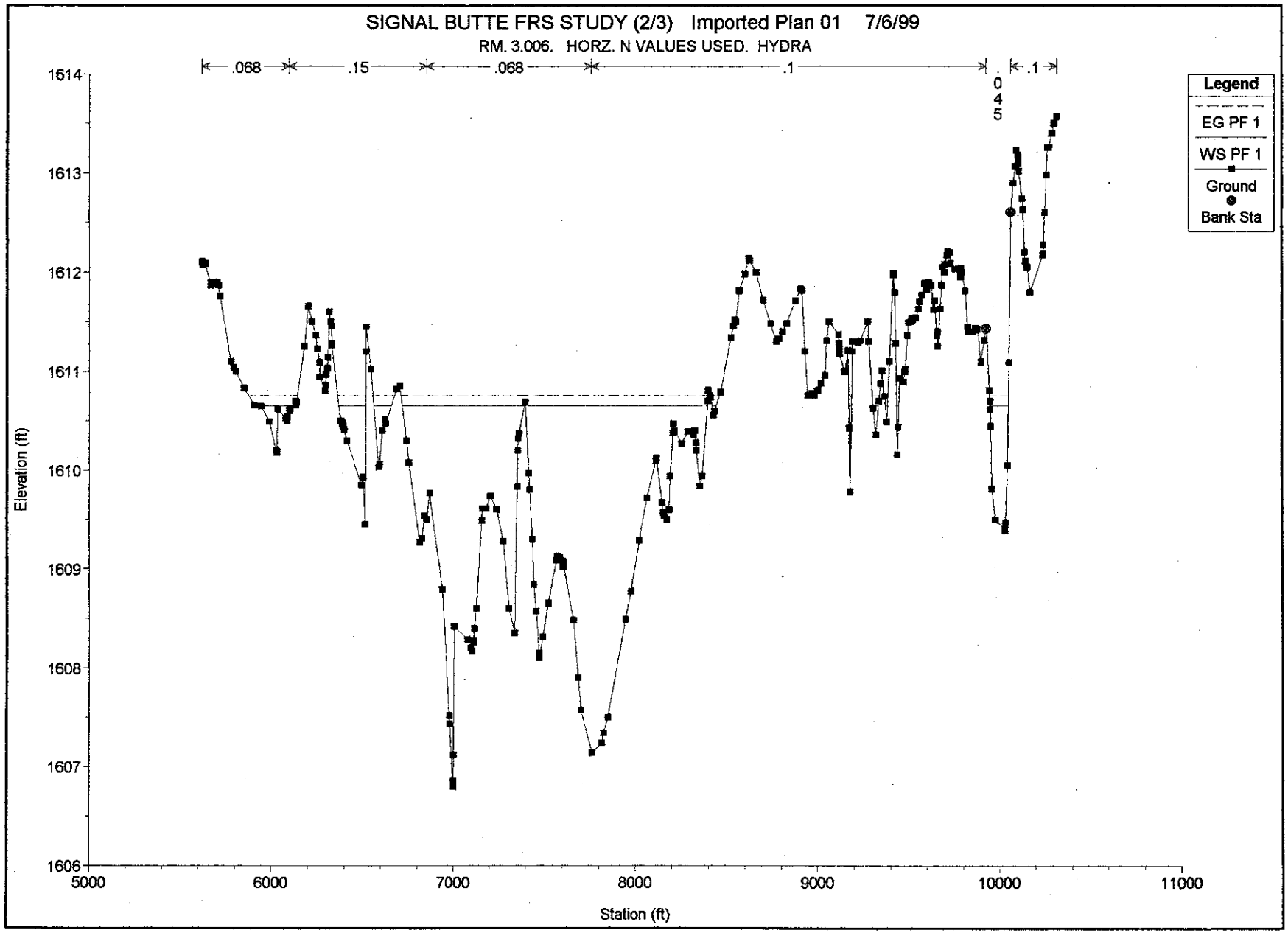

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.643. HORZ. N VALUES USED. AR
.15
.068
.15
.1
.15
.068
.0068
.0045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1598
1596
1594
1592
1590
1588
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

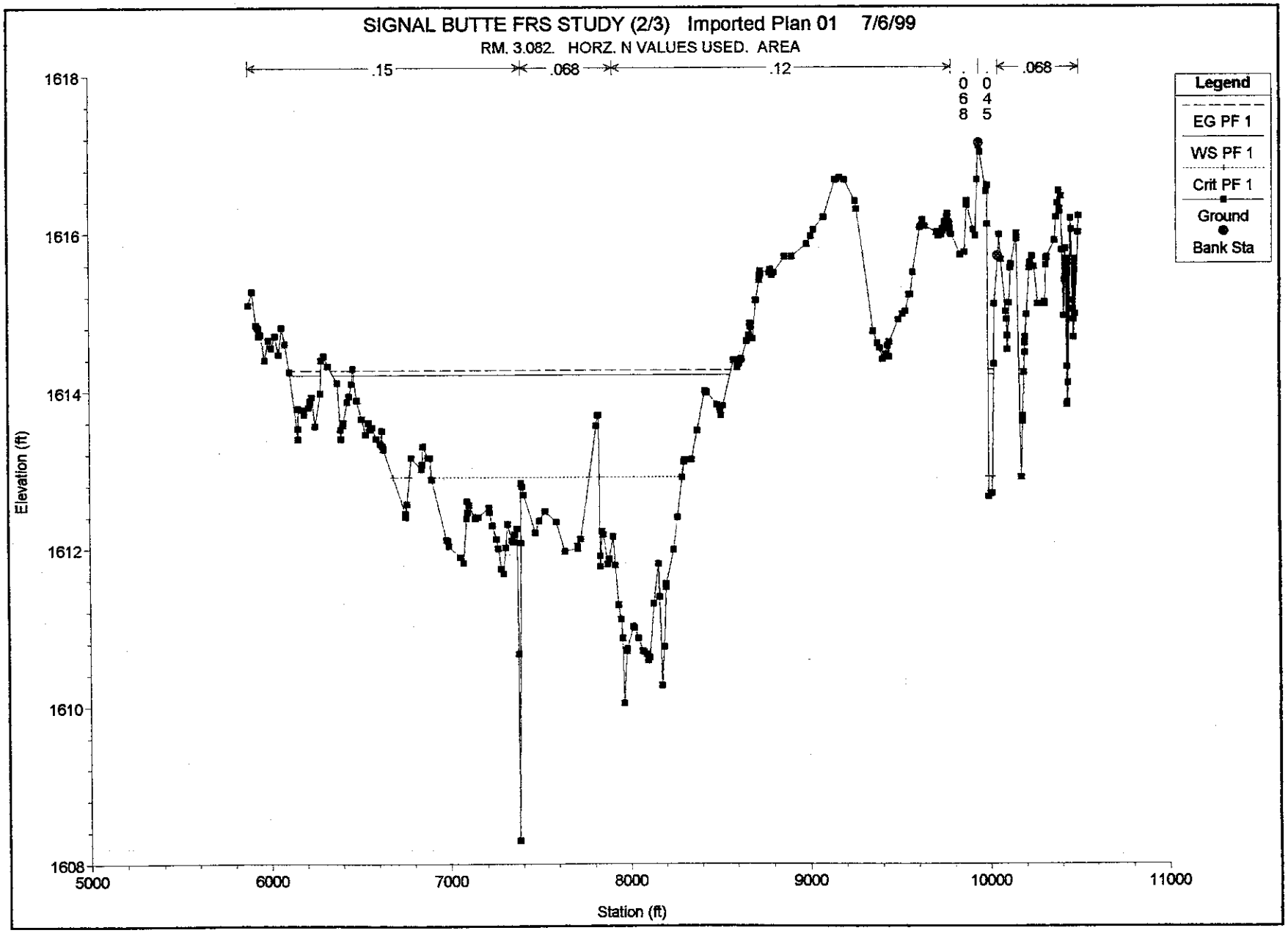

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.2.720. HORZ. N VALUES USED. AREA
.068
.15
.1
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1602
1600
1598
1596
1594
1592
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

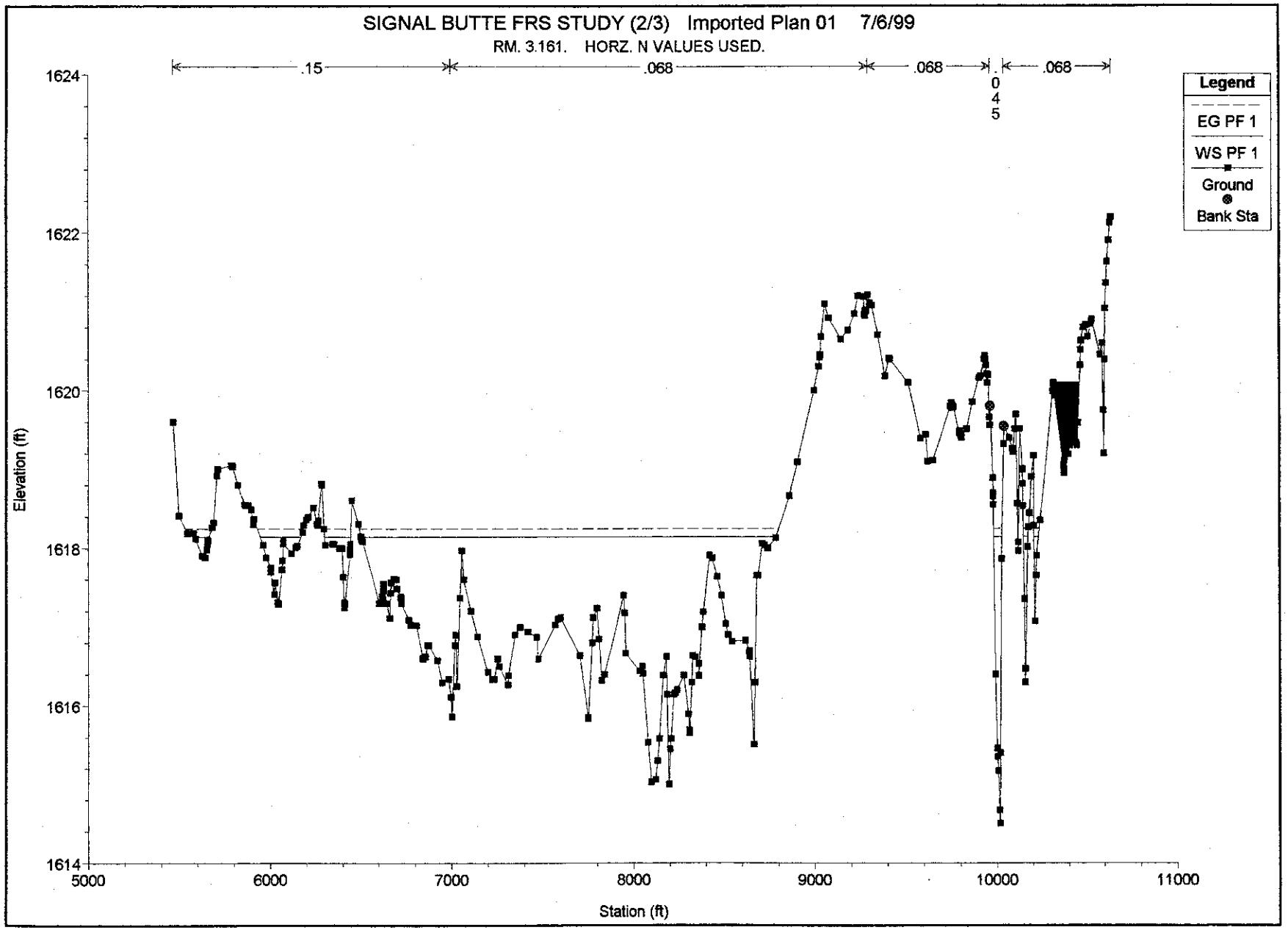

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.2.793. HORZ. N VALUES USED. AREA
.068
.15
.1
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1604
1603
1602
1601
1600
1599
1598
5000
6000
7000
8000
9000
10000
11000
Station (ft)

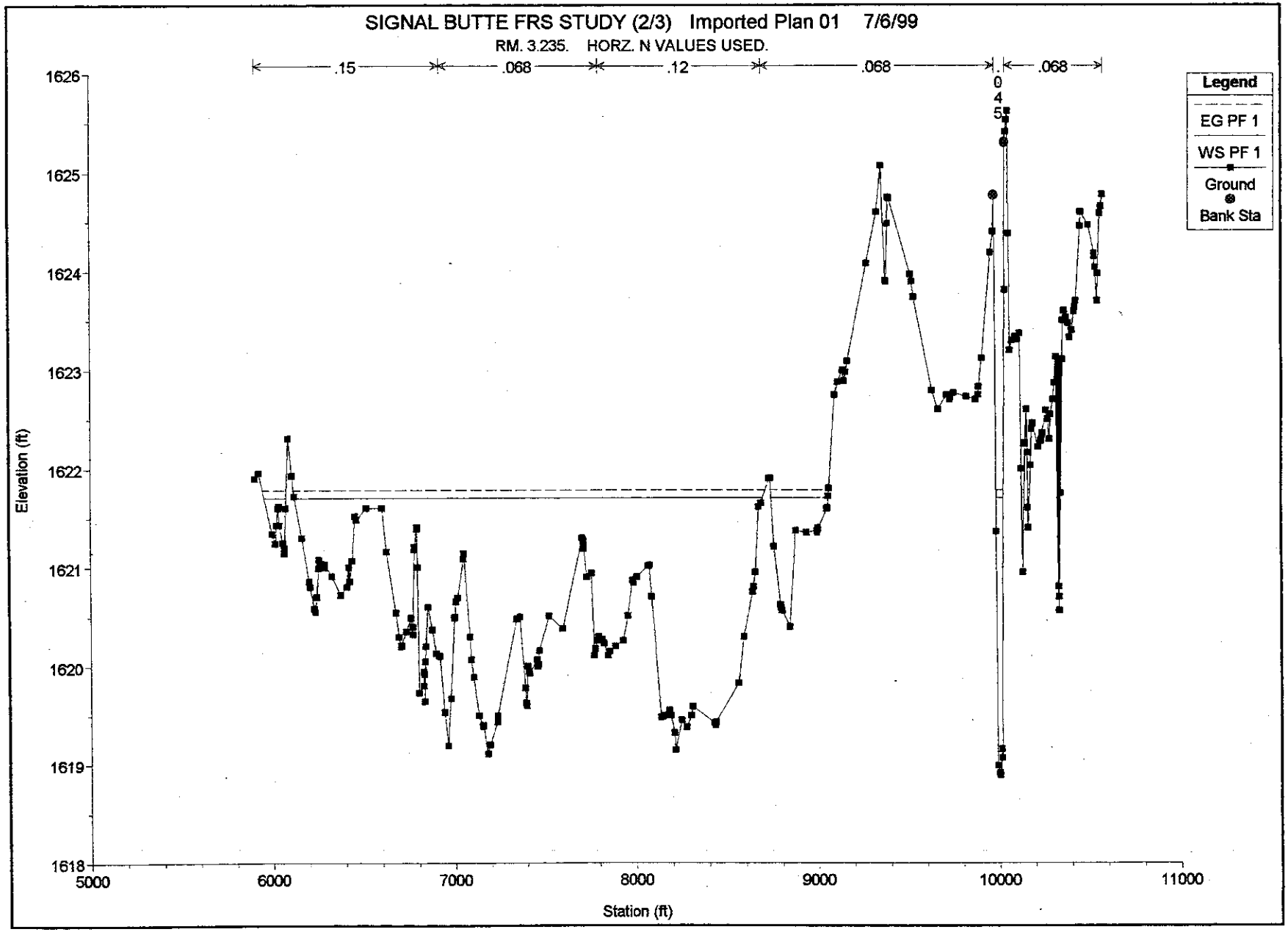

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.2.857 . HORZ. N VALUES USED. AR
.068
.15
.1
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1608
1607
1606
1605
1604
1603
1602
1601
1600
5000
6000
7000
8000
9000
10000
11000
Station (ft)

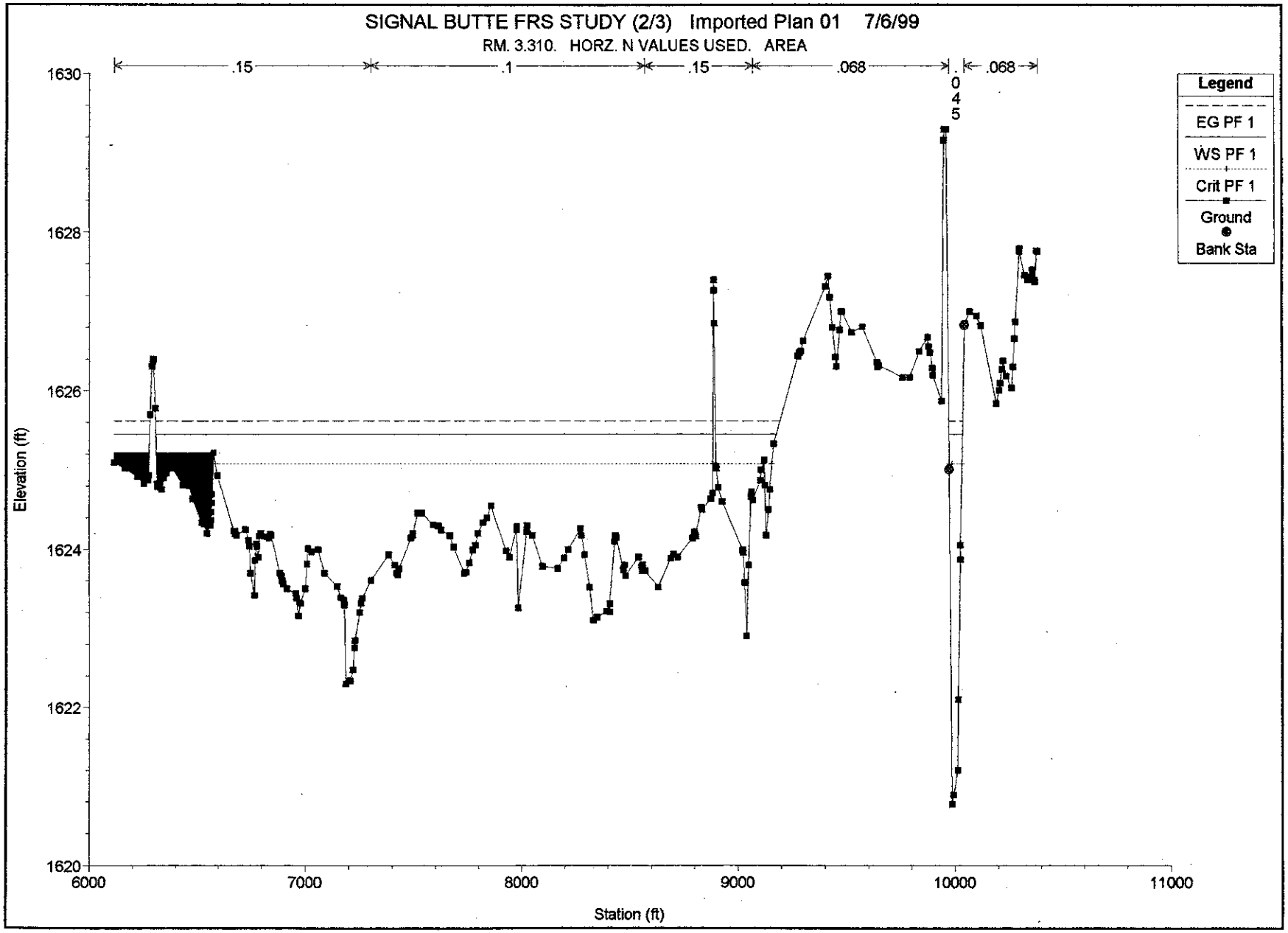

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 2.933. HORZ. N VALUES USED. ARE
.068
.15
.1
.068
.068
045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1611
1610
1609
1608
1607
1606
1605
1604
5000
6000
7000
8000
9000
10000
11000
Station (ft)

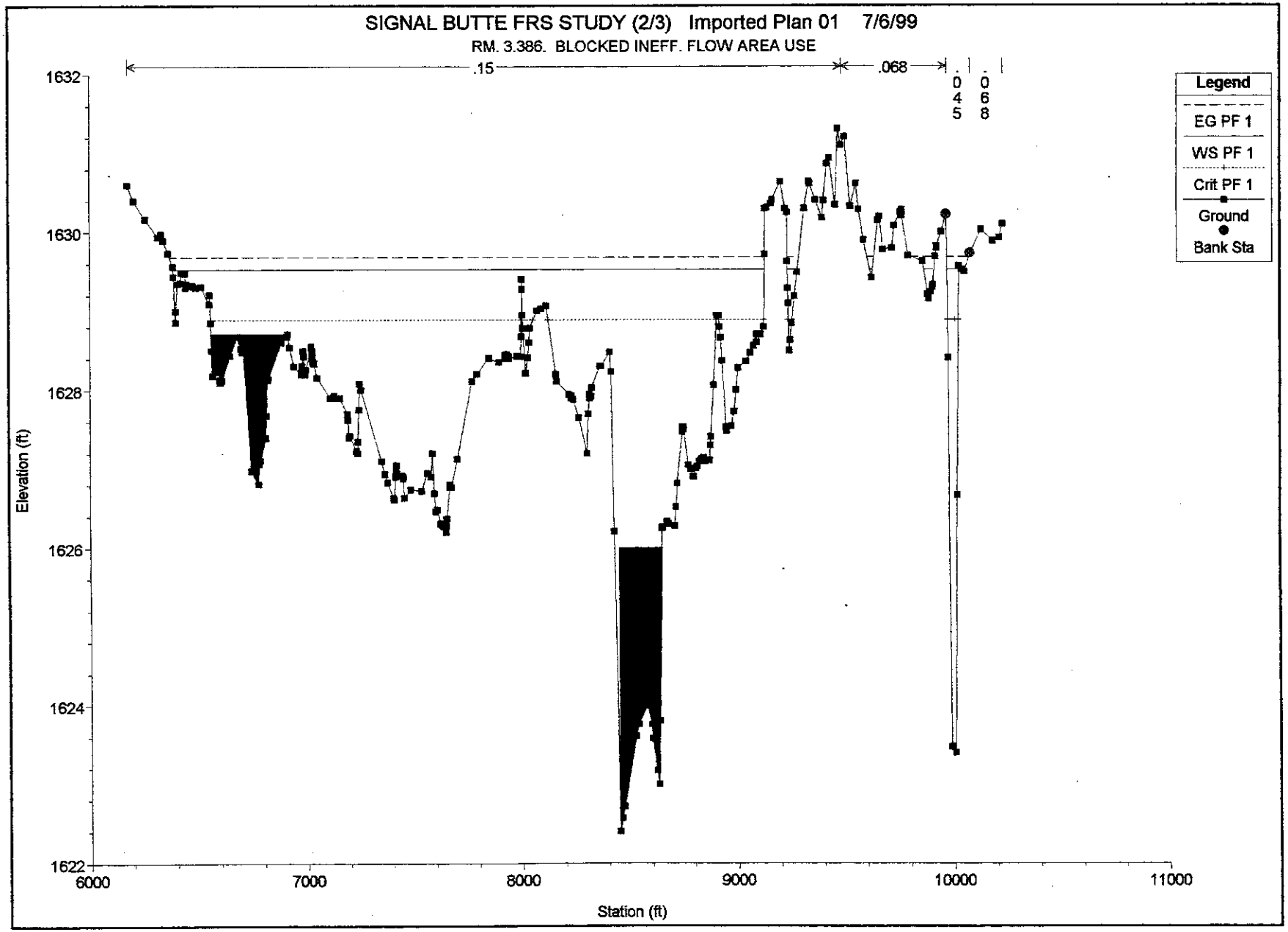

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.006. HORZ. N VALUES USED. HYDRA
.068
.15
.068
.1
.045
.1
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1614
1613
1612
1611
1610
1609
1608
1607
1606
5000
6000
7000
8000
9000
10000
11000
Station (ft)

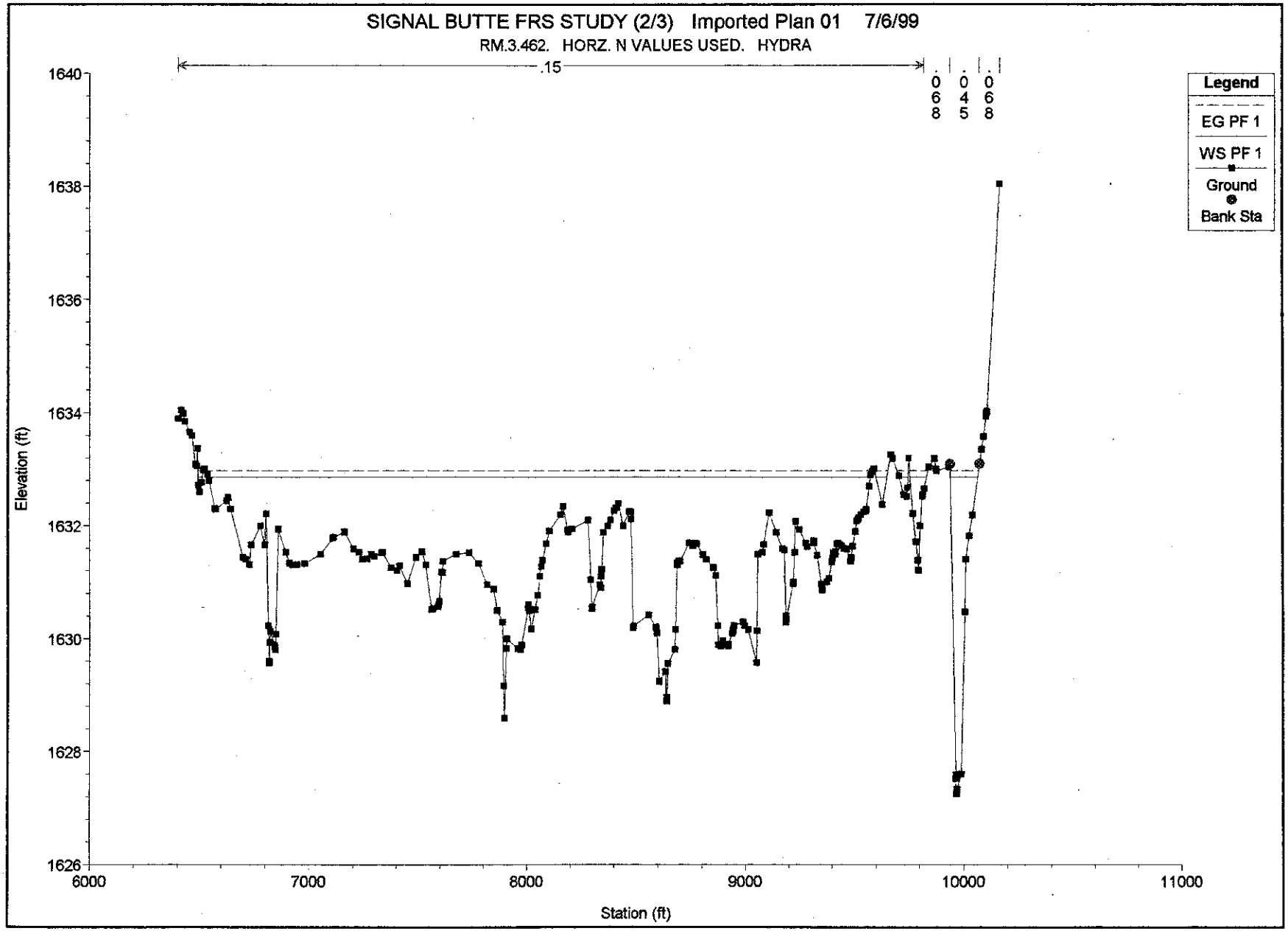

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.082. HORZ. N VALUES USED. AREA
.15
.068
.12
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1618
1616
1614
1612
1610
1608
5000
6000
7000
8000
9000
10000
11000
Station (ft)

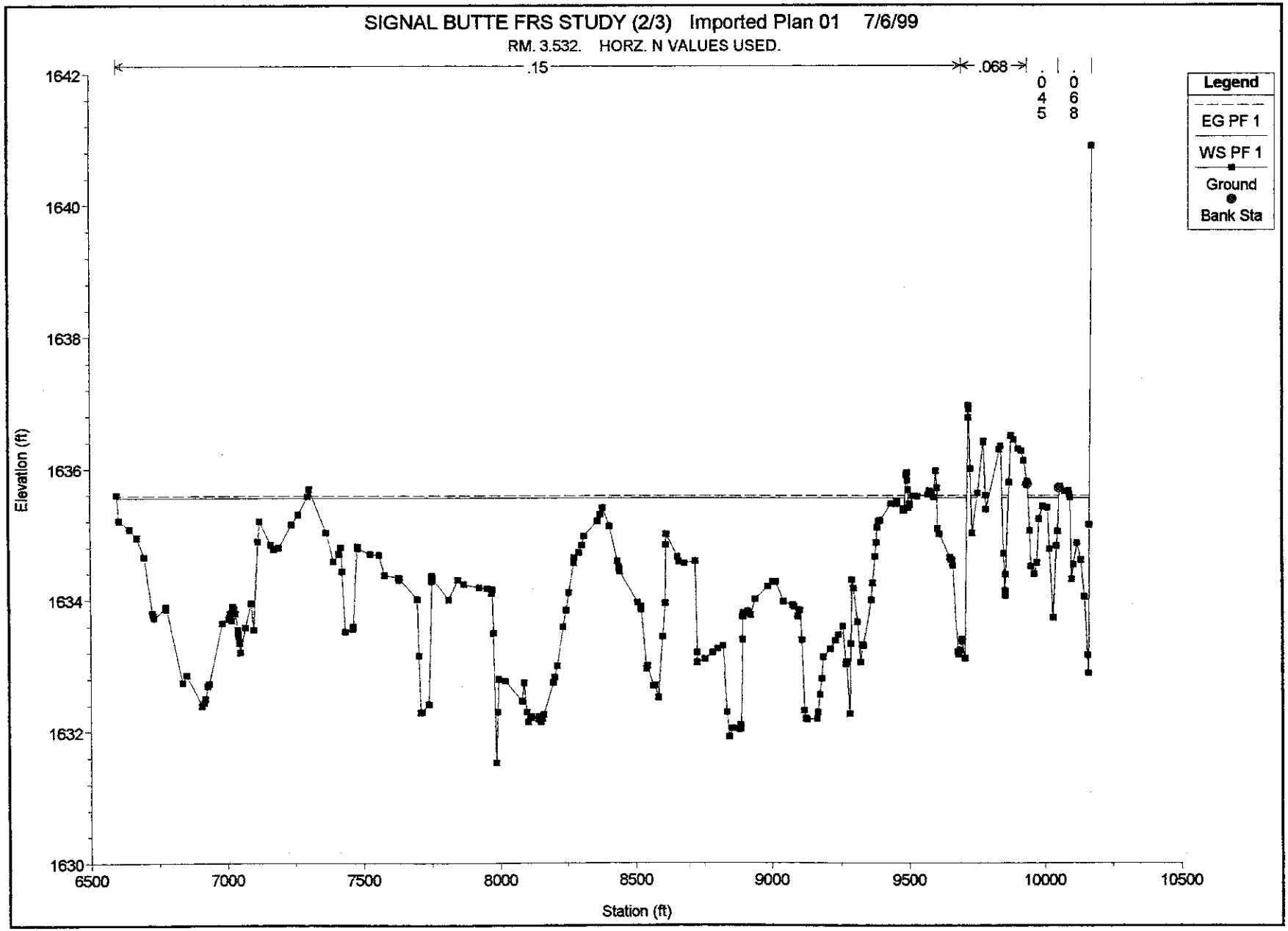

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.161. HORZ. N VALUES USED.
.15
.068
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1624
1622
1620
1618
1616
1614
5000
6000
7000
8000
9000
10000
11000
Station (ft)

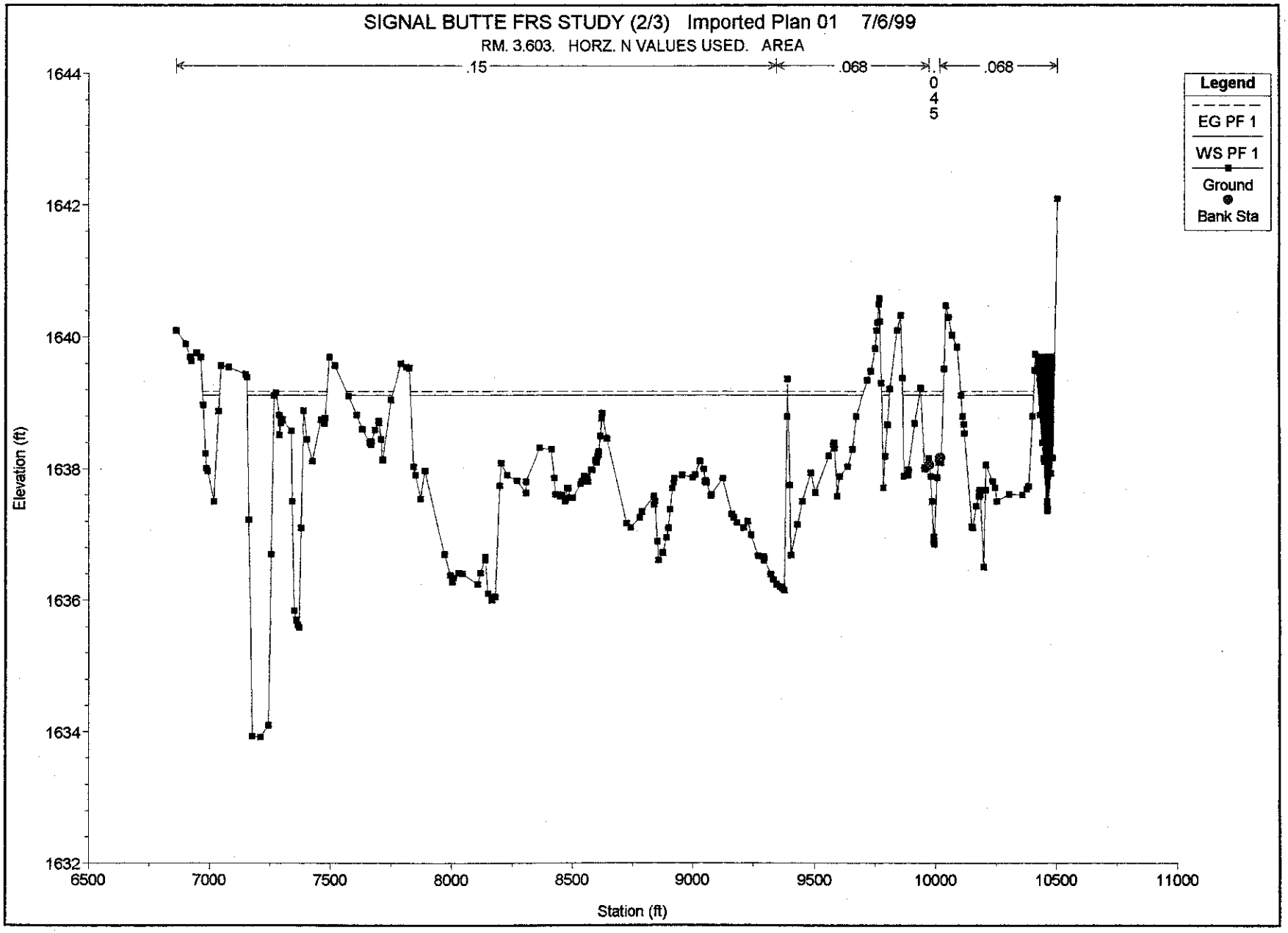

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.235. HORZ. N VALUES USED.
.15
.068
.12
.068
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1626
1625
1624
1623
1622
1621
1620
1619
1618
5000
6000
7000
8000
9000
10000
11000

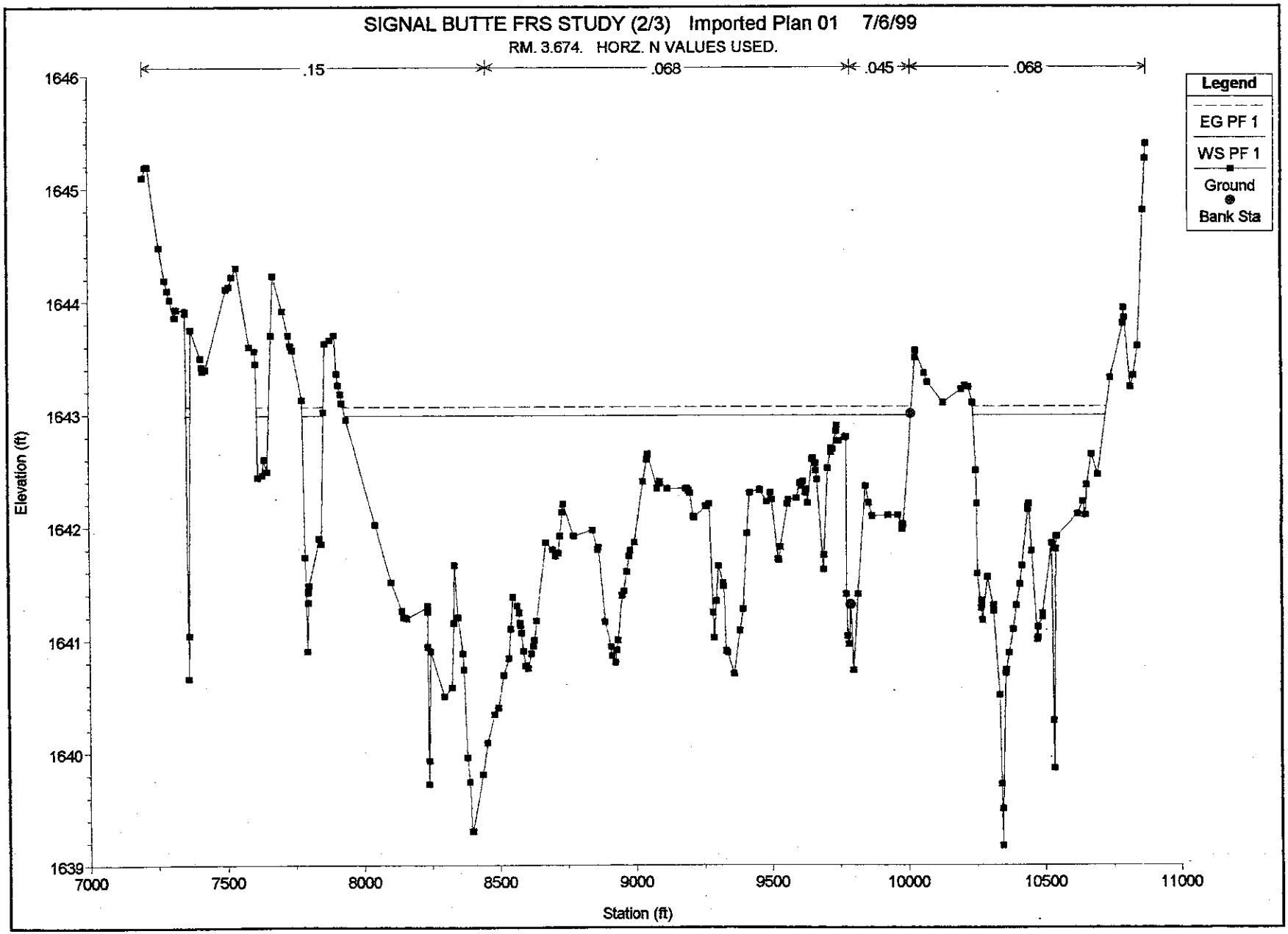

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.310. HORZ. N VALUES USED. AREA
.15
.1
.15
.068
.068
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1630
1628
1626
1624
1622
1620
6000
7000
8000
9000
10000
11000
Station (ft)

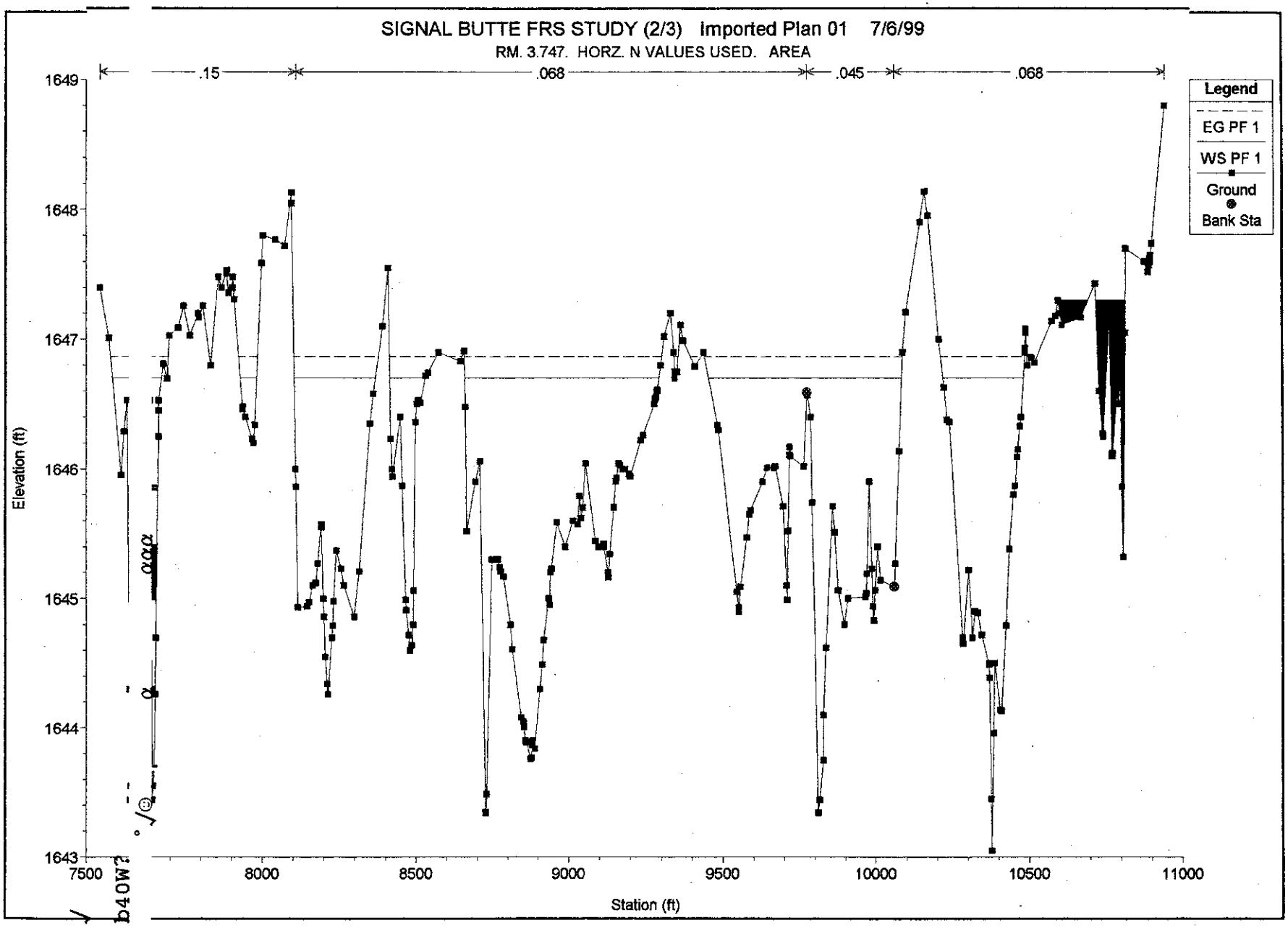

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.386. BLOCKED INEFF. FLOW AREA USE
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1632
1630
1628
1626
1624
1622
6000
7000
8000
9000
10000
11000
Station (ft)

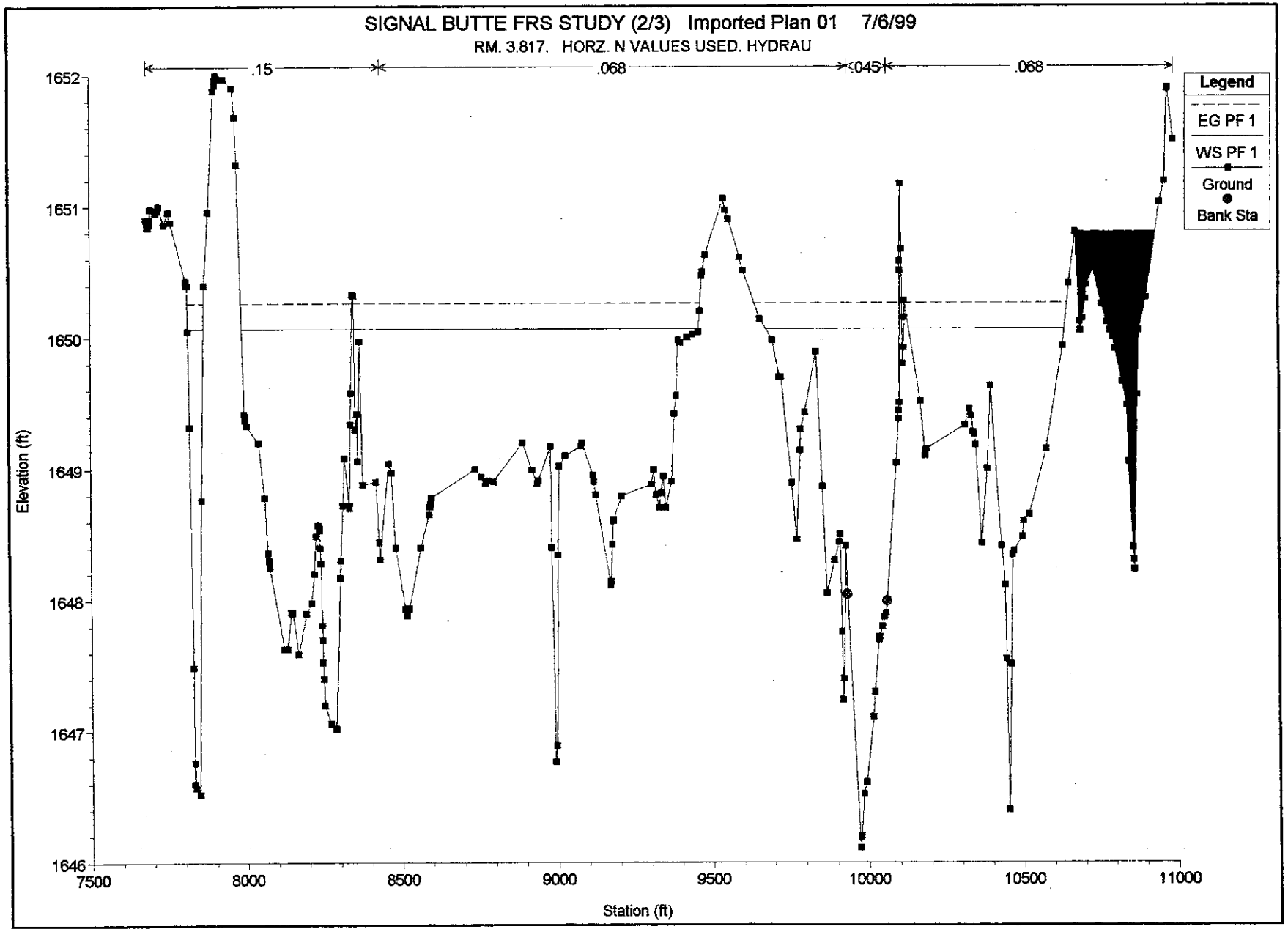

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.3.462. HORZ. N VALUES USED. HYDRA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1640
1638
1636
1634
1632
1630
1628
1626
6000
7000
8000
9000
10000
11000
Station (ft)

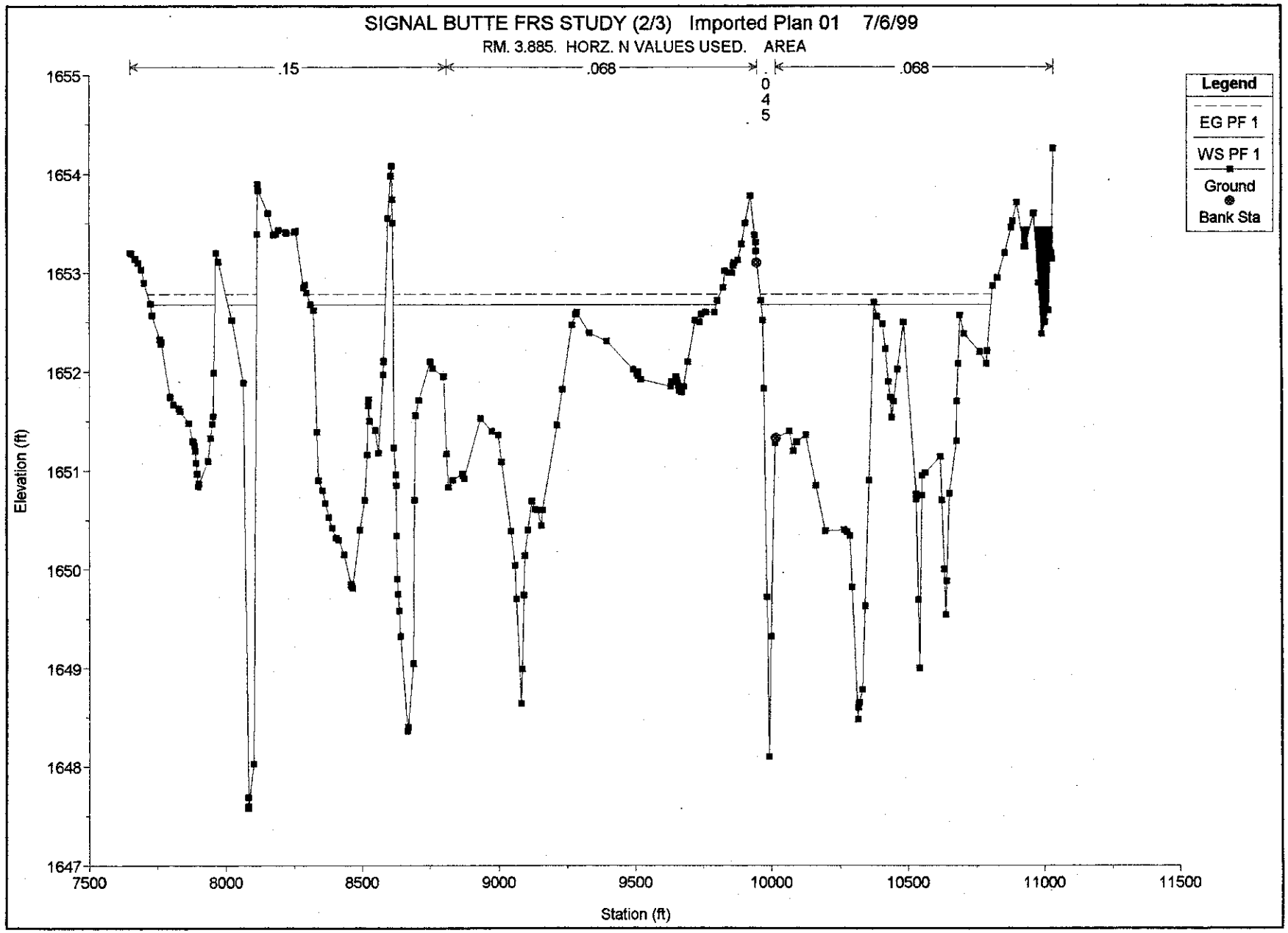

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.532. HORZ. N VALUES USED.
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1642
1640
1638
1636
1634
1632
1630
6500
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.603. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1644
1642
1640
1638
1636
1634
1632
6500
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.674. HORZ. N VALUES USED.
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1646
1645
1644
1643
1642
1641
1640
1639
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.747. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1649
1648
1647
1646
1645
1644
1643
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.817. HORZ. N VALUES USED. HYDRAU
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1652
1651
1650
1649
1648
1647
1646
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.885. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1655
1654
1653
1652
1651
1650
1649
1648
1647
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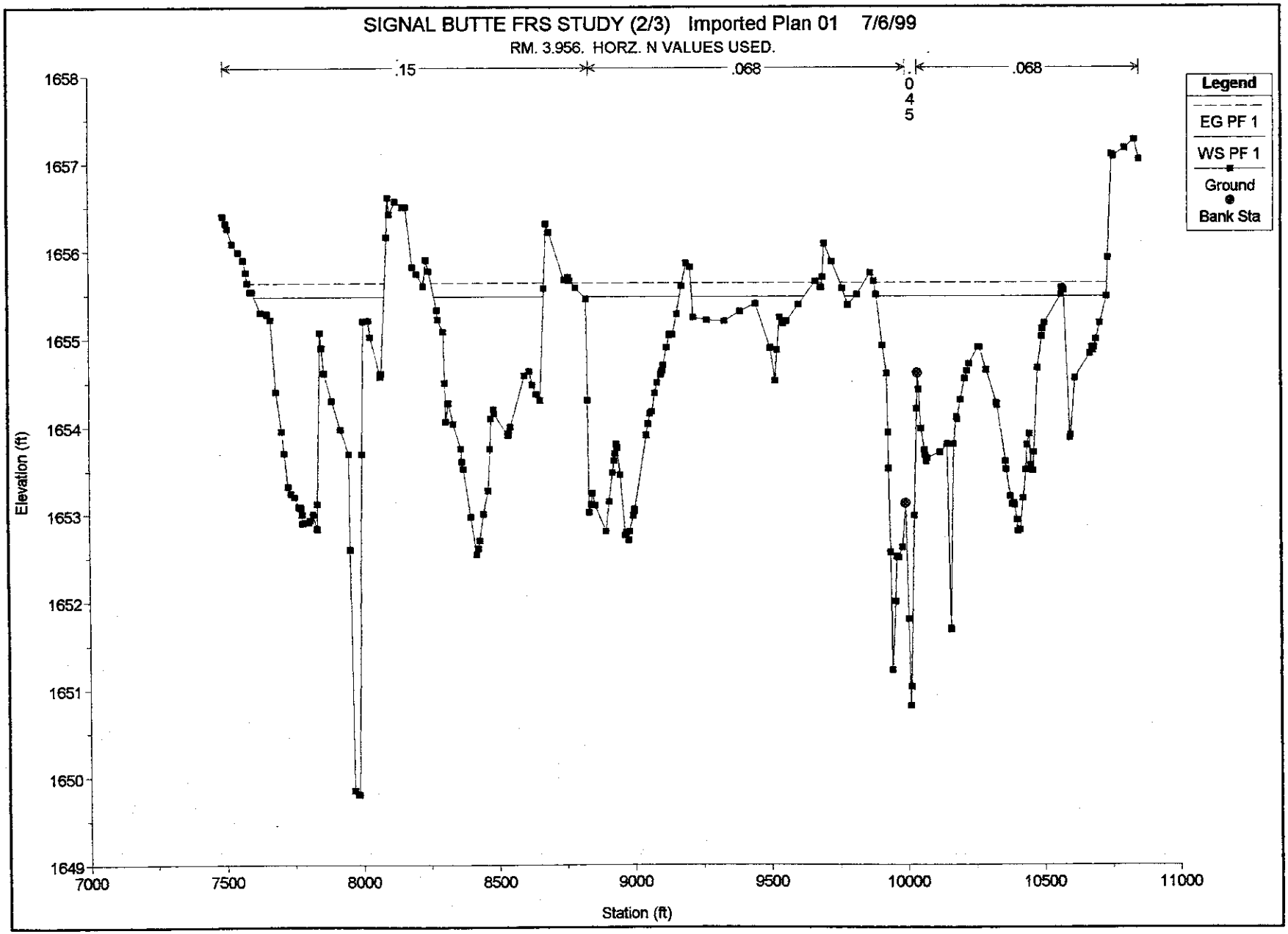
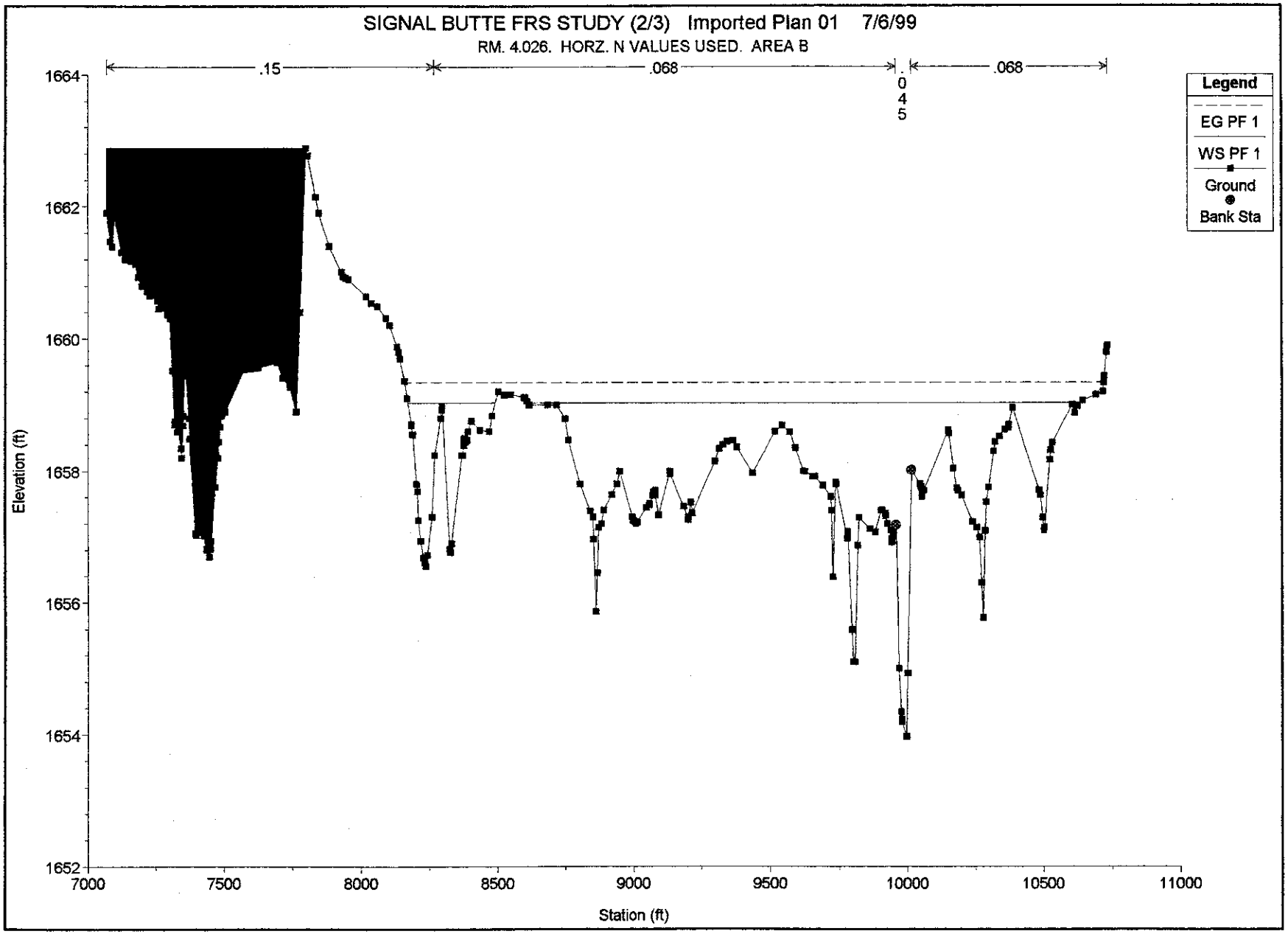
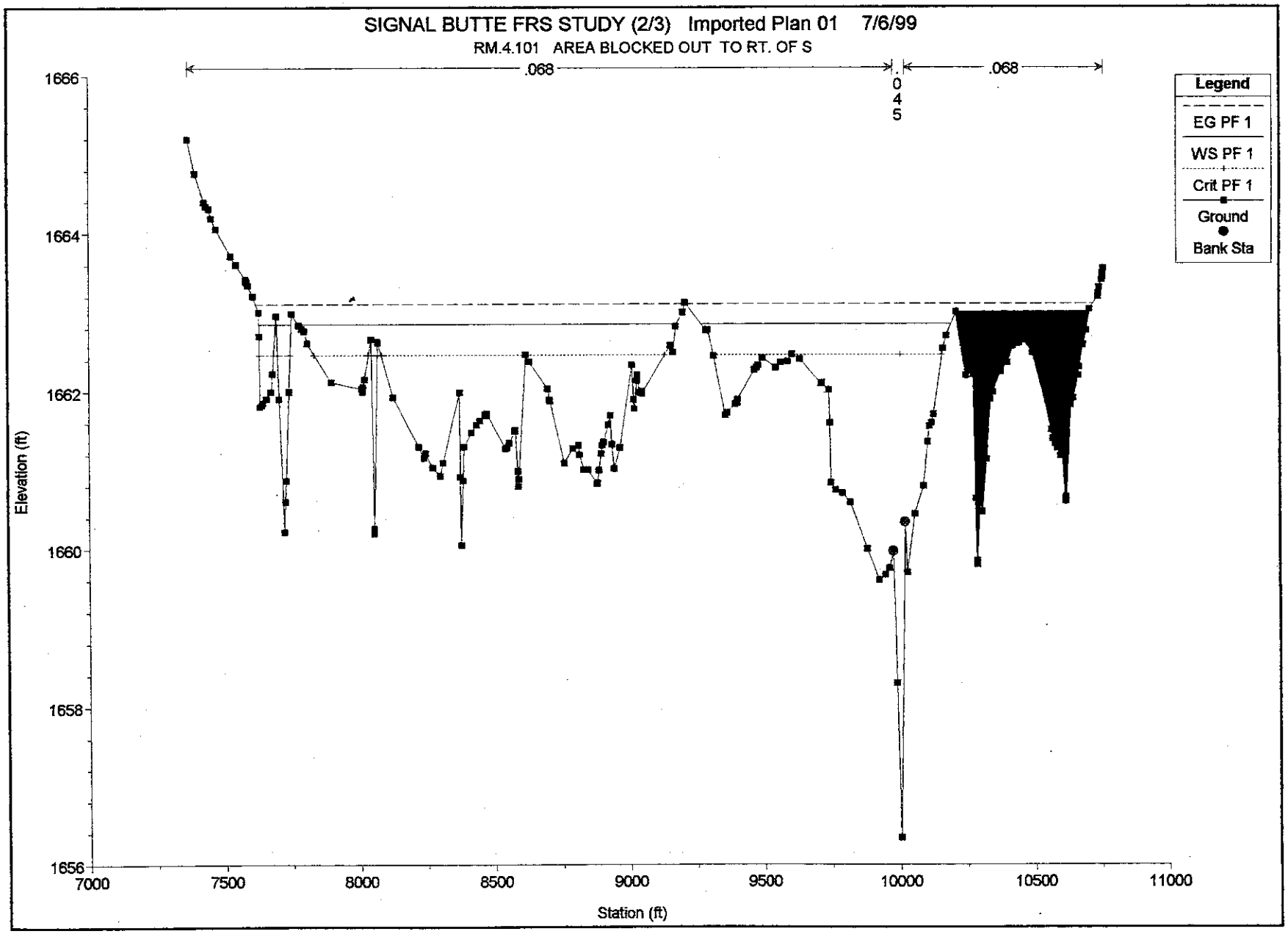
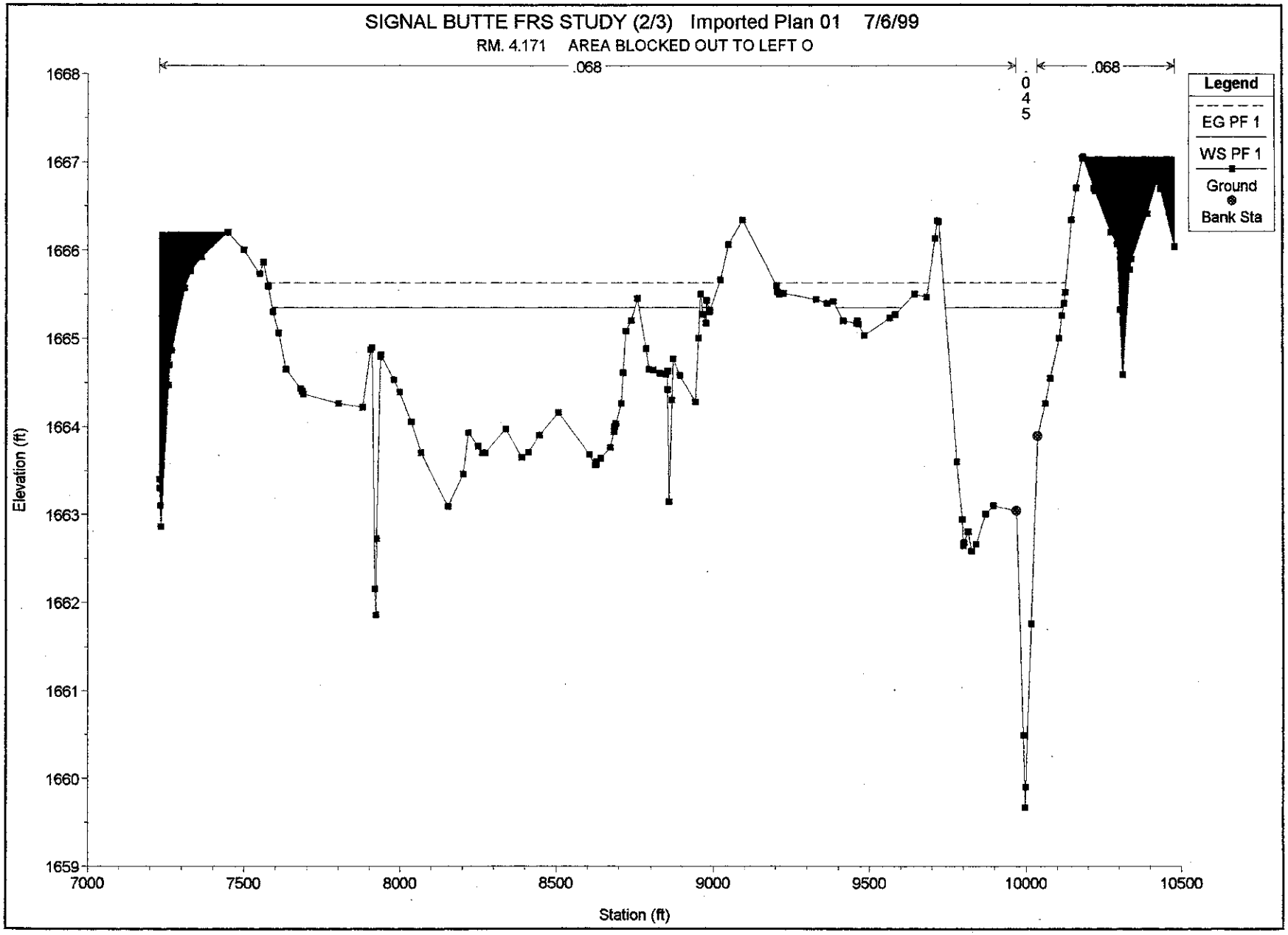
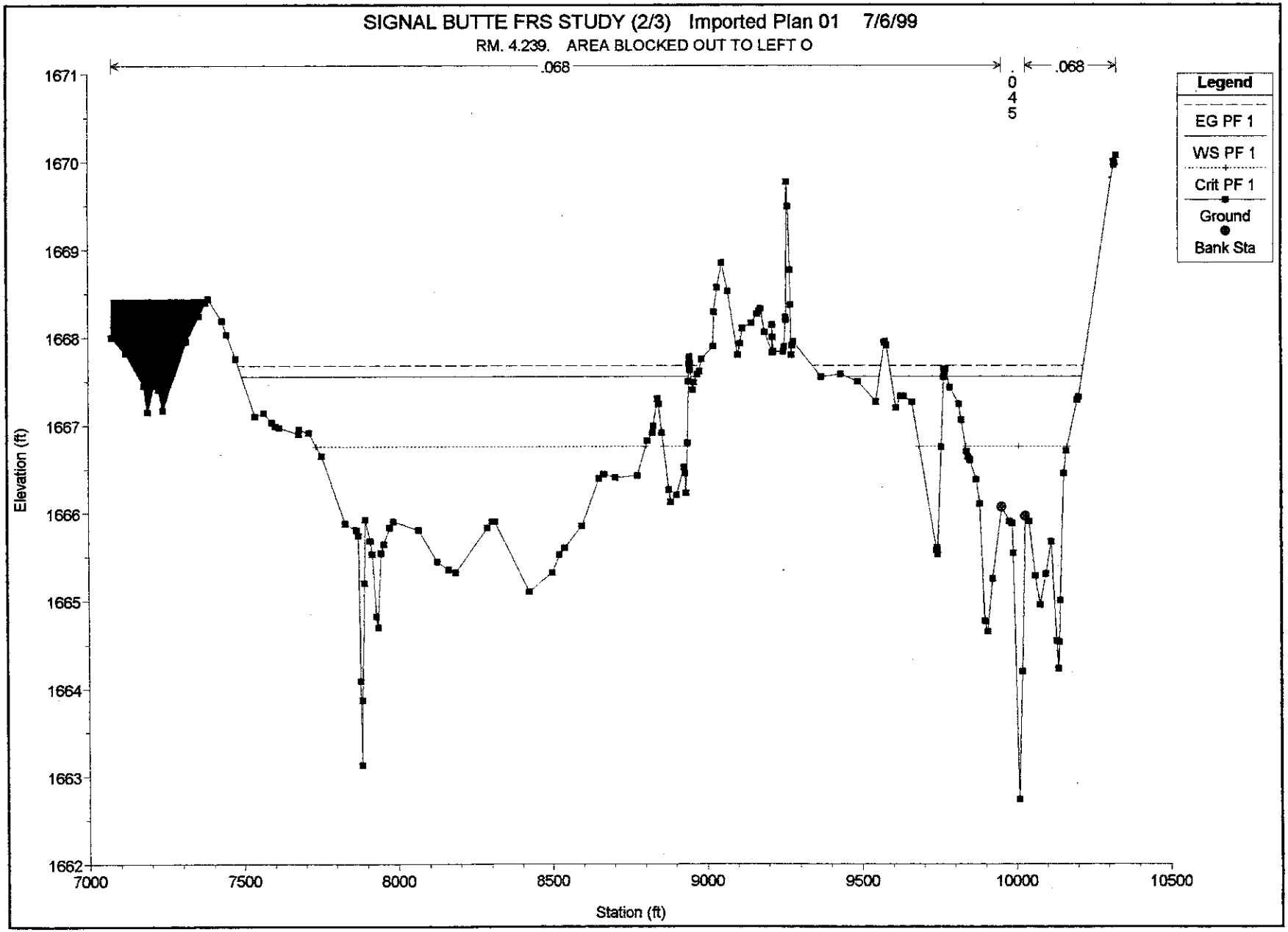
8000
8500
9000
9500
10000
10500
11000
11500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 3.956. HORZ. N VALUES USED.
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1658
1657
1656
1655
1654
1653
1652
1651
1650
1649
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.026. HORZ. N VALUES USED. AREA B
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1664
1662
1660
1658
1656
1654
1652
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.4.101 AREA BLOCKED OUT TO RT. OF S
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1666
1664
1662
1660
1658
1656
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.171 AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1668
1667
1666
1665
1664
1663
1662
1661
1660
1659
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.239. AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1671
1670
1669
1668
1667
1666
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1664
1663
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7500
8000
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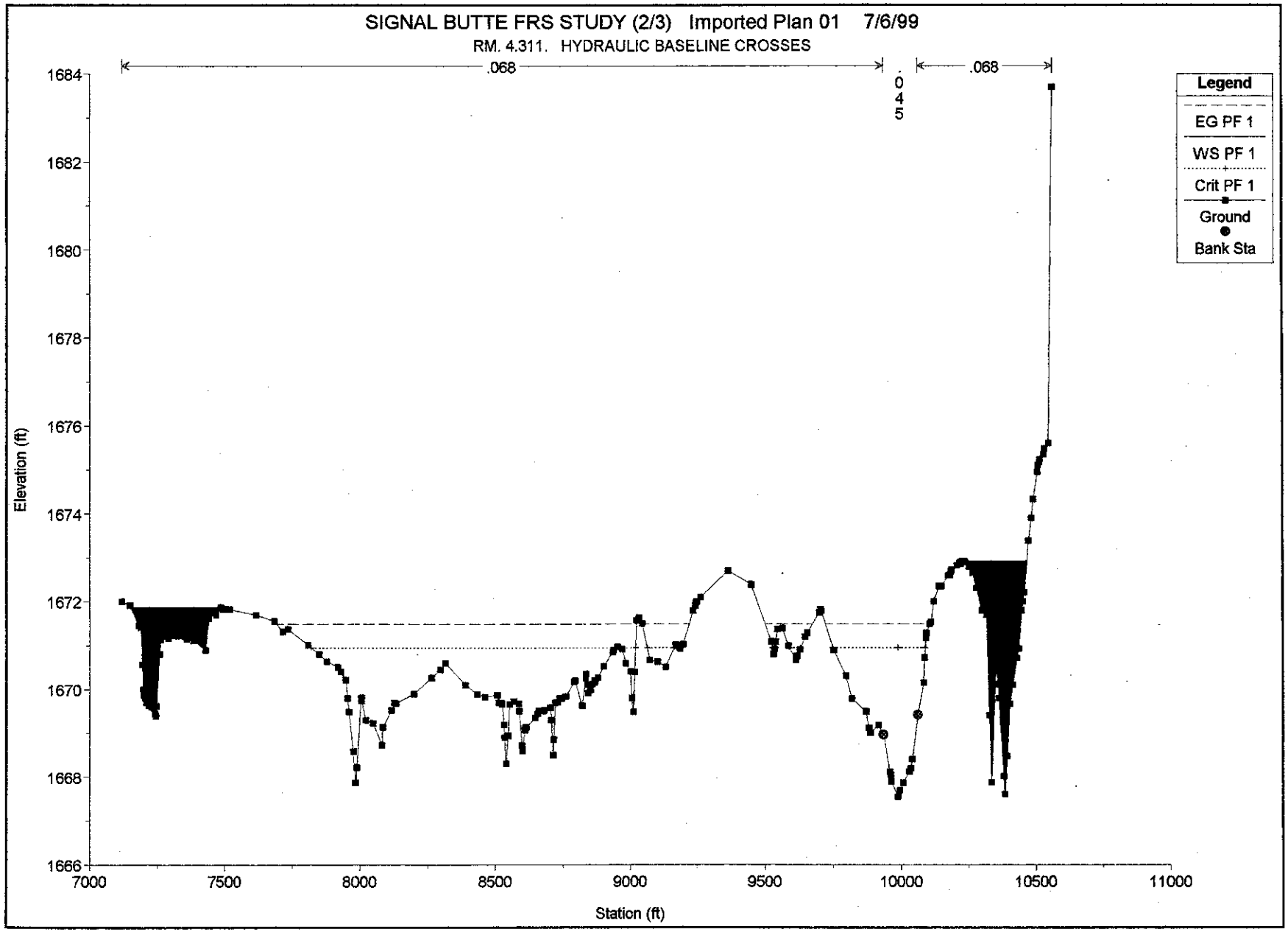
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.311. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
1672
1670
1668
1666
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7500
8000
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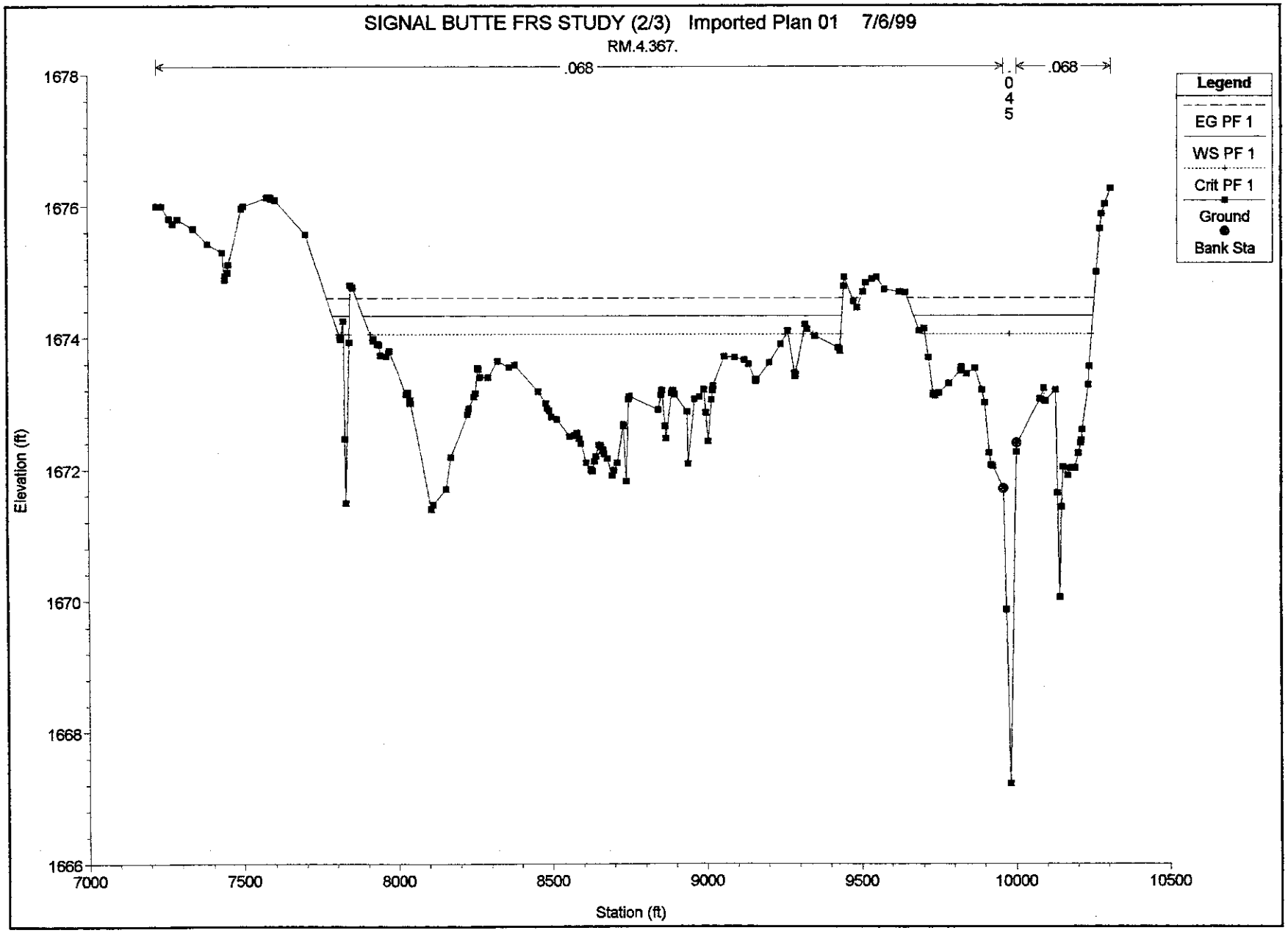
9000
9500
10000
10500
11000
Station (ft)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RM.4.367.
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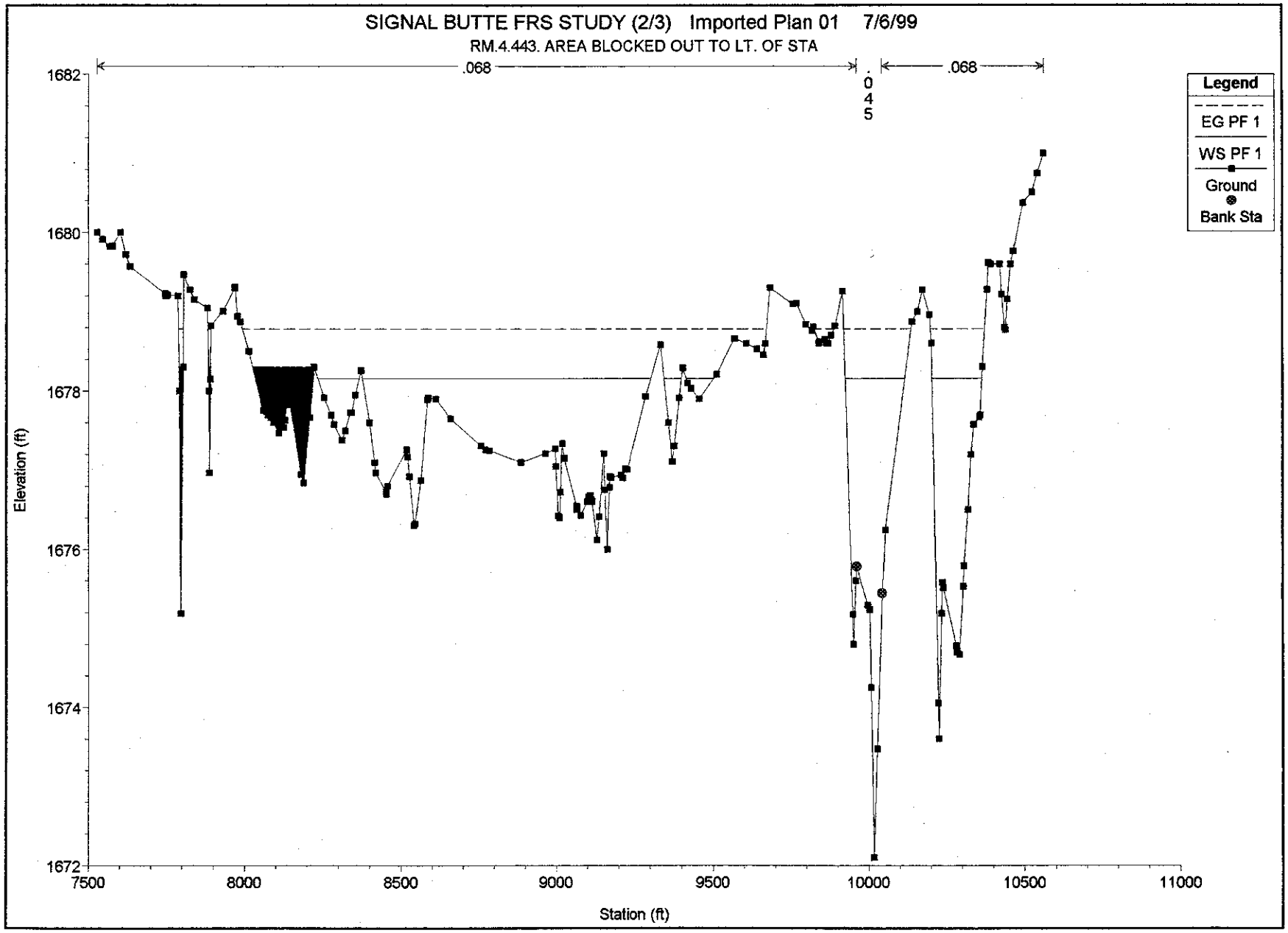
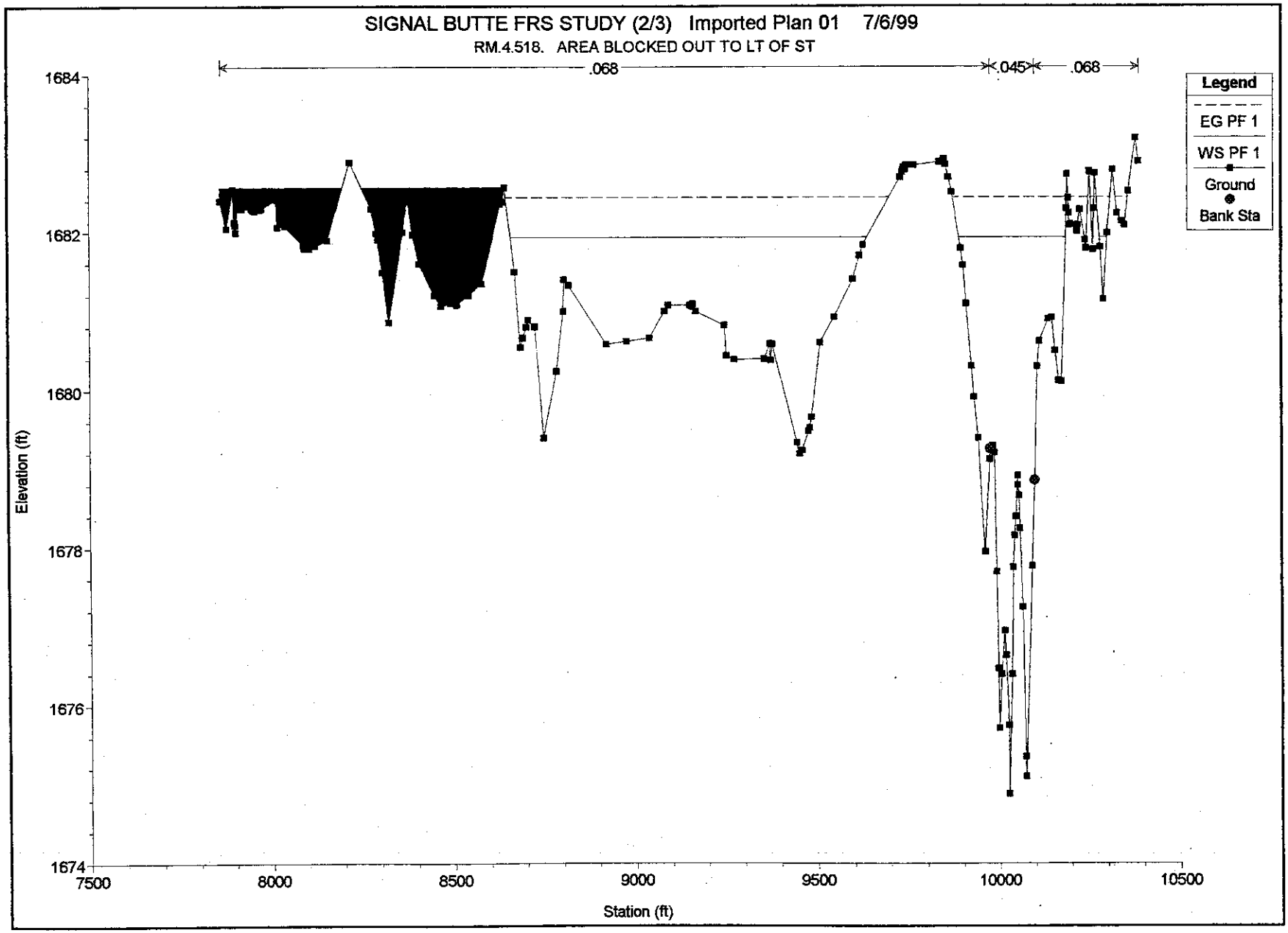
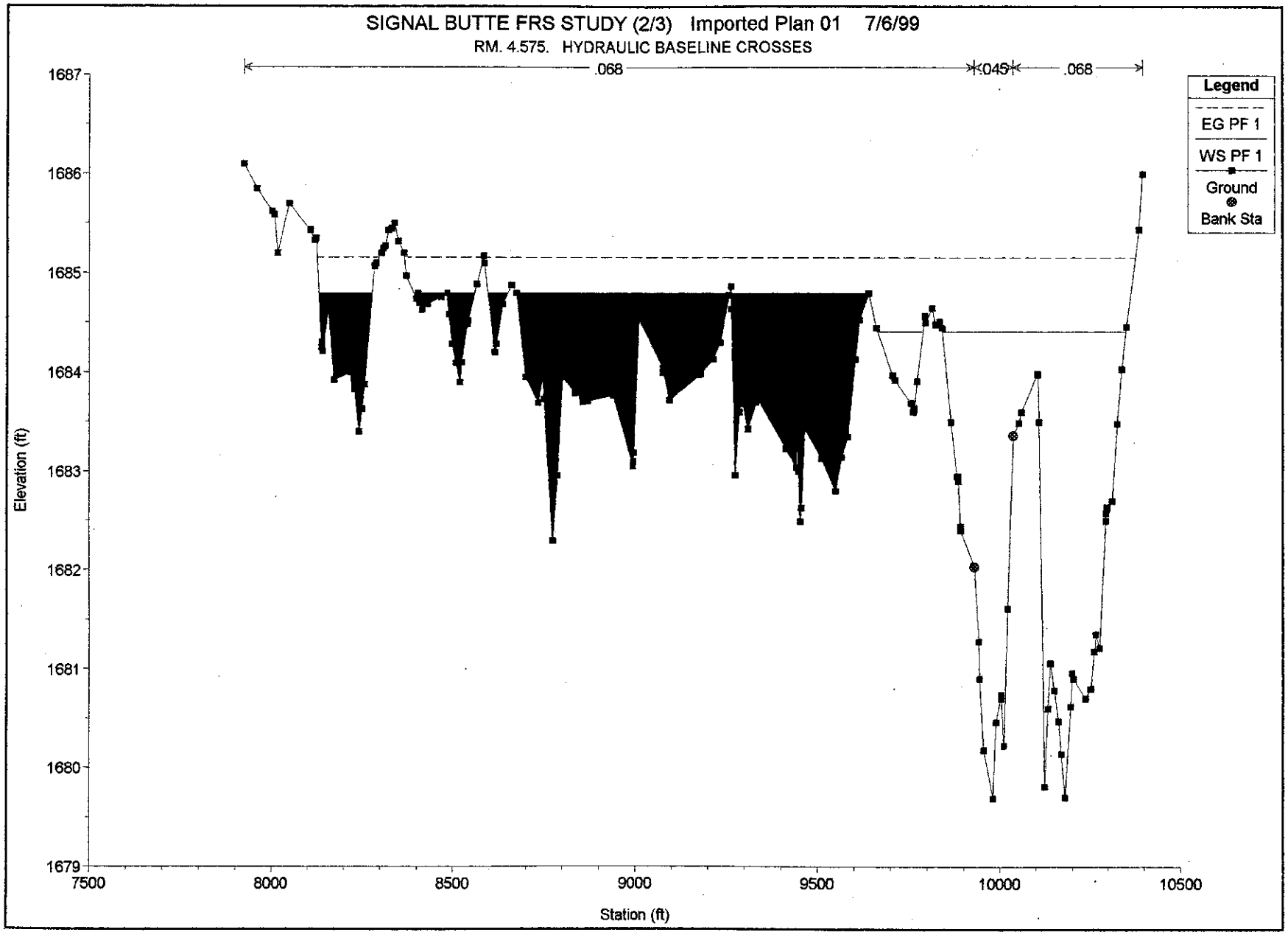
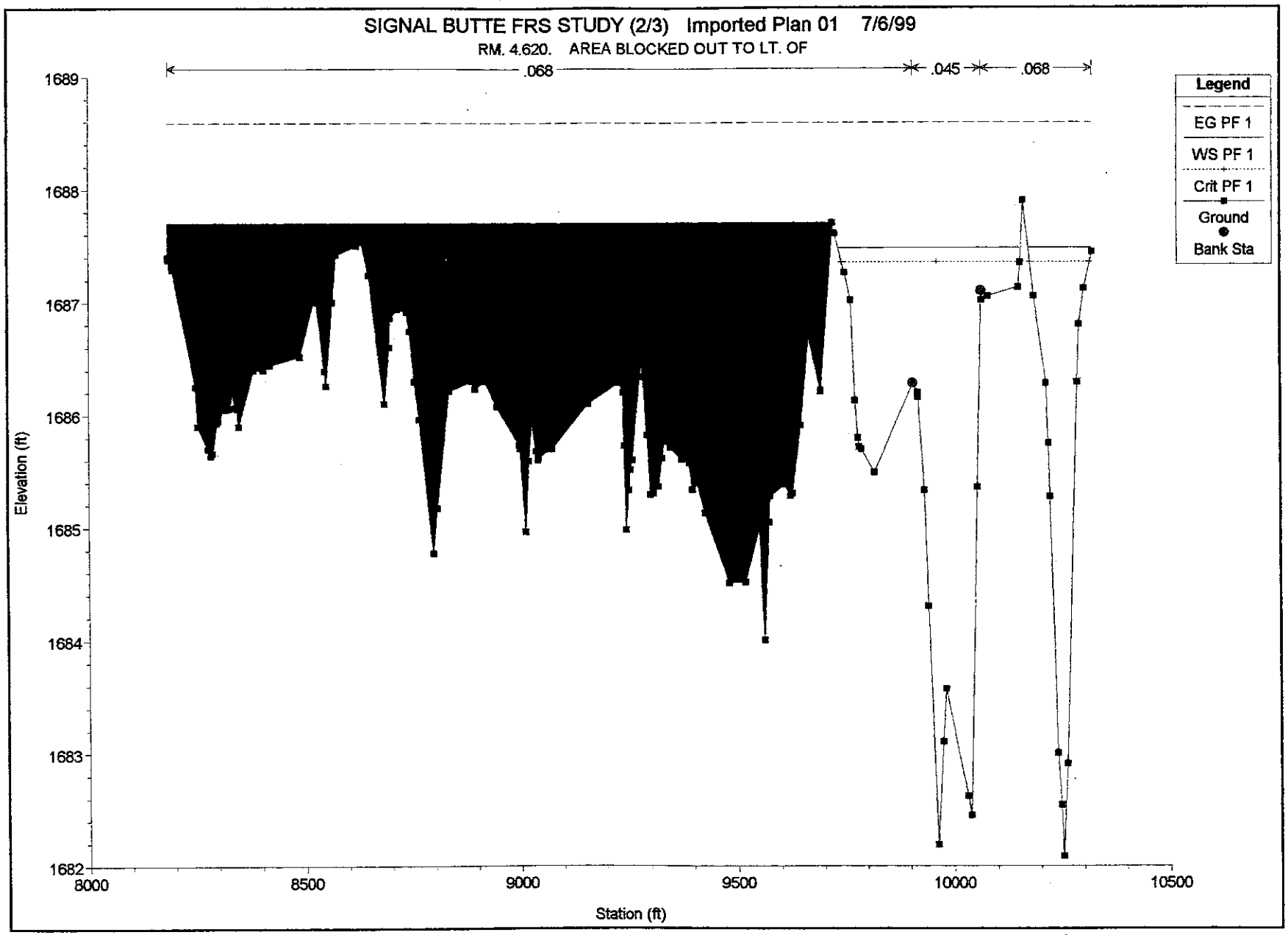
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1678
1676
1674
1672
1670
1668
1666
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.4.443. AREA BLOCKED OUT TO LT. OF STA
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1682
1680
1678
1676
1674
1672
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.4.518. AREA BLOCKED OUT TO LT OF ST
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.575. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1687
1686
1685
1684
1683
1682
1681
1680
1679
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.620. AREA BLOCKED OUT TO LT. OF
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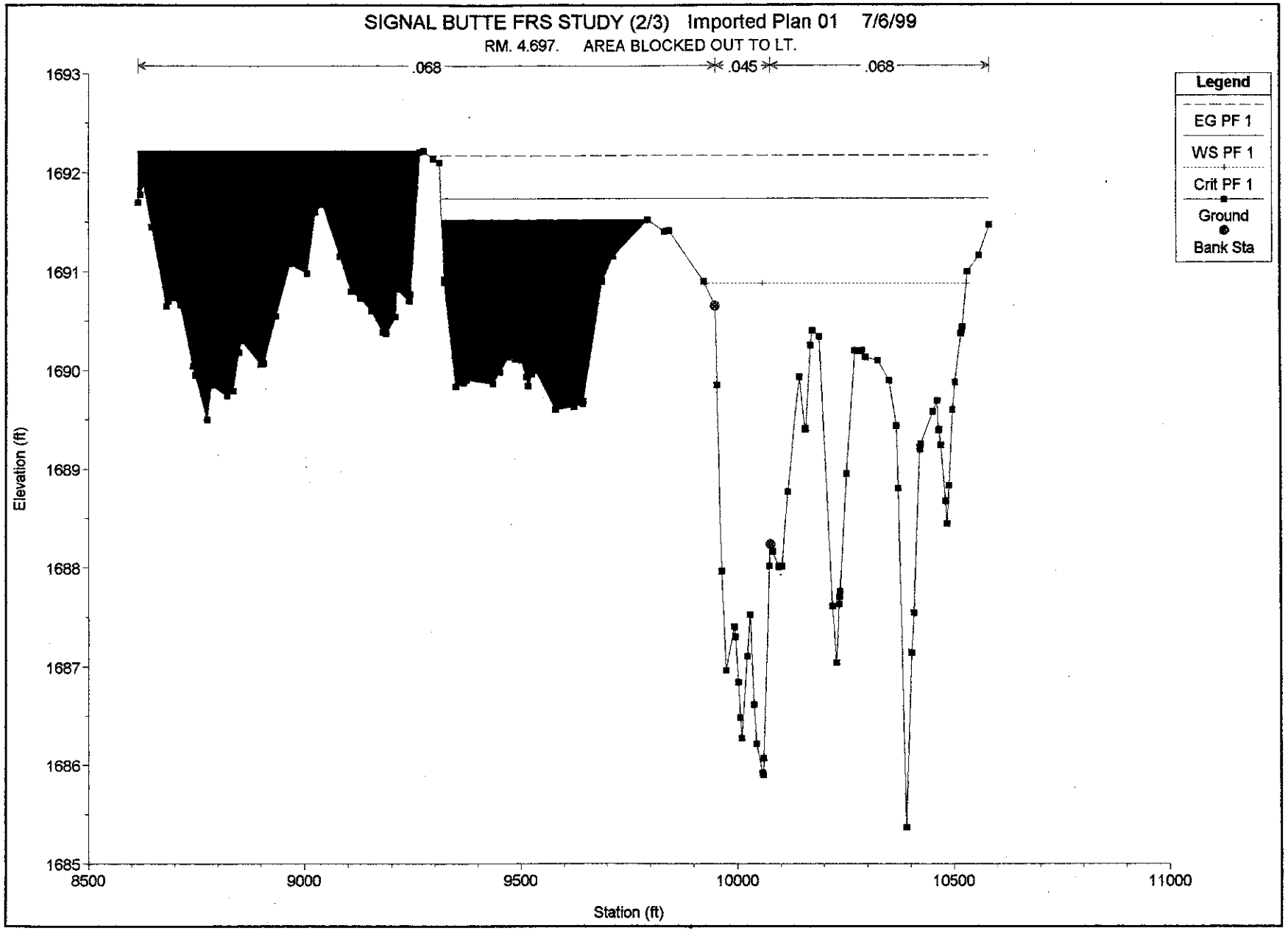
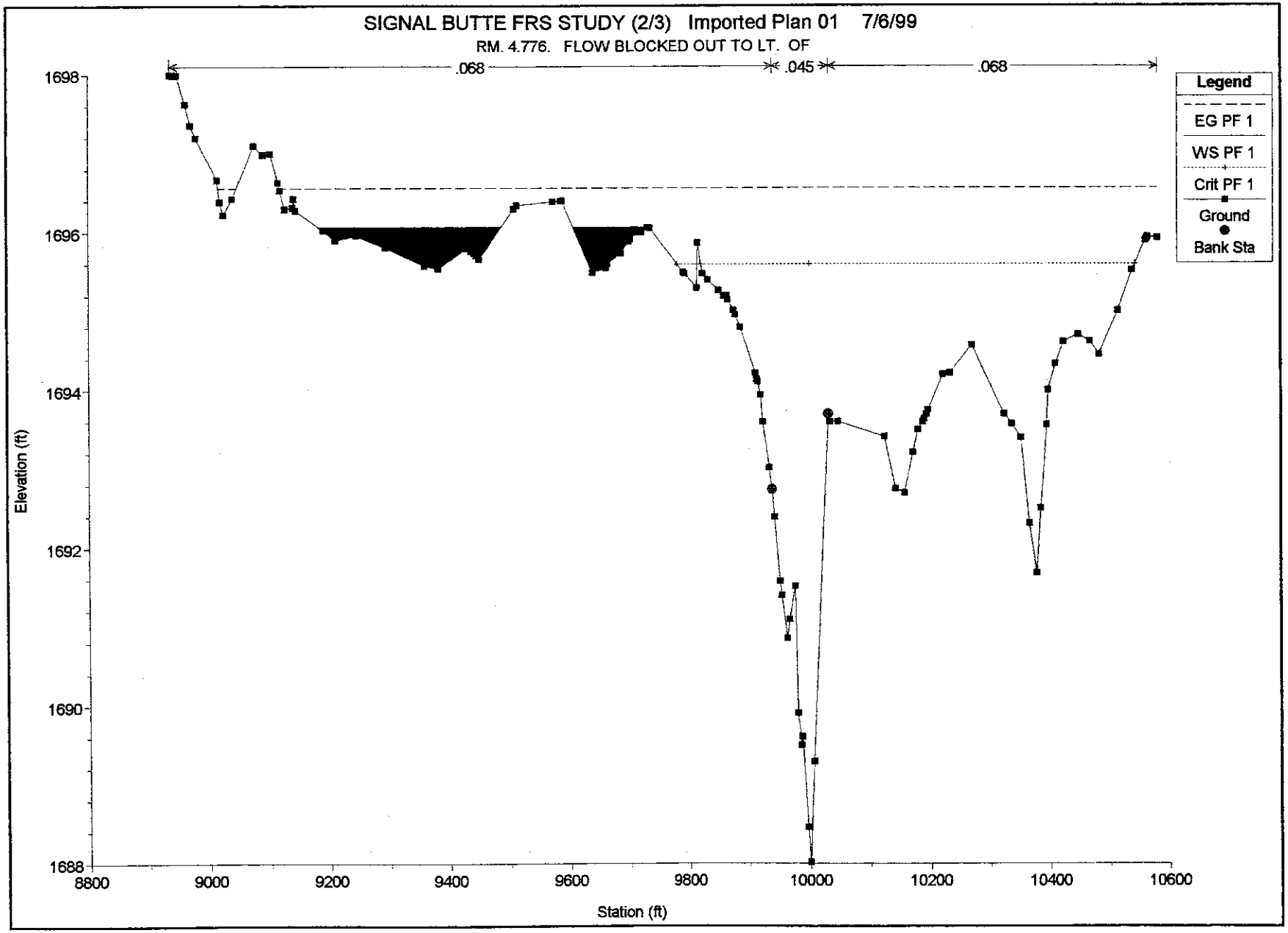
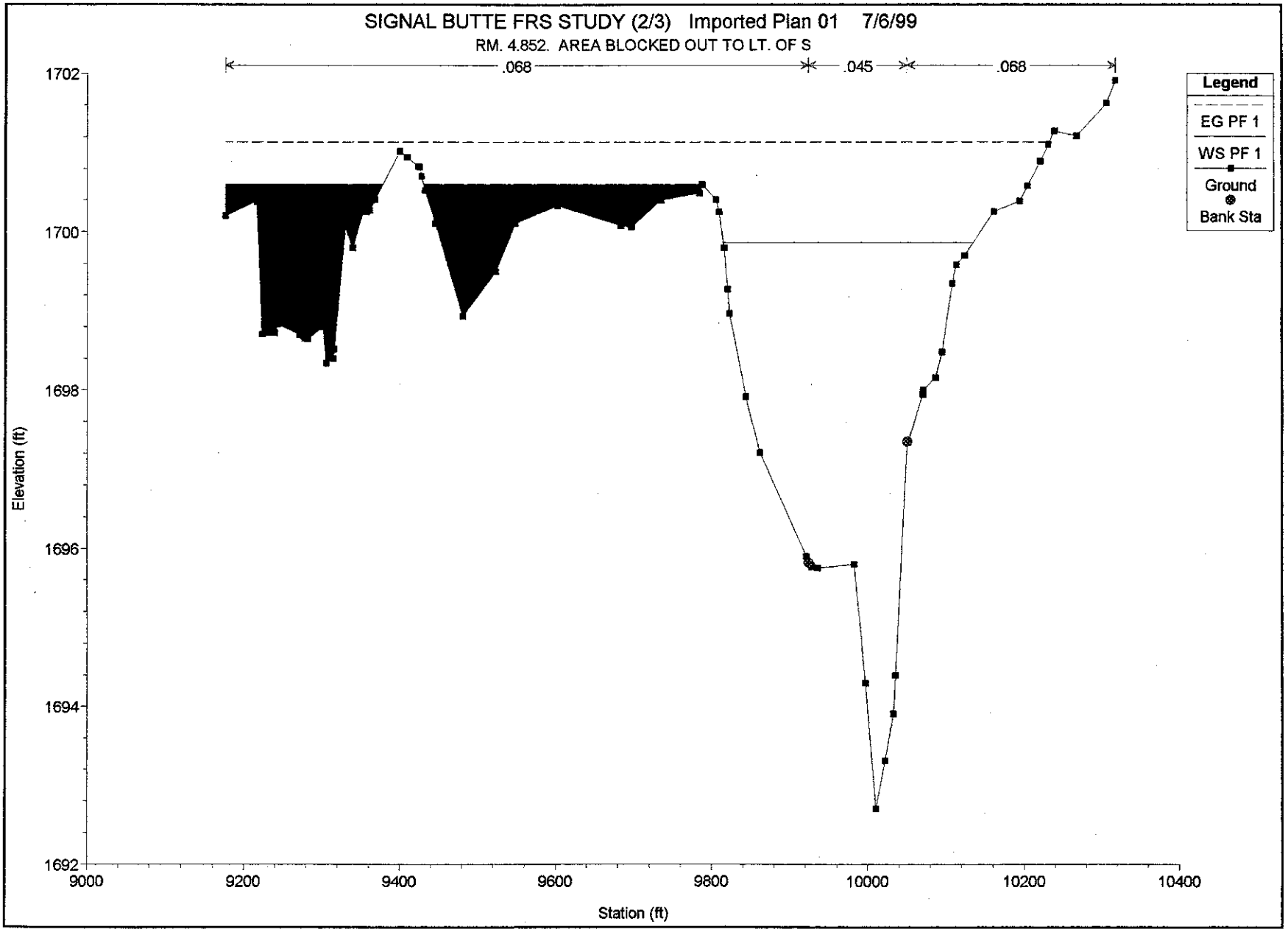
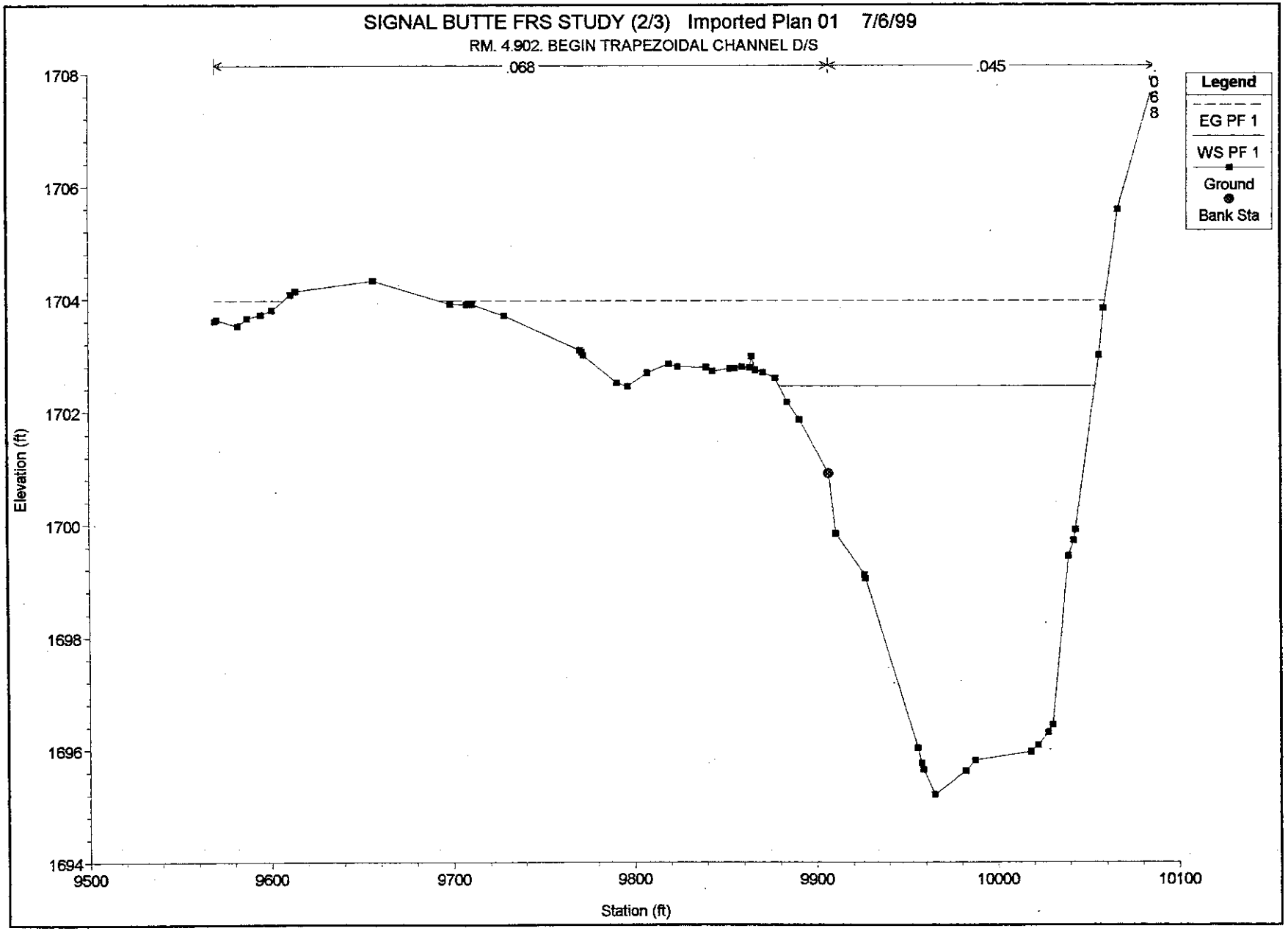
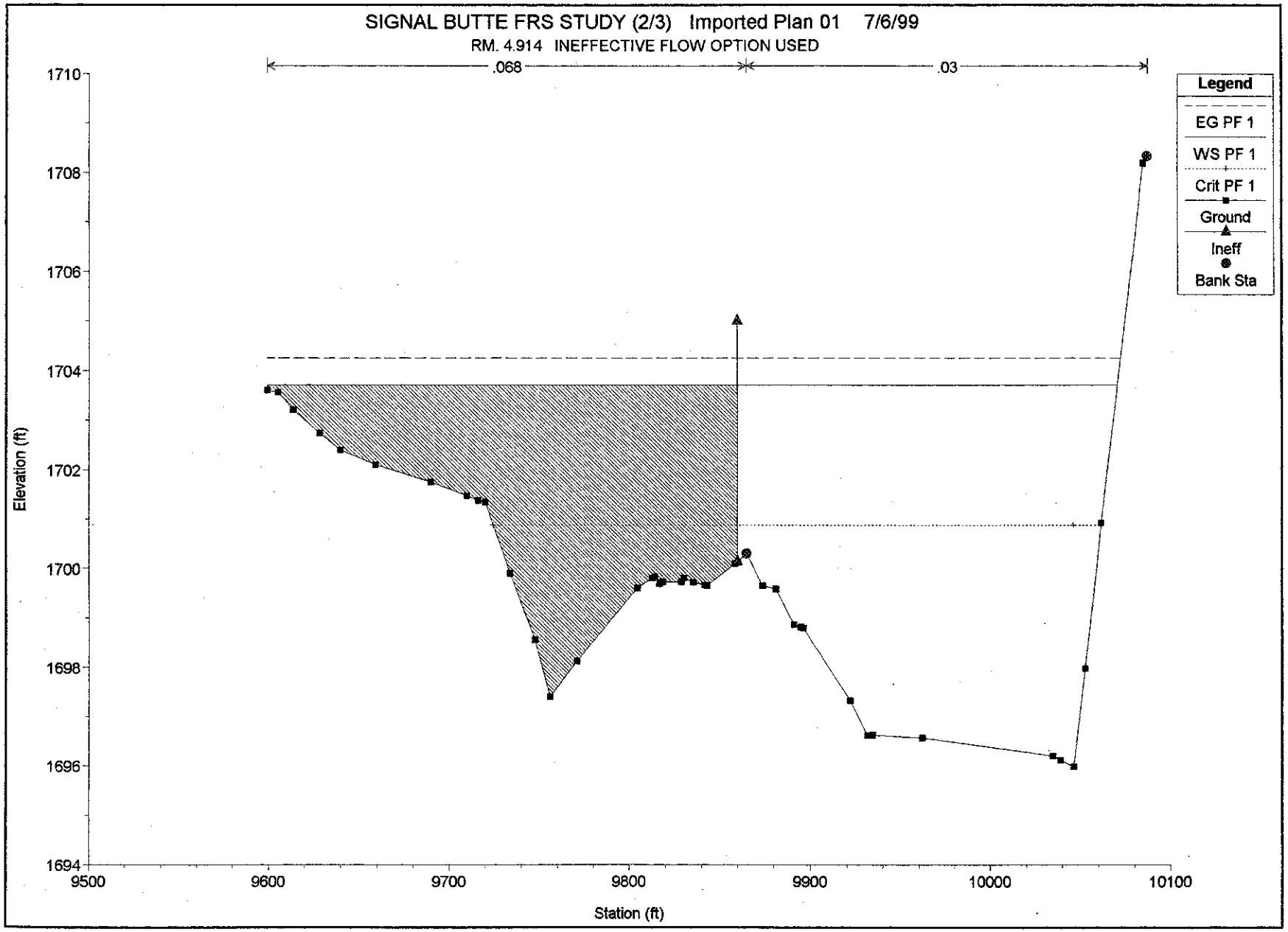
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1689
1688
1687
1686
1685
1684
1683
1682
8000
8500
9000
9500
10000
10500
Station (ft)

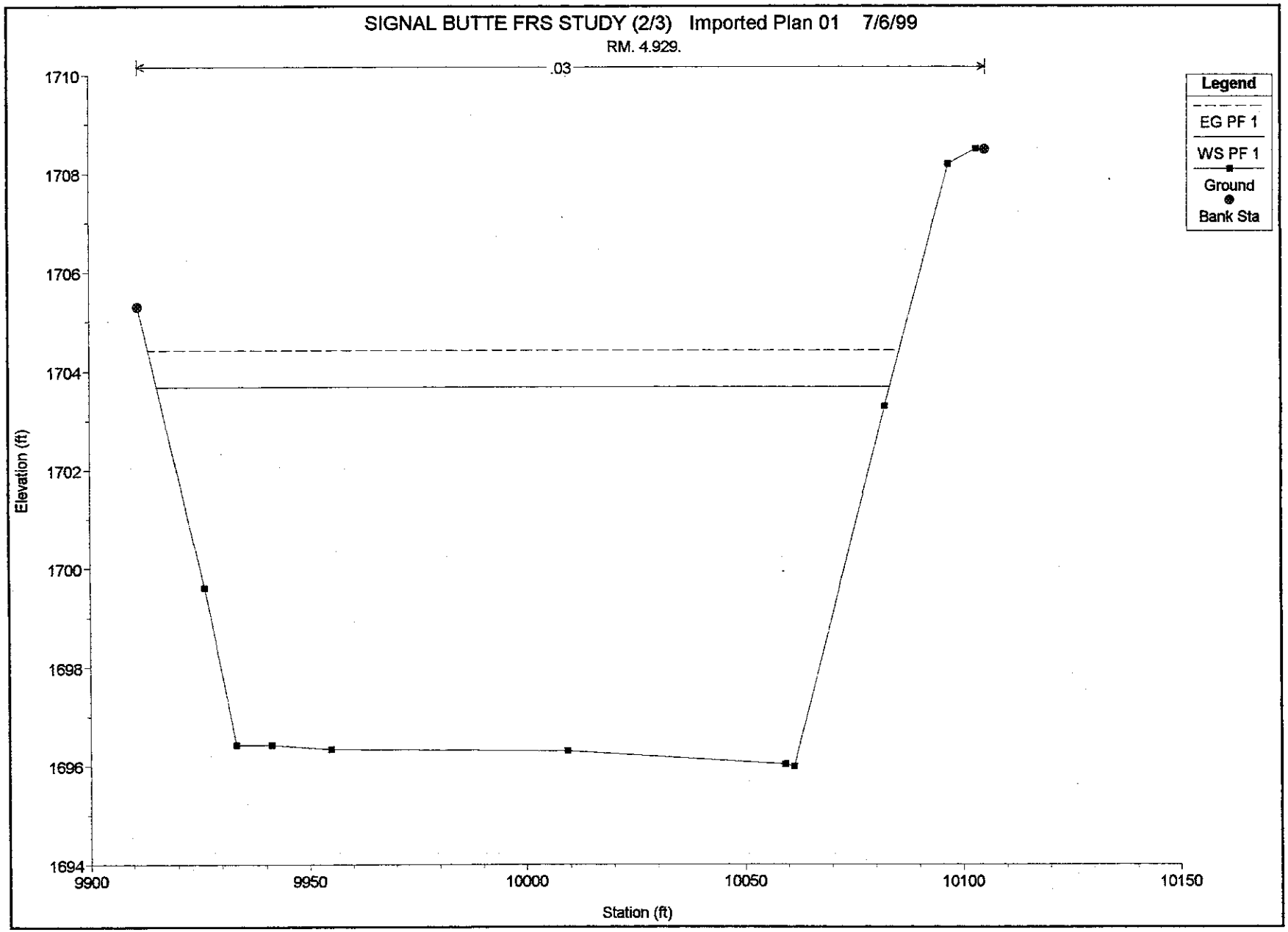

SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.697. AREA BLOCKED OUT TO LT.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1693
1692
1691
1690
1689
1688
1687
1686
1685
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.776. FLOW BLOCKED OUT TO LT. OF
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1698
1696
1694
1692
1690
1688
8800
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.852. AREA BLOCKED OUT TO LT. OF S
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1702
1700
1698
1696
1694
1692
9000
9200
9400
9600
9800
10000
10200
10400
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S
.068
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.914 INEFFECTIVE FLOW OPTION USED
.068
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.929.
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
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1706
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1702
1700
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1696
1694
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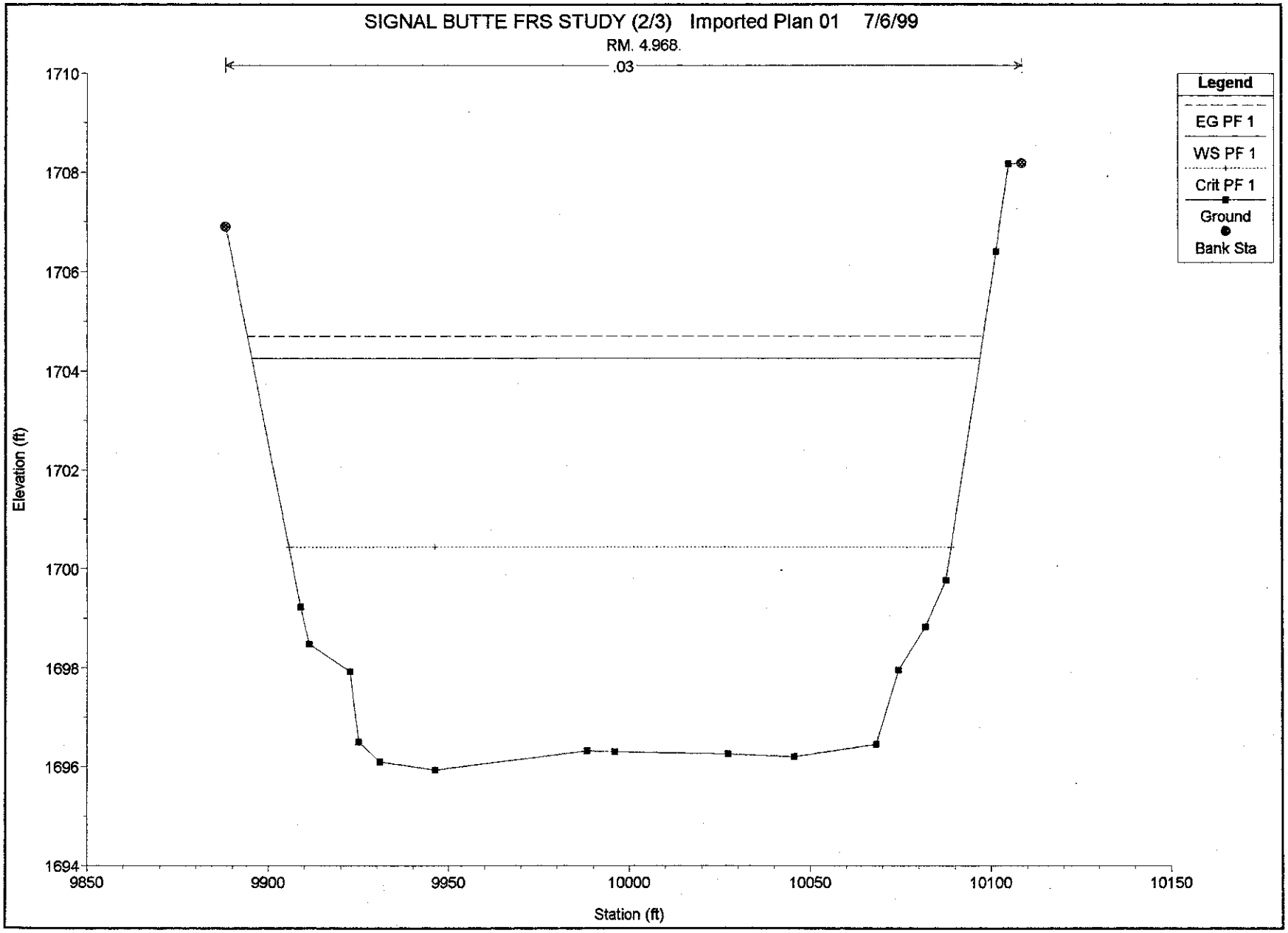
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.968.
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
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1700
1698
1696
1694
9850
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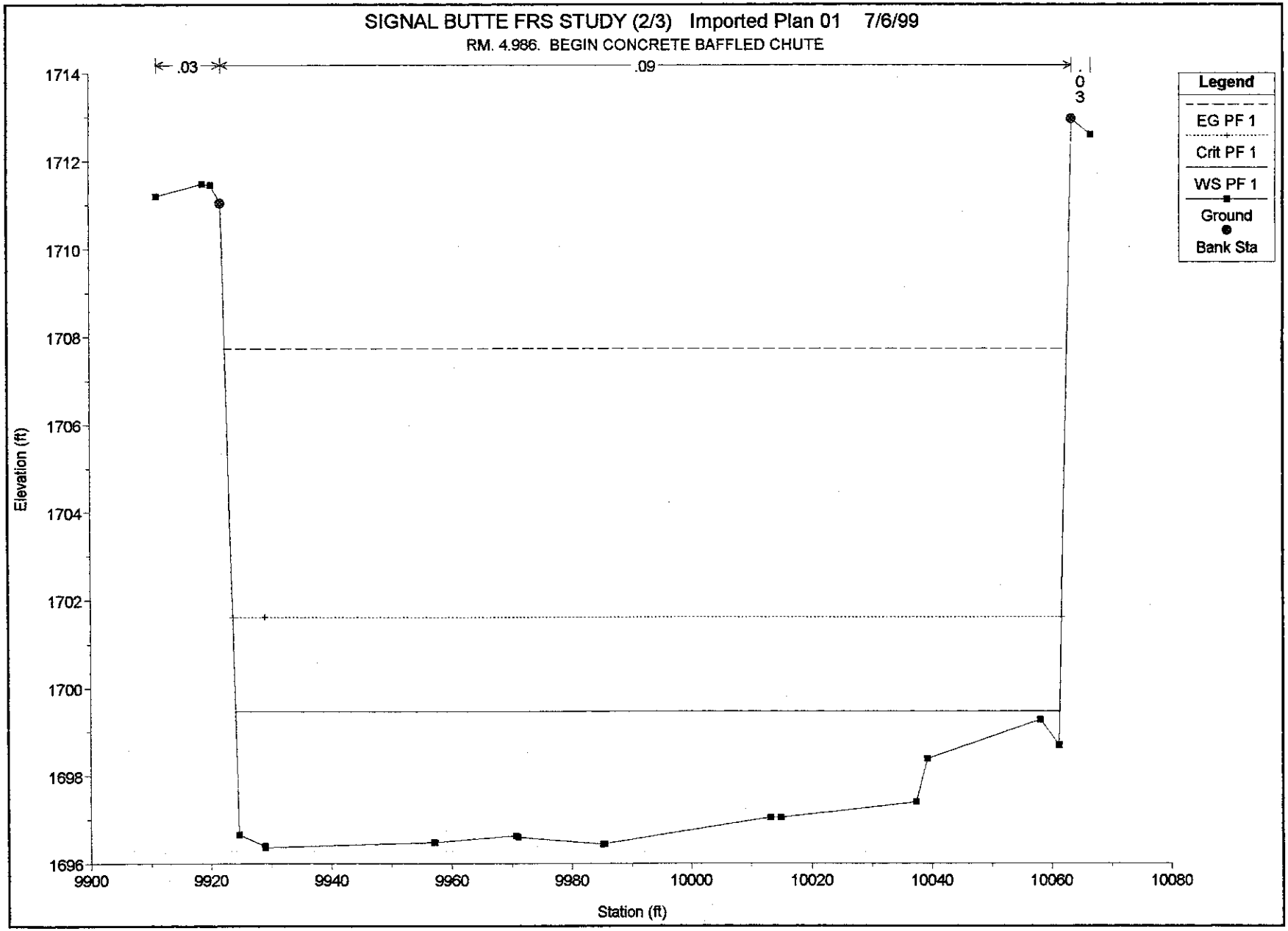
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE
.03
.09
.03
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1714
1712
1710
1708
1706
1704
1702
1700
1698
1696
9900
9920
9940
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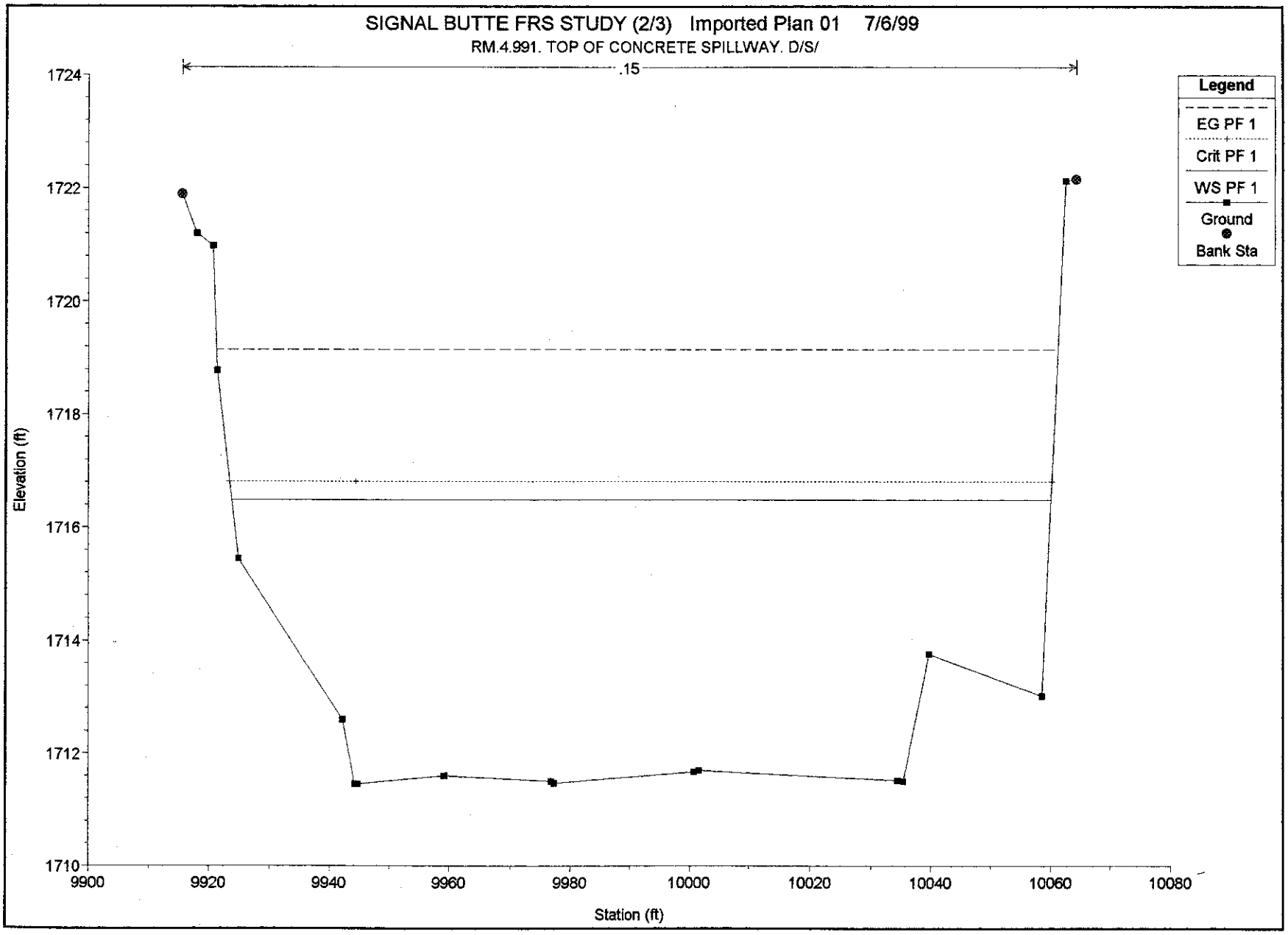
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/
.15
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
1710
9900
9920
9940
9960
9980
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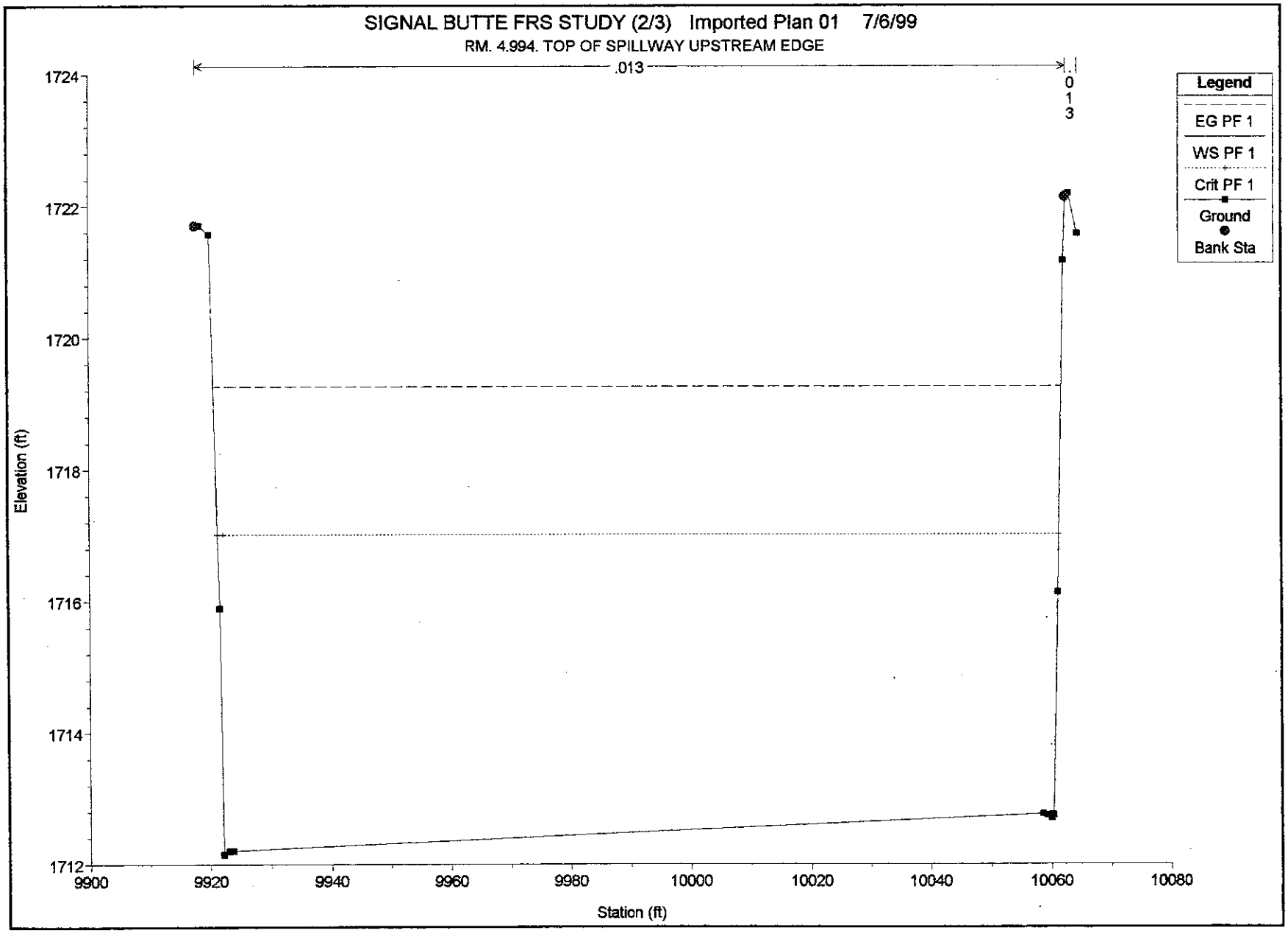
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE
.013
.013
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
9900
9920
9940
9960
9980
10000
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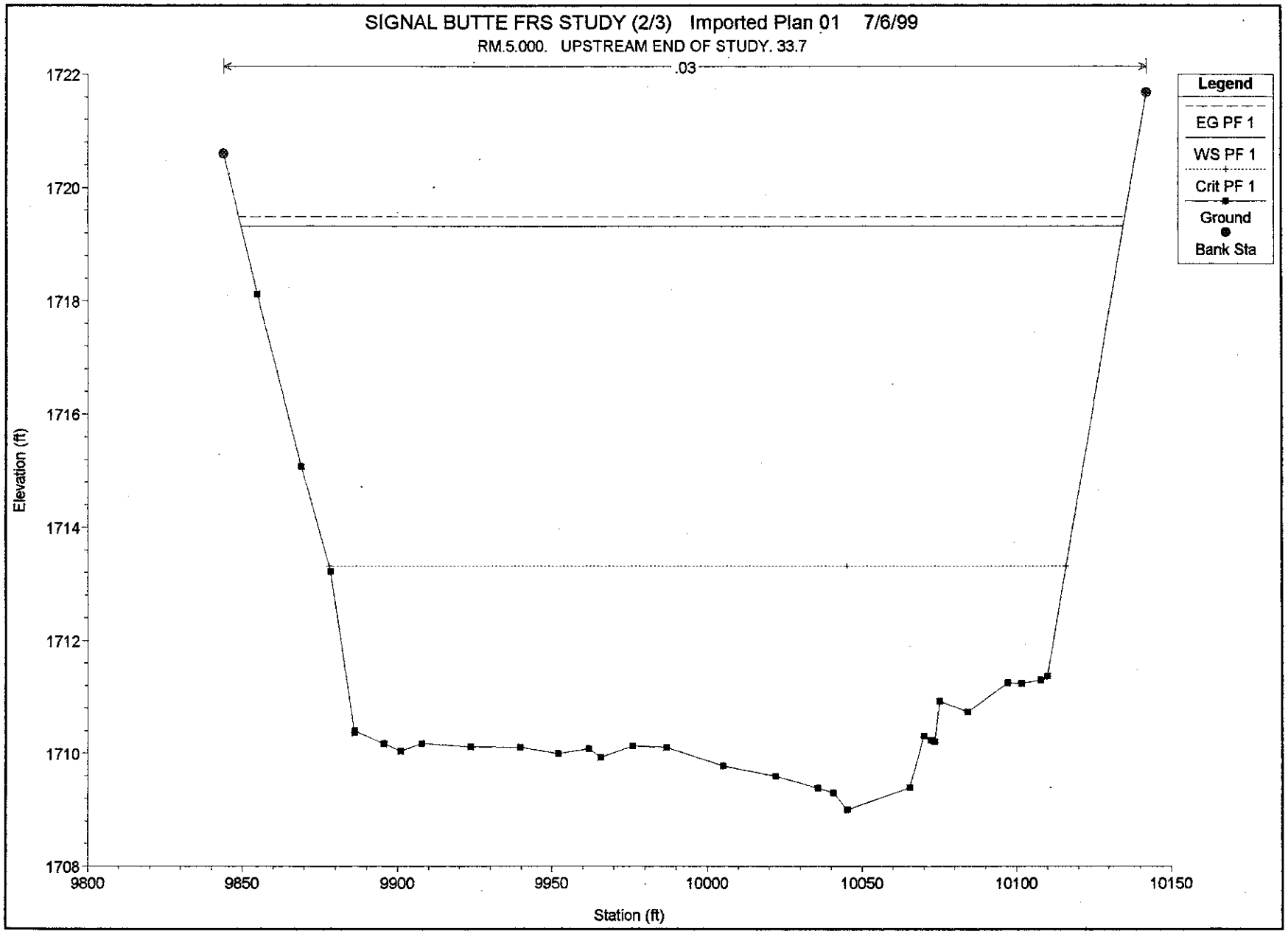
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (2/3) Imported Plan 01 7/6/99
RM.5.000. UPSTREAM END OF STUDY. 33.7
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
1708
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)

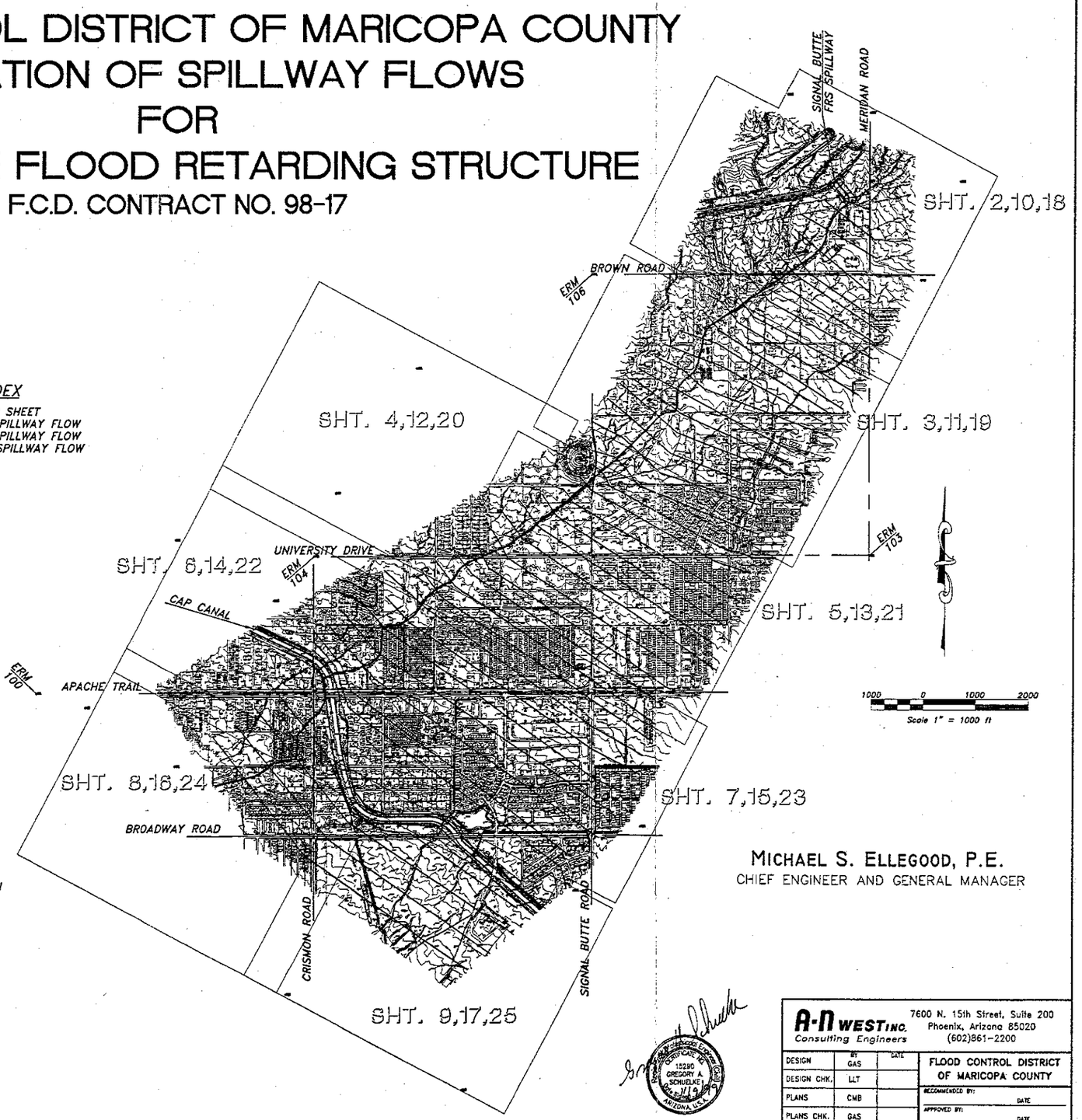
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
DELINEATION OF SPILLWAY FLOWS
FOR
SIGNAL BUTTE FLOOD RETARDING STRUCTURE

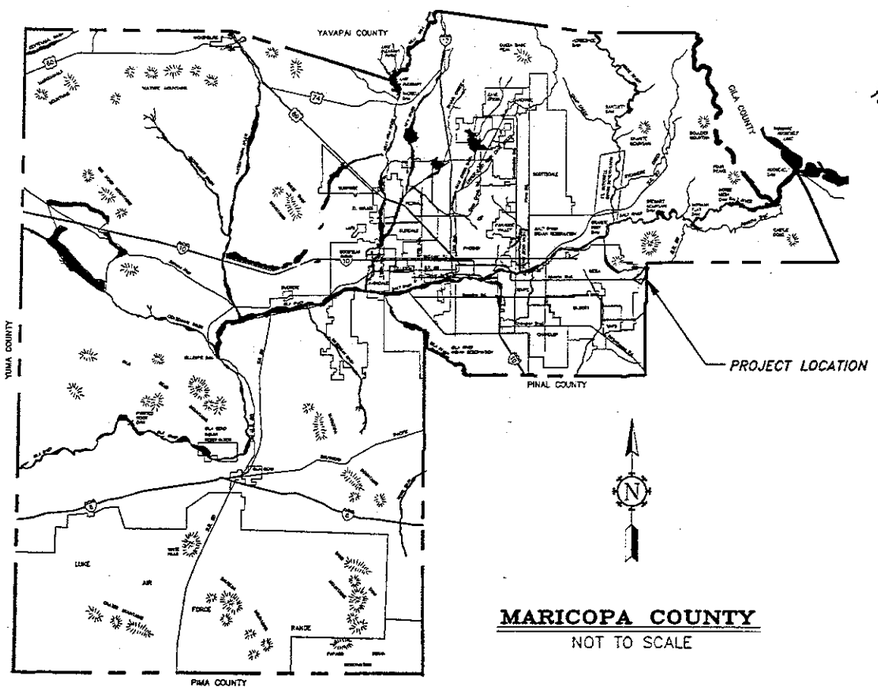
F.C.D. CONTRACT NO. 98-17

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

SHEET INDEX

1	COVER SHEET
2-9	1/3 SPILLWAY FLOW
10-17	2/3 SPILLWAY FLOW
18-25	FULL SPILLWAY FLOW





MARICOPA COUNTY
NOT TO SCALE

MICHAEL S. ELLEGOOD, P.E.
CHIEF ENGINEER AND GENERAL MANAGER

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE Date Signed 1/19/99 ARIZONA, U.S.A.

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 25

FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
5.000	1721.38	3.87	12.38	0.00
4.994	1718.39	13.73	6.24	0.01
4.991	1717.92	14.58	6.47	0.01
4.986	1700.21	26.22	3.84	0.01
4.968	1706.00	6.35	10.07	0.01
4.929	1705.24	8.28	9.26	0.02
4.914	1705.64	5.38	9.66	0.02
4.902	1703.48	12.05	8.28	0.02
4.852	1700.55	11.61	7.85	0.03
4.776	1696.30	10.73	8.28	0.04
4.697	1691.57	8.35	6.20	0.05
4.620	1687.19	8.33	5.10	0.06
4.575	1684.83	8.52	5.14	0.07
4.518	1682.43	8.04	7.55	0.08
4.443	1678.53	10.33	6.43	0.09
4.367	1674.78	8.31	7.56	0.10

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S. F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS

HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9

CROSS SECTION — RIVER MILE ID. 22.304

ELEVATION REFERENCE MARK — ERM3 X

ZONE DESIGNATIONS — ZONE A

CORPORATE LIMITS

COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

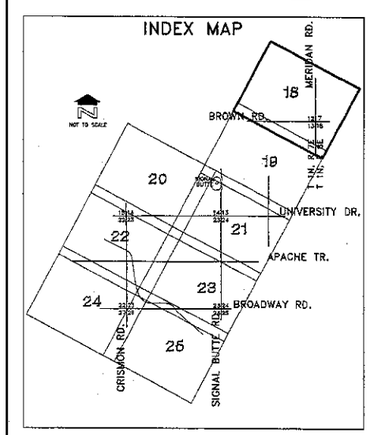
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF BROWN RD. & SIGNAL BUTTE RD.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUELKE DATE SIGNED 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC. Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 18 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
4.443	1678.53	10.33	6.43	0.09
4.367	1674.78	8.31	7.56	0.10
4.311	1671.33	9.55	3.79	0.11
4.239	1668.01	5.65	5.27	0.13
4.171	1665.75	8.19	6.08	0.14
4.101	1663.13	8.32	6.79	0.15
4.026	1659.45	8.53	5.48	0.17
3.956	1655.98	7.76	6.18	0.18
3.885	1653.10	5.09	5.52	0.20
3.817	1650.51	6.36	4.40	0.21
3.747	1647.10	5.55	4.05	0.23
3.674	1643.41	3.92	4.24	0.25
3.603	1639.58	4.98	5.66	0.28

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

- INUNDATION LIMITS
- HYDRAULIC BASE LINE WITH RIVER MILE — 4.0 — 3.9
- CROSS SECTION — RIVER MILE ID. 22.304
- ELEVATION REFERENCE MARK — ERM3 X
- ZONE DESIGNATIONS — ZONE A
- CORPORATE LIMITS
- COUNTY OR STATE JURISDICTIONAL BOUNDARY

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
212	1651.61	FOUND CITY OF MESA BRASS CAP IN HANDHOLE 0.47' BELOW RIM AT THE INTERSECTION OF CLANCY & DECATOR
106*	1675.83	FOUND BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF BROWN RD. & SIGNAL BUTTE RD.

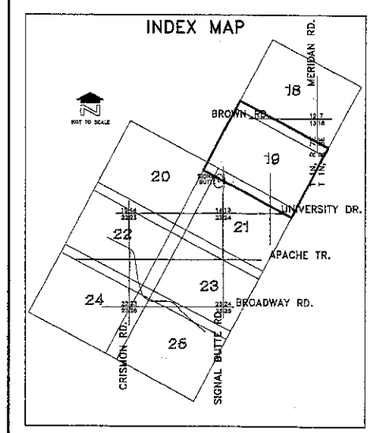
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 45290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

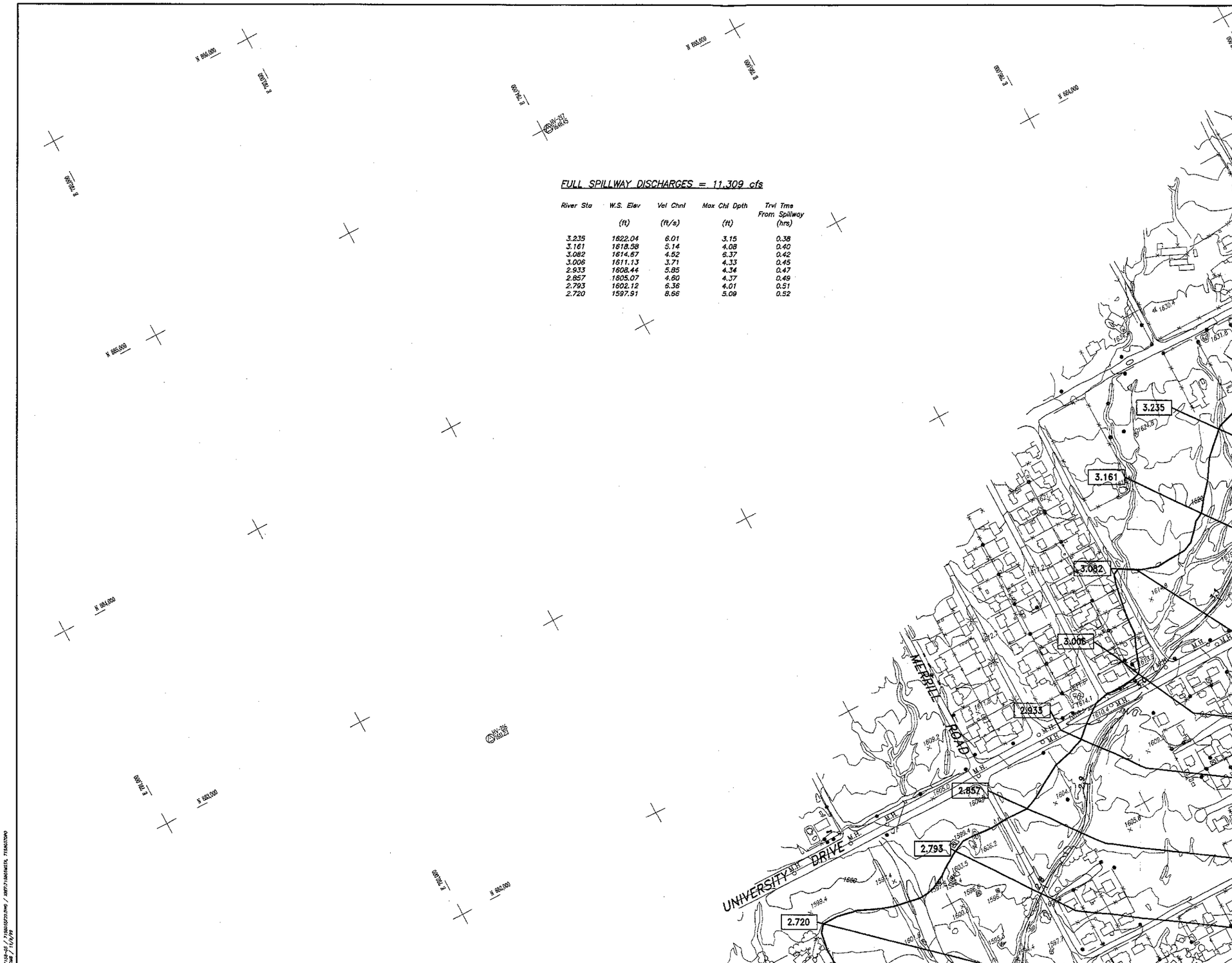
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 19 OF 25

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW



FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
3.235	1622.04	6.01	3.15	0.38
3.161	1618.58	5.14	4.08	0.40
3.082	1614.67	4.52	6.37	0.42
3.006	1611.13	3.71	4.33	0.45
2.933	1608.44	5.85	4.34	0.47
2.857	1605.07	4.60	4.37	0.49
2.793	1602.12	6.36	4.01	0.51
2.720	1597.91	8.66	5.09	0.52

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

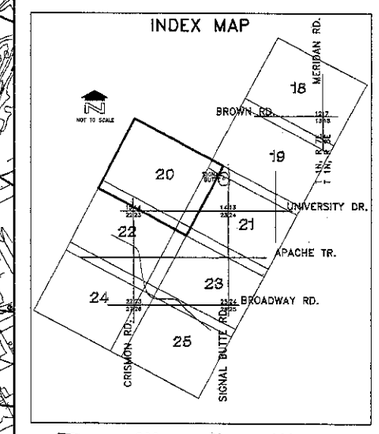
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104*	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUELKE 11/29/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 20 OF 25

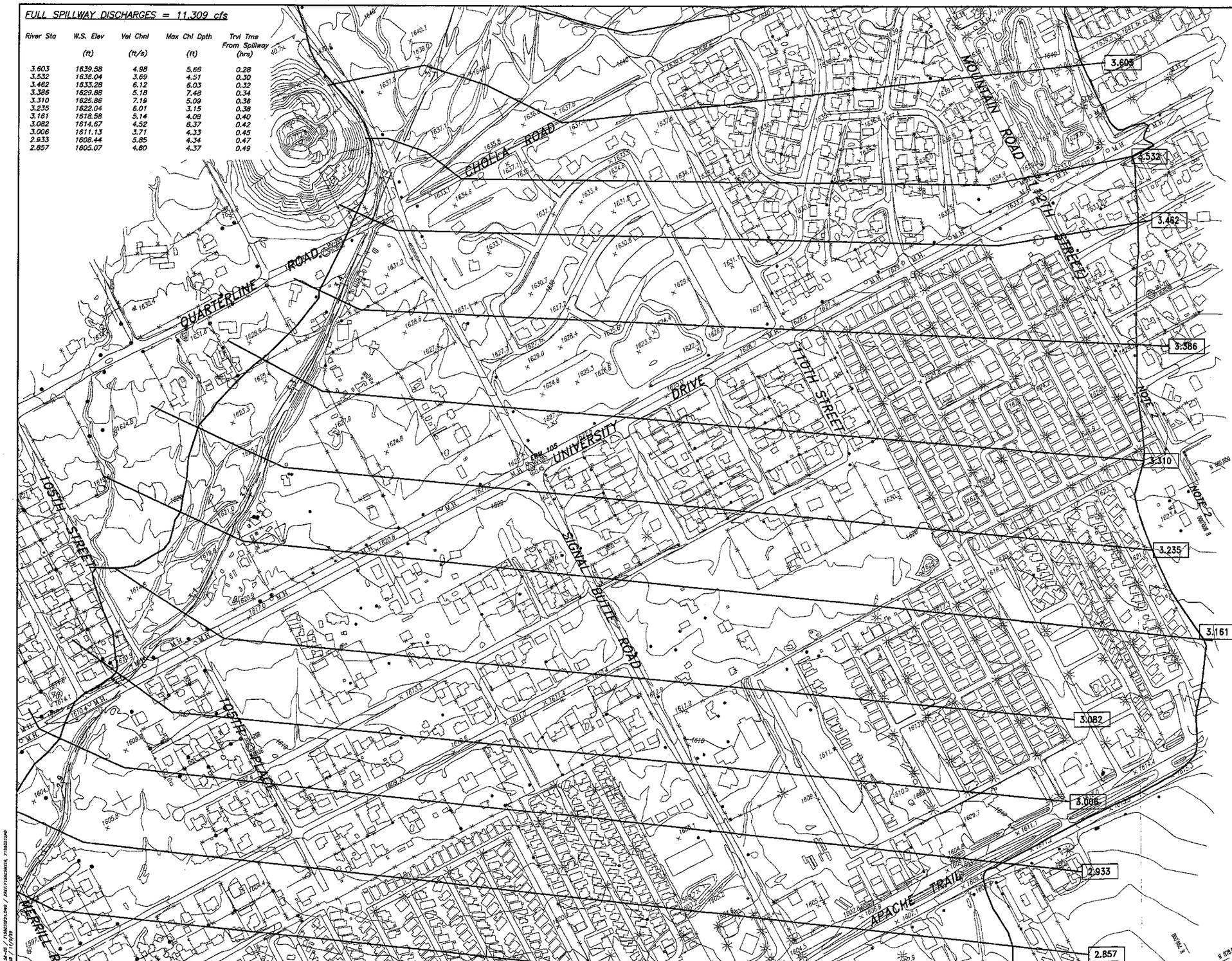
COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7158-00 / 7158SGSFSL.DWG / SNFD7158SNETB, 7158SGTD.DWG
CMB / 11/9/99

FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
3.603	1639.58	4.98	5.66	0.28
3.532	1636.04	3.69	4.51	0.30
3.462	1633.28	6.12	6.03	0.32
3.386	1629.88	5.18	7.48	0.34
3.310	1625.86	7.19	5.09	0.36
3.235	1622.04	6.01	3.15	0.38
3.161	1618.58	5.14	4.08	0.40
3.082	1614.67	4.52	6.37	0.42
3.006	1611.13	3.71	4.33	0.45
2.933	1608.44	5.85	4.34	0.47
2.857	1605.07	4.60	4.37	0.49



COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
105	1620.83	FOUND MCDOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF UNIVERSITY DR. & SIGNAL BUTTE RD.
103*	1651.54	FOUND MCDOT BRASS CAP IN HANDHOLE AT THE INTERSECTION OF MERIDIAN RD. & UNIVERSITY DR.

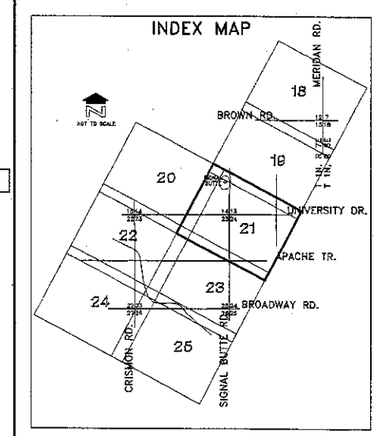
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) State of Arizona
15290 GREGORY A. SCHUELKE
Date 11/5/99
ARIZONA, U.S.A.

INDEX MAP



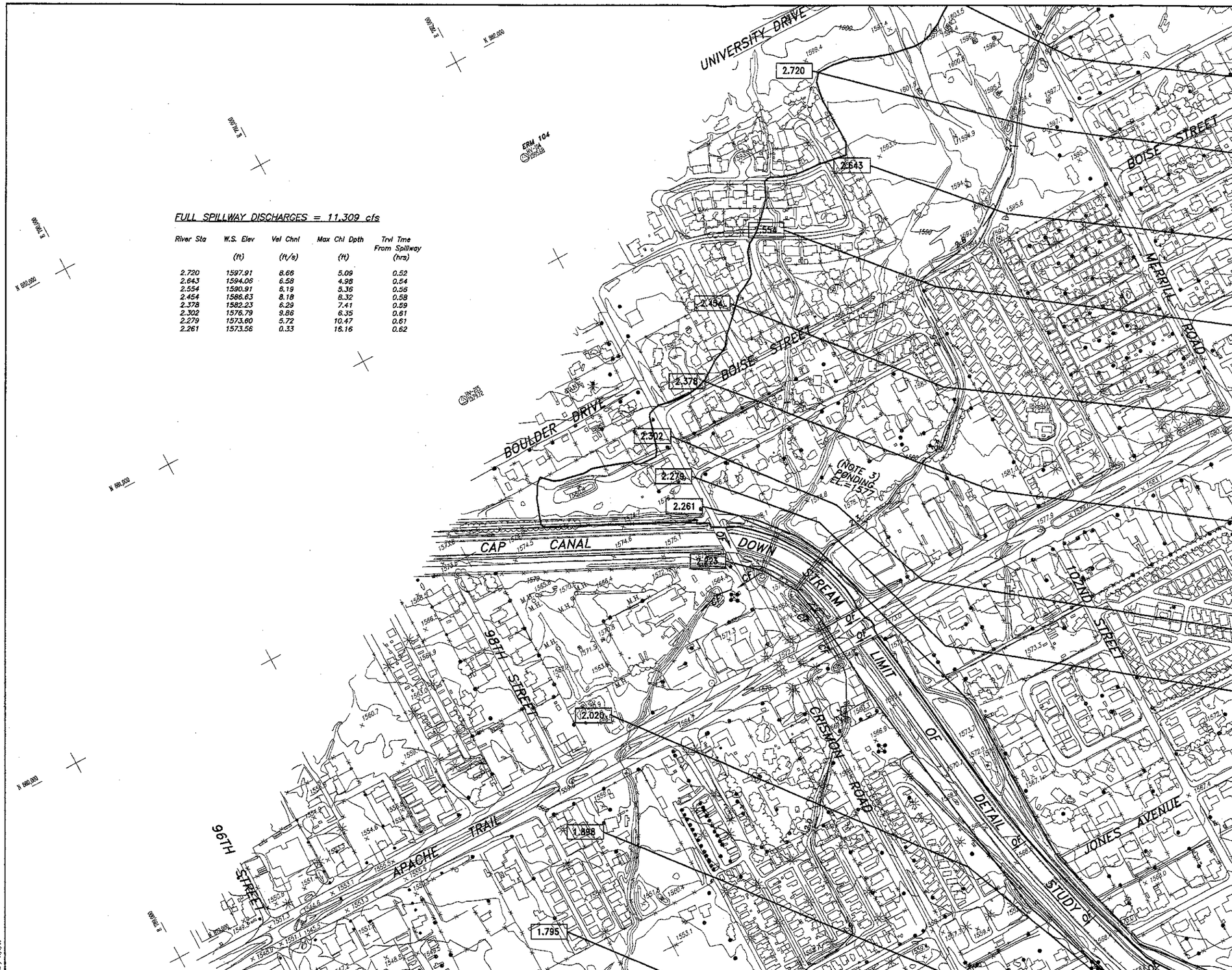
200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER



FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
2.720	1597.91	8.66	5.09	0.52
2.643	1594.06	6.58	4.98	0.54
2.554	1590.91	8.19	5.36	0.56
2.454	1586.63	8.18	8.32	0.58
2.378	1582.23	6.29	7.41	0.59
2.302	1576.79	9.86	6.35	0.61
2.279	1573.60	5.72	10.47	0.61
2.261	1573.56	0.33	16.16	0.62

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE 10. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

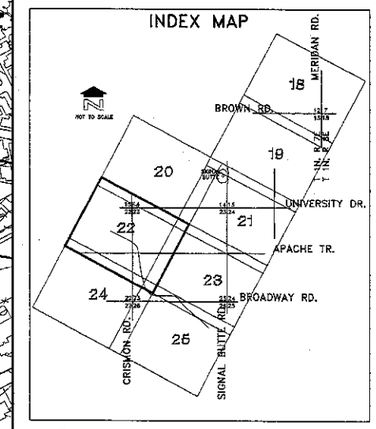
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
104	1595.34	FOUND MCDOT BRASS CAP IN HANDHOLE 0.34' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & UNIVERSITY DR.

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASLINE
3. POTENTIAL PONDING TO EL. 1577 UPSTREAM AND NORTH OF APACHE TRAIL DUE TO APACHE TRAIL ROAD EMBANKMENT

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHLEUKE Date Signed 11/9/99 ARIZONA U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

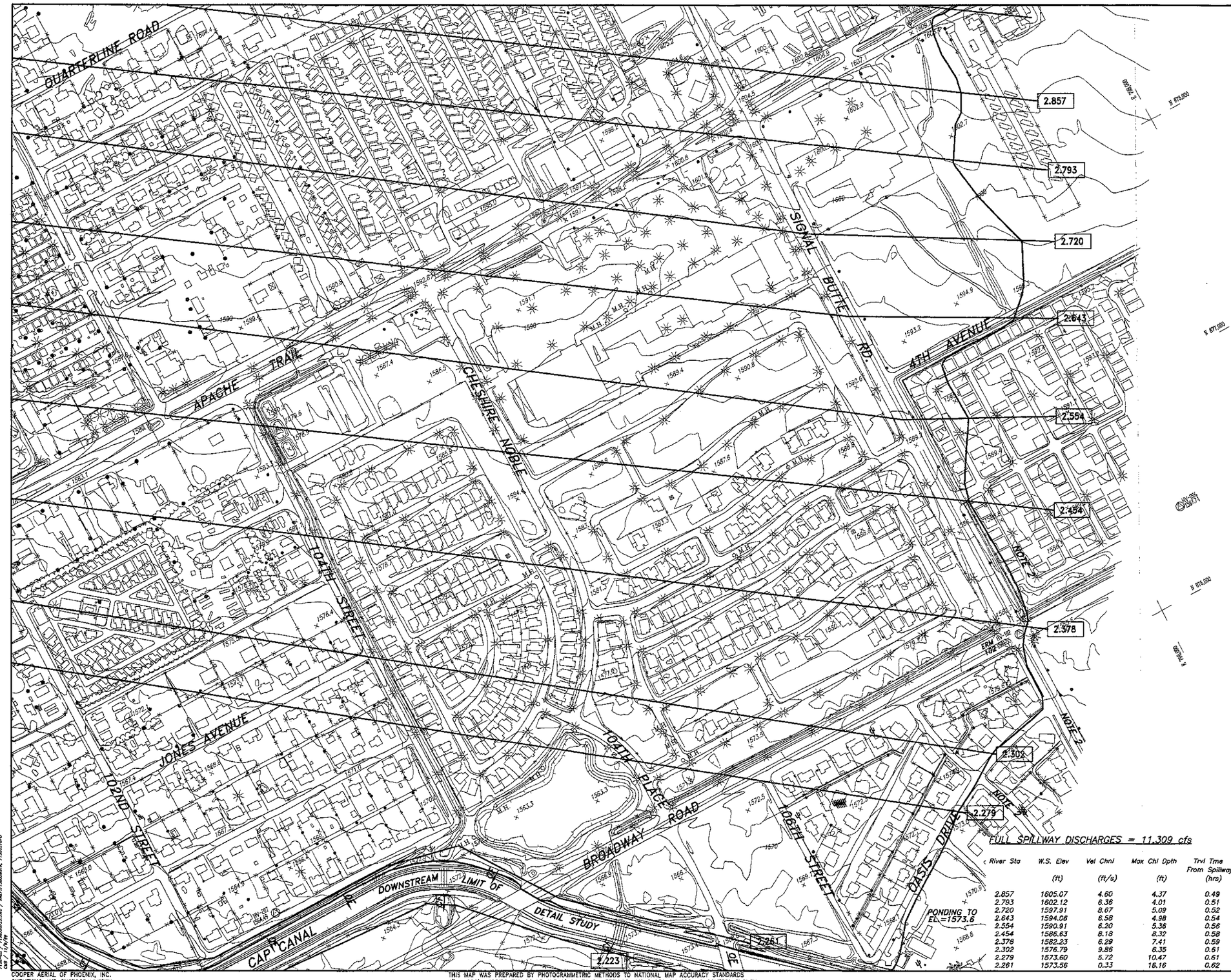
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 22 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.

7158-03 / 7158G3S22.DWG / VREF=7158G3MOR, 7158G3BG0
CAD / 11/4/99



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE	
JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

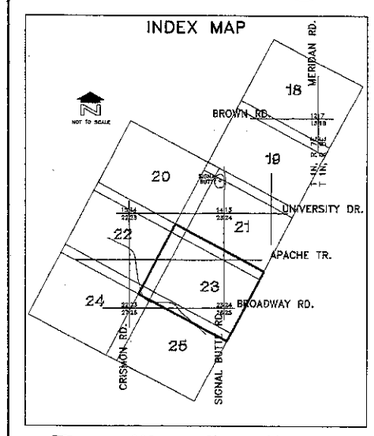
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1581.30	FOUND MCDOT BRASS CAP IN HANDHOLE 0.25' BELOW RIM AT THE INTERSECTION OF SIGNAL BUTTE RD. & BROADWAY

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
2. POTENTIAL SHALLOW (1 FT. AVE.) FLOODING IN STREETS.
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400+ FEET AT EL.1570.0 AND 1573.6, RESPECTIVELY.

REGISTERED PROFESSIONAL ENGINEER (CIVIL) 15290 GREGORY A. SCHUENKE 11/9/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

FULL SPILLWAY DISCHARGES = 11,309 cfs

℄ River Sta	W.S. Elev (ft)	Vel Chnl (ft/s)	Max Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
2.857	1605.07	4.60	4.37	0.49
2.793	1602.12	6.36	4.01	0.51
2.720	1597.91	8.67	5.09	0.52
2.643	1594.06	6.58	4.98	0.54
2.554	1590.91	6.20	5.36	0.56
2.454	1586.63	8.18	8.32	0.58
2.378	1582.23	6.29	7.41	0.59
2.302	1576.79	9.86	6.35	0.61
2.279	1573.60	5.72	10.47	0.61
2.261	1573.56	0.33	16.16	0.62

PONDING TO EL.=1573.6

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 23 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY AZTEC ENGINEERING.

FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev (ft)	Vel Chnl Max (ft/s)	Chl Dpth (ft)	Trvl Tme From Spillway (hrs)
2.261	1573.56	0.33	16.16	0.62

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.
F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.
OVERFLOW LOCATIONS ACROSS CAP	O.F.

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

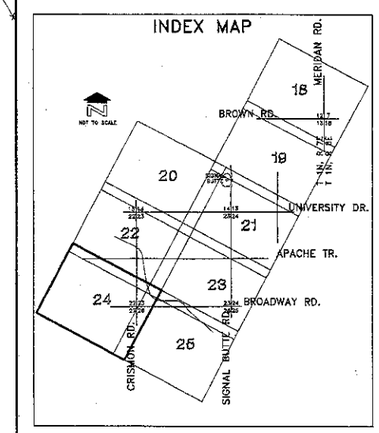
I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.
100*	1527.21	FOUND ADOT BRASS CAP IN HANDHOLE 0.62' BELOW RIM AT THE INTERSECTION OF ELLSWORTH RD. & APACHE TRAIL

NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

Registered Professional Engineer (Civil) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE Date Signed 11/17/99 ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400
SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

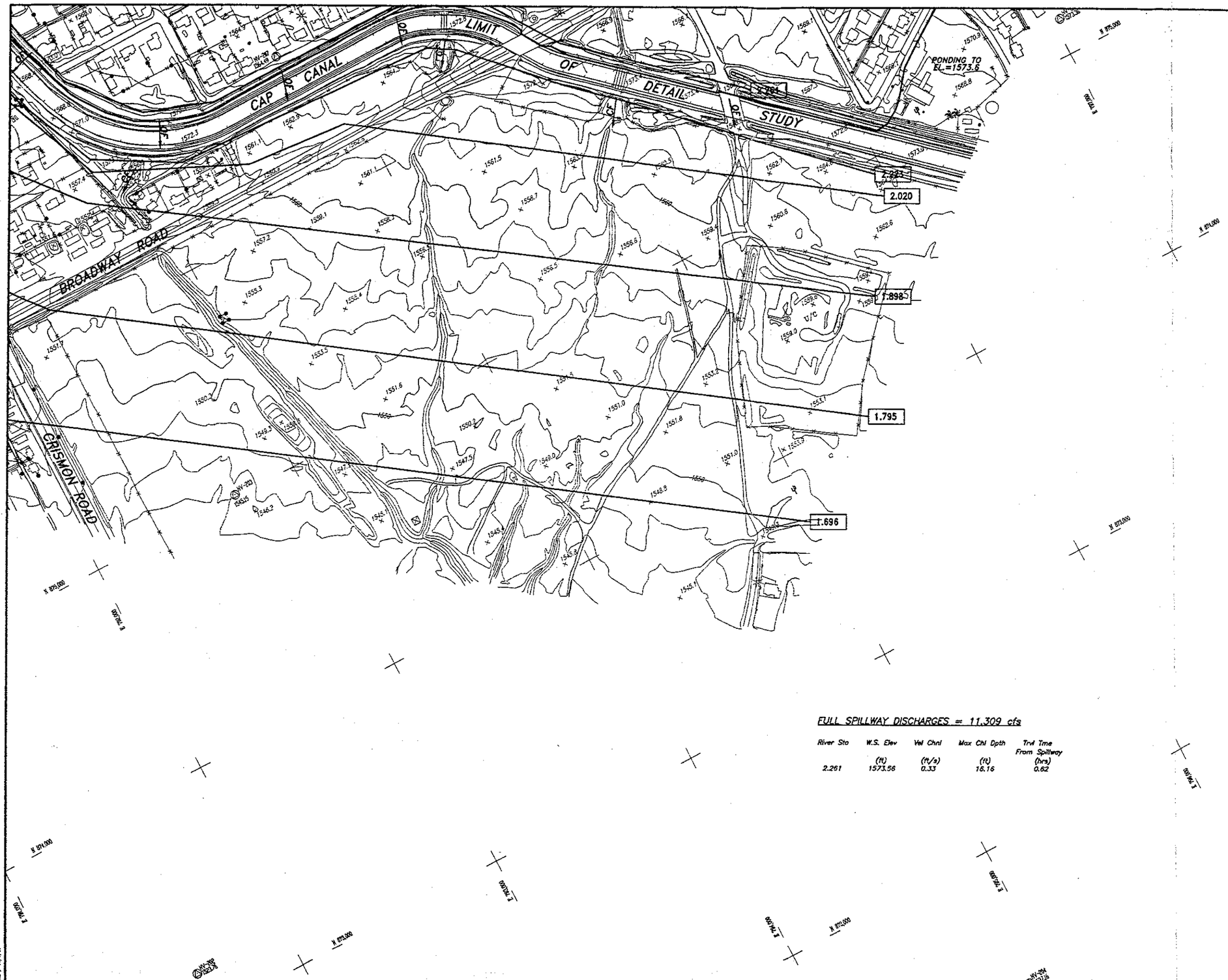
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 24 OF 25

7156-70 / 7155552F2.DWG / DBD:7156CMB7K, 7156SSTGWD
CMB / 11/19/99

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS
1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY
DATA PROVIDED BY AZTEC ENGINEERING.



FULL SPILLWAY DISCHARGES = 11,309 cfs

River Sta	W.S. Elev	Vel Chnl	Max Chl Dpth	Trvl Time From Spillway
	(ft)	(ft/s)	(ft)	(hrs)
2.261	1573.56	0.33	16.16	0.62

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DELINEATION OF SPILLWAY FLOWS FROM SIGNAL BUTTE F.R.S.

F.C.D. CONTRACT NO. 98-17

FULL SPILLWAY FLOW

LEGEND

INUNDATION LIMITS	
HYDRAULIC BASE LINE WITH RIVER MILE	4.0 — 3.9
CROSS SECTION	RIVER MILE ID. 22.304
ELEVATION REFERENCE MARK	ERM3 X
ZONE DESIGNATIONS	ZONE A
CORPORATE LIMITS	
COUNTY OR STATE JURISDICTIONAL BOUNDARY	
CULVERT FLOW ACROSS CAP	C.F.—
OVERFLOW LOCATIONS ACROSS CAP	O.F.—

ELEVATION REFERENCE MARKS

NOTE: ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
101*	1550.70	FOUND MCDOT BRASS CAP IN HANDHOLE 0.55' BELOW RIM AT THE INTERSECTION OF CRISMON RD. & BROADWAY RD.

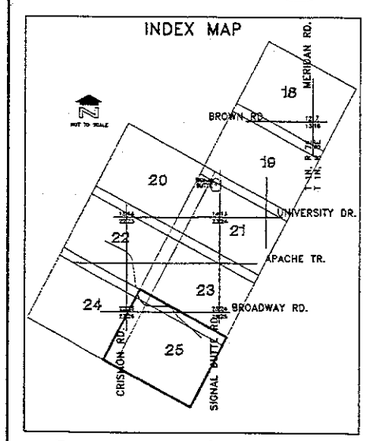
NOTES

1. CROSS-SECTION STA. 10,000.00 IS HYDRAULIC BASELINE
4. APPROX. PONDING EAST TO SIGNAL BUTTE ROAD FOR ALL (3) FLOW EVENTS TO PONDING EL. NOTED. PONDING CONTINUES EAST FOR 2/3 AND FULL FLOW EVENTS FOR 3400+ FEET AT EL.1570.0 AND 1573.6, RESPECTIVELY.

* ERM NOT SHOWN ON THIS SHEET; SEE SHEET 1

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15290 GREGORY A. SCHUELKE ARIZONA, U.S.A.

INDEX MAP



200 0' 200 400

SCALE: 1" = 200'
CONTOUR INTERVAL = 2'

A-N WEST INC.
Consulting Engineers
7600 N. 15th Street, Suite 200
Phoenix, Arizona 85020
(602)861-2200

	BY	DATE
DESIGN	GAS	
DESIGN CHK.	LLT	
PLANS	CMB	
PLANS CHK.	GAS	
SUBMITTED BY:		DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 25 OF 25

COOPER AERIAL OF PHOENIX, INC.
SURVEYING AND PHOTOGRAMMETRY
FLIGHT DATE: 10/15/98

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS 1" = 200' HORIZONTAL SCALE AND 2' CONTOUR INTERVALS AND BASED ON GROUND CONTROL SURVEY DATA PROVIDED BY AZTEC ENGINEERING.

CADMAN/FILE: N:\ARCHIVES\ CAD / DRAWINGS / 98-017 CMB 11/19/99 GAS

HEC-RAS September 1998 Version 2.2
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

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

PROJECT DATA
Project Title: SIGNAL BUTTE FRS STUDY (FULL FLOW)
Project File : SIGBUT3.prj
Run Date and Time: 7/6/99 7:26:58 AM

Project in English units

Project Description:
DELINEATE SPILLWAY FLOWS FROM SIGNAL BUTTE FRS DOWNSTREAM TO CAP CANAL
FCD NO.
98-17
PREPARED BY A-N WEST, INC. JOB. NO. 7158-05
EXISTING CONDITIONS .
FULL SPILLWAY FLOW= 11309 CFS. PROFILE 3.
TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL MAPPING OF PHOENIX.
PHOTO
DATE:10/15/98
FIELD SURVEY BY AZTEC ENGINEERING , PHX. AZ.
STARTING D/S WATER
SURFACE ELEV. BASED ON NORMAL DEPTH (S=0.011 FT/FT.)
STARTING U/S WSEL BASED
ON CRITICAL DEPTH.
COMPUTATIONAL FLOW REGIME: MIXED FLOW
HEC-RAS COMPUTER
MODEL, VER.2.2, SEPT.,1998.
MANNIN'GS (N) VALUE RANGE; 0.013 (CONCRETE
SPILLWAY), .030 (TRAP. CHANN. D/S SPILLWAY), .045 (MAIN CHANN.),.068 (LT.DEV.
OVERBANK), 0.10(MOD. DEV. O.B.,0.15 (HVY. DEV.)

PLAN DATA

Plan Title: Imported Plan 01
Plan File : C:\HEC\RAS\SIGBUT3.p01

Geometry Title: Imported Geom 02
Geometry File : C:\HEC\RAS\SIGBUT3.g02

Flow Title : Imported Flow 01
Flow File : C:\HEC\RAS\SIGBUT3.f01

Plan Summary Information:

Number of:	Cross Sections	= 51	Mulitple Openings	=	0
	Culverts	= 1	Inline Weirs	=	0
	Bridges	= 0			

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculaton tolerance	=	0.01
Maximum number of interations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Imported Flow 01
Flow File : C:\HEC\RAS\SIGBUT3.f01

Flow Data (cfs)

River	Reach	RS	PF 1
SIGNAL BUTTE	SPILLWAY	5.000	11309

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
SIGNAL BUTTE	SPILLWAY	PF 1	Critical	Normal S = .011

GEOMETRY DATA

Geometry Title: Imported Geom 02
Geometry File : C:\HEC\RAS\SIGBUT3.g02

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 5.000

INPUT
Description: RM.5.000. UPSTREAM END OF STUDY. 33.7 FT. UPSTREAM OF UPSTREAM EDGE OF CONCRETE SPILLWAY OF SIGNAL BUTTE F.R.S. STARTING WSEL BASED ON CRITICAL DEPTH FOR SUPERCRITICAL PROFILE OF MIXED FLOW COMPUTATIONS.

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9843.98	1720.6	9854.85	1718.12	9869.02	1715.08	9878.36	1713.22	9886.06	1710.36
9886.09	1710.4	9895.58	1710.17	9900.94	1710.04	9907.81	1710.17	9923.66	1710.11
9939.71	1710.1	9952.09	1709.99	9962.03	1710.08	9965.76	1709.93	9976.08	1710.13
9986.97	1710.1	10005.07	1709.78	10022.06	1709.59	10035.71	1709.38	10040.68	1709.3
10045.28	1709	10065.44	1709.39	10070.11	1710.3	10072.32	1710.23	10073.01	1710.22
10073.67	1710.2	10075.2	1710.92	10084.32	1710.73	10097.23	1711.25	10101.65	1711.24
10107.98	1711.3	10110.12	1711.37	10142.51	1721.68				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9843.98	.03	9843.98	.03	10142.51	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9843.98	10142.51	33.7	33.7	33.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1721.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.030	
W.S. Elev (ft)	1721.38	Reach Len. (ft)	33.70	33.70	33.70
Crit W.S. (ft)	1714.32	Flow Area (sq ft)		2925.77	
E.G. Slope (ft/ft)	0.000294	Area (sq ft)		2925.77	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	297.57	Top Width (ft)		297.57	
Vel Total (ft/s)	3.87	Avg. Vel. (ft/s)		3.87	
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)		9.83	
Conv. Total (cfs)	659273.6	Conv. (cfs)		659273.6	
Length Wtd. (ft)	33.70	Wetted Per. (ft)		301.52	
Min Ch El (ft)	1709.00	Shear (lb/sq ft)		0.18	
Alpha	1.00	Stream Power (lb/ft s)		0.69	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1833.21	113.04	201.06
C & E Loss (ft)	0.27	Cum SA (acres)	1087.36	33.82	132.78

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9843.98	RB 10142.51	11309.00	2925.77	301.52	100.00	9.83	3.87

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.994

INPUT
Description: RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE. DECREASE N VALUE TO 0.013 FOR TOP OF CONC. SPILLWAY.

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9917.72	1721.7	9918.28	1721.71	9919.94	1721.57	9921.53	1715.89	9922.08	1712.15
9922.98	1712.2	9923.3	1712.21	9923.63	1712.21	10058.64	1712.76	10059.41	1712.75
10060.03	1712.7	10060.35	1712.75	10061.14	1716.14	10062.05	1721.18	10062.48	1722.14
10062.99	1722.2	10064.47	1721.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9917.72	.013	9917.72	.013	10062.48	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9917.72	10062.48	12.96	12.96	12.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1721.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.93	Wt. n-Val.		0.013	
W.S. Elev (ft)	1718.39	Reach Len. (ft)	12.96	12.96	12.96
Crit W.S. (ft)	1718.39	Flow Area (sq ft)		823.65	
E.G. Slope (ft/ft)	0.001495	Area (sq ft)		823.65	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	140.72	Top Width (ft)		140.72	
Vel Total (ft/s)	13.73	Avg. Vel. (ft/s)		13.73	
Max Chl Dpth (ft)	6.24	Hydr. Depth (ft)		5.85	
Conv. Total (cfs)	292472.0	Conv. (cfs)		292472.0	
Length Wtd. (ft)	12.96	Wetted Per. (ft)		150.42	
Min Ch El (ft)	1712.15	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		7.02	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1833.21	111.59	201.06
C & E Loss (ft)	0.00	Cum SA (acres)	1087.36	33.65	132.78

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9917.72	RB 10062.48	11309.00	823.65	150.42	100.00	5.85	13.73

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 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: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.991

INPUT
Description: RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/ EDGE. MANNING'S N VALUE INCREASED FOR THIS REACH TO 0.15 TO ACCOUNT FOR BAFFLED BLOCK ENERGY DISSIPATOR BLOCKS.

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9915.58	1721.9	9918.01	1721.2	9920.69	1720.98	9921.31	1718.78	9924.8	1715.45
9942.18	1712.6	9944.25	1711.45	9944.71	1711.45	9959.07	1711.6	9959.23	1711.6
9976.87	1711.5	9977.34	1711.47	10000.77	1711.67	10001.66	1711.69	10034.46	1711.52
10035.44	1711.5	10039.72	1713.76	10058.59	1713.02	10062.68	1722.13	10064.47	1722.16

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9915.58	.013	9915.58	.151	10064.47	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9915.58	10064.47	27.8	27.8	27.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1721.22	Element			
Vel Head (ft)	3.30	Wt. n-Val.		0.150	
W.S. Elev (ft)	1717.92	Reach Len. (ft)	27.80	27.80	27.80
Crit W.S. (ft)	1718.24	Flow Area (sq ft)		775.44	
E.G. Slope (ft/ft)	0.229302	Area (sq ft)		775.44	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	138.58	Top Width (ft)		138.58	
Vel Total (ft/s)	14.58	Avg. Vel. (ft/s)		14.58	
Max Chl Dpth (ft)	6.47	Hydr. Depth (ft)		5.60	
Conv. Total (cfs)	23616.7	Conv. (cfs)		23616.7	
Length Wtd. (ft)	27.80	Wetted Per. (ft)		143.85	

Min Ch El (ft)	1711.45	Shear (lb/sq ft)		77.17	
Alpha	1.00	Stream Power (lb/ft s)		1125.46	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1833.21	111.36	201.06
C & E Loss (ft)	0.04	Cum SA (acres)	1087.36	33.60	132.78

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.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9915.58	RB 10064.47	11309.00	775.44	143.85	100.00	5.60	14.58

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.986

INPUT
Description: RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE SPILLWAY. INCREASE N VALUE TO 0.09 TO PROVIDE AVE. N VALUE BETWEEN FULL BAFFLED BLOCK SEGMENT AND TRAP. CHANN. SEGMENT.

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.12	1711.2	9918.76	1711.48	9920.17	1711.46	9921.79	1711.04	9924.61	1696.66
9928.91	1696.4	9929.02	1696.37	9957	1696.48	9957.18	1696.48	9970.7	1696.64
9971.09	1696.6	9985.17	1696.44	9985.42	1696.45	10013.17	1697.05	10014.95	1697.04
10037.37	1697.4	10039.25	1698.39	10058.26	1699.27	10061.28	1698.69	10063.52	1712.95
10066.66	1712.6								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.12	.03	9921.79	.09	10063.52	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9921.79	10063.52	92.6	92.6	92.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1710.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	10.67	Wt. n-Val.		0.090	
W.S. Elev (ft)	1700.21	Reach Len. (ft)	92.60	92.60	92.60
Crit W.S. (ft)	1703.02	Flow Area (sq ft)		431.35	
E.G. Slope (ft/ft)	0.574158	Area (sq ft)		431.35	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	137.61	Top Width (ft)		137.61	
Vel Total (ft/s)	26.22	Avg. Vel. (ft/s)		26.22	
Max Chl Dpth (ft)	3.84	Hydr. Depth (ft)		3.13	
Conv. Total (cfs)	14924.8	Conv. (cfs)		14924.8	
Length Wtd. (ft)	92.60	Wetted Per. (ft)		142.18	
Min Ch El (ft)	1696.37	Shear (lb/sq ft)		108.75	
Alpha	1.00	Stream Power (lb/ft s)		2851.10	

Frctn Loss (ft)	9.58	Cum Volume (acre-ft)	1833.21	110.97	201.06
C & E Loss (ft)	0.74	Cum SA (acres)	1087.36	33.52	132.78

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9921.79	RB 10063.52	11309.00	431.35	142.18	100.00	3.13	26.22

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.968

INPUT
Description: RM. 4.968.

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9888.2	1706.9	9909.13	1699.23	9911.27	1698.48	9922.54	1697.93	9925.09	1696.5
9930.97	1696.1	9946.22	1695.93	9988.32	1696.32	9996.02	1696.31	0027.28	1696.26
10045.55	1696.21	0068.23	1696.45	10074.45	1697.95	10081.83	1698.83	10087.66	1699.76
10101.66	1706.41	0105.26	1708.17	10108.82	1708.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9888.2	.03	9888.2	.03	10108.82	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9888.21	10108.82	208.34	208.34	208.34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1706.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.63	Wt. n-Val.		0.030	
W.S. Elev (ft)	1706.00	Reach Len. (ft)	208.34	208.34	208.34
Crit W.S. (ft)	1701.61	Flow Area (sq ft)		1779.83	
E.G. Slope (ft/ft)	0.000974	Area (sq ft)		1779.83	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	210.14	Top Width (ft)		210.14	
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)		6.35	
Max Chl Dpth (ft)	10.07	Hydr. Depth (ft)		8.47	
Conv. Total (cfs)	362345.7	Conv. (cfs)		362345.7	

Length Wtd. (ft)	208.34	Wetted Per. (ft)		213.59	
Min Ch El (ft)	1695.93	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		3.22	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1833.21	108.62	201.06
C & E Loss (ft)	0.04	Cum SA (acres)	1087.36	33.15	132.78

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9888.20	RB 10108.82	11309.00	1779.83	213.59	100.00	8.47	6.35

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.929

INPUT
Description: RM. 4.929.

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9911.26	1705.3	9926.18	1699.6	9933.33	1696.42	9941.32	1696.42	9954.96	1696.34
10009.41	1696.3	10059.24	1696.03	10061.29	1695.98	10082.37	1703.29	10096.95	1708.19
10103.33	1708.5	10105.48	1708.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9911.26	.03	9911.26	.03	10105.48	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9911.26	10105.48	125	76.23	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1706.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.07	Wt. n-Val.		0.030	
W.S. Elev (ft)	1705.24	Reach Len. (ft)	125.00	76.23	25.00
Crit W.S. (ft)		Flow Area (sq ft)		1365.12	
E.G. Slope (ft/ft)	0.001878	Area (sq ft)		1365.12	
Q Total (cfs)	11309.00	Flow (cfs)		11309.00	
Top Width (ft)	176.75	Top Width (ft)		176.75	
Vel Total (ft/s)	8.28	Avg. Vel. (ft/s)		8.28	
Max Chl Dpth (ft)	9.26	Hydr. Depth (ft)		7.72	
Conv. Total (cfs)	260983.8	Conv. (cfs)		260983.8	
Length Wtd. (ft)	81.21	Wetted Per. (ft)		180.02	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)		0.89	
Alpha	1.00	Stream Power (lb/ft s)		7.36	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	1833.21	101.10	201.06
C & E Loss (ft)	0.21	Cum SA (acres)	1087.36	32.22	132.78

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
LB 9911.26	RB 10105.48	11309.00	1365.12	180.02	100.00	7.72	8.28

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.914

INPUT
Description: RM. 4.914

Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9599.38	1703.6	9605.27	1703.57	9613.73	1703.21	9628.26	1702.74	9640.01	1702.4
9659.34	1702.1	9689.85	1701.75	9709.87	1701.47	9716.11	1701.37	9720.11	1701.34
9733.65	1699.9	9747.41	1698.56	9755.78	1697.4	9770.71	1698.13	9804.49	1699.6
9812.95	1699.8	9814.27	1699.83	9816.7	1699.69	9818.67	1699.73	9829.2	1699.73
9830.45	1699.8	9835.71	1699.72	9841.92	1699.66	9843.24	1699.65	9858.76	1700.1
9865.1	1700.3	9873.59	1699.65	9881.28	1699.58	9890.9	1698.86	9894.92	1698.82
9896.1	1698.8	9921.75	1697.32	9931.45	1696.61	9934.31	1696.62	9961.9	1696.57
10034.86	1696.21	10039.04	1696.12	10046.37	1695.98	10052.89	1697.97	10061.87	1700.92
10085.54	1708.21	10085.62	1708.19	10087.97	1708.33				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9599.38	.068	9865.1	.03	10087.97	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9865.1	10087.97	120	67.17	25	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1706.00	Element			
Vel Head (ft)	0.36	Wt. n-Val.	0.068	0.030	
W.S. Elev (ft)	1705.64	Reach Len. (ft)	120.00	67.17	25.00
Crit W.S. (ft)		Flow Area (sq ft)	1328.36	1678.60	
E.G. Slope (ft/ft)	0.000750	Area (sq ft)	1328.36	1678.60	
Q Total (cfs)	11309.00	Flow (cfs)	2310.80	8998.20	
Top Width (ft)	477.83	Top Width (ft)	265.72	212.11	
Vel Total (ft/s)	3.76	Avg. Vel. (ft/s)	1.74	5.36	
Max Chl Dpth (ft)	9.66	Hydr. Depth (ft)	5.00	7.91	
Conv. Total (cfs)	412890.9	Conv. (cfs)	84367.3	328523.7	
Length Wtd. (ft)	73.24	Wetted Per. (ft)	268.08	213.71	
Min Ch El (ft)	1695.98	Shear (lb/sq ft)	0.23	0.37	
Alpha	1.66	Stream Power (lb/ft s)	0.40	1.97	

Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	1831.31	98.44	201.06
C & E Loss (ft)	0.18	Cum SA (acres)	1086.98	31.88	132.78

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9599.38	9665.81	220.23	194.47	68.49	1.95	2.93	1.13
9665.81	9732.24	398.21	274.20	66.50	3.52	4.13	1.45
9732.24	9798.67	978.82	470.71	66.63	8.66	7.09	2.08
9798.67	9865.10	713.54	388.98	66.45	6.31	5.86	1.83
LB 9865.10	RB 10087.97	8998.20	1678.60	213.71	79.57	7.91	5.36

Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.902

INPUT
Description: RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S/ OF SPILLWAY.

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9569.3	1703.6	9570.24	1703.63	9582.02	1703.52	9587.21	1703.65	9594.87	1703.72
9600.67	1703.8	9611.08	1704.08	9613.59	1704.14	9656.3	1704.32	9698.56	1703.91
9707.61	1703.9	9710.56	1703.9	9728.44	1703.7	9770.15	1703.09	9771.24	1703.06
9772.19	1703	9790.71	1702.51	9796.64	1702.45	9807.42	1702.69	9819.3	1702.85
9824.23	1702.8	9840.04	1702.79	9843.47	1702.72	9853.18	1702.76	9855.36	1702.77
9859.69	1702.8	9864.04	1702.78	9864.74	1702.98	9866.98	1702.74	9871.07	1702.7
9877.7	1702.6	9884.14	1702.17	9890.93	1701.86	9906.82	1700.9	9910.86	1699.84
9926.61	1699.1	9927.39	1699.04	9955.71	1696.03	9957.81	1695.76	9958.84	1695.64
9964.99	1695.2	9982.12	1695.62	9987.28	1695.81	10018.22	1695.96	10022.17	1696.08
10027.92	1696.3	10030.31	1696.44	10039.31	1699.44	10042.31	1699.71	10043.42	1699.91
10056.21	1703	10058.82	1703.84	10066.78	1705.59	10086.97	1707.91	10087.92	1707.83

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9569.3	.068	9906.82	.045	10086.97	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9906.82	10086.97	350	261.94	230	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1705.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.20	Wt. n-Val.	0.068	0.045	
W.S. Elev (ft)	1703.48	Reach Len. (ft)	350.00	261.94	230.00
Crit W.S. (ft)	1703.39	Flow Area (sq ft)	135.98	914.81	
E.G. Slope (ft/ft)	0.012178	Area (sq ft)	135.98	914.81	
Q Total (cfs)	11309.00	Flow (cfs)	289.94	11019.06	
Top Width (ft)	314.32	Top Width (ft)	163.43	150.89	
Vel Total (ft/s)	10.76	Avg. Vel. (ft/s)	2.13	12.05	
Max Chl Dpth (ft)	8.28	Hydr. Depth (ft)	0.83	6.06	
Conv. Total (cfs)	102478.4	Conv. (cfs)	2627.3	99851.0	
Length Wtd. (ft)	272.68	Wetted Per. (ft)	163.54	152.22	
Min Ch El (ft)	1695.20	Shear (lb/sq ft)	0.63	4.57	
Alpha	1.22	Stream Power (lb/ft s)	1.35	55.04	
Frctn Loss (ft)	3.38	Cum Volume (acre-ft)	1829.29	96.44	201.06
C & E Loss (ft)	0.19	Cum SA (acres)	1086.38	31.60	132.78

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9738.06	9822.44	73.24	45.81	79.07	0.65	0.58	1.60
9822.44	9906.82	216.70	90.17	84.47	1.92	1.07	2.40
LB 9906.82	RB 10086.97	11019.06	914.81	152.22	97.44	6.06	12.05

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.852

INPUT
Description: RM. 4.852.

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9176.68	1700.2	9216.75	1700.39	9216.84	1700.39	9216.88	1700.39	9216.93	1700.38
9223.8	1698.7	9231.22	1698.72	9238.57	1698.73	9239.83	1698.72	9243.73	1698.83
9271.54	1698.7	9273.68	1698.71	9276.37	1698.68	9278.04	1698.65	9282.14	1698.64
9301.81	1698.8	9305.89	1698.34	9314.94	1698.4	9316.21	1698.52	9330.57	1700.06
9339.65	1699.8	9353.73	1700.26	9355.44	1700.25	9357.73	1700.25	9361.39	1700.27
9368.81	1700.4	9401.21	1701.02	9410.55	1700.94	9424.54	1700.83	9426.6	1700.82
9429.18	1700.7	9433.95	1700.52	9446.91	1700.1	9481.8	1698.93	9523.95	1699.49
9549.43	1700.1	9603.66	1700.33	9685.19	1700.08	9697.82	1700.06	9699.23	1700.07
9736.8	1700.4	9786.05	1700.49	9790.13	1700.6	9807.56	1700.41	9811.08	1700.25
9817.32	1699.8	9821.17	1699.28	9823.8	1698.97	9844.24	1697.92	9862.69	1697.21
9922.92	1695.9	9925.6	1695.82	9928.41	1695.78	9929.54	1695.77	9936.64	1695.75
9983.39	1695.8	9998.01	1694.31	10010.25	1692.71	10022.77	1693.31	10033.68	1693.91

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10036.17  1694.410051.93 1697.35 10052.2 1697.3410071.29 1697.9510071.49 1697.94
10071.83    169810087.16 1698.1610095.74 1698.4810109.44 1699.35 10114.9 1699.58
10125.72  1699.710163.22 1700.2610196.01 1700.3910205.48 1700.5810221.91 1700.89
 10232.4  1701.110240.12 1701.2710268.65 1701.21 10306.9 1701.6210318.47 1701.91

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 9176.68    .068  9925.6    .04510051.93    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9925.610051.93              330  402.55     425              .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1702.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.56	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1700.55	Reach Len. (ft)	330.00	402.55	425.00
Crit W.S. (ft)	1700.55	Flow Area (sq ft)	772.50	702.21	181.97
E.G. Slope (ft/ft)	0.012628	Area (sq ft)	772.50	702.21	181.97
Q Total (cfs)	11309.00	Flow (cfs)	2651.96	8153.26	503.78
Top Width (ft)	963.84	Top Width (ft)	685.55	126.33	151.96
Vel Total (ft/s)	6.83	Avg. Vel. (ft/s)	3.43	11.61	2.77
Max Chl Dpth (ft)	7.85	Hydr. Depth (ft)	1.13	5.56	1.20
Conv. Total (cfs)	100637.2	Conv. (cfs)	23599.4	72554.8	4483.1
Length Wtd. (ft)	396.55	Wetted Per. (ft)	686.41	126.86	152.02
Min Ch El (ft)	1692.70	Shear (lb/sq ft)	0.89	4.36	0.94
Alpha	2.15	Stream Power (lb/ft s)	3.05	50.67	2.61
Frctn Loss (ft)		Cum Volume (acre-ft)	1825.64	91.57	200.[illegible]
C & E Loss (ft)		Cum SA (acres)	1082.97	30.77	132.[illegible]

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
9176.68	9363.91	674.75	223.04	187.91	5.97	1.19	3.03
9363.91	9551.14	293.34	116.98	130.60	2.59	0.90	2.51
9551.14	9738.37	84.38	63.97	187.23	0.75	0.34	1.32
9738.37	9925.60	1599.49	368.51	180.66	14.14	2.04	4.34
LB 9925.60	RB 10051.93	8153.26	702.21	126.86	72.10	5.56	11.61
10051.93	10318.47	503.78	181.97	152.02	4.45	1.20	2.77

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.776

INPUT
Description: RM. 4.776.

Station Elevation Data num= 114

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8935.41	1698	8940.48	1697.99	8945.99	1698	8960.41	1697.63	8969.15	1697.36
8978.82	1697.2	9013.48	1696.67	9018.78	1696.39	9024.13	1696.23	9039.09	1696.43
9074.04	1697.1	9089.48	1696.99	9102.18	1697	9114.78	1696.64	9117.41	1696.54
9125.2	1696.3	9139.09	1696.32	9140.5	1696.43	9143.78	1696.28	9189.59	1696.03
9210.18	1695.9	9244.85	1695.96	9294.39	1695.81	9359.47	1695.58	9382.81	1695.54
9429.66	1695.8	9437.31	1695.76	9442.33	1695.74	9446.46	1695.71	9449.71	1695.66
9509.16	1696.3	9513.47	1696.34	9573.45	1696.39	9586.58	1696.4	9587.04	1696.4
9587.41	1696.4	9587.7	1696.4	9588.72	1696.4	9639.28	1695.49	9661.72	1695.55
9664.15	1695.6	9686.93	1695.74	9699.19	1695.89	9702	1695.91	9715.09	1696
9721.28	1696	9731.73	1696.07	9734.45	1696.06	9791.49	1695.5	9793.31	1695.48
9813.49	1695.3	9815.93	1695.87	9823.49	1695.48	9831.94	1695.4	9850.43	1695.27
9858.68	1695.2	9863.38	1695.2	9865.41	1695.15	9874.84	1695.02	9877.74	1694.96
9885.97	1694.8	9910.84	1694.22	9912.71	1694.14	9914.29	1694.11	9919.29	1693.94
9923.48	1693.6	9933.65	1693.02	9939.13	1692.74	9942.88	1692.39	9951.71	1691.58
9954.46	1691.4	9963.23	1690.86	9967.34	1691.1	9976.35	1691.51	9980.62	1689.91
9986.34	1689.5	9988.05	1689.61	9996.11	1688.46	9999.98	1688.02	10006.86	1689.3
10031.84	1693.7	10033.97	1693.6	10047.09	1693.6	10125.05	1693.41	10143.11	1692.75
10158.57	1692.7	10171.85	1693.21	10180.16	1693.51	10187.75	1693.61	10190.27	1693.64
10194.77	1693.7	10196.69	1693.75	10221.59	1694.21	10233.77	1694.22	10270.89	1694.57
10324.27	1693.7	10336.35	1693.57	10351.89	1693.41	10366.67	1692.31	10378.34	1691.68
10385.75	1692.5	10396.02	1693.56	10398.28	1694	10410.54	1694.33	10423.79	1694.61
10449.46	1694.7	10467.86	1694.62	10483.13	1694.45	10514.16	1695.01	10537.72	1695.52
10561.03	1695.9	10563.38	1695.92	10564.33	1695.94	10580.38	1695.93		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8935.41	.068	9939.13	.045	10031.84	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9939.13	10031.84	490	418.55	365	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1697.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.98	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1696.30	Reach Len. (ft)	490.00	418.55	365.00
Crit W.S. (ft)	1696.44	Flow Area (sq ft)	477.33	512.61	1245.01
E.G. Slope (ft/ft)	0.010957	Area (sq ft)	477.33	512.61	1245.01
Q Total (cfs)	11309.00	Flow (cfs)	893.97	5500.44	4914.59
Top Width (ft)	1358.66	Top Width (ft)	717.41	92.71	548.54
Vel Total (ft/s)	5.06	Avg. Vel. (ft/s)	1.87	10.73	3.95
Max Chl Dpth (ft)	8.28	Hydr. Depth (ft)	0.67	5.53	2.27
Conv. Total (cfs)	108036.2	Conv. (cfs)	8540.2	52546.3	46949.6

Length Wtd. (ft)	409.33	Wetted Per. (ft)	717.56	93.72	549
Min Ch El (ft)	1688.02	Shear (lb/sq ft)	0.46	3.74	1.55
Alpha	2.46	Stream Power (lb/ft s)	0.85	40.15	6.12
Frctn Loss (ft)	4.66	Cum Volume (acre-ft)	1820.90	85.96	193.62
C & E Loss (ft)	0.17	Cum SA (acres)	1077.66	29.76	128.96

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.
Note: Program found supercritical flow starting at this cross section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8935.41	9186.34	3.14	5.91	50.18	0.03	0.12	0.53
9186.34	9437.27	186.71	130.49	250.93	1.65	0.52	1.43
9437.27	9688.20	105.07	78.23	165.38	0.93	0.47	1.34
9688.20	9939.13	599.05	262.70	251.06	5.30	1.05	2.28
LB 9939.13	RB 10031.84	5500.44	512.61	93.72	48.64	5.53	10.73
10031.84	10580.38	4914.59	1245.01	549.17	43.46	2.27	3.95

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.697

INPUT
Description: RM. 4.697.

Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8615.35	1691.7	8621.19	1691.78	8628.32	1691.89	8647.84	1691.45	8681.66	1690.65
8685.98	1690.7	8711.81	1690.71	8713.45	1690.66	8742.34	1690.04	8747.69	1689.95
8775.29	1689.5	8785.04	1689.85	8822.44	1689.74	8835.79	1689.79	8849.3	1690.18
8855.86	1690.3	8900.66	1690.06	8902.91	1690.08	8903.54	1690.07	8904.13	1690.06
8905.54	1690.1	8906.72	1690.07	8935.66	1690.55	8968.19	1691.08	9007.95	1690.98
9027.69	1691.6	9045.3	1691.68	9084.5	1691.15	9109.44	1690.8	9130.16	1690.73
9155.24	1690.6	9181.66	1690.38	9188.41	1690.37	9210.31	1690.54	9213.33	1690.82
9243.78	1690.7	9245.88	1690.77	9269.01	1692.21	9276.84	1692.22	9298.69	1692.14
9313.27	1692.1	9323.7	1690.92	9324.25	1690.89	9350.46	1689.83	9368.99	1689.87
9376.02	1689.9	9436.31	1689.86	9453.1	1689.98	9473.97	1690.13	9488.68	1690.11
9503.3	1690.1	9513.87	1689.93	9519.01	1689.84	9527.01	1689.96	9536.07	1690
9581.7	1689.6	9625.31	1689.63	9646.29	1689.66	9647.75	1689.68	9690.82	1690.91
9691.3	1690.9	9716.92	1691.15	9797.52	1691.52	9835.95	1691.4	9847.69	1691.41

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 9926.16  1690.9 9951.62 1690.65 9955.39 1689.85 9965.75 1687.96 9974.68 1686.96
 9994.63  1687.4 9997.15  1687.310003.25 1686.8410007.88 1686.4810010.81 1686.27
 10023.5  1687.110030.84 1687.5210039.46 1686.6110044.28 1686.2110057.73 1685.92
10060.31  1685.910061.45 1686.0710074.94 1688.0110079.14 1688.2310083.15 1688.16
10096.94    168810097.71 1688.0110104.94 1688.0110117.41 1688.7710144.83 1689.93
10158.77  1689.410159.88 1689.4110160.08  1689.410160.12 1689.4110171.33 1690.25
10175.55  1690.410191.19 1690.3410220.07 1687.6110228.82 1687.0410235.53 1687.63
10236.59  1687.710237.85 1687.7610253.54 1688.9510273.02  1690.210283.18 1690.19
10289.59  1690.210298.19 1690.13 10326.9  1690.110352.34  1689.910368.46 1689.44
10373.51  1688.810390.43 1685.37 10402.6 1687.1410408.58 1687.54 10422.6 1689.22
10423.13  1689.210424.95 1689.2510453.45 1689.5810463.49 1689.6910466.12 1689.39
10468.63  1689.410472.04 1689.2410482.12 1688.67 10486.1 1688.44 10489.9 1688.83
10499.44  1689.610504.93 1689.8810520.08 1690.3710521.74 1690.4110522.63 1690.44
10535.38    169110562.52 1691.1610586.08 1691.47

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 8615.35    .068 9951.62    .04510079.14    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9951.6210079.14              425  406.56     380             .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1692.10  Element                  Left OB    Channel   Right OB
  Vel Head (ft)              0.53  Wt. n-Val.                0.068      0.045      0.068
  W.S. Elev (ft)          1691.57  Reach Len. (ft)          425.00     406.56     380.00
  Crit W.S. (ft)          1691.30  Flow Area (sq ft)       1281.60     560.09    1112.94
  E.G. Slope (ft/ft)     0.008939  Area (sq ft)            1281.60     560.09    1112.94
  Q Total (cfs)          11309.00  Flow (cfs)              2756.80    4674.44    3877.76
  Top Width (ft)          1857.09  Top Width (ft)          1222.63     127.52     506.94
  Vel Total (ft/s)           3.83  Avg. Vel. (ft/s)           2.15       8.35       3.48
  Max Chl Dpth (ft)          6.20  Hydr. Depth (ft)           1.05       4.39       2.20
  Conv. Total (cfs)      119613.7  Conv. (cfs)             29158.3    49440.9    41014.5
  Length Wtd. (ft)         407.94  Wetted Per. (ft)        1222.82     128.14     508.16
  Min Ch El (ft)          1685.90  Shear (lb/sq ft)           0.58       2.44       1.22
  Alpha                      2.33  Stream Power (lb/ft s)     1.26      20.36       4.26
  Frctn Loss (ft)            4.39  Cum Volume (acre-ft)    1811.01      80.81     183.74
  C & E Loss (ft)            0.01  Cum SA (acres)          1066.75      28.70     124.54

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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:  Hydraulic jump has occurred between this cross section and the previous upstream
section.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1
  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  8615.35       8949.42         908.16     398.59     306.81       8.03      1.30       2.28
  8949.42       9283.48         289.64     194.21     282.29       2.56      0.69       1.49
  9283.48       9617.55        1277.36     484.51     299.64      11.30      1.62       2.64
  9617.55       9951.62         281.65     204.29     334.09       2.49      0.61       1.38
  LB 9951.62    RB 10079.14    4674.44     560.09     128.14      41.33      4.39       8.35
  10079.14      10586.08       3877.76    1112.94     508.16      34.29      2.20       3.48
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.620**

INPUT
Description: RM. 4.620.

Station Elevation Data num= 138

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8183.54	1687.4	8184.89	1687.38	8186.81	1687.38	8189.78	1687.38	8190.4	1687.39
8191.61	1687.4	8192.65	1687.33	8193.42	1687.29	8247.72	1686.25	8252.69	1685.9
8276.3	1685.7	8282.47	1685.64	8286.78	1685.66	8297.37	1685.93	8298.63	1685.97
8298.72	1686	8299.28	1685.95	8313.34	1686.05	8316.75	1686.05	8325.87	1686.06
8333.25	1686.2	8338.01	1686.07	8342.44	1686.06	8347.31	1685.9	8381.53	1686.4
8402.32	1686.4	8418.07	1686.44	8418.12	1686.44	8487.43	1686.52	8523.15	1687.04
8527.12	1687	8544.28	1686.39	8548.4	1686.26	8563.44	1687	8572.28	1687.42
8619.36	1687.5	8629.86	1687.56	8631.08	1687.54	8646.85	1687.24	8683.07	1686.1
8693.85	1686.6	8697.03	1686.86	8713.67	1686.94	8736.22	1686.92	8743.7	1686.74
8753.78	1686.3	8764.15	1685.96	8796.52	1684.77	8806.21	1685.17	8832.47	1686.21
8885.89	1686.3	8893.28	1686.23	8915.42	1686.3	8944.62	1686.07	8997.14	1685.73
8999.1	1685.7	9012.34	1684.96	9018.78	1685.59	9025.58	1685.96	9035.59	1685.68
9040.14	1685.6	9041.36	1685.62	9071.61	1685.7	9156.97	1686.1	9229.09	1686.29
9238.36	1686.2	9240.57	1685.73	9246.15	1684.98	9250.97	1685.33	9254.36	1685.51
9259.12	1685.6	9275.26	1686.34	9281.03	1686.5	9293.86	1685.82	9301.28	1685.29
9308.97	1685.3	9319.63	1685.36	9327.79	1685.61	9331.55	1685.76	9346.55	1685.71
9373.18	1685.6	9390.49	1685.57	9398.52	1685.33	9410.53	1685.39	9428.27	1685.12
9482.54	1684.5	9519.3	1684.51	9551.85	1685	9552.27	1685.02	9552.65	1684.98
9563.28	1684	9573.01	1685.04	9575.03	1685.27	9610.37	1685.38	9623.76	1685.28
9628.21	1685.3	9646.82	1685.91	9664.39	1686.72	9691.62	1686.21	9691.93	1686.22
9720.21	1687.7	9725.38	1687.61	9747.48	1687.26	9762.48	1687.02	9771.94	1686.13
9778.52	1685.8	9782.17	1685.72	9787.44	1685.7	9817.59	1685.49	9907.42	1686.28
9918.29	1686.2	9919.18	1686.16	9933.7	1685.33	9942.43	1684.3	9962.7	1682.19
9974.77	1683.1	9981.07	1683.57	10031.53	1682.62	10038.88	1682.45	10056.07	1685.36
10065.59	1687.11	10066.81	1687.02	10080.47	1687.05	10150.42	1687.13	10154.68	1687.35
10162.53	1687.91	10187.11	1687.05	10213.74	1686.28	10220.07	1685.75	10223.62	1685.27
10239.74	1683	10247.89	1682.54	10251.65	1682.09	10261.52	1682.91	10287.46	1686.29
10291.34	1686.8	10301.97	1687.12	10322.59	1687.44				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8183.54	.068	9907.42	.045	10065.59	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9907.42	10065.59	160	235.25	230	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1687.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1687.19	Reach Len. (ft)	160.00	235.25	230.00
Crit W.S. (ft)		Flow Area (sq ft)	2000.67	518.83	259.57
E.G. Slope (ft/ft)	0.013140	Area (sq ft)	2000.67	518.83	259.57
Q Total (cfs)	11309.00	Flow (cfs)	5981.02	4323.43	1004.55
Top Width (ft)	1954.57	Top Width (ft)	1586.76	158.17	209.64
Vel Total (ft/s)	4.07	Avg. Vel. (ft/s)	2.99	8.33	3.87
Max Chl Dpth (ft)	5.10	Hydr. Depth (ft)	1.26	3.28	1.24
Conv. Total (cfs)	98657.8	Conv. (cfs)	52177.4	37716.8	8763.5
Length Wtd. (ft)	202.09	Wetted Per. (ft)	1587.45	158.83	210.20
Min Ch El (ft)	1682.19	Shear (lb/sq ft)	1.03	2.68	1.01
Alpha	1.97	Stream Power (lb/ft s)	3.09	22.33	3.92
Frctn Loss (ft)	2.36	Cum Volume (acre-ft)	1795.00	75.77	177.76
C & E Loss (ft)	0.00	Cum SA (acres)	1053.04	27.36	121.41

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
8183.54	8614.51	645.92	299.57	369.03	5.71	0.81	2.16
8614.51	9045.48	1141.82	434.27	397.28	10.10	1.09	2.63
9045.48	9476.45	2090.89	645.09	431.16	18.49	1.50	3.24
9476.45	9907.42	2102.40	621.74	389.98	18.59	1.60	3.38
LB 9907.42	RB 10065.59	4323.43	518.83	158.83	38.23	3.28	8.33
10065.59	10322.59	1004.55	259.57	210.20	8.88	1.24	3.87

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.575

INPUT
Description: RM. 4.575. HYDRAULIC BASELINE CROSSES NEAR BROWN RD.

Station Elevation Data num= 171

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7923.93	1686.1	7960.09	1685.85	8002	1685.62	8008.75	1685.59	8016.89	1685.2
8050.52	1685.7	8106.94	1685.43	8119.67	1685.33	8123.23	1685.35	8137.89	1684.25
8138.41	1684.3	8138.47	1684.26	8139.96	1684.21	8156.81	1684.63	8172.24	1683.92
8217.4	1684	8225.67	1683.96	8227.17	1683.93	8227.87	1683.89	8228.9	1683.83
8240.8	1683.4	8249.59	1683.63	8256.19	1683.88	8283.98	1685.07	8289.58	1685.1
8303.89	1685.2	8308.58	1685.25	8313.54	1685.27	8323.14	1685.43	8331.75	1685.45
8339.52	1685.5	8349.44	1685.32	8364.12	1685.2	8370.51	1684.97	8398.85	1684.74
8403.21	1684.8	8406.19	1684.7	8413.43	1684.63	8429.31	1684.69	8466.64	1684.76
8483.97	1684.8	8489.46	1684.58	8497.76	1684.28	8508.08	1684.09	8518.73	1683.9
8524.11	1684.1	8539.21	1684.48	8541.98	1684.52	8565.21	1684.89	8584.77	1685.17
8586.76	1685.1	8614.69	1684.2	8619.02	1684.28	8636.13	1684.69	8660.9	1684.88

8673.38	1684.8	8698	1683.95	8731.34	1683.69	8744.69	1683.94	8748.3	1683.73
8771.66	1682.3	8785.39	1682.96	8799.62	1683.95	8834.03	1683.79	8852.1	1683.76
8855.18	1683.7	8860.54	1683.74	8868.72	1683.71	8938.05	1683.77	8992.59	1683.05
8993.65	1683.1	8995.46	1683.19	9010.69	1684.54	9077.51	1684.04	9077.55	1684.04
9077.56	1684	9077.56	1684.04	9094.76	1683.72	9180.42	1683.98	9214.52	1684.13
9234.85	1684.3	9258.67	1684.78	9264.52	1684.87	9265.9	1684.64	9275.25	1682.96
9286.73	1683.6	9288.55	1683.71	9289.19	1683.69	9295.86	1683.68	9310.73	1683.43
9333.12	1683.7	9337.56	1683.73	9413.89	1683.23	9442.38	1683.04	9444.41	1683.4
9448.35	1683	9453.93	1682.49	9455.79	1682.63	9465.08	1683.44	9511.99	1683.13
9549.89	1682.8	9567.04	1683.14	9583.58	1683.35	9604.27	1684.13	9616.12	1684.53
9641.09	1684.8	9661.78	1684.45	9706.1	1683.97	9712.25	1683.92	9755.92	1683.69
9762.95	1683.6	9763.73	1683.64	9765.05	1683.63	9773.66	1683.91	9794.63	1684.57
9796.09	1684.5	9814.63	1684.65	9824.21	1684.48	9835.53	1684.51	9842.2	1684.45
9865.35	1683.5	9881.7	1682.95	9884.55	1682.95	9885.59	1682.9	9892.12	1682.44
9892.46	1682.4	9928.77	1682.05	9929.75	1682.04	9929.97	1682.03	9941.46	1681.28
9944.9	1680.9	9955.78	1680.18	9980.17	1679.69	9989.32	1680.46	10003.63	1680.74
10004.64	1680.7	10011.8	1680.22	10022.14	1681.61	10038.51	1683.36	10053.4	1683.49
10059.79	1683.61	10103.52	1683.99	10105.17	1683.98	10107.82	1683.51	10123.59	1679.81
10132.72	1680.61	10139.55	1681.06	10149.23	1680.78	10161.04	1680.47	10169.43	1680.14
10179.27	1679.7	10179.5	1679.71	10194.39	1680.62	10198.6	1680.96	10203.21	1680.9
10236.99	1680.71	10250.48	1680.81	10260.03	1681.18	10263.63	1681.35	10275.86	1681.21
10294.34	1682.51	10295.24	1682.57	10296.02	1682.62	10297.17	1682.63	10297.71	1682.64
10311.59	1682.71	10325.74	1683.48	10338.84	1684.03	10351.91	1684.46	10387.5	1685.44
10397.97	1686								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7923.93	.068	9929.97	.045	10038.51	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9929.97	10038.51	275	300.41	290	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1685.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1684.83	Reach Len. (ft)	275.00	300.41	290.00
Crit W.S. (ft)		Flow Area (sq ft)	1566.66	433.85	903.47
E.G. Slope (ft/ft)	0.010532	Area (sq ft)	1566.66	433.85	903.47
Q Total (cfs)	11309.00	Flow (cfs)	3628.30	3695.88	3984.82
Top Width (ft)	2075.47	Top Width (ft)	1640.07	108.54	326.87
Vel Total (ft/s)	3.89	Avg. Vel. (ft/s)	2.32	8.52	4.41
Max Chl Dpth (ft)	5.14	Hydr. Depth (ft)	0.96	4.00	2.76
Conv. Total (cfs)	110194.4	Conv. (cfs)	35354.0	36012.4	38827.9
Length Wtd. (ft)	287.94	Wetted Per. (ft)	1640.89	108.85	327.57
Min Ch El (ft)	1679.69	Shear (lb/sq ft)	0.63	2.62	1.81
Alpha	2.13	Stream Power (lb/ft s)	1.45	22.33	8.00
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)	1788.45	73.20	174.69
C & E Loss (ft)	0.00	Cum SA (acres)	1047.12	26.64	120.00

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7923.93	8425.44	198.23	116.34	186.13	1.75	0.63	1.70
8425.44	8926.95	673.90	346.30	453.96	5.96	0.76	1.95
8926.95	9428.46	1201.88	508.93	499.07	10.63	1.02	2.36
9428.46	9929.97	1554.30	595.10	501.73	13.74	1.19	2.61
LB 9929.97	RB 10038.51	3695.87	433.85	108.85	32.68	4.00	8.52
10038.51	10397.97	3984.82	903.47	327.57	35.24	2.76	4.41

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.

CROSS SECTION ***RIVER: SIGNAL BUTTE***
REACH: SPILLWAY **RS: 4.518**

INPUT
Description: RM.4.518.

Station Elevation Data num= 172

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7858.44	1682.4	7875.51	1682.05	7893.45	1682.55	7898.24	1682.13	7900.03	1682.09
7901.6	1682	7907.08	1682.38	7907.23	1682.38	7909.91	1682.43	7911.42	1682.5
7918.29	1682.3	7945.58	1682.3	7949.33	1682.28	7954.62	1682.27	7966.73	1682.29
7971.32	1682.3	8012.96	1682.42	8015.09	1682.07	8035.62	1682.08	8088.3	1681.84
8089.65	1681.8	8091.37	1681.83	8095.28	1681.82	8103.15	1681.8	8119.04	1681.83
8153.28	1681.9	8215.31	1682.89	8215.64	1682.89	8215.81	1682.89	8216.06	1682.89
8274.73	1682.3	8287.52	1681.99	8291.98	1681.91	8304.85	1681.49	8322.25	1680.86
8360.21	1682	8372.12	1682.39	8377.87	1682.4	8388.86	1681.97	8406.36	1681.6
8447.34	1681.2	8465.27	1681.07	8490.5	1681.1	8507.46	1681.08	8508.64	1681.09
8540.61	1681.2	8575.54	1681.35	8628.96	1682.36	8635.15	1682.39	8640.67	1682.57
8667.21	1681.5	8683.6	1680.54	8690.59	1680.66	8699.54	1680.8	8705.15	1680.89
8722.62	1680.8	8723.24	1680.81	8747.23	1679.4	8782.16	1680.24	8800.96	1681
8802.56	1681.4	8815.18	1681.33	8920.79	1680.58	8976.21	1680.62	9038.37	1680.66
9080.02	1681	9089.93	1681.08	9150.75	1681.08	9154.6	1681.07	9157.56	1681.06
9159.01	1681.1	9166.33	1681	9245.87	1680.82	9252.91	1680.44	9273.53	1680.39
9356.44	1680.4	9372.13	1680.59	9374.35	1680.38	9378.99	1680.58	9445.8	1679.34
9454.33	1679.2	9460.22	1679.24	9477	1679.49	9481.25	1679.53	9485.24	1679.66
9508.69	1680.6	9546.55	1680.93	9597.4	1681.41	9615.96	1681.71	9626.23	1681.84
9730.41	1682.7	9734.76	1682.77	9737.36	1682.8	9739.66	1682.82	9740.3	1682.83
9743.85	1682.8	9745.9	1682.85	9749.95	1682.85	9766.31	1682.85	9836.83	1682.89
9844.88	1682.9	9849.9	1682.93	9854.11	1682.86	9861.3	1682.7	9870.34	1682.51
9895.22	1681.8	9901.77	1681.58	9909.64	1681.1	9924.21	1680.31	9930.51	1679.92
9942.25	1679.4	9960.98	1677.95	9973.63	1679.13	9974.99	1679.26	9976.43	1679.25
9981.76	1679.3	9986.79	1679.21	9992.36	1677.7	9996.21	1676.47	9998.9	1675.71
10005.98	1676.4	10012.73	1676.95	10017.17	1676.64	10025.01	1675.75	10025.37	1674.88
10034.07	1676.4	10038.11	1677.75	10041.5	1678.16	10045.02	1678.4	10050.35	1678.92
10051.19	1678.8	10054.37	1678.67	10056.76	1678.25	10063.45	1677.25	10072.1	1675.35
10073.21	1675.1	10091.6	1677.77	10098.79	1678.86	10104.72	1680.3	10111.42	1680.62
10136.11	1680.9	10148.25	1680.92	10157.83	1680.5	10166.07	1680.12	10174.13	1680.11
10190.21	1682.3	10191.29	1682.74	10194.46	1682.43	10196.43	1682.24	10197.04	1682.09
10201.22	1682.1	10219.41	1682.01	10221.15	1682.09	10227.64	1682.29	10240.27	1681.9
10242.54	1681.8	10253.12	1682.77	10253.19	1682.78	10253.23	1682.78	10262.69	1681.78
10264.87	1682.3	10267.11	1682.75	10281.9	1681.81	10290.25	1681.15	10302.03	1681.99

10317.1 1682.810328.54 1682.2410341.52 1682.1410349.64 1682.0910360.19 1682.52
10380.36 1683.210388.39 1682.9

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7858.44	.068	9974.99	.04510098.79		.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9974.9910098.79		370	394.81	390	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1682.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1682.43	Reach Len. (ft)	370.00	394.81	390.00
Crit W.S. (ft)		Flow Area (sq ft)	2390.88	644.52	213.77
E.G. Slope (ft/ft)	0.006733	Area (sq ft)	2390.88	644.52	213.77
Q Total (cfs)	11309.00	Flow (cfs)	5649.62	5183.30	476.08
Top Width (ft)	2199.10	Top Width (ft)	1848.28	123.80	227.02
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)	2.36	8.04	2.23
Max Chl Dpth (ft)	7.55	Hydr. Depth (ft)	1.29	5.21	0.94
Conv. Total (cfs)	137824.6	Conv. (cfs)	68852.9	63169.7	5802.0
Length Wtd. (ft)	381.91	Wetted Per. (ft)	1848.89	126.04	227.67
Min Ch El (ft)	1674.88	Shear (lb/sq ft)	0.54	2.15	0.39
Alpha	2.69	Stream Power (lb/ft s)	1.28	17.29	0.88
Frctn Loss (ft)	3.76	Cum Volume (acre-ft)	1775.96	69.48	170.97
C & E Loss (ft)	0.01	Cum SA (acres)	1036.11	25.84	118.15

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7858.44	8387.58	178.50	180.00	444.29	1.58	0.41	0.99
8387.58	8916.71	1513.31	691.98	521.54	13.38	1.33	2.19
8916.71	9445.85	2571.04	956.60	529.18	22.73	1.81	2.69
9445.85	9974.99	1386.78	562.30	353.88	12.26	1.59	2.47
LB 9974.99	RB 10098.79	5183.30	644.52	126.04	45.83	5.21	8.04
10098.79	10388.39	476.08	213.77	227.67	4.21	0.94	2.23

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.443**

INPUT
Description: RM.4.443.

Station Elevation Data num= 191

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7526.67	1680	7545.06	1679.91	7568.71	1679.82	7572.74	1679.82	7577.15	1679.83
7603.68	1680	7619.7	1679.72	7633.68	1679.57	7744.86	1679.23	7746.82	1679.23
7746.97	1679.2	7747.58	1679.21	7747.95	1679.21	7748.38	1679.21	7748.65	1679.21
7749.35	1679.2	7753.99	1679.21	7787.77	1679.2	7791.96	1678	7797.46	1675.19
7804.11	1678.3	7806.25	1679.47	7825.23	1679.28	7839.84	1679.15	7881.83	1679.05
7885.55	1678	7887.72	1676.97	7890.5	1678.15	7892.69	1678.82	7931.27	1679.01
7968.53	1679.3	7968.93	1679.31	7969.67	1679.3	7976.45	1678.94	7986.76	1678.87
8012.87	1678.5	8059.4	1677.76	8071.6	1677.74	8075.81	1677.7	8084.49	1677.66
8094.39	1677.6	8109.81	1677.47	8127.2	1677.54	8130.64	1677.63	8138.35	1677.93
8141.37	1677.9	8146.18	1677.83	8181.53	1676.95	8190.17	1676.84	8208.19	1677.67
8222.33	1678.3	8254.79	1677.92	8276.28	1677.7	8285.67	1677.58	8311.73	1677.38
8321.81	1677.5	8337.73	1677.73	8342.4	1677.73	8353.48	1677.95	8372.5	1678.26
8399.06	1677.6	8416.09	1677.1	8420.04	1676.97	8452	1676.73	8452.96	1676.73
8454.52	1676.7	8456.71	1676.8	8518.47	1677.26	8520.45	1677.17	8526.38	1676.92
8541.61	1676.3	8545.35	1676.32	8562.74	1676.87	8583.66	1677.89	8587.46	1677.91
8612.15	1677.9	8659.71	1677.65	8758.69	1677.31	8773.71	1677.26	8786.13	1677.25
8887.72	1677.1	8965.45	1677.21	8998.52	1677.27	8999.59	1677.05	9006.19	1676.42
9011.36	1676.4	9014.22	1676.72	9020.73	1677.34	9027.22	1677.15	9066.24	1676.55
9066.75	1676.5	9066.86	1676.54	9067	1676.54	9079.9	1676.43	9100.22	1676.6
9101.84	1676.6	9105.36	1676.66	9106.53	1676.65	9109.54	1676.68	9114.08	1676.62
9115.46	1676.6	9131.63	1676.12	9139.36	1676.41	9153.08	1677.21	9157.08	1676.75
9164.32	1676	9171.85	1676.78	9173.07	1676.92	9178.23	1676.91	9209.52	1676.94
9213.9	1676.9	9223.13	1677.02	9229.72	1677.01	9288.05	1677.93	9337.3	1678.58
9361.98	1677.6	9373.36	1677.11	9378.9	1677.31	9394.09	1677.91	9406.32	1678.29
9422.64	1678.1	9432.6	1678.03	9457.73	1677.9	9514.38	1678.21	9571.73	1678.66
9609.4	1678.6	9642.91	1678.53	9664.84	1678.46	9670.22	1678.6	9685.74	1679.3
9757.61	1679.1	9770.07	1679.11	9800.24	1678.84	9819.54	1678.76	9825.27	1678.81
9843.39	1678.6	9844.88	1678.62	9862.63	1678.65	9867.47	1678.6	9871.41	1678.6
9882.14	1678.7	9894.57	1678.82	9918.63	1679.26	9950.13	1675.18	9952.59	1674.8
9960.91	1675.6	9964.4	1675.78	9997.47	1675.29	10003.22	1675.24	10007.44	1674.25
10017.36	1672.11	0028.41	1673.47	10044.95	1675.44	10055.41	1676.24	10141.09	1678.87
10158.77	1679	10174.95	1679.28	10196.72	1678.96	10203.25	1678.6	10224.22	1674.05
10226.21	1673.6	10235.26	1675.19	10237.53	1675.58	10241.09	1675.51	10280.4	1674.78
10283.74	1674.7	10291.73	1674.67	10304.14	1675.53	10307.07	1675.79	10319.81	1676.5
10329.1	1677.2	10337.65	1677.58	10355.62	1677.68	10356.35	1677.67	10358.92	1677.7
10367.15	1678.3	10382.08	1679.28	10386.46	1679.62	10388.16	1679.61	10393.5	1679.6
10422.34	1679.6	10429.46	1679.22	10438.66	1678.8	10440.84	1678.77	10447.94	1679.16
10458.16	1679.6	10466.36	1679.76	10499.02	1680.37	10526.88	1680.51	10544.74	1680.75
10564.34	1681								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7526.67	.068	9964.4	.045	10044.95	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9964.4	10044.95	380	401.96	390	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1679.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.63	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1678.53	Reach Len. (ft)	380.00	401.96	390.00
Crit W.S. (ft)		Flow Area (sq ft)	1797.99	318.01	531.94
E.G. Slope (ft/ft)	0.015819	Area (sq ft)	1797.99	318.01	531.94
Q Total (cfs)	11309.00	Flow (cfs)	5534.63	3284.25	2490.12
Top Width (ft)	1961.70	Top Width (ft)	1628.87	80.55	252.29
Vel Total (ft/s)	4.27	Avg. Vel. (ft/s)	3.08	10.33	4.68
Max Chl Dpth (ft)	6.43	Hydr. Depth (ft)	1.10	3.95	2.11
Conv. Total (cfs)	89915.2	Conv. (cfs)	44004.6	26112.2	19798.4
Length Wtd. (ft)	386.82	Wetted Per. (ft)	1631.75	81.10	253.19
Min Ch El (ft)	1672.10	Shear (lb/sq ft)	1.09	3.87	2.07
Alpha	2.22	Stream Power (lb/ft s)	3.35	39.99	9.71
Frctn Loss (ft)	4.01	Cum Volume (acre-ft)	1758.17	65.12	167.63
C & E Loss (ft)	0.11	Cum SA (acres)	1021.34	24.92	116.01

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7526.67	8136.10	280.88	117.76	150.18	2.48	0.80	2.39
8136.10	8745.54	1895.13	648.41	609.57	16.76	1.06	2.92
8745.54	9354.97	2917.28	837.40	604.96	25.80	1.38	3.48
9354.97	9964.40	441.35	194.43	267.04	3.90	0.73	2.27
LB 9964.40	RB 10044.95	3284.24	318.01	81.10	29.04	3.95	10.33
10044.95	10564.34	2490.12	531.94	253.19	22.02	2.11	4.68

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.367

INPUT
Description: RM.4.367.

Station Elevation Data num= 195

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7222.98	1676	7240.22	1676	7264.11	1675.81	7274.4	1675.74	7276.63	1675.73
7291.99	1675.8	7340.6	1675.66	7387.23	1675.43	7433.77	1675.3	7441.29	1674.88
7442.63	1674.9	7443.13	1674.94	7450.4	1674.99	7454.44	1675.11	7496.11	1675.97
7502.18	1676	7577.58	1676.13	7580.59	1676.14	7588.15	1676.14	7589.52	1676.12
7604.22	1676.1	7701.39	1675.57	7811.64	1674.01	7814.64	1673.98	7815.92	1674
7816.36	1674	7824	1674.25	7828.7	1672.46	7831.59	1671.49	7842.06	1673.93
7845.87	1674.8	7850.77	1674.77	7852.33	1674.76	7918.48	1673.95	7922.02	1673.98

7934.44	1673.9	7937.73	1673.89	7944.65	1673.73	7964.02	1673.71	7972.4	1673.79
7973.17	1673.8	8026.98	1673.14	8034.06	1673.17	8035.17	1673.14	8040.43	1673.05
8040.8	1673	8041.26	1673.03	8042.37	1673	8109.51	1671.39	8115.51	1671.46
8156.54	1671.7	8171.99	1672.18	8225.95	1672.83	8228.48	1672.88	8229.62	1672.92
8247.78	1673.1	8252.21	1673.15	8260.07	1673.53	8261.68	1673.52	8267.63	1673.4
8292.66	1673.4	8324.74	1673.64	8361.56	1673.55	8380.88	1673.58	8456.49	1673.18
8480.27	1673	8486.09	1672.92	8491.39	1672.89	8499.02	1672.79	8517.81	1672.76
8558.79	1672.5	8575.57	1672.51	8583.57	1672.55	8590.06	1672.46	8595.51	1672.39
8613.16	1672.1	8628.57	1672	8630.35	1671.98	8633.59	1671.97	8640.39	1672.12
8644.87	1672.2	8655.57	1672.37	8658.01	1672.37	8660.29	1672.34	8666.64	1672.28
8667.7	1672.3	8669.98	1672.23	8681.23	1672.16	8696.74	1671.9	8702.12	1671.98
8713.08	1672.1	8732.95	1672.68	8733.3	1672.66	8742.15	1671.82	8750.56	1673.07
8750.81	1673.1	8751.38	1673.11	8753.07	1673.11	8846.43	1672.9	8855.89	1673.13
8857.82	1673.2	8867.55	1672.66	8871.32	1672.47	8888.7	1673.16	8889.87	1673.19
8893.54	1673.2	8899.29	1673.14	8939.82	1672.87	8943.3	1672.08	8964.31	1673.07
8979.79	1673.1	8994.85	1673.21	9000.34	1672.86	9008.41	1672.43	9018.75	1673.06
9021.54	1673.2	9023.81	1673.27	9060.37	1673.71	9093.93	1673.7	9125.17	1673.66
9138.8	1673.6	9159.57	1673.36	9161.7	1673.34	9164.79	1673.36	9205.35	1673.62
9241.57	1673.9	9265.12	1674.1	9286.86	1673.46	9288.38	1673.41	9289.91	1673.44
9321.41	1674.2	9327.8	1674.13	9352.49	1674.02	9426.69	1673.85	9431.69	1673.83
9432.92	1673.8	9445.25	1674.78	9447.58	1674.92	9477.62	1674.55	9488.87	1674.46
9507.62	1674.7	9517.99	1674.83	9537.36	1674.89	9551.85	1674.92	9578.38	1674.73
9626.61	1674.7	9645.81	1674.69	9690.78	1674.1	9693.2	1674.1	9706.61	1674.14
9721.24	1673.7	9735.17	1673.13	9736.31	1673.15	9741.44	1673.12	9754.18	1673.16
9786.45	1673.3	9825.29	1673.5	9827.18	1673.55	9844.28	1673.45	9869.58	1673.53
9893.45	1673.2	9901.85	1673.01	9916.31	1672.25	9921.77	1672.06	9928.56	1672.05
9961.3	1671.7	9969.05	1669.86	9981.82	1667.22	10003.8	1672.26	10004.3	1672.4
10006.33	1672.4	10079.89	1673.07	10092.16	1673.23	10093.19	1673.04	10099.96	1673.04
10131.86	1673.2	10137.88	1671.64	10143.22	1670.05	10149.63	1671.42	10153.91	1672.03
10171.82	1671.9	10176.93	1672.01	10185.27	1672.02	10193.86	1672.02	10204.76	1672.24
10213.41	1672.4	10214.25	1672.44	10217.94	1672.6	10236.4	1673.28	10240.68	1673.56
10262.37	167	10275.61	1675.65	10281.06	1675.88	10292.26	1676.03	10311.16	1676.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7222.98	.068	9961.3	.045	10004.3	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9961.3	10004.3	275	294.8	290	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1675.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1674.78	Reach Len. (ft)	275.00	294.80	290.00
Crit W.S. (ft)	1674.42	Flow Area (sq ft)	3142.13	222.78	539.55
E.G. Slope (ft/ft)	0.007293	Area (sq ft)	3142.13	222.78	539.55
Q Total (cfs)	11309.00	Flow (cfs)	7801.33	1850.32	1657.35
Top Width (ft)	2428.58	Top Width (ft)	2130.79	43.00	254.79
Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)	2.48	8.31	3.07
Max Chl Dpth (ft)	7.56	Hydr. Depth (ft)	1.47	5.18	2.12
Conv. Total (cfs)	132421.8	Conv. (cfs)	91349.1	21666.2	19406.6
Length Wtd. (ft)	281.12	Wetted Per. (ft)	2132.22	44.08	255.50
Min Ch El (ft)	1667.22	Shear (lb/sq ft)	0.67	2.30	0.96
Alpha	2.02	Stream Power (lb/ft s)	1.67	19.12	2.95
Frctn Loss (ft)	3.09	Cum Volume (acre-ft)	1736.62	62.63	162.83
C & E Loss (ft)	0.03	Cum SA (acres)	1004.94	24.35	113.74

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7222.98	7907.56	113.39	87.85	148.36	1.00	0.60	1.29
7907.56	8592.14	3386.43	1243.03	684.64	29.94	1.82	2.72
8592.14	9276.72	3172.76	1195.57	684.95	28.06	1.75	2.65
9276.72	9961.30	1128.76	615.68	614.27	9.98	1.00	1.83
LB 9961.30	RB 10004.30	1850.32	222.78	44.08	16.36	5.18	8.31
10004.30	10311.16	1657.34	539.55	255.50	14.66	2.12	3.07

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.311

INPUT
Description: RM. 4.311. HYDRAULIC BASELINE CROSSES NEAR 112TH STR. AREA BLOCKED OUT TO LEFT OF STA. 7488.05 AND TO RIGHT OF STA. 10230 DUE TO RIDGES.

Station Elevation Data num= 232

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7118.23	1672	7150.91	1671.91	7182.25	1671.46	7191.26	1671.42	7195.81	1670.57
7199.34	1670	7200.25	1669.87	7206.14	1669.81	7210.43	1669.7	7220.54	1669.63
7230.71	1669.6	7237.19	1669.58	7243.62	1669.45	7245.81	1669.39	7248.07	1669.62
7259.42	1670.8	7262.1	1671.14	7291.58	1671.17	7357.92	1671.15	7384.06	1671.12
7428.69	1670.9	7439.37	1671.62	7457.81	1671.74	7460.38	1671.76	7460.53	1671.76
7467.92	1671.7	7488.05	1671.87	7494.52	1671.83	7500.63	1671.84	7518.16	1671.83
7617.21	1671.7	7683.48	1671.56	7714.93	1671.32	7733.78	1671.38	7808.95	1671.02
7850.35	1670.8	7878.05	1670.64	7920.91	1670.51	7931.1	1670.41	7948.08	1670.22
7956.13	1669.8	7960.76	1669.49	7976.13	1668.58	7983.82	1667.87	7988.37	1668.22
8003.74	1669.8	8005.47	1669.81	8005.67	1669.81	8006.33	1669.77	8006.49	1669.75
8021.59	1669.3	8048.43	1669.23	8081.92	1668.72	8083.92	1669.13	8116.44	1669.52
8126.8	1669.7	8134.39	1669.68	8200.08	1669.9	8267.2	1670.27	8298.12	1670.45
8316.65	1670.6	8390.54	1670.1	8433.2	1669.89	8461.75	1669.82	8510.02	1669.87
8515.06	1669.7	8524.06	1669.68	8526.52	1669.66	8533.24	1669.19	8536.24	1668.9
8540.52	1668.3	8549.14	1668.94	8554.1	1669.66	8571.11	1669.73	8588.27	1669.67
8589.46	1669.5	8599.39	1668.71	8599.67	1668.71	8601.54	1668.6	8611.29	1669.07
8611.74	1669.1	8612.1	1669.11	8616.02	1669.13	8648.77	1669.35	8657.75	1669.44
8660.28	1669.5	8666.38	1669.5	8676.35	1669.5	8682.67	1669.52	8705.42	1669.58
8707.32	1669.3	8713.56	1668.5	8715.62	1668.85	8721.63	1669.69	8731.05	1669.71
8738.45	1669.8	8746.72	1669.79	8758.52	1669.84	8760.08	1669.84	8792.35	1670.18
8795.25	1670.2	8819.78	1669.63	8821.49	1669.62	8833.71	1670.25	8835.85	1670.35
8840.95	1670.1	8844.56	1669.91	8852.68	1669.99	8860.91	1670.11	8868.86	1670.16
8869.59	1670.2	8871.08	1670.2	8880.85	1670.27	8902.93	1670.53	8934.59	1670.86
8939.68	1670.9	8952.3	1670.98	8969.55	1670.92	8983.69	1670.6	9001.33	1670.41

9007.29	1669.8	9011.4	1669.48	9018.06	1670.4	9024.58	1671.57	9032.85	1671.63
9045.06	1671.5	9074.16	1670.68	9103.36	1670.63	9132.67	1670.51	9169.29	1671.02
9176.19	1671	9183.93	1670.97	9187.4	1670.93	9199.18	1671.03	9236.64	1671.8
9244.69	1671.9	9246.37	1671.97	9248.97	1672	9249.25	1672	9262.96	1672.1
9365.82	1672.7	9449.83	1672.39	9450.76	1672.38	9451.2	1672.39	9451.37	1672.38
9522.37	1671.1	9533.27	1670.8	9536.47	1670.92	9539.68	1671.08	9547.08	1671.38
9563.88	1671.4	9587.16	1671	9615.37	1670.68	9620.61	1670.76	9630.03	1670.91
9647.92	1671.2	9657.32	1671.29	9699.72	1671.75	9705.04	1671.82	9707.72	1671.8
9752.39	1670.9	9798.88	1670.31	9819.47	1669.79	9871.93	1669.49	9881.28	1669.11
9886.65	1669	9917.67	1669.18	9935.43	1668.96	9959.76	1668.11	9962.55	1668.05
9965.05	1667.9	9989.41	1667.54	9994.89	1667.69	10007.36	1667.86	10030.1	1668.12
10035.78	1668.2	10040.26	1668.4	10061.18	1669.41	10082.13	1670.16	10086.51	1670.73
10090.99	1671.2	10091.3	1671.17	10093.86	1671.29	10105.85	1671.49	10110.6	1671.54
10121.45	167	10140.94	1672.35	10146.27	1672.34	10149.1	1672.35	10175.24	1672.59
10180.23	1672.6	10184.42	1672.68	10188.5	1672.72	10206.84	1672.82	10219.26	1672.87
10222.08	1672.9	10222.73	1672.85	10229.18	1672.92	10235.64	1672.92	10237.88	1672.9
10252.16	1672.8	10266.28	1672.66	10279.99	1672.31	10301.85	1671.79	10319.1	1671.7
10329.8	1669.4	10337.11	1667.87	10350.45	1670.11	10354.45	1670.84	10357.99	1670.42
10363.59	1669.8	10381.22	1668.01	10385.35	1667.6	10393.38	1668.48	10404.35	1669.66
10414.53	1670.1	10431.25	1670.72	10437.67	1670.93	10447.62	1671.81	10453.62	1672
10459.02	1672.2	10474.84	1673.38	10484.03	1673.9	10491.75	1674.33	10507.36	1674.95
10508.96	1675.1	10515.19	1675.17	10516.99	1675.23	10530.24	1675.35	10533.99	1675.48
10548.66	1675.6	10565.27	1683.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7118.23	.068	9935.43	.045	10061.18	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9935.43	10061.18	325	379.86	380	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7118.23	7488.05	1671.87	10229.18	10565.27	1672.92

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1671.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1671.33	Reach Len. (ft)	325.00	379.86	380.00
Crit W.S. (ft)	1671.33	Flow Area (sq ft)	2123.79	396.11	38.16
E.G. Slope (ft/ft)	0.018144	Area (sq ft)	2123.79	396.11	38.16
Q Total (cfs)	11309.00	Flow (cfs)	7405.31	3784.79	118.90
Top Width (ft)	1938.63	Top Width (ft)	1777.92	125.75	34.96
Vel Total (ft/s)	4.42	Avg. Vel. (ft/s)	3.49	9.55	3.12
Max Chl Dpth (ft)	3.79	Hydr. Depth (ft)	1.19	3.15	1.09
Conv. Total (cfs)	83957.7	Conv. (cfs)	54976.8	28098.2	882.7
Length Wtd. (ft)	340.35	Wetted Per. (ft)	1778.84	125.81	35.04
Min Ch El (ft)	1667.54	Shear (lb/sq ft)	1.35	3.57	1.23
Alpha	1.98	Stream Power (lb/ft s)	4.72	34.08	3.84
Frctn Loss (ft)	3.59	Cum Volume (acre-ft)	1720.00	60.53	160.91
C & E Loss (ft)	0.14	Cum SA (acres)	992.60	23.78	112.77

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7118.23	7822.53	13.95	14.60	81.56	0.12	0.18	0.96
7822.53	8526.83	3679.37	980.89	704.55	32.53	1.39	3.75
8526.83	9231.13	2710.14	795.22	659.55	23.96	1.21	3.41
9231.13	9935.43	1001.84	333.08	333.19	8.86	1.00	3.01
LB 9935.43	RB 10061.18	3784.80	396.11	125.81	33.47	3.15	9.55
10061.18	10565.27	118.90	38.16	35.04	1.05	1.09	3.12

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: 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.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.239

INPUT
Description: RM. 4.239. AREA BLOCKED OUT TO LEFT OF STA. 7387.38 DUE TO RIDGE.

Station Elevation Data num= 165

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7075.61	1668	7119.41	1667.82	7177.14	1667.45	7189.35	1667.15	7210.08	1667.45
7221.45	1667.5	7224.37	1667.41	7237.86	1667.17	7315.02	1667.95	7356.3	1668.24
7377.59	1668.4	7387.38	1668.44	7431.74	1668.19	7444.43	1668.03	7474.75	1667.76
7537.56	1667.1	7566.64	1667.14	7593.2	1667.03	7604.41	1666.99	7616.17	1666.97
7680.56	1666.9	7682.13	1666.95	7711.65	1666.91	7753.22	1666.65	7830.1	1665.88
7867.17	1665.8	7873.44	1665.74	7879.45	1664.09	7882.83	1663.13	7885.6	1663.87
7891.87	1665.2	7895.1	1665.92	7910.8	1665.68	7916.32	1665.53	7929.81	1664.82
7934.74	1664.7	7945.75	1665.54	7954.61	1665.64	7973.63	1665.83	7986.08	1665.9
8066.99	1665.8	8126.39	1665.44	8162.51	1665.35	8185.44	1665.32	8288.1	1665.83
8303.89	1665.9	8312.97	1665.9	8422.34	1665.1	8499.56	1665.32	8524	1665.52
8540.79	1665.6	8597.23	1665.85	8652.46	1666.39	8667.79	1666.44	8668.83	1666.44
8705.75	1666.4	8777.68	1666.42	8810.33	1666.82	8826.07	1666.91	8829.82	1666.99
8842.87	1667.3	8846.6	1667.24	8857.2	1666.91	8880.23	1666.26	8885.34	1666.12
8904.41	1666.2	8928.74	1666.52	8931.29	1666.45	8934.94	1666.22	8939.31	1666.8
8942.88	1667.5	8944.35	1667.7	8945.7	1667.78	8946.82	1667.71	8947.55	1667.63
8956.94	1667.4	8959.97	1667.49	8970.99	1667.58	8977.32	1667.61	8985.31	1667.75
9023.01	1667.9	9024.64	1668.29	9035.64	1668.57	9050.43	1668.85	9070.29	1668.53

9102.4	1667.8	9109.99	1667.93	9118.32	1668.1	9147.36	1668.16	9165.72	1668.27
9172.28	1668.3	9175.79	1668.33	9189.78	1668.06	9213.21	1667.83	9213.83	1668.14
9215.02	1668	9215.66	1667.84	9247.77	1667.84	9250.97	1667.89	9256.36	1668.23
9257.79	1668.2	9258.47	1669.77	9263.49	1669.49	9270.01	1668.77	9271.75	1668.37
9274.21	1667.8	9277.14	1667.91	9280.65	1667.95	9369.93	1667.55	9432.48	1667.58
9488.37	1667.5	9546.29	1667.27	9573.59	1667.94	9576.31	1667.95	9580.91	1667.91
9611.83	1667.2	9625.17	1667.33	9636.6	1667.33	9663.75	1667.26	9743.58	1665.57
9744.87	1665.6	9746.8	1665.52	9758.68	1666.75	9766.66	1667.55	9767.99	1667.64
9770.01	1667.6	9772.43	1667.64	9786.03	1667.43	9814.78	1667.24	9823.53	1667.06
9840.46	1666.7	9844.15	1666.64	9849.21	1666.61	9850.12	1666.6	9871.06	1666.38
9882.61	1666.1	9897.87	1664.77	9907.13	1664.65	9923.83	1665.25	9954.67	1666.06
9980.06	1665.9	9986.91	1665.88	9988.64	1665.88	9990.94	1665.54	10009.96	1662.74
10020.47	1664.2	10031.52	1665.96	10042.69	1665.91	10062.27	1665.28	10077.9	1664.95
10096.65	1665.3	10114.99	1665.67	10131.91	1664.54	10137.15	1664.23	10140.52	1664.53
10144.03	166	10156.54	1666.45	10163.57	1666.71	10200.04	1667.29	10205.1	1667.32
10320.69	167	10321.62	1669.96	10323.86	1669.98	10324.68	1669.99	10329.3	1670.07

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7075.61	.068	9954.67	.045	10031.52	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9954.67	10031.52	225	363.96	440	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
7075.61	7387.38	1668.44

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1668.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1668.01	Reach Len. (ft)	225.00	363.96	440.00
Crit W.S. (ft)	1667.09	Flow Area (sq ft)	3528.89	229.01	398.07
E.G. Slope (ft/ft)	0.006891	Area (sq ft)	3528.89	229.01	398.07
Q Total (cfs)	11309.00	Flow (cfs)	8885.67	1294.66	1128.66
Top Width (ft)	2617.09	Top Width (ft)	2336.75	76.85	203.50
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)	2.52	5.65	2.84
Max Chl Dpth (ft)	5.27	Hydr. Depth (ft)	1.51	2.98	1.96
Conv. Total (cfs)	136229.5	Conv. (cfs)	107037.8	15595.7	13596.0
Length Wtd. (ft)	259.92	Wetted Per. (ft)	2338.02	77.32	203.71
Min Ch El (ft)	1662.74	Shear (lb/sq ft)	0.65	1.27	0.84
Alpha	1.28	Stream Power (lb/ft s)	1.64	7.20	2.38
Frctn Loss (ft)	2.08	Cum Volume (acre-ft)	1698.91	57.81	159.01
C & E Loss (ft)	0.02	Cum SA (acres)	977.25	22.89	111.73

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7075.61	7795.38	566.36	335.11	349.10	5.01	0.96	1.69
7795.38	8515.14	5614.18	1773.30	720.50	49.64	2.46	3.17
8515.14	9234.91	1600.94	759.88	568.74	14.16	1.34	2.11

9234.91	9954.67	1104.19	660.60	699.68	9.76	0.94	1.67
LB 9954.67	RB 10031.52	1294.66	229.01	77.32	11.45	2.98	5.65
10031.52	10329.30	1128.66	398.07	203.71	9.98	1.96	2.84

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 4.171**

INPUT
Description: RM. 4.171 AREA BLOCKED OUT TO LEFT OF STA.7447.86 DUE TO CONTAINMENT BY RIDGE. AND ALSO BETWEEN STA 10187.48 AND 10480.19 DUE TO CONTAINMT. BY RIDGE.

Station Elevation Data num= 145

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7230.69	1663.4	7231.21	1663.3	7233.09	1663.1	7235.4	1662.86	7258.65	1664.47
7262.05	1664.7	7270.15	1664.86	7309.93	1665.57	7330.14	1665.76	7363.27	1665.92
7447.86	1666.2	7499.45	1666	7549.7	1665.73	7561.99	1665.86	7577.77	1665.59
7591.74	1665.3	7610.41	1665.06	7632.71	1664.65	7680.26	1664.43	7682.94	1664.4
7684.23	1664.4	7688.96	1664.37	7801.03	1664.26	7878.48	1664.22	7903.97	1664.87
7909.32	1664.9	7918.34	1662.15	7920.27	1661.86	7924.3	1662.72	7936.25	1664.79
7936.38	1664.8	7937.3	1664.81	7977.71	1664.53	7998.2	1664.39	8036.48	1664.05
8067.99	1663.7	8154.2	1663.09	8202.07	1663.46	8219.59	1663.93	8249.15	1663.78
8263.3	1663.7	8271.92	1663.7	8339.01	1663.97	8389.64	1663.65	8411.63	1663.71
8447.02	1663.9	8507.36	1664.16	8606.31	1663.68	8625.09	1663.56	8628.07	1663.58
8628.89	1663.6	8630.32	1663.57	8642.61	1663.64	8672.89	1663.76	8685.66	1663.94
8686.75	1664	8691.19	1664.03	8708.67	1664.26	8714.87	1664.61	8723.91	1665.08
8740.32	1665.2	8759.38	1665.45	8786.64	1664.88	8796.77	1664.65	8809.27	1664.64
8830.29	1664.6	8850.26	1664.59	8855.02	1664.63	8855.56	1664.42	8860.54	1663.14
8869.2	1664.3	8873.39	1664.77	8895.34	1664.58	8945.23	1664.28	8954.7	1665
8960.76	1665.5	8971.08	1665.27	8979.44	1665.17	8980.6	1665.43	8991.42	1665.32
8991.48	1665.3	8991.79	1665.32	9025.37	1665.66	9049.92	1666.06	9095.98	1666.34
9205.08	1665.6	9208.26	1665.53	9213.7	1665.5	9227.83	1665.51	9331.42	1665.44
9365.48	1665.4	9384.66	1665.42	9417.04	1665.2	9417.17	1665.2	9459.46	1665.17
9462.16	1665.2	9465.83	1665.16	9484.99	1665.03	9566.87	1665.23	9584.11	1665.27
9646.09	1665.5	9684.59	1665.47	9711.86	1666.13	9719.68	1666.33	9724.38	1666.32
9780.37	1663.6	9798.24	1662.94	9801.53	1662.67	9801.91	1662.64	9805.56	1662.68
9817.2	1662.8	9818.59	1662.8	9826.97	1662.58	9842.88	1662.66	9872.4	1663
9897.74	1663.1	9966.5	1663.04	9969.64	1663.04	9991.53	1660.49	9997.3	1659.67
9998.69	1659.9	10017.15	1661.76	10038.55	1663.89	10062.83	1664.26	10078.73	1664.55
10107.97	1665	10117.15	1665.26	10123.68	1665.4	10128.13	1665.52	10148.43	1666.34
10163.68	1666.7	10183.2	1667.04	10187.48	1667.06	10221.7	1666.7	10224.49	1666.67
10277.57	1666.2	10295.65	1666.07	10304.54	1665.33	10313.37	1664.59	10336.94	1665.78
10340.66	1665.9	10393.34	1666.41	10424.52	1666.78	10435.88	1666.69	10480.19	1666.04

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7230.69	.068	9969.64	.045	10038.55	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9969.64	10038.55	290	364.78	370	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
7230.69	7447.86	1666.21	0187.48	10480.19	1667.06

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1666.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1665.75	Reach Len. (ft)	290.00	364.78	370.00
Crit W.S. (ft)		Flow Area (sq ft)	3011.69	281.36	100.53
E.G. Slope (ft/ft)	0.009498	Area (sq ft)	3011.69	281.36	100.53
Q Total (cfs)	11309.00	Flow (cfs)	8783.34	2303.62	222.04
Top Width (ft)	2376.29	Top Width (ft)	2212.21	68.91	95.17
Vel Total (ft/s)	3.33	Avg. Vel. (ft/s)	2.92	8.19	2.21
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)	1.36	4.08	1.06
Conv. Total (cfs)	116040.6	Conv. (cfs)	90125.0	23637.2	2278.4
Length Wtd. (ft)	311.19	Wetted Per. (ft)	2213.47	69.33	95.19
Min Ch El (ft)	1659.67	Shear (lb/sq ft)	0.81	2.41	0.63
Alpha	1.83	Stream Power (lb/ft s)	2.35	19.70	1.38
Frctn Loss (ft)	2.67	Cum Volume (acre-ft)	1682.02	55.67	156.49
C & E Loss (ft)	0.02	Cum SA (acres)	965.50	22.28	110.23

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7230.69	7915.43	1109.12	427.46	351.48	9.81	1.22	2.59
7915.43	8600.17	4612.56	1312.92	685.18	40.79	1.92	3.51
8600.17	9284.90	1159.98	518.39	532.21	10.26	0.97	2.24
9284.90	9969.64	1901.68	752.92	644.61	16.82	1.17	2.53
LB 9969.64	RB 10038.55	2303.62	281.36	69.33	20.37	4.08	8.19
10038.55	10480.19	222.04	100.53	95.19	1.96	1.06	2.21

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.101

INPUT
Description: RM.4.101

Station Elevation Data num= 197

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7362.74	1665.2	7391.29	1664.77	7425.1	1664.4	7431.92	1664.35	7441.38	1664.32
7451.45	1664.2	7467.65	1664.06	7521.78	1663.72	7541.24	1663.61	7576.1	1663.42
7578.82	1663.4	7580.64	1663.39	7584.98	1663.35	7602.25	1663.21	7625.04	1663.01
7626.66	1662.7	7629.62	1661.81	7635.05	1661.83	7641.41	1661.86	7654.04	1661.91
7670.7	1662	7675.45	1662.23	7690.41	1662.96	7700.72	1661.91	7719.18	1660.22
7723.11	1660.6	7726.05	1660.87	7736.84	1662	7746.98	1662.99	7773.26	1662.84
7785.13	1662.8	7792.41	1662.77	7805.33	1662.61	7894.96	1662.12	8005.26	1662.04

8009.17	1662	8011.46	1662.06	8016.32	1662.16	8040.99	1662.66	8053.39	1660.26
8053.46	1660.2	8053.54	1660.26	8065.81	1662.63	8067.85	1662.62	8123.38	1661.93
8219.36	1661.3	8237.58	1661.16	8245.59	1661.22	8270.81	1661.04	8299.85	1660.93
8310.01	1661.1	8370.7	1661.99	8373.7	1660.92	8376.55	1660.05	8382.97	1660.87
8386.76	1661.3	8415.12	1661.48	8434.87	1661.58	8445.99	1661.63	8466	1661.71
8471.07	1661.7	8472.16	1661.72	8539.87	1661.28	8546.24	1661.29	8554.37	1661.35
8576.18	1661.5	8576.37	1661.51	8577.73	1661.51	8577.99	1661.5	8585.91	1660.99
8588.17	1660.8	8589.26	1660.89	8615.95	1662.47	8627.29	1662.38	8696.45	1662.04
8702.52	1661.9	8705.06	1661.88	8757.9	1661.09	8787.79	1661.28	8809.72	1661.32
8813.63	1661.2	8829.22	1661.01	8845.59	1661.01	8879.61	1660.83	8881.95	1660.84
8886.12	1661	8894.66	1661.21	8898.99	1661.32	8904.57	1661.36	8921.16	1661.58
8930.67	1661.7	8936.22	1661.33	8943.31	1661.02	8964.39	1661.29	9008.98	1662.34
9015.63	1661.9	9017.14	1661.78	9028.08	1662.14	9030.05	1662.21	9036.97	1661.99
9046.08	1662	9047.44	1661.98	9151.25	1662.58	9162.2	1662.5	9172.23	1662.82
9199.28	1663	9207.63	1663.13	9285.59	1662.77	9293.22	1662.78	9314.13	1662.45
9355.79	1661.7	9363.39	1661.73	9392.23	1661.84	9400.67	1661.86	9401.55	1661.86
9402.58	1661.9	9465.37	1662.27	9474.08	1662.3	9479.15	1662.33	9493.87	1662.43
9544.61	1662.3	9563.01	1662.37	9589.47	1662.38	9605.04	1662.47	9633.49	1662.41
9711.19	1662.1	9711.53	1662.11	9711.61	1662.11	9711.98	1662.11	9738.97	1662.02
9741.73	1661.6	9745.38	1660.84	9763	1660.75	9787	1660.71	9818.03	1660.59
9879.77	1660	9924.52	1659.6	9946.63	1659.67	9961.76	1659.75	9976.5	1659.97
9988.62	1658.3	10002.39	1656.34	10019.79	1660.34	10019.8	1660.34	10019.81	1660.34
10026.26	1659.7	10055.66	1660.44	10086.78	1660.8	10102.76	1661.36	10108.32	1661.56
10117.31	1661.6	10125.47	1661.71	10160.34	1662.54	10171.4	1662.7	10207.99	1663.01
10245.4	1662.2	10271.02	1662.27	10271.63	1662.26	10273.59	1662.21	10282.01	1660.64
10286.58	1659.8	10287.43	1659.85	10299.17	1660.64	10305.98	1660.47	10322.99	1661.14
10336.84	1661.9	10344.38	1661.99	10372.33	1662.24	10397.98	1662.36	10418.61	1662.57
10433.06	1662.6	10441.18	1662.61	10457	1662.65	10490.92	1662.49	10563.49	1661.51
10569.19	1661.4	10576.59	1661.33	10585.01	1661.28	10596.69	1661.18	10601.12	1661.28
10615.9	1660.6	10616.15	1660.64	10616.72	1660.66	10635.32	1661.83	10643.47	1661.91
10662.59	1662.2	10665.49	1662.31	10680.21	1662.58	10692.92	1662.77	10705.3	1663.04
10736.03	1663.2	10737.13	1663.24	10741.81	1663.31	10752.45	1663.41	10753.01	1663.45
10754.53	1663.5	10758.02	1663.55						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7362.74	.068	9976.5	.045	10019.79	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9976.5	10019.79	450	400.93	315	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1663.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.068	0.045	0.068
W.S. Elev (ft)	1663.13	Reach Len. (ft)	450.00	400.93	315.00
Crit W.S. (ft)	1662.81	Flow Area (sq ft)	3203.14	211.74	879.30
E.G. Slope (ft/ft)	0.007808	Area (sq ft)	3203.14	211.74	879.30
Q Total (cfs)	11309.00	Flow (cfs)	7577.11	1761.12	1970.77
Top Width (ft)	3110.87	Top Width (ft)	2364.90	43.29	702.68
Vel Total (ft/s)	2.63	Avg. Vel. (ft/s)	2.37	8.32	2.24
Max Chl Dpth (ft)	6.79	Hydr. Depth (ft)	1.35	4.89	1.25
Conv. Total (cfs)	127982.2	Conv. (cfs)	85749.0	19930.3	22302.9
Length Wtd. (ft)	417.17	Wetted Per. (ft)	2366.57	44.00	703.13
Min Ch El (ft)	1656.34	Shear (lb/sq ft)	0.66	2.35	0.61
Alpha	2.22	Stream Power (lb/ft s)	1.56	19.51	1.37
Frctn Loss (ft)	3.62	Cum Volume (acre-ft)	1661.33	53.61	152.33
C & E Loss (ft)	0.01	Cum SA (acres)	950.27	21.81	106.84

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7362.74	8016.18	653.55	368.35	405.21	5.78	0.91	1.77
8016.18	8669.62	2464.24	989.42	654.43	21.79	1.51	2.49
8669.62	9323.06	1619.23	768.55	653.37	14.32	1.18	2.11
9323.06	9976.50	2840.09	1076.81	653.57	25.11	1.65	2.64
LB 9976.50	RB 10019.79	1761.12	211.74	44.00	15.57	4.89	8.32
10019.79	10758.02	1970.77	879.30	703.13	17.43	1.25	2.24

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 4.026

INPUT
Description: RM. 4.026. HORZ. N VALUES USED. AREA BLOCKED OUT TO LEFT OF STA.7801.55 DUE TO RIDGE.

Station Elevation Data num= 266

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7068.44	1661.9	7081.6	1661.47	7088.09	1661.39	7099.17	1661.83	7123.5	1661.31
7139.3	1661.2	7158.22	1661.18	7174.23	1661.13	7184.9	1660.93	7198.81	1660.8
7204.09	1660.9	7217.93	1660.72	7229.3	1660.65	7256.75	1660.58	7261.92	1660.46
7290.96	1660.4	7291.79	1660.37	7294.84	1660.36	7301.12	1660.31	7311.85	1659.52
7320.01	1658.7	7320.54	1658.76	7328.52	1658.59	7333.33	1658.59	7343.04	1658.35
7345.14	1658.2	7349.53	1658.69	7350.89	1658.84	7353.65	1659.45	7357.06	1659.65
7372.01	1658.8	7374.34	1658.49	7395.73	1657.05	7397.49	1657.03	7397.9	1657.03
7410.38	1657.1	7417.47	1657.08	7426.06	1657.02	7436.22	1656.82	7438.19	1656.8
7446.97	1656.7	7451.42	1656.81	7452.47	1656.85	7454.15	1656.93	7469.66	1657.75
7479.03	1658.2	7482.62	1658.44	7488.26	1658.67	7492.57	1658.84	7494.47	1658.88
7504.78	1658.9	7575.68	1659.54	7598.31	1659.55	7615.69	1659.56	7618.33	1659.57
7622.43	1659.6	7626.73	1659.56	7695.08	1659.64	7714.48	1659.41	7743.37	1659.27
7765.39	1658.9	7778.41	1660.4	7801.55	1662.89	7808.31	1662.77	7837.14	1662.15
7850.6	1661.9	7886.72	1661.4	7930.84	1661.01	7937.56	1660.94	7945.93	1660.92
7957.29	1660.9	8021.68	1660.64	8039.9	1660.54	8062.19	1660.49	8093.85	1660.31
8107.26	1660.2	8132.94	1659.88	8138.09	1659.8	8143.38	1659.7	8161.11	1659.36
8169.33	1659.1	8185.42	1658.71	8186.26	1658.69	8189.49	1658.56	8190.67	1658.55
8204.15	1657.8	8208.31	1657.69	8211.08	1657.25	8219.72	1656.93	8228.09	1656.68
8233.36	1656.6	8236.79	1656.55	8245.15	1656.72	8262.62	1657.3	8270	1658.24
8293.08	1658.8	8296.13	1658.93	8298.34	1658.97	8325.15	1656.81	8327.98	1656.76
8332.62	1656.9	8368.38	1658.24	8372	1658.24	8375.28	1658.41	8376.3	1658.47
8377.23	1658.5	8378.18	1658.39	8379.54	1658.5	8385.21	1658.44	8389.13	1658.47
8391.75	1658.6	8405.28	1658.76	8435.94	1658.62	8471.08	1658.6	8481.04	1658.84
8505.91	1659.2	8527	1659.15	8550.4	1659.16	8600.46	1659.12	8604.37	1659.11
8604.9	1659.1	8611.12	1659.06	8618.39	1659	8619.42	1659	8688.38	1659
8721.21	1659	8752.37	1658.79	8763.16	1658.47	8805.23	1657.8	8843.95	1657.39
8853.35	1657.3	8855.31	1656.96	8864.99	1655.86	8869.45	1656.45	8874.07	1657.14
8884.22	1657.2	8892.9	1657.41	8923.51	1657.64	8941.66	1657.8	8951.65	1658

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 8997.23  1657.3 9000.92 1657.24 9002.35 1657.24 9007.13 1657.22 9011.75  1657.2
  9011.9  1657.2 9013.57 1657.21 9015.79 1657.22 9048.52 1657.44 9059.01 1657.48
 9061.81  1657.5 9072.06 1657.62 9075.61 1657.68 9079.83 1657.68 9080.54 1657.67
 9081.46  1657.7 9082.65 1657.63 9094.26 1657.32 9094.63 1657.33 9095.02 1657.33
 9135.32    1658 9135.75 1657.95 9187.66 1657.46 9202.55 1657.26 9203.08 1657.26
 9204.45  1657.3 9214.54 1657.52 9219.24 1657.36  9301.3 1658.15 9316.95 1658.34
 9329.78  1658.4 9345.01 1658.45 9365.24 1658.46 9379.77 1658.36 9436.68 1657.97
  9518.9  1658.6 9543.58 1658.69 9572.42 1658.59 9592.69 1658.35 9622.89    1658
 9626.85    1658 9657.48 1657.92  9661.8 1657.92 9690.81 1657.78 9720.91 1657.61
 9722.13  1657.4  9727.7 1656.39 9738.76 1657.82 9738.82 1657.83 9738.93 1657.83
 9739.08  1657.8 9780.91 1656.98 9782.49 1657.08  9797.8 1655.59 9801.77  1655.1
 9806.78  1655.1 9820.39 1656.87 9824.31 1657.29 9865.88 1657.12 9885.41 1657.07
 9906.46  1657.4 9908.89 1657.41 9921.17 1657.35    9924 1657.32 9928.45  1657.2
 9941.91  1657.1 9943.91 1656.91 9944.86 1656.96  9948.5 1656.93 9950.42 1657.03
  9953.3  1657.1 9960.94 1657.18 9970.51    1655 9979.51 1654.34 9979.95 1654.23
 9980.06  1654.2  9980.4 1654.19 9997.05 1653.9710001.81 1654.9310016.93 1658.01
10048.86  1657.810051.33 1657.7710052.87 1657.7510054.68 1657.6610055.71 1657.61
10062.08  1657.7 10151.7 1658.6210153.28 1658.5710170.32 1658.0410184.36 1657.74
10187.57  1657.710202.36 1657.63 10241.5 1657.23 10257.6 1657.1410267.31 1656.99
10274.88  1656.310279.51 1655.7710288.67 1657.0910292.18 1657.5310300.02 1657.75
10320.21  1658.3   10325 1658.4410340.86 1658.5310360.77 1658.63 10373.3 1658.66
 10375.7  1658.710389.33 1658.9610485.11 1657.7110490.66 1657.63 10499.5 1657.29
10505.49  1657.110505.95 1657.1410528.01 1658.1710531.41 1658.3210535.75 1658.43
10609.26    1659 10616.7 1658.8810627.72 1658.9810647.11 1659.0710694.08 1659.15
10720.28  1659.210722.71 1659.3410724.39 1659.4410733.24 1659.7910735.43 1659.88
10736.17  1659.9

Manning's n Values          num=        4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7068.44     .15    8270    .068 9960.94    .04510016.93    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9960.9410016.93               340   365.6     370              .1       .3

Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
 7068.44 7801.55 1662.89

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1659.74   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.29   Wt. n-Val.                 0.071      0.045      0.068
  W.S. Elev (ft)            1659.45   Reach Len. (ft)           340.00     365.60     370.00
  Crit W.S. (ft)                      Flow Area (sq ft)        2654.81     238.02     866.88
  E.G. Slope (ft/ft)       0.009842   Area (sq ft)             2654.81     238.02     866.88
  Q Total (cfs)            11309.00   Flow (cfs)               7128.70    2029.41    2150.90
  Top Width (ft)            2568.15   Top Width (ft)           1804.47      55.99     707.69
  Vel Total (ft/s)             3.01   Avg. Vel. (ft/s)            2.69       8.53       2.48
  Max Chl Dpth (ft)            5.48   Hydr. Depth (ft)            1.47       4.25       1.22
  Conv. Total (cfs)        113993.6   Conv. (cfs)              71856.6    20456.2    21680.8
  Length Wtd. (ft)           351.37   Wetted Per. (ft)         1805.50      56.68     707.97
  Min Ch El (ft)            1653.97   Shear (lb/sq ft)            0.90       2.58       0.75
  Alpha                        2.07   Stream Power (lb/ft s)      2.43      22.00       1.87
  Frctn Loss (ft)              3.54   Cum Volume (acre-ft)     1631.07      51.54     146.01
  C & E Loss (ft)              0.03   Cum SA (acres)            928.73      21.36     101.74
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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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7791.56	8514.69	844.09	451.06	358.53	7.46	1.26	1.87
8514.69	9237.82	2695.01	1007.28	723.36	23.83	1.39	2.68
9237.82	9960.94	3589.60	1196.47	723.61	31.74	1.65	3.00
LB 9960.94	RB 10016.93	2029.41	238.02	56.68	17.95	4.25	8.53
10016.93	10736.17	2150.90	866.88	707.97	19.02	1.22	2.48

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 3.956

INPUT
Description: RM. 3.956. HORZ. N VALUES USED.

Station Elevation Data num= 245

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7493.42	1656.4	7504.43	1656.32	7509.71	1656.26	7526.4	1656.09	7548.6	1655.99
7568.56	1655.9	7575.56	1655.76	7581.54	1655.64	7592.25	1655.54	7598.62	1655.54
7629.82	1655.3	7651.88	1655.28	7653.28	1655.29	7654.2	1655.28	7665.94	1655.22
7686.14	1654.4	7705.61	1653.95	7714.07	1653.7	7729.29	1653.32	7739.01	1653.24
7752.15	1653.2	7768.01	1653.09	7771.6	1653.08	7773.76	1653.09	7776.42	1653.07
7780.23	1653	7783.19	1652.9	7790.75	1652.91	7807.06	1652.91	7811.43	1652.93
7822.46	1653	7836.24	1652.84	7836.98	1652.83	7838.32	1653.12	7847.93	1655.07
7853.85	1654.9	7862.33	1654.61	7888.82	1654.3	7920.16	1653.97	7951.23	1653.69
7956.12	1652.6	7968.32	1649.85	7979.65	1649.81	7985.56	1649.8	7999.27	1653.69
8004.41	1655.2	8023.45	1655.21	8030.56	1655.02	8064.03	1654.59	8066.49	1654.57
8069.28	1654.6	8089.89	1656.16	8094.93	1656.61	8101.49	1656.42	8123.66	1656.57
8149.85	1656.5	8160.78	1656.5	8184.95	1655.82	8201.57	1655.74	8224.63	1655.6
8235.45	1655.9	8246.5	1655.77	8275.89	1655.33	8279.92	1655.22	8297.29	1655.08
8303.08	1654.5	8306.64	1654.06	8317.18	1654.27	8333.95	1654.03	8361.7	1653.75
8365.22	1653.6	8371.53	1653.52	8397.97	1652.97	8419.49	1652.54	8425.83	1652.61
8431.95	1652.7	8445.55	1653	8462.25	1653.27	8469.5	1653.75	8472.9	1654.09
8484.1	1654.2	8485.6	1654.15	8537.8	1653.9	8538.9	1653.91	8540.92	1653.93
8545.17	1654	8597.86	1654.58	8616.34	1654.63	8626.95	1654.48	8641.04	1654.37
8655.02	1654.3	8670.28	1655.57	8679.01	1656.31	8688.96	1656.21	8747.17	1655.67
8760.26	1655.7	8762.69	1655.66	8765.8	1655.66	8787.55	1655.58	8826.3	1655.45
8830.77	1654.3	8836.99	1653.02	8844.51	1653.11	8847.75	1653.24	8859.68	1653.1
8898.85	1652.8	8911.66	1653.14	8923.61	1653.47	8930.14	1653.61	8933.62	1653.69
8936.32	1653.8	8939.6	1653.76	8950.99	1653.45	8969.85	1652.76	8974.27	1652.79
8981.84	1652.7	8985.45	1652.8	8999.96	1652.98	9002.95	1653.03	9003.7	1653.05
9045.59	1653.9	9053.02	1654.03	9059.81	1654.15	9065.91	1654.17	9076.78	1654.38
9086.49	1654.5	9099.82	1654.59	9101.32	1654.61	9104.5	1654.64	9108.51	1654.7
9119.58	1654.9	9131.31	1655.04	9132.68	1655.05	9141.68	1655.05	9158.54	1655.28
9174.98	1655.6	9192.27	1655.86	9206.28	1655.82	9218.28	1655.24	9267.03	1655.21
9331.41	1655.2	9388.72	1655.31	9444.54	1655.4	9497.12	1654.89	9497.75	1654.89
9498.65	1654.9	9515.86	1654.52	9523.68	1654.87	9533.61	1655.24	9545.74	1655.17
9557.67	1655.2	9602.57	1655.39	9664.08	1655.65	9683.41	1655.58	9685.95	1655.58
9688.94	1655.7	9697.24	1656.08	9723.76	1655.88	9763.18	1655.57	9783.93	1655.38

9816.42	1655.5	9866.39	1655.75	9877.97	1655.65	9887.44	1655.5	9909.16	1654.92
9925.33	1654.6	9930.08	1653.93	9932.66	1653.52	9938.22	1652.56	9944.59	1651.22
9955.97	1652	9961.1	1652.51	9967.72	1652.5	9981.96	1652.62	9994.75	1653.12
10003.68	1651.8	10010.19	1650.81	10012.05	1651.03	10025.9	1652.98	10034.22	1654.2
10037.46	1654.6	10041.76	1654.42	10050.54	1653.97	10062.62	1653.73	10065.78	1653.67
10068.44	1653.6	10072.86	1653.64	10119.96	1653.7	10146.25	1653.8	10158.45	1651.68
10158.54	1651.7	10158.61	1651.68	10170.76	1653.8	10181.49	1654.1	10184.22	1654.08
10197.63	1654.3	10212.11	1654.54	10220.56	1654.63	10228.08	1654.71	10260.47	1654.9
10268.49	1654.9	10292.33	1654.64	10328.47	1654.27	10331.12	1654.25	10332.17	1654.24
10360.89	1653.6	10363.55	1653.51	10378.78	1653.2	10384.75	1653.11	10390.02	1653.12
10394.22	1653.1	10403.27	1652.93	10405.9	1652.8	10414.43	1652.82	10425.56	1653.18
10434.89	1653.5	10439.91	1653.79	10447.04	1653.91	10454	1653.55	10461.14	1653.49
10464.67	1653.7	10478.45	1654.66	10493.76	1655.02	10496.54	1655.11	10504.46	1655.17
10567.89	1655.5	10569.25	1655.58	10573.01	1655.57	10575.29	1655.55	10597.79	1653.87
10602.02	1653.9	10616.91	1654.55	10673.62	1654.83	10679.78	1654.9	10683.1	1654.86
10688.98	1654.9	10695.89	1654.99	10708.67	1655.17	10733.56	1655.48	10738.39	1655.92
10753.96	1657.1	10760.65	1657.08	10802.11	1657.17	10837.12	1657.27	10854.37	1657.04

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
7493.42	.15	8836.99	.068	9994.75	.045	10037.46	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9994.75	10037.46	310	377.63	300	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.103	0.045	0.068
W.S. Elev (ft)	1655.98	Reach Len. (ft)	310.00	377.63	300.00
Crit W.S. (ft)		Flow Area (sq ft)	3321.41	151.41	1175.62
E.G. Slope (ft/ft)	0.010357	Area (sq ft)	3321.41	151.41	1175.62
Q Total (cfs)	11309.00	Flow (cfs)	6448.27	1175.06	3685.66
Top Width (ft)	3043.55	Top Width (ft)	2299.09	42.71	701.75
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	1.94	7.76	3.14
Max Chl Dpth (ft)	6.18	Hydr. Depth (ft)	1.44	3.55	1.68
Conv. Total (cfs)	111123.2	Conv. (cfs)	63361.3	11546.3	36215.6
Length Wtd. (ft)	312.17	Wetted Per. (ft)	2301.59	43.14	702.35
Min Ch El (ft)	1650.81	Shear (lb/sq ft)	0.93	2.27	1.08
Alpha	1.96	Stream Power (lb/ft s)	1.81	17.61	3.39
Frctn Loss (ft)	2.93	Cum Volume (acre-ft)	1607.75	49.90	137.34
C & E Loss (ft)	0.02	Cum SA (acres)	912.72	20.94	95.75

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7493.42	8118.75	1524.44	1012.92	538.64	13.48	1.89	1.50
8118.75	8744.08	1098.46	824.66	526.67	9.71	1.57	1.33
8744.08	9369.42	2671.71	923.33	625.69	23.62	1.48	2.89
9369.42	9994.75	1153.66	560.51	610.58	10.20	0.92	2.06
LB 9994.75	RB 10037.46	1175.06	151.41	43.14	10.39	3.55	7.76
10037.46	10854.37	3685.66	1175.62	702.35	32.59	1.68	3.14

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.885**

INPUT
Description: RM. 3.885. HORZ. N VALUES USED. AREA RIGHT OF STA. 10903.28 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 248

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7650.82	1653.2	7653.74	1653.19	7667.17	1653.14	7678.49	1653.1	7690.69	1653.03
7701.42	1652.9	7725.19	1652.69	7729.9	1652.57	7757.63	1652.33	7760.65	1652.28
7763.22	1652.3	7793.94	1651.75	7795.32	1651.74	7808.63	1651.67	7827.81	1651.63
7832.36	1651.6	7862.74	1651.48	7877.13	1651.3	7881.39	1651.29	7884.24	1651.25
7887.74	1651.2	7890.56	1651.08	7894.44	1650.97	7897.39	1650.84	7900.75	1650.87
7935.24	1651.1	7943.41	1651.33	7949.82	1651.47	7953.22	1651.55	7955.94	1651.99
7963.87	1653.2	7973	1653.11	8021.72	1652.52	8064.33	1651.89	8081.12	1647.69
8081.42	1647.6	8081.54	1647.58	8082.39	1647.6	8099.75	1648.03	8114.4	1653.39
8115.69	1653.9	8117.1	1653.84	8117.5	1653.84	8118.1	1653.84	8119.39	1653.83
8154.63	1653.6	8173	1653.38	8184.3	1653.39	8191.97	1653.43	8217.96	1653.41
8222.41	1653.4	8251.82	1653.41	8255.55	1653.42	8284.94	1652.85	8290.38	1652.88
8296.4	1652.8	8311.1	1652.68	8322.26	1652.62	8333.8	1651.39	8340.01	1650.9
8355.36	1650.8	8364.93	1650.67	8378.63	1650.53	8390.75	1650.42	8406.35	1650.32
8416.04	1650.3	8435.07	1650.15	8461	1649.85	8462.61	1649.83	8465.54	1649.81
8493.41	1650.4	8510.45	1650.7	8520.17	1651.16	8523.74	1651.66	8525.16	1651.72
8528.48	1651.5	8548.18	1651.41	8561.78	1651.18	8579.03	1651.97	8579.4	1652.11
8579.7	1652.1	8598.16	1653.55	8607.74	1653.98	8611.88	1654.08	8613.36	1653.74
8613.97	1653.5	8618.94	1651.23	8625.29	1650.96	8627.02	1650.85	8628.64	1650.34
8630.73	1649.9	8634.09	1649.75	8636.61	1649.58	8642.76	1649.32	8668.32	1648.36
8669.58	1648.4	8688.69	1649.05	8694.39	1650.7	8697	1651.56	8709.35	1651.71
8751.59	1652.1	8760.19	1652.03	8799.74	1651.95	8809.73	1651.17	8817.79	1650.83
8833.08	1650.9	8866.81	1650.97	8869.12	1650.95	8874.71	1650.92	8933.14	1651.53
8975.42	1651.4	8998.8	1651.36	9010.54	1651.09	9044.9	1650.39	9059.86	1650.04
9063.96	1649.7	9082.86	1648.64	9086.19	1648.99	9092.38	1649.74	9095.48	1650.14
9107.14	1650.4	9122.35	1650.69	9134.51	1650.61	9142.59	1650.6	9155.78	1650.44
9159.33	1650.6	9212.88	1651.46	9232.59	1651.82	9269.23	1652.47	9282.12	1652.58
9286.08	1652.6	9332.57	1652.39	9396.84	1652.31	9493.73	1652.02	9506.01	1651.98
9510.42	1652	9510.86	1651.96	9521.78	1651.92	9631.9	1651.85	9634.5	1651.9
9639.27	1651.9	9641.22	1651.9	9651.83	1651.95	9652.75	1651.95	9656.71	1651.91
9658.54	1651.9	9660.07	1651.86	9664.38	1651.81	9674.29	1651.79	9680.96	1651.85
9696.71	1652.1	9724.35	1652.52	9740.86	1652.5	9746.58	1652.58	9763.9	1652.6
9795.26	1652.6	9805.18	1652.72	9826.11	1652.85	9833.45	1653.02	9847.46	1653
9856.84	1653	9862.61	1653.07	9866.22	1653.1	9879.58	1653.13	9893.79	1653.29
9908.29	1653.5	9925.91	1653.78	9941.93	1653.38	9944.86	1653.22	9946.02	1653.31
9948.66	1653.1	9963.68	1652.72	9970.61	1652.52	9973.59	1651.83	9983.3	1649.72
9990.87	1648.1	9999.98	1649.32	10014.84	1651.28	10018.65	1651.33	10067.18	1651.4
10081.08	1651.2	10092.4	1651.29	10127.86	1651.36	10163.66	1650.85	10197.84	1650.39
10267.67	1650.4	10278.71	1650.38	10287.99	1650.34	10295.41	1649.82	10315.86	1648.48
10318.39	1648.6	10319.99	1648.64	10320.99	1648.65	10333.32	1648.78	10343.52	1649.63
10359.68	1650.9	10378.43	1652.7	10388.98	1652.56	10410.39	1652.48	10419.49	1652.23
10429.95	1651.9	10436.73	1651.74	10442.86	1651.54	10449.34	1651.7	10463.86	1652.02
10484.87	1652.5	10530.6	1650.76	10530.89	1650.75	10531.1	1650.71	10537.4	1649.69

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10541.46    1649   10551 1650.7510552.02 1650.9510563.06 1650.9810618.28 1651.14
10623.83  1650.710632.81    165010638.59 1649.5410641.61 1649.8810652.24 1650.77
10678.12  1651.310680.11  1651.710684.13 1652.0810691.76 1652.5710707.86 1652.38
10763.73  1652.210788.33 1652.0810791.92 1652.2110812.87 1652.8710830.61 1652.95
10858.54  1653.210881.94 1653.4610887.34 1653.5210903.28 1653.7110928.27 1653.26
10930.87  1653.410931.37 1653.3410932.55 1653.29 10934.2 1653.2610965.53  1653.6
10981.26  1652.910993.38 1652.38 11006.5  1652.5 11019.5 1652.6211025.27 1653.22
11029.81  1653.211031.96 1653.1411038.59 1654.26

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7650.82     .15 8809.73    .068 9948.66    .04510018.65    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9948.6610018.65              320  359.41     280             .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
10903.2811038.59 1653.71

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1653.21   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.11   Wt. n-Val.                 0.099      0.045      0.068
  W.S. Elev (ft)            1653.10   Reach Len. (ft)           320.00     359.41     280.00
  Crit W.S. (ft)                      Flow Area (sq ft)        3126.74     151.41    1511.71
  E.G. Slope (ft/ft)       0.008565   Area (sq ft)             3126.74     151.41    1511.71
  Q Total (cfs)            11309.00   Flow (cfs)               5976.36     769.95    4562.69
  Top Width (ft)            2892.68   Top Width (ft)           1994.54      69.84     828.30
  Vel Total (ft/s)             2.36   Avg. Vel. (ft/s)            1.91       5.09       3.02
  Max Chl Dpth (ft)            5.52   Hydr. Depth (ft)            1.57       2.17       1.83
  Conv. Total (cfs)        122195.0   Conv. (cfs)              64575.2     8319.4    49300.4
  Length Wtd. (ft)           314.58   Wetted Per. (ft)         1997.56      70.54     829.14
  Min Ch El (ft)            1648.10   Shear (lb/sq ft)            0.84       1.15       0.97
  Alpha                        1.32   Stream Power (lb/ft s)      1.60       5.84       2.94
  Frctn Loss (ft)              2.48   Cum Volume (acre-ft)     1584.80      48.59     128.08
  C & E Loss (ft)              0.01   Cum SA (acres)            897.44      20.46      90.48

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta        Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)         (ft)             (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  7650.82      8225.28         651.45     593.09    425.09       5.76      1.40       1.10
  8225.28      8799.74        1497.12    1047.83    506.22      13.24      2.07       1.43
  8799.74      9374.20        3082.91    1062.04    574.68      27.26      1.85       2.90
  9374.20      9948.66         744.89     423.78    491.58       6.59      0.86       1.76
  LB 9948.66   RB 10018.65     769.95     151.41     70.54       6.81      2.17       5.09
  10018.65     11038.59       4562.70    1511.71    829.14      40.35      1.83       3.02

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.817**

INPUT
Description: RM. 3.817. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR ADOBE RD. ALIGN. REA BLOCKED OUT TO RIGHT OF STA. 10987.53 DUE TO RIDGE. NOTE BREAKOUT FLOW TO LT OF LT. END STA. SHOWN ON MAPS. NOT CONSIDERED EF. FLOW. FLOW RETURNS NEAR SEC. 3.674.

Station Elevation Data num= 251

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7682.24	1650.9	7684.74	1650.88	7686.56	1650.84	7688.54	1650.84	7691.14	1650.86
7693.03	1650.9	7695.72	1650.98	7710.05	1650.95	7712.7	1650.96	7716.44	1650.97
7721.29	1651	7737.77	1650.86	7751.66	1650.96	7758.06	1650.88	7806.42	1650.43
7807.72	1650.4	7810.96	1650.4	7812.58	1650.05	7815.81	1649.32	7824.87	1647.49
7827.78	1646.6	7828.14	1646.76	7831.32	1646.57	7844.72	1646.52	7854.7	1648.76
7863.2	1650.4	7877.88	1650.96	7896.01	1651.88	7900.19	1651.96	7901.21	1651.92
7903.35	1652	7904.32	1651.99	7907.18	1651.98	7914.16	1651.97	7928.25	1651.97
7955.26	1651.9	7965.1	1651.68	7970.81	1651.32	7994.41	1649.42	7997.45	1649.37
7998.83	1649.4	8001.42	1649.33	8038.43	1649.2	8058.74	1648.78	8069.11	1648.36
8071.8	1648.3	8074.11	1648.25	8120.15	1647.63	8129.34	1647.63	8142.86	1647.91
8144.5	1647.9	8146.04	1647.91	8164.4	1647.59	8190.85	1647.9	8209.23	1647.98
8218	1648.2	8223.35	1648.49	8229.41	1648.57	8234.51	1648.55	8235.23	1648.53
8236.43	1648.4	8238.69	1648.28	8242.49	1647.81	8243.43	1647.7	8244.33	1647.53
8246.68	1647.4	8249.39	1647.2	8269.99	1647.06	8285.76	1647.02	8300.85	1648.17
8302.69	1648.3	8310.75	1648.72	8315.37	1649.08	8331.96	1648.72	8331.99	1648.72
8332.01	1648.7	8334.16	1649.34	8335.75	1649.58	8341.63	1650.33	8345.56	1650.32
8350.01	1649.3	8355.76	1649.42	8357.41	1649.06	8363.65	1649.97	8373.18	1648.88
8416.94	1648.9	8426.17	1648.44	8429.19	1648.31	8457.36	1649.04	8465.7	1648.97
8479.28	1648.4	8511.77	1647.93	8515.75	1647.88	8520.03	1647.93	8523.54	1647.94
8561.58	1648.4	8589.65	1648.65	8592.56	1648.71	8594.48	1648.73	8596.12	1648.78
8735.49	1649	8754.96	1648.94	8770.76	1648.89	8777.77	1648.91	8794.96	1648.9
8889.33	1649.2	8918.99	1648.99	8935.59	1648.89	8938.32	1648.91	8977.87	1649.17
8980.94	1648.4	8989.87	1646.77	8994.96	1646.89	9000.12	1648.34	9004.8	1649.02
9025.15	1649.1	9076.26	1649.17	9079.37	1649.2	9116.09	1648.95	9118.87	1648.9
9125.71	1648.8	9171.92	1648.11	9172.92	1648.14	9178.35	1648.42	9181.65	1648.6
9182.42	1648.6	9183.21	1648.61	9209.01	1648.79	9303.25	1648.88	9310.94	1648.99
9318.95	1648.8	9330.65	1648.7	9335.85	1648.81	9343.1	1648.94	9351.29	1648.7
9368.24	1648.9	9378.4	1649.42	9383.35	1649.56	9390.93	1649.98	9399.63	1649.96
9422.08	1650	9438.08	1650.02	9458.97	1650.04	9462.97	1650.2	9469.33	1650.47
9471.78	1650.5	9480.67	1650.63	9539.72	1651.06	9546.61	1650.97	9546.84	1650.97
9556.57	1650.9	9590.82	1650.61	9601.71	1650.51	9655.94	1650.14	9697.48	1649.98
9718.44	1649.7	9724.7	1649.7	9757.44	1648.89	9775.14	1648.46	9785.75	1649.14
9787.55	1649.3	9799.87	1649.43	9835.62	1649.89	9854.86	1648.86	9868.28	1648.05
9892.93	1648.3	9908.45	1648.44	9910.77	1648.5	9915.98	1647.76	9919.25	1647.24
9922.27	1647.4	9929.04	1648.41	9934.06	1648.04	9971.21	1646.11	9973.14	1646.19
9974.93	1646.2	9984.49	1646.52	9993.52	1646.61	10015.5	1647.11	10019.5	1647.3
10033.7	1647.7	10034.27	1647.72	10034.6	1647.72	10044.46	1647.8	10051.6	1647.87
10056.5	1647.9	10060.88	1647.99	10091.51	1649.04	10098.19	1649.38	10099.04	1649.44
10101.34	1649.5	10103.18	1650.51	10103.88	1650.58	10106.81	1651.17	10109.82	1650.67
10112.11	1649.8	10115.76	1649.92	10118.34	1650.15	10118.93	1650.28	10168.11	1649.51
10183.95	1649.1	10185.66	1649.14	10187.66	1649.15	10313.01	1649.33	10326.94	1649.45
10333	1649.4	10340.41	1649.28	10343.15	1649.26	10346.69	1649.18	10367.43	1648.43
10384.62	1649	10396.42	1649.63	10430.58	1648.41	10440.44	1648.11	10443.88	1647.55
10451.12	1646.4	10459.39	1647.51	10465.45	1648.34	10470.62	1648.37	10496.61	1648.48
10502.34	1648.6	10522.06	1648.65	10575.84	1649.15	10631.22	1649.93	10649.6	1650.41
10673.07	1650.8	10686.55	1650.12	10688.07	1650.05	10693.34	1650.14	10702.44	1650.29
10706.31	1650.4	10730.96	1650.52	10758.11	1650.25	10774.38	1650.11	10784.5	1650.05

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10793.85    165010800.83 1649.9110825.07 1649.6610839.99 1649.4810844.06 1649.05
10857.02  1648.410859.16  1648.310860.14 1648.2310871.76 1649.5610876.98 1650.05
10900.64  1650.310945.61 1651.0310960.78 1651.1910968.12 1651.8910969.99  1651.9
10987.53  1651.5

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7682.24     .15 8429.19    .068 9934.06    .04510060.88    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9934.0610060.88              400  370.17     365             .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
10673.0710987.53  1650.8
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1650.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.086	0.045	0.068
W.S. Elev (ft)	1650.51	Reach Len. (ft)	400.00	370.17	365.00
Crit W.S. (ft)		Flow Area (sq ft)	3150.78	428.68	827.72
E.G. Slope (ft/ft)	0.007325	Area (sq ft)	3150.78	428.68	827.72
Q Total (cfs)	11309.00	Flow (cfs)	6634.22	2727.59	1947.19
Top Width (ft)	2608.63	Top Width (ft)	1893.78	126.82	588.03
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)	2.11	6.36	2.35
Max Chl Dpth (ft)	4.40	Hydr. Depth (ft)	1.66	3.38	1.41
Conv. Total (cfs)	132137.6	Conv. (cfs)	77516.2	31870.0	22751.5
Length Wtd. (ft)	386.62	Wetted Per. (ft)	1896.25	126.90	588.84
Min Ch El (ft)	1646.11	Shear (lb/sq ft)	0.76	1.54	0.64
Alpha	2.02	Stream Power (lb/ft s)	1.60	9.83	1.51
Frctn Loss (ft)	3.40	Cum Volume (acre-ft)	1561.74	46.20	120.56
C & E Loss (ft)	0.00	Cum SA (acres)	883.16	19.64	85.93

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7682.24	8245.20	965.54	703.41	334.32	8.54	2.11	1.37
8245.20	8808.15	2407.92	1063.39	563.54	21.29	1.89	2.26
8808.15	9371.10	2410.53	933.58	563.48	21.32	1.66	2.58
9371.10	9934.06	850.24	450.41	434.90	7.52	1.04	1.89
LB 9934.06	RB 10060.88	2727.59	428.68	126.90	24.12	3.38	6.36
10060.88	10987.53	1947.18	827.72	588.84	17.22	1.41	2.35

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.747**

INPUT
Description: RM. 3.747. HORZ. N VALUES USED. AREA BLOCKED OUT TO RIGHT OF 10942.18 DUE TO RIDGE

Station Elevation Data num= 290

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7545.9	1647.4	7574.93	1647.01	7613.05	1645.95	7622.49	1646.29	7633.4	1646.53
7640.58	1644.3	7643.04	1643.44	7644.6	1643.55	7647.71	1643.69	7650.74	1644.26
7653.17	1644.7	7661.31	1646.25	7662.38	1646.45	7662.8	1646.53	7677.94	1646.81
7689.54	1646.7	7697.36	1647.03	7725.07	1647.09	7743.98	1647.26	7763.21	1647.03
7791.34	1647.2	7793.77	1647.17	7807.28	1647.26	7831.13	1646.8	7858.09	1647.48
7867.31	1647.4	7884.4	1647.53	7884.62	1647.51	7884.66	1647.51	7891.05	1647.36
7903.22	1647.4	7904.88	1647.48	7908.86	1647.31	7935.61	1646.46	7935.93	1646.48
7945.86	1646.4	7966.59	1646.23	7971.29	1646.2	7975.03	1646.34	7998.03	1647.59
8002.15	1647.8	8042.01	1647.77	8071.95	1647.72	8094.78	1648.13	8095.18	1648.05
8106.64	1646	8108.16	1645.86	8114.38	1644.93	8144.87	1644.94	8150.49	1644.97
8164.08	1645.1	8174.11	1645.12	8179.67	1645.27	8192.14	1645.57	8192.25	1645.55
8198.42	1645	8199.52	1644.86	8203.91	1644.55	8210.83	1644.34	8212.85	1644.26
8226	1644.7	8227.8	1644.79	8230.82	1644.98	8240.49	1645.37	8255.95	1645.23
8264.51	1645.1	8298.71	1644.86	8314.29	1645.21	8349.65	1646.35	8360.74	1646.58
8390.81	1647.1	8408.27	1647.55	8416.28	1646.23	8421.2	1646	8423.08	1645.94
8447.72	1646.4	8454.47	1645.87	8466.69	1644.99	8468.26	1644.91	8475.12	1644.72
8479.22	1644.6	8486.16	1644.64	8489.92	1644.8	8492.4	1645.06	8497.74	1646.36
8502.98	1646.5	8507.76	1646.53	8514.26	1646.51	8530.87	1646.72	8538.89	1646.74
8573.55	1646.9	8644.68	1646.83	8657.09	1646.91	8659.89	1646.48	8664.84	1645.52
8693.41	1645.9	8709.07	1646.06	8727.21	1643.35	8727.35	1643.34	8729.03	1643.49
8747.14	1645.3	8767.83	1645.3	8774.08	1645.24	8777	1645.21	8785.67	1645.17
8808.01	1644.8	8815.22	1644.61	8845.55	1644.08	8851.98	1644.05	8853.38	1644.01
8858.62	1643.9	8861.43	1643.89	8874.95	1643.76	8878.46	1643.77	8880.05	1643.87
8881.57	1643.9	8889.33	1643.84	8904.97	1644.3	8912.76	1644.49	8918.08	1644.68
8933.61	1645	8936.96	1644.95	8941.01	1645.2	8943.19	1645.23	8961.27	1645.59
8988.77	1645.4	9014.31	1645.6	9030.2	1645.57	9034.98	1645.79	9042	1645.62
9045.7	1645.7	9055.66	1646.04	9086.89	1645.44	9098.55	1645.4	9113.72	1645.42
9113.77	1645.4	9128	1645.2	9129.85	1645.16	9133.8	1645.34	9147.31	1645.7
9153.82	1645.9	9156.95	1645.93	9162.4	1646.04	9167.25	1646.03	9176.52	1646
9184.87	1646	9196.46	1645.96	9200.5	1645.94	9233.35	1646.22	9241.25	1646.26
9278.64	1646.5	9280.62	1646.54	9283.37	1646.55	9287.45	1646.6	9289.14	1646.61
9299.03	1646.8	9311.58	1647.02	9331.89	1647.2	9341.55	1646.9	9344.43	1646.75
9344.52	1646.7	9353.28	1646.75	9365.36	1647.11	9373.31	1646.99	9411.37	1646.79
9440.7	1646.9	9484.63	1646.34	9487.36	1646.3	9545.87	1645.05	9551.9	1644.93
9552.29	1644.9	9558.52	1645.09	9579.03	1645.47	9587.63	1645.65	9590.94	1645.68
9629.81	1645.9	9644.33	1646.01	9666.9	1646.01	9671.58	1646.02	9697.26	1645.71
9708.76	1645.1	9710.05	1644.99	9713.27	1645.52	9716.86	1646.11	9717.22	1646.17
9720.55	1646.1	9764.21	1646.02	9775.15	1646.57	9775.35	1646.59	9776.68	1646.57
9786.79	1646.4	9792.14	1645.74	9810.55	1643.34	9815.75	1643.44	9827.83	1643.75
9827.99	1644.1	9834.89	1644.62	9858.49	1645.71	9864.92	1645.51	9876.69	1645.06
9896.62	1644.8	9907.62	1645	9966.94	1645.01	9969.96	1645.04	9971.36	1645.19
9978.88	1645.9	9988.14	1645.23	9992.09	1644.94	9994.17	1644.83	9998.98	1645.06
10006.1	1645.4	10016.2	1645.14	10060.91	1645.09	10064.55	1645.27	10076.54	1646.14
10086.69	1646.9	10097.57	1647.21	10144.33	1647.91	10159.29	1648.14	10169.33	1647.95
10205.58	1647	10221.6	1646.63	10230.88	1646.38	10237.31	1646.36	10239.11	1646.36
10282.35	1644.7	10282.72	1644.66	10283	1644.65	10283.14	1644.65	10302.14	1645.22
10314.54	1644.7	10322.86	1644.91	10332.37	1644.89	10344.08	1644.72	10368.5	1644.49
10369.08	1644.5	10369.52	1644.39	10375.31	1643.45	10378.17	1643.05	10382.99	1643.96

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10385.95  1644.510404.15 1644.1410409.63 1644.1310422.26 1644.79 10433.9 1645.38
10447.54  1645.810453.24 1645.8710458.95 1646.0910462.71 1646.1510468.59 1646.33
10472.46  1646.410486.29  1646.910486.45 1646.9310487.49 1647.0510487.81 1647.08
10494.22  1646.810505.56 1646.8610517.27 1646.8210575.13 1647.14 10586.9 1647.18
10594.83  1647.310601.63  1647.210607.31 1647.1110669.92 1647.1710715.02 1647.43
10727.21  1646.6 10740.1 1646.2710740.28 1646.2610741.14 1646.2510761.52 1647.18
10770.27  1646.110770.34 1646.1110770.62 1646.1210784.33 1646.5810791.73  1646.5
10798.49  1646.710802.33 1645.8610806.61 1645.3210813.48 1647.0510815.62  1647.7
10875.94  1647.610887.87 1647.5210890.94 1647.5710891.43 1647.5810892.94  1647.6
10893.28  1647.610894.19 1647.6210896.19 1647.6510899.98 1647.7410942.18  1648.8

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
  7545.9     .15 8108.16    .068 9775.35    .04510060.91    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9775.3510060.91               390  385.69    400              .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
10715.0210877.77 1647.43
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1647.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.070	0.045	0.068
W.S. Elev (ft)	1647.10	Reach Len. (ft)	390.00	385.69	400.00
Crit W.S. (ft)		Flow Area (sq ft)	2383.42	586.38	558.58
E.G. Slope (ft/ft)	0.010850	Area (sq ft)	2383.42	586.38	558.58
Q Total (cfs)	11309.00	Flow (cfs)	6452.99	3253.97	1602.04
Top Width (ft)	2596.10	Top Width (ft)	1912.48	285.56	398.06
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	2.71	5.55	2.87
Max Chl Dpth (ft)	4.05	Hydr. Depth (ft)	1.25	2.05	1.40
Conv. Total (cfs)	108567.8	Conv. (cfs)	61949.5	31238.5	15379.8
Length Wtd. (ft)	390.78	Wetted Per. (ft)	1914.63	286.14	398.52
Min Ch El (ft)	1643.34	Shear (lb/sq ft)	0.84	1.39	0.95
Alpha	1.38	Stream Power (lb/ft s)	2.28	7.70	2.72
Frctn Loss (ft)	3.77	Cum Volume (acre-ft)	1536.33	41.89	114.76
C & E Loss (ft)	0.04	Cum SA (acres)	865.68	17.89	81.80

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7545.90	8103.26	120.22	167.30	278.02	1.06	0.60	0.72
8103.26	8660.63	1734.10	672.97	537.56	15.33	1.25	2.58
8660.63	9217.99	3580.67	1053.68	557.83	31.66	1.89	3.40
9217.99	9775.35	1018.01	489.48	541.22	9.00	0.90	2.08
LB 9775.35	RB 10060.91	3253.97	586.38	286.14	28.77	2.05	5.55
10060.91	10942.18	1602.04	558.58	398.52	14.17	1.40	2.87

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.674**

INPUT
Description: RM. 3.674. HORZ. N VALUES USED. AREA BLOCKED OUT TO RIGHT OF STA. 10877.77 DUE TO RIDGE.

Station Elevation Data num= 279

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7200.95	1645.1	7211.54	1645.19	7219.61	1645.19	7260.08	1644.48	7279.15	1644.19
7288.35	1644.1	7297.92	1644.02	7316.08	1643.86	7321.27	1643.93	7353.04	1643.92
7353.15	1643.9	7353.19	1643.9	7361.78	1640.66	7363.34	1641.04	7372.98	1643.75
7408.7	1643.5	7412.99	1643.42	7415.02	1643.39	7416.03	1643.38	7416.24	1643.38
7425.15	1643.4	7499.77	1644.11	7509.93	1644.13	7521.83	1644.22	7538.53	1644.3
7584.48	1643.6	7604.7	1643.56	7607.01	1643.45	7614.4	1642.44	7630.9	1642.46
7636.43	1642.6	7648.39	1642.49	7664.91	1643.7	7670.78	1644.23	7705.96	1643.92
7729.2	1643.7	7736.07	1643.61	7742.72	1643.57	7776.43	1643.13	7787.33	1641.73
7794.09	1640.9	7797.5	1641.33	7798.06	1641.42	7798.28	1641.43	7800.99	1641.48
7839.99	1641.9	7846.9	1641.85	7854.88	1643.02	7860.26	1643.63	7878.75	1643.66
7894.43	1643.7	7903.51	1643.36	7908.51	1643.26	7917.13	1643.18	7920.3	1643.1
7922.82	1643.1	7938.39	1642.95	8043.21	1642.02	8102.41	1641.51	8141.02	1641.26
8145.75	1641.2	8152.14	1641.2	8160.16	1641.19	8235.28	1641.29	8235.49	1641.29
8235.63	1641.3	8235.81	1641.25	8236.53	1640.94	8239.63	1639.72	8240.59	1639.93
8246.33	1640.9	8296.29	1640.5	8325.73	1640.58	8332.34	1641.15	8337.05	1641.66
8348.82	1641.2	8366.1	1640.88	8368.86	1640.74	8381.74	1639.96	8389.42	1639.74
8398.31	1639.3	8401.93	1639.3	8438.27	1639.81	8455.2	1640.09	8481.07	1640.34
8495.56	1640.4	8514.78	1640.69	8533.24	1640.84	8540.73	1641.1	8549.92	1641.38
8564.28	1641.3	8572.39	1641.24	8574.85	1641.15	8576.46	1641.13	8579.65	1641.06
8586.82	1640.9	8595.78	1640.77	8604.56	1640.75	8615.97	1640.88	8623.73	1640.95
8627.11	1641	8636.05	1641.17	8672.32	1641.86	8672.58	1641.86	8672.79	1641.86
8696.12	1641.8	8706.82	1641.74	8717.09	1641.77	8723.15	1641.92	8733.09	1642.13
8736.02	1642.2	8774.54	1641.92	8776.05	1641.92	8776.61	1641.92	8843.88	1641.97
8860.6	1641.8	8864.64	1641.82	8886.75	1641.16	8909.19	1640.94	8913.39	1640.86
8925.82	1640.8	8929.16	1640.91	8935.25	1641	8950.89	1641.39	8957.4	1641.43
8967.2	1641.6	8976.69	1641.74	8981.82	1641.79	8996.76	1641.86	9030.15	1642.4
9043.95	1642.6	9047	1642.64	9047.84	1642.65	9082.39	1642.34	9090.1	1642.38
9091.86	1642.4	9118.29	1642.34	9185.68	1642.34	9190.98	1642.34	9195.01	1642.32
9200.15	1642.3	9212.28	1642.09	9215.05	1642.08	9258.42	1642.18	9262.34	1642.18
9271.16	1642.2	9283.31	1641.24	9286.46	1641.02	9294.34	1641.34	9303.36	1641.65
9321.3	1641.5	9321.8	1641.49	9322.43	1641.47	9332.21	1640.9	9336.26	1640.89
9360.74	1640.7	9381.89	1641.08	9392.94	1641.27	9408.74	1641.94	9419.61	1642.3
9420.73	1642.3	9456.15	1642.33	9457.21	1642.32	9457.67	1642.32	9481.42	1642.22
9495.1	1642.3	9501.74	1642.24	9523.77	1641.71	9526.63	1641.7	9533.03	1641.82
9557.36	1642.2	9561.39	1642.24	9590.96	1642.25	9605.38	1642.39	9609.42	1642.36
9614.59	1642.4	9623.2	1642.33	9623.65	1642.3	9627.17	1642.33	9631.91	1642.21
9648.03	1642.6	9651.84	1642.61	9651.96	1642.61	9661.95	1642.56	9662.28	1642.56
9662.68	1642.5	9667.82	1642.42	9691.93	1641.62	9693.89	1641.75	9706.54	1642.52
9718.37	1642.7	9719.73	1642.66	9719.86	1642.66	9724.18	1642.69	9737.54	1642.85
9739.12	1642.9	9740.58	1642.76	9747.41	1642.76	9769.8	1642.79	9774.62	1642.8
9774.69	1641.4	9778.6	1641.03	9782.95	1640.96	9790.92	1641.31	9798.17	1640.73
9816.29	1641.4	9844.6	1642.36	9856.09	1642.21	9868.37	1642.09	9927.35	1642.1
9963.5	1642.1	9978.34	1642.01	9979.37	1641.98	9980.55	1642.02	9981.8	1642.01
10010.89	1643	10027.78	1643.5	10028.34	1643.56	10059.89	1643.36	10072.58	1643.28

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10128.88  1643.110195.84 1643.2210208.75 1643.2510220.61 1643.2410235.16  1643.1
10246.39  1642.510249.89  1642.210251.56 1641.5810266.45 1641.2810267.72 1641.34
10268.86  1641.3 10272.1 1641.1710291.03 1641.55 10310.4 1641.2710310.54 1641.26
10310.71  1641.310311.14 1641.2510334.08 1640.5110339.72 1639.7210343.64 1639.17
10345.88  1639.510355.55  1640.710357.51 1640.7310367.73 1640.8810381.69 1641.09
10394.01  1641.310407.73 1641.4910415.38 1641.6510437.33 1642.1510437.94 1642.17
10440.61  1642.210452.14 1641.7810471.36    164110473.02 1641.0210474.33 1641.11
10491.31  1641.210491.46 1641.2310524.79 1641.8510530.54 1640.2810532.57 1639.86
10539.89  1641.810540.48 1641.91 10543.3 1641.9110621.25 1642.1110639.75 1642.22
10648.07  1642.110653.59 1642.3710671.06 1642.6410695.13 1642.4610741.29 1643.32
10790.61  1643.810791.58 1643.9410795.23 1643.85 10817.1 1643.2410829.08 1643.34
10843.59  1643.610864.34  1644.810873.18 1645.2610877.77 1645.39

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 7200.95     .15  8455.2    .068  9769.8    .04510010.89    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        9769.810010.89               430  372.11     425              .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
10791.5810877.77 1643.98
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1643.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.088	0.045	0.068
W.S. Elev (ft)	1643.41	Reach Len. (ft)	430.00	372.11	425.00
Crit W.S. (ft)		Flow Area (sq ft)	3448.79	347.41	895.74
E.G. Slope (ft/ft)	0.008710	Area (sq ft)	3448.79	347.41	895.74
Q Total (cfs)	11309.00	Flow (cfs)	7802.16	1360.55	2146.29
Top Width (ft)	3006.37	Top Width (ft)	2053.64	241.09	711.64
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	2.26	3.92	2.40
Max Chl Dpth (ft)	4.24	Hydr. Depth (ft)	1.68	1.44	1.26
Conv. Total (cfs)	121173.8	Conv. (cfs)	83598.6	14578.0	22997.1
Length Wtd. (ft)	424.51	Wetted Per. (ft)	2055.68	242.52	712.60
Min Ch El (ft)	1640.73	Shear (lb/sq ft)	0.91	0.78	0.68
Alpha	1.11	Stream Power (lb/ft s)	2.06	3.05	1.64
Frctn Loss (ft)	3.85	Cum Volume (acre-ft)	1510.23	37.75	108.08
C & E Loss (ft)	0.01	Cum SA (acres)	847.92	15.56	76.70

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
7200.95	7843.16	166.88	178.53	172.10	1.48	1.04	0.93
7843.16	8485.38	2131.96	1261.53	598.91	18.85	2.11	1.69
8485.38	9127.59	3380.84	1143.70	642.28	29.90	1.78	2.96
9127.59	9769.80	2122.47	865.03	642.39	18.77	1.35	2.45
LB 9769.80	RB 10010.89	1360.55	347.41	242.52	12.03	1.44	3.92
10010.89	10877.77	2146.29	895.74	712.60	18.98	1.26	2.40

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.603**

INPUT
Description: RM. 3.603. HORZ. N VALUES USED.

Station Elevation Data num= 263

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6861.52	1640.1	6901.54	1639.9	6918.66	1639.7	6924.99	1639.64	6945.38	1639.76
6964.26	1639.7	6972.39	1638.97	6982.46	1638.23	6986.7	1638.01	6992.08	1637.97
7020.87	1637.5	7040.23	1638.88	7049.92	1639.57	7080.83	1639.55	7151.28	1639.44
7155.26	1639.4	7163.61	1637.22	7176.7	1633.93	7211.21	1633.92	7243.5	1634.1
7254.81	1636.7	7267.71	1639.12	7275.68	1639.16	7287.8	1638.82	7288.53	1638.52
7296.3	1638.7	7296.77	1638.76	7299.65	1638.75	7303.11	1638.74	7339.26	1638.58
7343.5	1637.5	7350.75	1635.84	7358.66	1635.7	7365.4	1635.63	7369.87	1635.59
7379.89	1637.1	7389.19	1638.89	7402.65	1638.45	7427.37	1638.12	7460.96	1638.75
7475.8	1638.7	7477.15	1638.7	7477.36	1638.69	7477.91	1638.73	7478.79	1638.77
7496.87	1639.7	7519.93	1639.57	7577.49	1639.11	7609.75	1638.82	7634.15	1638.61
7662.34	1638.4	7667.65	1638.37	7669.95	1638.42	7685.93	1638.59	7700.97	1638.73
7702.66	1638.7	7711.72	1638.45	7717.11	1638.13	7719.7	1638.14	7751.74	1639.05
7793.58	1639.6	7816.04	1639.55	7828.8	1639.53	7846.25	1638.03	7853.88	1637.9
7875.49	1637.54	7875.5	1637.54	7875.53	1637.54	7891.72	1637.97	7971.17	1636.7
7995.1	1636.37	8003.09	1636.27	8008.46	1636.34	8028.24	1636.41	8044.65	1636.4
8108.91	1636.24	8120.91	1636.41	8138.65	1636.65	8140.16	1636.61	8150.6	1636.1
8167.71	1636	8180.97	1636.05	8200.69	1637.74	8205.42	1638.09	8231.78	1637.9
8271.22	1637.82	8308.37	1637.63	8309.76	1637.8	8366.14	1638.32	8414.89	1638.3
8425.12	1637.86	8431.56	1637.61	8451.64	1637.58	8459.77	1637.6	8471.29	1637.5
8472.42	1637.52	8479.83	1637.71	8480.25	1637.71	8484.55	1637.71	8485.09	1637.7
8491.96	1637.56	8503.41	1637.56	8536.42	1637.77	8539.99	1637.81	8540.1	1637.8
8540.33	1637.81	8551.04	1637.89	8554.25	1637.87	8563.91	1637.88	8567.32	1637.8
8579.6	1637.99	8585.84	1637.98	8599.08	1638.13	8600.19	1638.13	8603.31	1638.1
8606.45	1638.19	8610.64	1638.21	8611.27	1638.24	8612.53	1638.26	8619.01	1638.5
8625.37	1638.77	8627.32	1638.85	8646.21	1638.46	8728.15	1637.17	8745.05	1637.1
8781.22	1637.26	8792.82	1637.34	8839.98	1637.58	8842.1	1637.45	8846.64	1637.5
8855.18	1636.89	8860.99	1636.6	8877.28	1636.72	8893.71	1636.95	8901.88	1637.1
8908.32	1637.38	8918.41	1637.7	8923.49	1637.79	8926.29	1637.85	8959.38	1637.9
9002.63	1637.87	9014.05	1637.91	9033.63	1638.12	9048.76	1638	9055.01	1637.8
9057.14	1637.81	9058.65	1637.82	9060.44	1637.79	9078.33	1637.59	9080.09	1637.6
9126.43	1637.85	9163.23	1637.31	9170.85	1637.26	9186.12	1637.18	9211.86	1637.1
9230.09	1637.2	9244.22	1636.99	9271.35	1636.67	9294.25	1636.66	9295.03	1636.6
9296.94	1636.63	9322.51	1636.39	9332.81	1636.31	9347.65	1636.24	9363.32	1636.2
9369.57	1636.18	9377.64	1636.15	9378.03	1636.15	9378.44	1636.15	9389.17	1638.8
9391.8	1639.37	9400.41	1637.75	9405.47	1636.68	9431.66	1637.15	9452.49	1637.5
9487.08	1637.94	9505.28	1637.64	9559	1638.2	9578.1	1638.37	9580.82	1638.4
9581.81	1638.31	9593.35	1637.58	9603.08	1637.88	9637.2	1638.03	9655.84	1638.3
9672.14	1638.8	9719.2	1639.35	9734	1639.48	9752.16	1639.83	9758.36	1640.1
9762.22	1640.22	9767.8	1640.5	9769.87	1640.59	9771.67	1640.24	9776.52	1639.3
9784.24	1637.71	9791.91	1638.19	9801.54	1638.67	9812.39	1639.22	9843.18	1640.1
9859.25	1640.33	9864.07	1639.38	9871.47	1637.89	9884.39	1637.9	9885.31	1637.9
9888.64	1637.99	9913.29	1638.69	9938.22	1639.23	9954.79	1638.02	9955.6	1638
9960.87	1638.01	9972.7	1638.16	9976.41	1638.06	9979.55	1637.88	9986.21	1637.5
9992.78	1636.96	9993.74	1636.88	9994.27	1636.85	10007.58	1637.87	10012.22	1638.1

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10020.33 1638.1710022.16  1638.110036.98 1639.5210043.62 1640.4810055.28  1640.3
10068.42 1640.0310089.93 1639.8510090.08 1639.8410106.37 1639.1210112.53  1638.8
10117.08 1638.6810120.53 1638.5410151.76 1637.1110153.41 1637.1110154.24  1637.1
 10169.4 1637.4310179.39 1637.5810182.39 1637.6710185.38 1637.6110199.71  1636.5
10206.93 1637.6710209.52 1638.0610236.19 1637.8110246.88 1637.7110255.19  1637.5
10304.59 1637.6110359.23  1637.610379.67 1637.6910386.83 1637.7310401.85  1638.8
10411.54  1639.510414.43 1639.7410434.12 1638.8210443.35  1638.410443.78  1638.4
 10449.6 1638.1610450.36 1638.1110462.38  1637.510464.09 1637.3610465.25  1637.4
 10480.9 1637.9310487.76 1638.1710508.76  1642.1

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 6861.52     .15 9347.65    .068 9976.41    .04510020.33    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9976.4110020.33               375  374.47     300             .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1639.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.129	0.045	0.068
W.S. Elev (ft)	1639.58	Reach Len. (ft)	375.00	374.47	300.00
Crit W.S. (ft)		Flow Area (sq ft)	5200.55	85.57	675.18
E.G. Slope (ft/ft)	0.009365	Area (sq ft)	5200.55	85.57	675.18
Q Total (cfs)	11309.00	Flow (cfs)	8866.15	426.02	2016.83
Top Width (ft)	3354.27	Top Width (ft)	2899.56	43.92	410.79
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)	1.70	4.98	2.99
Max Chl Dpth (ft)	5.66	Hydr. Depth (ft)	1.79	1.95	1.64
Conv. Total (cfs)	116861.4	Conv. (cfs)	91618.3	4402.2	20840.9
Length Wtd. (ft)	367.18	Wetted Per. (ft)	2903.16	44.01	411.36
Min Ch El (ft)	1636.85	Shear (lb/sq ft)	1.05	1.14	0.96
Alpha	1.33	Stream Power (lb/ft s)	1.79	5.66	2.87
Frctn Loss (ft)	3.55	Cum Volume (acre-ft)	1467.54	35.90	100.42
C & E Loss (ft)	0.01	Cum SA (acres)	823.48	14.34	71.23

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6861.52	7640.24	1287.09	993.79	652.31	11.38	1.53	1.30
7640.24	8418.96	2233.66	1475.54	766.44	19.75	1.93	1.51
8418.96	9197.69	2258.95	1495.10	778.83	19.97	1.92	1.51
9197.69	9976.41	3086.46	1236.12	705.58	27.29	1.75	2.50
LB 9976.41	RB 10020.33	426.02	85.57	44.01	3.77	1.95	4.98
10020.33	10508.76	2016.83	675.18	411.36	17.83	1.64	2.99

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.532**

INPUT
Description: RM. 3.532. HORZ. N VALUES USED.

Station Elevation Data num= 281

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6596.9	1635.6	6605.07	1635.21	6644.47	1635.08	6668.86	1634.95	6695.67	1634.65
6725.09	1633.8	6728.54	1633.76	6729.66	1633.73	6773.42	1633.87	6774.39	1633.86
6774.76	1633.9	6835.11	1632.74	6851.67	1632.86	6906.54	1632.39	6915.68	1632.44
6918.01	1632.5	6926.76	1632.69	6931.88	1632.73	6981.27	1633.65	7006.17	1633.71
7010.35	1633.8	7015.83	1633.69	7018.74	1633.81	7021.11	1633.9	7024.87	1633.86
7029.1	1633.8	7037.5	1633.55	7040.83	1633.49	7042.18	1633.45	7045.22	1633.35
7048.96	1633.2	7066.22	1633.58	7089.25	1633.95	7097.23	1633.55	7115.28	1634.89
7120.78	1635.2	7162.52	1634.84	7172.83	1634.77	7191.45	1634.8	7239.87	1635.15
7263.79	1635.3	7298.02	1635.58	7303.33	1635.69	7364.58	1635.03	7392.2	1634.58
7412.24	1634.7	7418.88	1634.8	7423.21	1634.43	7432.31	1633.52	7461.41	1633.56
7462.29	1633.6	7462.5	1633.58	7462.79	1633.6	7479.92	1634.81	7481.99	1634.78
7526.14	1634.7	7558.69	1634.68	7580.31	1634.37	7630.72	1634.34	7632.37	1634.33
7632.53	1634.3	7633.63	1634.32	7697.16	1634.01	7702.8	1633.15	7709.09	1632.29
7714.87	1632.3	7738.92	1632.41	7750.9	1634.28	7751.96	1634.36	7753.27	1634.33
7811.97	1634	7846.9	1634.3	7867.36	1634.24	7924.03	1634.19	7954.67	1634.17
7969.13	1634.1	7971.43	1634.16	7974.46	1633.5	7984.36	1631.53	7990.27	1632.3
7994.03	1632.8	7994.06	1632.79	8018.6	1632.77	8080.89	1632.46	8087.09	1632.74
8097.25	1632.3	8102.82	1632.15	8111.13	1632.21	8112.69	1632.21	8115.57	1632.23
8140.33	1632.2	8142.04	1632.23	8146.19	1632.18	8149.01	1632.15	8150.82	1632.15
8155.94	1632.2	8162.1	1632.26	8196.76	1632.74	8198.49	1632.76	8201.93	1632.83
8211.62	1633	8232.35	1633.59	8244.54	1633.84	8255.56	1634.11	8273.49	1634.56
8274.85	1634.6	8276.54	1634.64	8293.58	1634.72	8304.49	1634.83	8311.37	1634.97
8362.48	1635.2	8372.76	1635.3	8381.95	1635.4	8405.04	1635.12	8433.15	1634.59
8438.83	1634.5	8439.8	1634.47	8442.33	1634.43	8507.68	1633.96	8520.08	1633.87
8520.95	1633.9	8521.23	1633.85	8540.28	1632.96	8544.04	1633	8565.14	1632.69
8572.28	1632.7	8583.25	1632.51	8599.27	1633.44	8609.42	1633.95	8614.21	1634.83
8615.39	1635	8654.77	1634.65	8659.3	1634.58	8680.73	1634.55	8721.04	1634.59
8725.15	1633.2	8725.54	1633.05	8756.13	1633.1	8783	1633.2	8802.63	1633.26
8821.78	1633.3	8837.2	1632.29	8845.95	1631.92	8857.39	1632.05	8879.22	1632.03
8886.46	1632.1	8889.27	1632.04	8892.91	1633.4	8893.58	1633.75	8894.66	1633.75
8896.58	1633.8	8903.91	1633.8	8913.63	1633.83	8923.88	1633.77	8939.84	1634.01
8987.35	1634.2	9005.28	1634.27	9014.14	1634.27	9042.42	1633.97	9075.3	1633.92
9080.22	1633.9	9094.32	1633.75	9101.12	1633.84	9107.95	1633.39	9116.55	1632.32
9122.12	1632.2	9127.44	1632.18	9164.54	1632.2	9167.88	1632.29	9173.94	1632.56
9181.02	1632.8	9186.29	1633.13	9211.66	1633.25	9230.93	1633.38	9240.88	1633.47
9257.59	1633.6	9269.65	1633.02	9271.91	1633.06	9283.23	1632.27	9286.56	1633.33
9291.8	1634.3	9297.86	1634.17	9311.27	1633.66	9322.66	1633.05	9328.69	1633.32
9331.42	1633.3	9361.95	1633.99	9366.65	1634.25	9374.71	1634.65	9379.44	1634.87
9382.85	1635.1	9389.15	1635.19	9393.83	1635.21	9435.85	1635.46	9454.62	1635.46
9458.47	1635.5	9480.68	1635.36	9480.81	1635.37	9481	1635.38	9483.47	1635.36
9490.94	1635.9	9493.5	1635.93	9494.64	1635.94	9496.41	1635.82	9497.85	1635.67
9501.4	1635.4	9503.73	1635.46	9506.08	1635.44	9518.12	1635.58	9532.19	1635.57
9572.97	1635.6	9577.39	1635.66	9586.36	1635.62	9593.54	1635.56	9599.16	1635.96
9605.16	1635.7	9606.85	1635.08	9613.56	1635	9651.71	1634.64	9655.15	1634.61
9660.51	1634.6	9662.19	1634.52	9680.36	1633.21	9681.25	1633.17	9686.52	1633.23
9693.08	1633.4	9694.81	1633.37	9705.17	1633.11	9719.19	1636.77	9719.89	1636.96
9720.5	1636.9	9727.11	1636	9733.3	1635.01	9754.18	1635.62	9776.15	1636.41
9776.38	1636.4	9783.04	1635.59	9784.85	1635.37	9835.89	1636.29	9839.85	1636.34
9851.14	1634.7	9855.79	1634.06	9856.34	1634.13	9858.51	1634.38	9871.02	1635.79

9877.79	1636.5	9888.4	1636.44	9906.83	1636.3	9916.41	1636.27	9925.37	1636.12
9938.02	1635.8	9938.48	1635.79	9938.58	1635.78	9938.79	1635.76	9947.15	1635.05
9951.96	1634.5	9963.14	1634.39	9973.21	1634.56	9983.27	1635.23	9996.84	1635.42
10014.05	1635.4	10019.88	1634.77	10033.01	1633.73	10046.05	1634.82	10051.24	1635.04
10057.73	1635.7	10057.87	1635.72	10058.73	1635.72	10078.09	1635.65	10091.32	1635.66
10095.68	1635.6	10095.96	1635.56	10101.99	1634.31	10108.59	1634.53	10122.33	1634.86
10136.83	1634.6	10149.01	1634.04	10158.5	1633.16	10161.75	1632.89	10166.91	1635.14
10179.06	1640.9								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6596.9	.15	9694.81	.068	9938.79	.045	10057.73	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9938.79	10057.73	260	371.74	350	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1636.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.148	0.045	0.068
W.S. Elev (ft)	1636.04	Reach Len. (ft)	260.00	371.74	350.00
Crit W.S. (ft)		Flow Area (sq ft)	6454.78	139.38	134.37
E.G. Slope (ft/ft)	0.010126	Area (sq ft)	6454.78	139.38	134.37
Q Total (cfs)	11309.00	Flow (cfs)	10461.28	514.05	333.67
Top Width (ft)	3473.16	Top Width (ft)	3243.14	118.94	111.08
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)	1.62	3.69	2.48
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)	1.99	1.17	1.21
Conv. Total (cfs)	112384.8	Conv. (cfs)	103960.5	5108.4	3315.9
Length Wtd. (ft)	274.68	Wetted Per. (ft)	3246.83	119.19	111.96
Min Ch El (ft)	1633.73	Shear (lb/sq ft)	1.26	0.74	0.76
Alpha	1.14	Stream Power (lb/ft s)	2.04	2.73	1.88
Frctn Loss (ft)	2.66	Cum Volume (acre-ft)	1417.37	34.94	97.63
C & E Loss (ft)	0.01	Cum SA (acres)	797.04	13.64	69.43

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6596.90	7432.37	2262.54	1523.90	836.13	20.01	1.82	1.48
7432.37	8267.84	3613.05	2018.06	836.19	31.95	2.42	1.79
8267.84	9103.32	2822.78	1740.35	836.30	24.96	2.08	1.62
9103.32	9938.79	1762.91	1172.47	738.20	15.59	1.59	1.50
LB 9938.79	RB 10057.73	514.05	139.38	119.19	4.55	1.17	3.69
10057.73	10179.06	333.67	134.37	111.96	2.95	1.21	2.48

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.462**

INPUT
Description: RM.3.462. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR SIGNAL BUTTE RD.

Station Elevation Data num= 268

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6404.21	1633.9	6418.29	1634.05	6426.22	1633.99	6435.65	1633.85	6456.77	1633.66
6466.46	1633.6	6483.24	1633.1	6489.29	1633.06	6493.32	1633.37	6496.1	1632.72
6501.79	1632.6	6511.26	1632.77	6518.61	1632.99	6522.99	1633.01	6538.14	1632.91
6544.98	1632.8	6572.22	1632.31	6576.07	1632.29	6626.13	1632.44	6632.21	1632.5
6642.48	1632.3	6700.68	1631.44	6711.26	1631.4	6729	1631.31	6737.54	1631.66
6780.36	1632	6800.54	1631.66	6807.39	1632.21	6815.99	1630.23	6819.01	1629.57
6819.59	1629.6	6822.95	1629.94	6825.1	1630.13	6844.59	1629.89	6846.73	1629.85
6847.41	1629.8	6849.82	1630.08	6863.59	1631.94	6895.68	1631.53	6912.25	1631.34
6925.63	1631.3	6948.21	1631.31	6983.31	1631.33	7053.54	1631.5	7110.79	1631.78
7115.27	1631.8	7163.13	1631.88	7163.34	1631.88	7163.45	1631.88	7163.58	1631.88
7164.14	1631.9	7205.11	1631.59	7231.79	1631.53	7246.9	1631.4	7267.24	1631.41
7288.4	1631.5	7299.99	1631.46	7335.99	1631.52	7339.81	1631.53	7379.14	1631.25
7404.45	1631.2	7416.91	1631.29	7453.01	1630.97	7491.86	1631.44	7520.16	1631.54
7537.29	1631.3	7565.05	1630.52	7565.74	1630.52	7571.59	1630.53	7593.21	1630.57
7596.72	1630.6	7598.53	1630.66	7610.01	1631.18	7613.12	1631.17	7615.83	1631.37
7678.18	1631.5	7737.93	1631.52	7780.99	1631.33	7818.56	1630.95	7850.35	1630.88
7864.79	1630.5	7889.38	1630.29	7894.05	1629.16	7898.23	1628.59	7906.89	1629.83
7908.26	1630	7957.42	1629.83	7971.76	1629.8	7976.6	1629.89	8007.48	1630.55
8008.83	1630.6	8011.14	1630.49	8020.1	1630.17	8037.7	1630.52	8051.65	1630.77
8062.81	1631.1	8069	1631.28	8073.79	1631.39	8091.14	1631.68	8107.81	1631.91
8160.24	1632.2	8171.11	1632.34	8192.38	1631.92	8193.4	1631.89	8211.05	1631.94
8284.95	1632.1	8294.58	1631.04	8300.31	1630.53	8301.89	1630.56	8336.73	1630.95
8341.11	1630.9	8342.32	1631.1	8343.49	1631.15	8345	1631.23	8354.85	1631.88
8376.24	1632	8387.05	1632.1	8403.77	1632.27	8412.43	1632.32	8423.38	1632.39
8445.87	1632	8473.67	1632.25	8480.66	1632.24	8480.98	1632.12	8487.56	1630.21
8488.71	1630.2	8491.12	1630.22	8560.27	1630.42	8590.31	1630.21	8594.04	1630.19
8596.63	1630.1	8606.51	1629.24	8606.96	1629.23	8635.13	1629.42	8639.06	1628.89
8640.65	1628.9	8642.14	1628.96	8646.52	1629.56	8677.75	1629.81	8681.23	1630.16
8688.42	1631.3	8690.31	1631.34	8695.63	1631.37	8700.63	1631.38	8703.24	1631.37
8744.8	1631.7	8759.95	1631.65	8774.1	1631.69	8778.76	1631.68	8807.14	1631.49
8820.34	1631.4	8851.88	1631.26	8855.04	1631.25	8864.13	1631.12	8872.58	1630.23
8875.87	1629.9	8886.1	1629.87	8891.03	1629.89	8896.65	1629.96	8920.22	1629.87
8923.43	1629.9	8940.81	1630.1	8944.45	1630.14	8945.68	1630.16	8948.2	1630.23
8988.99	1630.3	8997.55	1630.23	9013.63	1630.16	9053.58	1629.58	9055.99	1630.14
9059.71	1631.5	9081.41	1631.53	9088.21	1631.67	9111.03	1632.23	9144.49	1631.88
9172.64	1631.6	9180.98	1631.57	9186.06	1630.41	9186.81	1630.29	9189.94	1630.35
9220.96	1631	9222.42	1630.97	9227.47	1631.53	9232.06	1632.08	9250.24	1631.93
9280.64	1631.7	9286.95	1631.63	9316.12	1631.73	9316.14	1631.73	9316.29	1631.74
9316.47	1631.7	9332.8	1631.48	9352.27	1630.96	9354.59	1630.9	9356.06	1630.86
9376.42	1631	9385.31	1631.07	9398.73	1631.36	9403.58	1631.43	9406.84	1631.52
9415.05	1631.5	9415.9	1631.55	9416.3	1631.55	9425.53	1631.68	9426.17	1631.68
9426.74	1631.7	9427.08	1631.68	9427.42	1631.68	9436.46	1631.67	9444.1	1631.65
9455.53	1631.6	9468.68	1631.59	9484.74	1631.37	9488.29	1631.44	9495.1	1631.64
9506.08	1631.9	9513.37	1632.09	9513.75	1632.09	9520.53	1632.12	9523.15	1632.14
9532.7	1632.2	9546.05	1632.25	9554.45	1632.26	9555.86	1632.29	9569.92	1632.7
9576.78	1632.9	9585.46	1632.97	9591.22	1633.01	9630.2	1632.38	9669.99	1633.26
9678.1	1633.2	9705.44	1632.89	9726.82	1632.55	9742.94	1632.52	9745.35	1632.68
9752.31	1633.2	9772.7	1632.22	9785.42	1631.71	9795.56	1631.39	9796.63	1631.21

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 9806.09    1632 9813.87 1632.52 9816.72 1632.55 9822.61 1632.66 9844.22 1633.05
 9868.63  1633.2 9871.69 1633.19 9876.87 1633.01 9878.35 1632.97 9935.39 1633.05
 9941.71  1633.1 9966.25 1627.59 9966.51 1627.52    9968 1627.25 9970.19 1627.33
 9989.33  1627.610007.52 1630.4710011.41  1631.410026.68 1631.8210041.71 1632.19
 10073.3  1633.110081.64 1633.3610091.03 1633.5810102.65 1633.9310103.77    1634
10104.34    163410106.12 1634.0310167.53 1638.05

Manning's n Values          num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 6404.21     .15 9822.61    .068 9941.71    .045 10073.3    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9941.71 10073.3              400  399.38     400             .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1633.42   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.14   Wt. n-Val.                0.150      0.045      0.068
  W.S. Elev (ft)            1633.28   Reach Len. (ft)          400.00     399.38     400.00
  Crit W.S. (ft)                      Flow Area (sq ft)       6319.16     358.20       0.54
  E.G. Slope (ft/ft)       0.009138   Area (sq ft)            6319.16     358.20       0.54
  Q Total (cfs)            11309.00   Flow (cfs)              9115.68    2193.09       0.23
  Top Width (ft)            3600.59   Top Width (ft)          3463.12     131.59       5.88
  Vel Total (ft/s)             1.69   Avg. Vel. (ft/s)           1.44       6.12       0.42
  Max Chl Dpth (ft)            6.03   Hydr. Depth (ft)           1.82       2.72       0.09
  Conv. Total (cfs)        118306.9   Conv. (cfs)            95362.0    22942.6        2.4
  Length Wtd. (ft)           399.90   Wetted Per. (ft)        3465.55     132.60       5.88
  Min Ch El (ft)            1627.25   Shear (lb/sq ft)           1.04       1.54       0.05
  Alpha                        3.12   Stream Power (lb/ft s)     1.50       9.44       0.02
  Frctn Loss (ft)              3.44   Cum Volume (acre-ft)    1379.24      32.81      97.09
  C & E Loss (ft)              0.02   Cum SA (acres)           777.02      12.57      68.96

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta       Flow       Area       W.P.     % Conv.    Hydr D.   Velocity
  (ft)         (ft)            (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  6404.21      7288.58       1557.33    1257.93    810.60      13.77      1.55       1.24
  7288.58      8172.96       3060.93    1954.08    884.73      27.07      2.21       1.57
  8172.96      9057.33       3333.58    2057.22    885.26      29.48      2.33       1.62
  9057.33      9941.71       1163.85    1049.93    884.96      10.29      1.19       1.11
  LB 9941.71   RB 10073.30   2193.09     358.20    132.60      19.39      2.72       6.12
  10073.30     10167.53         0.23       0.54      5.88       0.00      0.09       0.42

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.386**

INPUT
Description: RM. 3.386. BLOCKED INEFF. FLOW AREA USED BELOW EL.1626 AND BETWEEN STA.8450 AND 8670 TO BLOCK OUT RET.BASIN. HORZ. N VALUES USED.

Station Elevation Data num= 296

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6177.65	1630.6	6204.47	1630.4	6260.31	1630.17	6315.77	1629.94	6331.51	1629.98
6340.18	1629.9	6363.04	1629.74	6384.72	1629.57	6386.61	1629.44	6396.67	1628.86
6398.19	1629	6405.25	1629.35	6418.88	1629.36	6424.03	1629.49	6439.84	1629.48
6444.11	1629.3	6445.73	1629.35	6466.06	1629.33	6469.69	1629.33	6472.94	1629.32
6488.93	1629.3	6513.31	1629.31	6549.51	1629.09	6552.17	1629.21	6556.68	1628.85
6560.8	1628.5	6564.53	1628.18	6576.77	1628.23	6593.83	1628.29	6599.27	1628.13
6600.28	1628.1	6606.04	1628.12	6644.15	1628.44	6676.2	1628.68	6694.83	1628.53
6697.96	1628.5	6700.59	1628.48	6700.88	1628.48	6701.02	1628.48	6702.66	1628.48
6708.15	1628.5	6742.99	1626.98	6775.67	1626.81	6777.22	1627.07	6784.54	1627.11
6807.17	1627.4	6807.4	1627.39	6810.27	1627.68	6815.41	1628.13	6818.18	1628.14
6880.59	1628.6	6901.75	1628.68	6906.97	1628.68	6911.28	1628.71	6920.24	1628.54
6938.68	1628.3	6972.89	1628.2	6973.53	1628.23	6975.15	1628.31	6979.3	1628.5
6980.9	1628.5	6982.29	1628.48	6984.3	1628.43	6987.91	1628.23	6988.65	1628.23
6991.02	1628.2	6993.33	1628.26	7019.08	1628.54	7020.62	1628.55	7023.28	1628.5
7025.4	1628.4	7027.26	1628.42	7029.37	1628.36	7032.31	1628.34	7048.79	1628.16
7108.89	1627.9	7122.96	1627.92	7127.19	1627.93	7140.2	1627.9	7155.55	1627.9
7190.99	1627.7	7192.62	1627.62	7195.67	1627.4	7199.9	1627.42	7232.49	1627.23
7235.31	1627.2	7237.09	1627.35	7241.73	1627.75	7245.57	1628.08	7250.45	1628
7346.36	1627.1	7363.33	1626.94	7374.54	1626.83	7404.18	1626.63	7406.93	1626.61
7413.29	1626.9	7415.5	1626.98	7416.97	1627.05	7443.77	1626.92	7446.86	1626.88
7448.7	1626.9	7453.8	1626.63	7483.96	1626.74	7534.75	1626.72	7561.67	1626.95
7579.65	1626.9	7585.28	1627.2	7594.97	1626.69	7599.74	1626.46	7608.23	1626.48
7625.04	1626.3	7627.27	1626.31	7630.02	1626.29	7636.12	1626.27	7643.68	1626.27
7648.72	1626.2	7649.38	1626.26	7650.1	1626.28	7651.62	1626.36	7652.53	1626.37
7664.9	1626.8	7665.29	1626.77	7671.62	1626.77	7700.23	1627.13	7767.55	1628.11
7791.94	1628.2	7846.52	1628.41	7849.79	1628.4	7895.45	1628.35	7923.69	1628.44
7926.05	1628.4	7929.13	1628.45	7931.62	1628.43	7932.81	1628.44	7941.2	1628.43
7942.09	1628.4	7978.67	1628.43	7998.02	1628.42	8000.07	1628.67	8001.54	1629.28
8002.1	1629.4	8004.84	1628.95	8005.47	1628.78	8020.09	1628.21	8029.42	1628.41
8034.23	1628.6	8036.79	1628.78	8073.09	1629.01	8091.74	1629.03	8112.78	1629.07
8157.07	1628.2	8159.09	1628.19	8159.95	1628.18	8162.27	1628.11	8217.42	1627.94
8226.28	1627.9	8227.45	1627.93	8236.42	1627.88	8261.2	1627.65	8300.28	1627.2
8308.24	1627.7	8311.77	1627.95	8314.65	1627.9	8319.88	1627.92	8323.54	1628.03
8361.12	1628.3	8367.22	1628.3	8405.92	1628.48	8411.82	1628.23	8426.19	1626.21
8450.12	1622.4	8460.1	1622.57	8470.24	1622.72	8524.36	1623.61	8534.46	1623.76
8573.34	1624	8577.18	1624.01	8598.91	1623.76	8600.83	1623.58	8621.5	1623.18
8631.49	1623	8635.98	1623.8	8649.33	1626.25	8652	1626.26	8672.94	1626.33
8678.95	1626.3	8708.17	1626.28	8713.26	1626.52	8720.27	1626.82	8744.55	1627.47
8746.27	1627.5	8747.66	1627.53	8748.13	1627.53	8750.79	1627.5	8772.03	1627.05
8783.39	1627	8794.1	1626.91	8795.95	1626.9	8806.79	1627.01	8814.11	1627.03
8825.45	1627.1	8834.11	1627.13	8841.84	1627.14	8846.75	1627.1	8872.11	1627.11
8875.97	1627.3	8877.92	1627.41	8890.17	1628.06	8905.85	1628.94	8914.2	1628.94
8917.39	1628.8	8922.98	1628.66	8929.36	1628.37	8948.54	1627.53	8949.37	1627.49
8949.49	1627.5	8949.64	1627.48	8949.77	1627.48	8971.82	1627.54	8984.69	1627.73
8993.18	1628	9003.19	1628.28	9040.1	1628.36	9057.89	1628.47	9073.89	1628.56
9088.7	1628.7	9089.43	1628.6	9107.24	1628.7	9121.77	1628.8	9125.55	1629.72
9128.4	1630.3	9136.86	1630.31	9156.57	1630.36	9162.46	1630.41	9201.12	1630.64
9221.99	1630.3	9230.56	1630.25	9232.3	1629.63	9233.3	1629.29	9234.82	1629.1

9240.54	1628.5	9244.9	1628.63	9251.79	1628.84	9265.18	1629.19	9278.15	1629.49
9312.25	1630.3	9332.4	1630.65	9335.62	1630.62	9362.62	1630.41	9392.11	1630.18
9399.66	1630.4	9415.28	1630.87	9424.84	1630.94	9454.47	1630.35	9465.15	1631.31
9480.83	1631.1	9496.77	1631.21	9523.65	1630.33	9550.56	1630.62	9563.72	1630.29
9585.87	1629.9	9622.89	1629.42	9653.41	1630.15	9658.36	1630.2	9675.32	1629.78
9717.06	1629.8	9727.86	1630.08	9755.6	1630.25	9761.78	1630.28	9762.36	1630.21
9790.85	1629.7	9855.16	1629.63	9880.56	1629.21	9883.25	1629.16	9893.41	1629.24
9902.61	1629.3	9903.09	1629.33	9914.39	1629.69	9920.41	1629.8	9921.82	1629.82
9942.96	1630	9967.41	1630.22	9972.82	1628.41	9987.58	1623.47	9992.37	1623.48
10006.07	1623.4	10015.25	1626.67	10023.32	1629.57	10041.78	1629.53	10047.69	1629.5
10049.35	1629.5	10076.89	1629.73	10129.81	1630.03	10181.45	1629.89	10210.73	1629.93
10228.1	1630.1								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
6177.65	.15	9480.83	.068	9967.41	.045	10076.89	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9967.41	10076.89	450	404.63	380	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8470	8670	1626

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1629.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.150	0.045	0.068
W.S. Elev (ft)	1629.88	Reach Len. (ft)	450.00	404.63	380.00
Crit W.S. (ft)	1628.28	Flow Area (sq ft)	6499.59	255.20	2.00
E.G. Slope (ft/ft)	0.008074	Area (sq ft)	6499.59	255.20	2.00
Q Total (cfs)	11309.00	Flow (cfs)	9985.92	1322.38	0.70
Top Width (ft)	3233.20	Top Width (ft)	3098.19	108.46	26.55
Vel Total (ft/s)	1.67	Avg. Vel. (ft/s)	1.54	5.18	0.35
Max Chl Dpth (ft)	7.48	Hydr. Depth (ft)	2.10	2.35	0.08
Conv. Total (cfs)	125855.8	Conv. (cfs)	111131.4	14716.6	7.8
Length Wtd. (ft)	444.18	Wetted Per. (ft)	3100.02	110.58	26.55
Min Ch El (ft)	1623.40	Shear (lb/sq ft)	1.06	1.16	0.04
Alpha	1.86	Stream Power (lb/ft s)	1.62	6.03	0.01
Frctn Loss (ft)	3.94	Cum Volume (acre-ft)	1320.39	30.00	97.07
C & E Loss (ft)	0.01	Cum SA (acres)	746.90	11.47	68.81

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6177.65	7125.09	1163.33	1096.62	782.33	10.29	1.40	1.06
7125.09	8072.53	3265.47	2199.54	947.80	28.87	2.32	1.48
8072.53	9019.97	5348.19	2957.96	948.37	47.29	3.12	1.81
9019.97	9967.41	208.93	245.47	421.51	1.85	0.58	0.85
LB 9967.41	RB 10076.89	1322.38	255.20	110.58	11.69	2.35	5.18
10076.89	10228.10	0.70	2.00	26.55	0.01	0.08	0.35

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.310**

INPUT
Description: RM. 3.310. HORZ. N VALUES USED.

Station Elevation Data num= 254

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6115.85	1625.1	6163.39	1625.02	6222.58	1624.92	6254.16	1624.83	6273.71	1624.88
6273.86	1624.9	6274.38	1624.94	6282.2	1625.7	6289.84	1626.31	6294.82	1626.37
6297.08	1626.4	6305.68	1625.78	6313.85	1624.83	6315.75	1624.79	6335.86	1624.76
6346	1624.9	6357.24	1624.96	6357.43	1624.97	6385.06	1625.02	6434.59	1624.81
6463.77	1624.8	6477.93	1624.64	6521.21	1624.34	6521.41	1624.34	6531.86	1624.32
6545.05	1624.2	6562.22	1624.3	6564.21	1624.37	6565.45	1624.47	6567.33	1624.59
6569.23	1624.7	6577.1	1625.22	6595	1624.93	6671.72	1624.23	6675.85	1624.23
6677.39	1624.2	6684.65	1624.18	6727.29	1624.25	6739.74	1624.11	6744.92	1624.04
6749.5	1623.7	6768.56	1623.42	6769.93	1623.86	6777.98	1624.07	6780.17	1624.04
6785.35	1623.9	6791.23	1624.17	6791.55	1624.17	6793.22	1624.17	6794.1	1624.17
6796.53	1624.2	6822.13	1624.16	6833.62	1624.15	6839.54	1624.19	6844.07	1624.18
6884.4	1623.7	6890.07	1623.66	6892.76	1623.61	6893.87	1623.61	6894.66	1623.6
6895.31	1623.6	6895.74	1623.6	6899.01	1623.56	6899.16	1623.56	6900.51	1623.56
6916.13	1623.5	6958.36	1623.44	6961.04	1623.38	6969.36	1623.16	6978.68	1623.32
7001.12	1623.5	7007.79	1623.81	7013.57	1624.01	7030.17	1623.97	7060.38	1624
7089.57	1623.7	7148.3	1623.53	7165.42	1623.39	7180.11	1623.36	7180.6	1623.3
7188.58	1622.3	7208.27	1622.34	7219.88	1622.48	7227.13	1622.76	7230.1	1622.85
7251.73	1623.2	7258.44	1623.32	7263.33	1623.38	7303.1	1623.61	7384.27	1623.93
7412.28	1623.8	7421.69	1623.7	7427.49	1623.68	7433.65	1623.75	7489.82	1624.15
7496.88	1624.2	7498.5	1624.18	7518.97	1624.46	7539.69	1624.46	7592.31	1624.31
7610.88	1624.3	7615.44	1624.29	7629.44	1624.24	7667.49	1624.17	7685.4	1624.03
7733.46	1623.7	7742.59	1623.71	7757.65	1623.83	7772.01	1623.99	7786.31	1624.05
7796.14	1624.2	7821.12	1624.34	7838.02	1624.4	7859.11	1624.55	7927.05	1623.98
7944.24	1623.9	7978.01	1624.29	7978.15	1624.25	7985.17	1623.26	8022.94	1624.22
8026.69	1624.3	8050.54	1624.18	8096.53	1623.78	8164.93	1623.76	8195.62	1623.89
8215.25	1624	8272.78	1624.26	8276.63	1624.18	8291.77	1623.93	8317.31	1623.52
8333.46	1623.1	8350.5	1623.14	8394.21	1623.22	8410.17	1623.21	8411.51	1623.31
8432.94	1624.1	8437.62	1624.17	8440.78	1624.15	8471.85	1623.74	8473.81	1623.76
8478.82	1623.8	8482.02	1623.66	8542.26	1623.9	8557.17	1623.79	8559.16	1623.73
8561.39	1623.8	8571.07	1623.73	8632.74	1623.52	8689.2	1623.89	8702.66	1623.94
8721.65	1623.9	8791.57	1624.14	8801.64	1624.22	8808.8	1624.17	8832.63	1624.53
8835.66	1624.5	8876.08	1624.64	8876.87	1624.64	8884.9	1624.71	8891.17	1627.27
8891.81	1627.4	8893.69	1626.85	8899.94	1625.05	8902.11	1625.02	8909.46	1624.78
8927.51	1624.6	9022.01	1623.99	9024.96	1623.96	9030.07	1623.58	9038.88	1622.91
9051.26	1623.8	9060.35	1624.66	9063.16	1624.72	9070.01	1624.62	9105.63	1624.87
9107.19	1625	9109.11	1625	9122.21	1625.13	9125.44	1624.81	9131.25	1624.18
9141.29	1624.5	9148.38	1624.75	9164.93	1625.33	9278.35	1626.44	9283.64	1626.48
9290.82	1626.5	9302.33	1626.63	9402.15	1627.32	9415.03	1627.45	9422.46	1627.18
9434.5	1626.8	9448.38	1626.43	9452.69	1626.31	9467.3	1626.77	9474.83	1627
9478.35	1627	9521.06	1626.74	9571.17	1626.81	9639.77	1626.36	9642.6	1626.33
9643.01	1626.3	9643.41	1626.32	9649.5	1626.32	9758.49	1626.17	9790.28	1626.17
9835.07	1626.5	9873.52	1626.68	9878.4	1626.56	9884.11	1626.48	9894.82	1626.29
9897.54	1626.2	9938.09	1625.87	9950.84	1629.16	9951.34	1629.3	9951.9	1629.3
9960.05	1629.3	9973.23	1625.01	9986.23	1620.77	9993.8	1620.89	10012.1	1621.2

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10014.66  1622.110025.24 1623.8710026.15 1624.0510046.39 1626.8310048.11 1626.85
10070.23    162710100.76 1626.9510119.12 1626.8210193.19 1625.84   10205 1626.01
10209.65  1626.110217.73 1626.2710223.02 1626.3810238.65 1626.1910261.93 1626.04
10268.11  1626.3 10275.8 1626.6610280.53 1626.8710298.79 1627.7610298.91 1627.77
10299.28  1627.810299.78 1627.7610323.66 1627.4610324.09 1627.4610325.69 1627.46
10336.34  1627.410340.17 1627.4410346.96 1627.4310356.13 1627.4410360.17 1627.53
10368.85  1627.410371.49 1627.3810379.46 1627.7710383.71 1627.76

Manning's n Values          num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 6115.85     .15  7303.1      .1 8571.07     .15 9070.01    .068 9973.23    .045
10046.39    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9973.2310046.39               380  395.59     410            .1       .3
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1626.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.120	0.045	0.068
W.S. Elev (ft)	1625.86	Reach Len. (ft)	380.00	395.59	410.00
Crit W.S. (ft)	1625.31	Flow Area (sq ft)	5365.19	219.47	0.02
E.G. Slope (ft/ft)	0.009804	Area (sq ft)	5365.19	219.47	0.02
Q Total (cfs)	11309.00	Flow (cfs)	9729.38	1579.62	0.00
Top Width (ft)	3144.29	Top Width (ft)	3075.70	66.08	2.51
Vel Total (ft/s)	2.03	Avg. Vel. (ft/s)	1.81	7.20	0.09
Max Chl Dpth (ft)	5.09	Hydr. Depth (ft)	1.74	3.32	0.01
Conv. Total (cfs)	114213.1	Conv. (cfs)	98260.0	15953.1	0.0
Length Wtd. (ft)	381.60	Wetted Per. (ft)	3077.63	67.20	2.51
Min Ch El (ft)	1620.77	Shear (lb/sq ft)	1.07	2.00	0.01
Alpha	2.45	Stream Power (lb/ft s)	1.93	14.39	0.00
Frctn Loss (ft)	3.85	Cum Volume (acre-ft)	1259.10	27.80	97.07
C & E Loss (ft)	0.02	Cum SA (acres)	715.01	10.66	68.69

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
6115.85	7080.20	1735.66	1381.63	944.93	15.35	1.46	1.26
7080.20	8044.54	3929.77	1906.96	964.53	34.75	1.98	2.06
8044.54	9008.89	3669.01	1839.57	955.31	32.44	1.93	1.99
9008.89	9973.23	394.93	237.04	212.86	3.49	1.12	1.67
LB 9973.23	RB 10046.39	1579.62	219.47	67.20	13.97	3.32	7.20
10046.39	10383.71	0.00	0.02	2.51	0.00	0.01	0.09

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.235**

INPUT
Description: RM. 3.235. HORZ. N VALUES USED.

Station Elevation Data num= 270

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5901.57	1621.9	5921.29	1621.96	5997.74	1621.34	6015.78	1621.24	6023.78	1621.43
6029.98	1621.6	6033.72	1621.62	6036.81	1621.43	6057.18	1621.25	6064.42	1621.14
6065.64	1621.2	6072.28	1621.6	6084.26	1622.31	6105.56	1621.93	6118.31	1621.72
6160.44	1621.3	6198.56	1620.86	6205.85	1620.8	6229	1620.58	6232.43	1620.55
6240.13	1620.7	6250.7	1620.99	6253.67	1621.08	6258.59	1621.04	6264.34	1621.04
6284.14	1621	6284.57	1621.03	6324.09	1620.91	6372.44	1620.72	6406.78	1620.8
6418.67	1621	6423.44	1620.86	6434.87	1621.07	6451.63	1621.52	6460.2	1621.48
6514.73	1621.6	6598.11	1621.6	6621.62	1621.16	6674.16	1620.54	6690.71	1620.3
6704.02	1620.2	6704.17	1620.21	6728.51	1620.35	6754.71	1620.49	6765.55	1620.32
6766.65	1620.4	6775.01	1621.18	6775.09	1621.18	6775.15	1621.18	6776.51	1621.21
6787.78	1621.4	6788.33	1621.41	6788.84	1621.39	6792.08	1621	6798.28	1619.73
6825.23	1619.8	6825.66	1619.95	6826.9	1619.92	6830.64	1619.64	6831.94	1620.05
6835.39	1620.2	6848.24	1620.6	6871.98	1620.37	6893.6	1620.13	6907.02	1620.11
6913.53	1620.1	6940.25	1619.53	6959.27	1619.19	6975.35	1619.67	6996.51	1620.49
6998.21	1620.5	7004.36	1620.65	7013.88	1620.69	7045.23	1621.09	7049.32	1621.14
7081.5	1620.3	7091.26	1620.07	7102.15	1619.89	7132.2	1619.5	7153.56	1619.39
7155.13	1619.4	7181.14	1619.11	7191.84	1619.2	7231.53	1619.43	7235.48	1619.45
7236.17	1619.5	7339.52	1620.48	7356.16	1620.5	7387.54	1619.78	7394.55	1619.63
7395.82	1619.6	7402.51	1620	7406.73	1619.95	7412.61	1619.93	7454.31	1620.07
7454.96	1620	7461.58	1620.02	7467.4	1620.16	7521.92	1620.51	7595.3	1620.38
7704.32	1621.3	7709.22	1621.28	7710.35	1621.26	7712.46	1621.22	7713.94	1621.19
7728.05	1620.9	7755.04	1620.94	7769.15	1620.11	7775.52	1620.18	7784.6	1620.26
7794.36	1620.3	7811.08	1620.27	7821.71	1620.23	7845.33	1620.11	7857.06	1620.15
7886.72	1620.2	7927.37	1620.26	7954.02	1620.51	7980.24	1620.87	7986.96	1620.84
8005.24	1620.9	8066.49	1621.01	8070.12	1621.01	8071.27	1621.01	8073.59	1621.02
8086.67	1620.7	8138.22	1619.48	8150.44	1619.49	8154.64	1619.5	8182.27	1619.55
8190.21	1619.5	8212.48	1619.32	8217.96	1619.15	8251.52	1619.45	8276.13	1619.38
8302.42	1619.5	8309.23	1619.59	8429.25	1619.42	8432.31	1619.42	8432.81	1619.42
8433.92	1619.4	8438.74	1619.43	8562.74	1619.83	8590.46	1620.3	8639.91	1620.75
8645.27	1620.8	8656.61	1620.95	8673.22	1621.61	8685.62	1621.65	8731.18	1621.9
8735.19	1621.9	8757.56	1621.21	8793.05	1620.62	8796.13	1620.59	8801.72	1620.56
8841.23	1620.4	8876.4	1621.37	8936.13	1621.35	8993.97	1621.37	8996.93	1621.35
8997.92	1621.4	8998.54	1621.38	9000.21	1621.38	9002.11	1621.38	9049.22	1621.59
9051.59	1621.6	9057.13	1621.72	9061.02	1621.8	9091.89	1622.75	9109.55	1622.88
9137.11	1623	9147.52	1622.89	9155.03	1622.98	9163.51	1623.09	9269.31	1624.08
9325.02	1624.6	9349.84	1625.07	9349.87	1625.07	9349.97	1625.07	9372.56	1623.91
9373.53	1623.9	9384.46	1624.48	9387.57	1624.75	9393.22	1624.74	9508.46	1623.97
9516.32	1623.9	9528.31	1623.74	9628.03	1622.79	9661.68	1622.6	9710.7	1622.75
9727.9	1622.7	9728.74	1622.72	9729.35	1622.72	9747.6	1622.77	9817.83	1622.73
9867.18	1622.7	9882.34	1622.75	9887.34	1622.83	9903.85	1623.12	9951.2	1624.19
9965.45	1624.4	9972.67	1624.77	9982.97	1621.36	9990.18	1618.99	10000.25	1618.92
10003.15	1618.91	0005.35	1618.89	10014.71	1619.16	10017.03	1619.07	10030.43	1623.81
10035.08	1625.31	0038.45	1625.41	10045.59	1625.53	10048.52	1625.62	10055.12	1624.38
10059.06	1623.21	0071.94	1623.31	0092.29	1623.34	10102.73	1623.31	10115.51	1623.37
10123.62	162	10129.22	1620.95	10142.89	1622.25	10143.04	1622.26	10143.09	1622.26
10151.93	1622.61	0157.18	1622.16	10159.34	1621.61	0160.55	1621.41	0173.88	1622.03
10180.06	1622.41	0183.55	1622.45	10185.94	1622.46	10215.89	1622.22	10231.71	1622.28
10233.9	1622.31	0234.65	1622.29	10240.37	1622.36	10256.79	1622.59	10267.32	1622.5
10276.2	1622.31	0283.62	1622.55	10296.17	1622.71	0303.18	1622.87	10314.95	1623.13

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10328.48  1620.810329.96 1620.56   10331  1620.710336.97 1621.7510348.87 1623.11
10351.22  1623.510359.37  1623.610368.35 1623.5310383.22 1623.4710390.48 1623.33
10402.36  1623.4 10413.7 1623.5910419.26 1623.6410422.95  1623.710448.87 1624.46
10453.16  1624.610492.73 1624.4710523.98 1624.1810525.37 1624.1510529.62 1624.04
10542.18  1623.710546.82 1623.9810558.72 1624.5910565.55 1624.6610573.22 1624.78

Manning's n Values          num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 5901.57     .15 6913.53    .068 7794.36     .12 8685.62    .068 9972.67    .045
10035.08    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9972.6710035.08               375  388.39     390              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1622.15  Element                    Left OB    Channel   Right OB
  Vel Head (ft)                0.11  Wt. n-Val.                  0.094      0.045      0.068
  W.S. Elev (ft)            1622.05  Reach Len. (ft)            375.00     388.39     390.00
  Crit W.S. (ft)                     Flow Area (sq ft)         4708.08     108.92      28.23
  E.G. Slope (ft/ft)       0.010346  Area (sq ft)              4708.08     108.92      28.23
  Q Total (cfs)            11309.00  Flow (cfs)               10611.43     654.16      43.41
  Top Width (ft)            3244.86  Top Width (ft)            3148.11      44.54      52.20
  Vel Total (ft/s)             2.33  Avg. Vel. (ft/s)             2.25       6.01       1.54
  Max Chl Dpth (ft)            3.16  Hydr. Depth (ft)             1.50       2.45       0.54
  Conv. Total (cfs)        111182.5  Conv. (cfs)              104324.4     6431.3      426.8
  Length Wtd. (ft)           375.86  Wetted Per. (ft)          3148.86      45.55      52.69
  Min Ch El (ft)            1618.89  Shear (lb/sq ft)             0.97       1.54       0.35
  Alpha                        1.26  Stream Power (lb/ft s)       2.18       9.28       0.53
  Frctn Loss (ft)              3.47  Cum Volume (acre-ft)      1215.17      26.30      96.93
  C & E Loss (ft)              0.00  Cum SA (acres)             687.86      10.16      68.43

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.    % Conv.    Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                 (ft)     (ft/s)
  5901.57       6919.34        1052.50    1009.81    999.00       9.31       1.01       1.04
  6919.34       7937.12        5886.71    1873.08   1017.90      52.05       1.84       3.14
  7937.12       8954.89        3575.75    1761.38   1017.85      31.62       1.73       2.03
  8954.89       9972.67          96.47      63.81    114.10       0.85       0.56       1.51
  LB 9972.67    RB 10035.08     654.16     108.92     45.55       5.78       2.45       6.01
  10035.08      10573.22         43.41      28.23     52.69       0.38       0.54       1.54

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.161**

INPUT
Description: RM. 3.161. HORZ. N VALUES USED.

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5468.62	1619.6	5499.49	1618.41	5544.71	1618.19	5577.7	1618.19	5589.85	1618.12
5626.7	1617.9	5640.03	1617.88	5651.59	1617.98	5654.66	1618.05	5657.05	1618.09
5657.95	1618.1	5680.26	1618.26	5687.96	1618.32	5706.25	1618.92	5708.7	1618.99
5712.17	1619	5784.92	1619.05	5788.44	1619.05	5790.06	1619.04	5792.5	1619.03
5821.05	1618.8	5860.47	1618.55	5862.81	1618.54	5877.55	1618.54	5893.38	1618.49
5906.76	1618.3	5908.45	1618.37	5961.35	1618.04	5977.01	1617.88	6002.36	1617.75
6002.78	1617.7	6024.09	1617.41	6024.51	1617.56	6040.49	1617.31	6043.46	1617.29
6045.89	1617.3	6063.18	1617.73	6066.59	1617.84	6072.44	1618.05	6072.48	1618.05
6072.5	1618.1	6072.74	1618.05	6118.98	1617.93	6143.42	1618.01	6149.07	1618.03
6180.18	1618.2	6187.01	1618.29	6198.77	1618.36	6210.74	1618.39	6238.23	1618.51
6257.53	1618.3	6260.78	1618.29	6264.34	1618.35	6283.67	1618.82	6284.11	1618.8
6284.81	1618.8	6295.33	1618.24	6302.3	1618.04	6345.19	1618.05	6352.88	1618.05
6381.78	1618	6396.45	1618	6401.6	1617.63	6406.63	1617.31	6408.51	1617.25
6411.28	1617.3	6441.23	1617.92	6441.94	1617.98	6442.81	1618.05	6450.49	1618.6
6490.21	1618.3	6504.34	1618.15	6507.11	1618.11	6510.7	1618.09	6512.7	1618.08
6605.53	1617.3	6617.99	1617.3	6620.69	1617.38	6626.77	1617.46	6627.94	1617.54
6645.75	1617.3	6660.73	1617.11	6665.59	1617.43	6668.43	1617.56	6684.6	1617.61
6698.64	1617.6	6701.61	1617.48	6721.16	1617.38	6722.75	1617.36	6723.1	1617.36
6724.88	1617.3	6766.64	1617.09	6772.99	1617.03	6806.37	1617.02	6841.54	1616.61
6844.54	1616.6	6857.21	1616.63	6867.34	1616.77	6875.58	1616.77	6920.64	1616.58
6946.3	1616.3	6983.79	1616.34	6996.9	1616.11	7002.22	1615.86	7017.2	1616.77
7022.24	1616.9	7027.82	1616.25	7044.8	1617.37	7057.3	1617.97	7067.11	1617.6
7106.03	1617.2	7143	1616.88	7199.4	1616.43	7221.37	1616.34	7232.38	1616.34
7251.34	1616.6	7260.55	1616.5	7307.88	1616.27	7310.6	1616.39	7346.24	1616.9
7374.77	1617	7417.67	1616.94	7466.34	1616.87	7476.95	1616.6	7570.15	1617.03
7586.44	1617.1	7598.23	1617.12	7706.54	1616.64	7748.66	1615.85	7750.69	1615.84
7772.12	1616.8	7779.03	1617.12	7797.56	1617.24	7810.45	1616.85	7825.03	1616.32
7841.11	1616.4	7946.96	1617.4	7952.27	1617.18	7955.93	1616.67	8035.74	1616.44
8051.57	1616.5	8053.42	1616.41	8082.78	1615.53	8099.84	1615.03	8124.59	1615.06
8134.75	1615.3	8143.76	1615.58	8165.53	1616.39	8183.06	1616.63	8186.82	1616.14
8195.99	1615	8204.96	1615.45	8209.33	1615.58	8224.93	1616.14	8232.29	1616.16
8242.19	1616.2	8279.81	1616.39	8304.25	1615.89	8309.2	1615.69	8310.66	1615.65
8324.17	1616.3	8328.5	1616.64	8341.87	1616.62	8361.05	1616.54	8362.72	1616.38
8379.51	1617	8387.4	1617.19	8425.65	1617.91	8437.5	1617.87	8465.58	1617.64
8488.2	1617.4	8512.74	1617.04	8525.34	1616.9	8547.25	1616.82	8622.77	1616.83
8643.34	1616.7	8643.8	1616.69	8644.71	1616.68	8645.29	1616.63	8668.57	1615.51
8673.56	1616.3	8684.76	1617.65	8692.3	1617.65	8714.41	1618.06	8728.2	1618.04
8740.58	1618	8743.25	1618	8787.45	1618.13	8862.15	1618.66	8907.55	1619.09
8997.74	1620	9027.65	1620.3	9031.45	1620.42	9033.93	1620.45	9040.49	1620.68
9059.96	1621.1	9081.57	1620.92	9147.76	1620.65	9186.67	1620.76	9223.28	1620.97
9243.07	1621.2	9272.53	1621.19	9278.03	1620.96	9280.15	1620.95	9282.53	1621.01
9286.24	1621	9289.93	1621.02	9297.12	1621.21	9308.15	1621.11	9318.25	1621.08
9350.12	1620.7	9390.95	1620.18	9413.59	1620.41	9416.41	1620.39	9416.76	1620.4
9516.31	1620.1	9584.4	1619.39	9613.06	1619.44	9623.35	1619.1	9652.28	1619.11
9748.26	1619.8	9753.61	1619.84	9754.86	1619.82	9756.98	1619.81	9758.86	1619.78
9761.34	1619.8	9763.83	1619.79	9794.75	1619.46	9799.07	1619.49	9802.53	1619.43
9807.61	1619.4	9837.01	1619.51	9868.37	1619.85	9903.21	1620.16	9915.3	1620.18
9934.17	1620.4	9938.15	1620.44	9939.81	1620.4	9944.61	1620.32	9948.32	1620.21
9950.86	1620.1	9956.1	1620.2	9961.1	1619.66	9964.7	1619.56	9964.97	1619.56

9965.69	1619.8	9978.5	1618.89	9981.21	1618.7	9982.06	1618.65	9982.5	1618.55
9992.27	1616.4	10003.2	1615.46	10004.86	1615.35	10007.61	1615.17	10016.1	1614.67
10018.09	1614.51	10021.08	1615.41	10028.53	1617.86	10042.14	1619.32	10044.99	1619.54
10072.26	1619.41	10089.84	1619.26	10092.09	1619.26	10093.98	1619.22	10105.34	1619.51
10110.56	1619.71	10117.86	1618.56	10121.41	1617.96	10122.93	1618.07	10129.96	1619.51
10145.81	1619	10146.38	1618.99	10147.49	1618.81	10148.61	1618.53	10155	1617.35
10159.9	1616.31	10161.76	1616.47	10173.5	1618.01	10180.84	1618.26	10185.93	1618.44
10196.02	1618.91	10206.93	1619.17	10209.28	1618.28	10212.7	1617.07	10220.64	1617.65
10224.12	1617.91	10245.27	1618.35	10315.61	1619.99	10318.91	1620.07	10319.41	1620.08
10319.66	1620.11	10320.06	1620.09	10320.11	1620.09	10325.77	1619.93	10373.14	1619.05
10377.17	1619	10377.52	1618.95	10380.35	1619.11	10382.12	1619.23	10399.43	1619.19
10410.82	1619.31	10419.85	1619.36	10440.19	1619.34	10441.9	1619.33	10443.89	1619.33
10449.29	1619.31	10455.93	1619.59	10467.51	1620.32	10470.33	1620.51	10473.64	1620.63
10486.78	1620.8	10498.7	1620.83	10509.24	1620.68	10526.95	1620.84	10530.65	1620.88
10531.95	1620.91	10533.31	1620.9	10578.9	1620.45	10592.36	1620.6	10596.89	1619.75
10599.72	1619.2	10605.6	1620.39	10608.46	1621.04	10613.56	1621.36	10618.69	1621.63
10629.54	1621.91	10635.79	1622.12	10640.61	1622.19				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5468.62	.15	6996.9	.068	9297.12	.068	9965.69	.045	10044.99	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9965.69	10044.99	425	416.26	375	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1618.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.076	0.045	0.068
W.S. Elev (ft)	1618.58	Reach Len. (ft)	425.00	416.26	375.00
Crit W.S. (ft)		Flow Area (sq ft)	4408.77	120.74	65.82
E.G. Slope (ft/ft)	0.008249	Area (sq ft)	4408.77	120.74	65.82
Q Total (cfs)	11309.00	Flow (cfs)	10580.76	621.59	106.65
Top Width (ft)	3322.66	Top Width (ft)	3175.30	52.81	94.55
Vel Total (ft/s)	2.46	Avg. Vel. (ft/s)	2.40	5.15	1.62
Max Chl Dpth (ft)	4.08	Hydr. Depth (ft)	1.39	2.29	0.70
Conv. Total (cfs)	124516.9	Conv. (cfs)	116498.7	6844.0	1174.2
Length Wtd. (ft)	424.27	Wetted Per. (ft)	3176.18	53.69	95.30
Min Ch El (ft)	1614.50	Shear (lb/sq ft)	0.71	1.16	0.36
Alpha	1.13	Stream Power (lb/ft s)	1.72	5.96	0.58
Frctn Loss (ft)	3.92	Cum Volume (acre-ft)	1175.92	25.28	96.51
C & E Loss (ft)	0.01	Cum SA (acres)	660.64	9.73	67.77

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5468.62	6592.89	267.25	468.62	918.14	2.36	0.51	0.57
6592.89	7717.16	4431.01	1919.12	1124.45	39.18	1.71	2.31
7717.16	8841.42	5882.44	2020.75	1124.79	52.02	1.80	2.91
8841.42	9965.69	0.05	0.28	8.80	0.00	0.03	0.20
LB 9965.69	RB 10044.99	621.59	120.74	53.69	5.50	2.29	5.15
10044.99	10640.61	106.65	65.82	95.30	0.94	0.70	1.62

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.082**

INPUT
Description: RM. 3.082. HORZ. N VALUES USED.

Station Elevation Data num= 300

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5881.19	1615.1	5901.68	1615.27	5925.45	1614.84	5933.13	1614.81	5938.15	1614.79
5940.22	1614.7	5947.18	1614.72	5973.27	1614.4	5992.34	1614.65	6007.68	1614.55
6028.58	1614.7	6051.16	1614.47	6067.04	1614.81	6083.52	1614.6	6111	1614.25
6157.97	1613.4	6158.47	1613.53	6158.93	1613.78	6182.26	1613.77	6190.95	1613.71
6215.87	1613.8	6224.05	1613.88	6235.3	1613.93	6251.26	1613.56	6281.68	1613.98
6286.5	1614.4	6302.82	1614.45	6322.74	1614.32	6375.44	1614.11	6392.62	1613.52
6397.03	1613.4	6405.8	1613.57	6409	1613.6	6431.23	1613.87	6440.74	1613.94
6453.4	1614.1	6462.58	1614.29	6484.49	1613.89	6513.99	1613.65	6535.74	1613.45
6551.73	1613.6	6562.46	1613.52	6571.21	1613.54	6593.96	1613.4	6616.47	1613.33
6626.49	1613.5	6627.66	1613.31	6635.15	1613.27	6636.02	1613.26	6755.64	1612.44
6755.87	1612.4	6762.74	1612.56	6786.4	1613.15	6844.15	1613.01	6847.94	1613.07
6852.85	1613.3	6881.8	1613.15	6891.45	1613.15	6898.36	1612.88	6980.5	1612.11
6989.08	1612.1	6994.7	1612.03	7056	1611.89	7075.62	1611.82	7092.2	1612.38
7096.05	1612.6	7097.77	1612.46	7106.66	1612.55	7140.79	1612.38	7149.86	1612.4
7156.54	1612.4	7217.22	1612.52	7219.04	1612.46	7234.77	1612.29	7254.76	1612.12
7266.18	1612	7282.14	1611.74	7295.65	1611.68	7308.84	1612.01	7319.52	1612.31
7344.99	1612.1	7350.28	1612.08	7358.15	1612.18	7370.58	1612.25	7375.49	1610.67
7379.87	1608.3	7391.26	1612.07	7393.2	1612.83	7396.27	1612.79	7407.64	1612.68
7472.83	1612.2	7494.71	1612.35	7528.1	1612.47	7592.37	1612.34	7639.17	1611.96
7710.64	1612	7711.83	1612.03	7728.34	1612.12	7814.83	1613.56	7822.01	1613.69
7828.17	1613.7	7835.1	1611.9	7835.37	1611.77	7844.45	1612.22	7853.01	1612.18
7877.2	1611.8	7883.97	1611.86	7907.07	1612.15	7919.92	1611.78	7936.05	1611.28
7950.57	1611.1	7957.4	1610.86	7966.92	1610.04	7981.3	1610.7	7981.65	1610.71
7981.85	1610.7	7983.63	1610.73	8017.25	1611.01	8023.64	1610.99	8046.19	1610.86
8071.48	1610.7	8079.67	1610.69	8094.18	1610.66	8101.63	1610.58	8109.36	1610.62
8134.2	1611.3	8161.29	1611.8	8166.61	1611.38	8179.87	1610.26	8192.19	1610.75
8203.38	1611.5	8203.61	1611.55	8203.87	1611.55	8246.32	1611.98	8268.64	1612.39
8296.77	1612.9	8305.39	1613.1	8310.52	1613.12	8348.83	1613.13	8380.06	1613.5
8425.66	1614	8429.27	1613.98	8434.67	1613.99	8492.88	1613.83	8507.27	1613.79
8511.8	1613.8	8511.91	1613.75	8515.59	1613.69	8525.36	1613.81	8586.75	1614.39
8607.58	1614.3	8614.4	1614.34	8619.06	1614.35	8624.18	1614.39	8625.85	1614.4
8626.09	1614.4	8626.78	1614.4	8629.05	1614.4	8631.61	1614.41	8660.33	1614.63
8673.09	1614.7	8679.77	1614.85	8681.5	1614.81	8694.21	1614.66	8710.45	1615.15
8728.07	1615.4	8731.26	1615.46	8731.77	1615.47	8732.52	1615.48	8733.76	1615.52
8783.91	1615.5	8787.85	1615.54	8791.31	1615.5	8796.16	1615.47	8805.86	1615.5
8867.12	1615.7	8907.23	1615.7	8988.4	1615.86	9011.58	1615.96	9026.77	1616.04
9083.82	1616.2	9146.3	1616.68	9152.27	1616.67	9170.93	1616.7	9196.92	1616.67
9257.91	1616.4	9264.83	1616.3	9353.47	1614.75	9379.01	1614.6	9391.58	1614.54
9407.12	1614.4	9422.2	1614.46	9436.54	1614.57	9442.84	1614.43	9445.34	1614.61
9496.83	1614.9	9519.83	1614.97	9534.35	1615.01	9554.28	1615.22	9562.94	1615.22
9576.93	1615.5	9618.22	1616.07	9625.79	1616.08	9634.9	1616.16	9647.47	1616.08
9712.04	1616	9720.67	1615.96	9736.26	1615.97	9737.28	1615.97	9738.48	1615.98
9739.47	1616	9744.42	1616.02	9748.04	1616.05	9759.13	1616.13	9765.97	1616.14

9772.32	1616.2	9774.03	1616.24	9782.42	1616.13	9783.57	1616.11	9785.29	1616.07
9787.81	1616	9791.08	1615.98	9843.16	1615.72	9865.28	1615.75	9877.85	1616.35
9878.64	1616.4	9879.13	1616.37	9914.72	1616.04	9926.54	1615.96	9937.23	1616.67
9944.29	1617.1	9945.94	1617.13	9952.17	1617.02	9989.24	1616.52	9992.75	1616.6
9993.69	1616.1	9997.36	1612.65	10009.9	1612.69	10017.97	1612.71	10026.75	1614.34
10031.06	1615.11	10050.71	1615.71	10059.47	1615.97	10068.61	1615.66	10096.02	1615
10100.32	1614.91	10103.34	1614.69	10106.85	1614.52	10115.46	1615.11	10121.56	1615.55
10125.49	1615.61	10155.56	1615.98	10156.33	1615.99	10156.55	1615.95	10156.86	1615.92
10179.53	1612.91	10187.76	1613.61	10188.86	1613.68	10196.86	1614.23	10200.18	1614.48
10202.05	1614.6	10203.8	1614.67	10212.02	1614.96	10228.19	1615.55	10232.55	1615.62
10242.35	1615.71	10253.36	1615.57	10275.34	1615.11	10303.03	1615.11	10311.42	1615.12
10313.3	1615.11	10318.83	1615.59	10320.44	1615.68	10321.34	1615.68	10323.42	1615.69
10367.78	1615.91	10380.19	1616.19	10384.31	1616.37	10392.53	1616.53	10396.14	1616.3
10396.6	1616.31	10397.76	1616.27	10406.06	1616.46	10411.37	1615.78	10418.86	1614.95
10424.53	1615.4	10427.6	1615.81	10435.65	1614.31	10437.98	1613.82	10438.37	1613.85
10441.66	1614.11	10461.23	1616.18	10462.21	1616.04	10471.92	1615.14	10473.34	1615.03
10474.97	1614.91	10477.29	1614.67	10482.95	1614.97	10501.05	161	10503.52	1616.21

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5881.19	.15	7396.27	.068	7907.07	.12	9791.08	.068	9945.94	.045
10050.71	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9945.94	10050.71	370	403.32	390	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1614.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.107	0.045	0.068
W.S. Elev (ft)	1614.68	Reach Len. (ft)	370.00	403.32	390.00
Crit W.S. (ft)	1613.23	Flow Area (sq ft)	4995.76	53.79	38.25
E.G. Slope (ft/ft)	0.010313	Area (sq ft)	4995.76	53.79	38.25
Q Total (cfs)	11309.00	Flow (cfs)	10995.46	242.83	70.70
Top Width (ft)	2878.43	Top Width (ft)	2788.12	33.45	56.86
Vel Total (ft/s)	2.22	Avg. Vel. (ft/s)	2.20	4.51	1.85
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	1.79	1.61	0.67
Conv. Total (cfs)	111358.0	Conv. (cfs)	108270.6	2391.2	696.2
Length Wtd. (ft)	371.27	Wetted Per. (ft)	2790.49	34.43	57.18
Min Ch El (ft)	1612.65	Shear (lb/sq ft)	1.15	1.01	0.43
Alpha	1.05	Stream Power (lb/ft s)	2.54	4.54	0.80
Frctn Loss (ft)	3.51	Cum Volume (acre-ft)	1130.04	24.45	96.06
C & E Loss (ft)	0.00	Cum SA (acres)	631.55	9.31	67.12

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5881.19	6897.38	900.10	917.34	924.24	7.96	0.99	0.98
6897.38	7913.57	6785.14	2448.35	1018.13	60.00	2.41	2.77
7913.57	8929.75	3305.90	1617.16	757.19	29.23	2.14	2.04
8929.75	9945.94	4.33	12.91	90.93	0.04	0.14	0.34
LB 9945.94	RB 10050.71	242.83	53.79	34.43	2.15	1.61	4.51
10050.71	10503.52	70.70	38.25	57.18	0.63	0.67	1.85

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 3.006**

INPUT
Description: RM. 3.006. HORZ. N VALUES USED. HYDRAULIC BASELINE CROSSES NEAR UNIVERSITY DR.

Station Elevation Data num= 307

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5622.28	1612.1	5624.12	1612.11	5626.1	1612.08	5639.1	1612.09	5669.38	1611.87
5669.44	1611.9	5669.47	1611.87	5669.48	1611.87	5700.86	1611.88	5706.36	1611.9
5710.94	1611.87	5722.79	1611.76	5779.55	1611.1	5795.49	1611.04	5806.25	1611
5850.72	1610.83	5909.28	1610.66	5943.75	1610.65	5990.95	1610.49	6029.17	1610.2
6031.99	1610.18	6032.07	1610.19	6036.82	1610.62	6079.15	1610.53	6086.59	1610.5
6089.95	1610.54	6101.05	1610.61	6103.22	1610.6	6105.51	1610.62	6134.3	1610.7
6137.74	1610.66	6140.71	1610.68	6184.39	1611.25	6205	1611.66	6226.06	1611.5
6245.17	1611.36	6252.91	1611.23	6266.24	1611.09	6266.82	1610.94	6295.76	1610.8
6299.4	1610.86	6300.53	1610.97	6307.64	1611.03	6310.82	1611.14	6319.22	1611.6
6325.65	1611.5	6328.51	1611.46	6331.06	1611.28	6332.74	1611.26	6381.81	1610.5
6388.86	1610.48	6392.29	1610.47	6394.04	1610.45	6398.81	1610.41	6415.8	1610.3
6494.6	1609.85	6505.59	1609.93	6516.4	1609.45	6516.47	1609.45	6521.03	1611.2
6521.55	1611.45	6546.46	1611.02	6589.03	1610.03	6594.25	1610.06	6610.78	1610.4
6624.58	1610.51	6628.65	1610.47	6686.38	1610.82	6706.65	1610.85	6741.37	1610.3
6753.92	1610.08	6813.69	1609.27	6827.19	1609.31	6840.89	1609.54	6854.56	1609.5
6868.45	1609.77	6938.31	1608.79	6977.61	1607.52	6980.39	1607.43	6999.4	1606.8
6999.95	1606.86	7001.28	1607.12	7007.97	1608.42	7080.62	1608.29	7097.49	1608.2
7105.84	1608.17	7112.88	1608.26	7114.32	1608.27	7118.83	1608.4	7128.82	1608.6
7160.15	1609.49	7163.89	1609.61	7184.2	1609.61	7207.35	1609.74	7240.85	1609.6
7277.44	1609.28	7307.06	1608.6	7338.01	1608.35	7354.7	1609.83	7358.4	1610.2
7360.15	1610.32	7365.62	1610.37	7400.16	1610.69	7417.47	1609.97	7422.23	1609.8
7438.37	1609.3	7445.47	1608.84	7457.97	1608.57	7474.98	1608.15	7476.81	1608.1
7495.34	1608.31	7525.74	1608.65	7570.3	1609.09	7576.56	1609.13	7580.13	1609.1
7589.78	1609.11	7605.87	1609.02	7606.48	1609.08	7663.37	1608.48	7690.06	1607.9
7705.49	1607.57	7761.27	1607.14	7815.71	1607.24	7828.55	1607.34	7850.86	1607.5
7947.51	1608.49	7978.72	1608.77	8025.9	1609.29	8067.4	1609.72	8115.53	1610.1
8119.41	1610.12	8148.29	1609.67	8153.79	1609.57	8160.4	1609.54	8174.56	1609.5
8189.21	1609.6	8193.98	1609.94	8209.76	1610.38	8212.25	1610.47	8218.03	1610.4
8220.32	1610.4	8254.84	1610.27	8289.88	1610.39	8320.06	1610.36	8326.94	1610.4
8333.24	1610.28	8335	1610.2	8354.75	1609.84	8368.18	1609.94	8398.42	1610.7
8402.07	1610.81	8409.36	1610.76	8414.03	1610.74	8430.86	1610.56	8434.84	1610.6
8468.41	1610.79	8527.66	1611.34	8542.04	1611.46	8549.07	1611.52	8553.33	1611.5
8573.02	1611.81	8603.1	1611.98	8623.14	1612.14	8630.1	1612.12	8666.88	1612
8702.31	1611.72	8742.92	1611.48	8775.64	1611.3	8790.61	1611.33	8807.61	1611.4
8832.38	1611.48	8878.32	1611.71	8908.87	1611.83	8915.93	1611.81	8931.4	1611.2
8945.7	1610.76	8960.9	1610.76	8968.55	1610.78	8985.3	1610.76	8998.21	1610.8
9007.25	1610.81	9022.16	1610.88	9044.48	1610.96	9051.69	1611.31	9065.93	1611.5
9116.69	1611.37	9119.88	1611.28	9122.11	1611.23	9124.18	1611.18	9149.01	1611
9154.28	1611	9170.02	1611.21	9176.09	1610.43	9181.22	1609.78	9192.27	1611.2
9193.92	1611.3	9201.05	1611.3	9224.57	1611.29	9238.22	1611.31	9276.52	1611.5
9282.19	1611.3	9304.13	1610.63	9319.1	1610.36	9319.21	1610.36	9334.83	1610.7
9345.66	1610.88	9354.82	1611.01	9366.03	1610.75	9379.3	1610.49	9395.28	1611.1
9416.95	1611.97	9417.13	1611.98	9417.25	1611.98	9417.33	1611.98	9424.75	1611.8

9429.09	1611.28	9437.41	1610.16	9442.62	1610.44	9450.48	1610.93	9470.07	1610.9
9478.84	1611	9480.01	1611.02	9493.57	1611.36	9498.79	1611.49	9513.05	1611.5
9517.15	1611.53	9523.36	1611.52	9541.44	1611.54	9557.4	1611.63	9562.69	1611.7
9574.74	1611.77	9586.65	1611.89	9599.98	1611.84	9602.17	1611.82	9614.25	1611.9
9627.63	1611.87	9639.41	1611.62	9645.18	1611.71	9658.17	1611.36	9662.35	1611.4
9663.96	1611.25	9676.47	1611.63	9683.5	1611.87	9687.85	1612.05	9700.02	1612
9702.59	1612.08	9713.42	1612.17	9716.98	1612.19	9718	1612.21	9730.66	1612.2
9734.03	1612.09	9755.83	1612.03	9759.27	1612.03	9788.19	1611.95	9788.71	1612
9790.54	1612.04	9792.88	1612	9813.24	1611.81	9826.54	1611.45	9828.15	1611.4
9854.48	1611.4	9869.15	1611.44	9880.16	1611.42	9899.58	1611.09	9899.72	1611.1
9920.83	1611.31	9930.46	1611.43	9945.44	1610.81	9948.7	1610.62	9950.34	1610.7
9952.97	1610.45	9959.29	1609.81	9978.76	1609.51	0033.42	1609.41	0033.69	1609.4
10034.13	1609.39	10035.55	1609.47	10047.65	1610.05	10054.55	1611.09	10067.73	1612.6
10080.18	1612.91	0091.81	1613.07	10098.68	1613.23	10106.65	1613.18	10108.67	1613.1
10109.26	1613.16	10113.36	1613.02	10131.26	1612.74	10134.22	1612.63	10139.87	1612.2
10146.19	1612.11	10154.2	1612.04	10155.78	1612.05	10156.55	1612.05	10171.16	1611.8
10241.83	1612.17	10243.24	1612.18	10244.01	1612.19	10245.73	1612.27	10253.63	1612.6
10262	1612.98	10271.24	1613.26	10276.37	1613.26	10292.01	1613.41	0302.36	1613.5
10305.41	1613.51	0317.26	1613.57						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5622.28	.068	6101.05	.15	6854.56	.068	7761.27	.1	9930.46	.045
10067.73	.1								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9930.46	10067.73	300	382.27	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1611.24	Element			
Vel Head (ft)	0.11	Wt. n-Val.	0.079	0.045	
W.S. Elev (ft)	1611.13	Reach Len. (ft)	300.00	382.27	400.00
Crit W.S. (ft)		Flow Area (sq ft)	4113.05	155.69	
E.G. Slope (ft/ft)	0.008731	Area (sq ft)	4113.05	155.69	
Q Total (cfs)	11309.00	Flow (cfs)	10728.90	580.10	
Top Width (ft)	3043.69	Top Width (ft)	2926.53	117.17	
Vel Total (ft/s)	2.65	Avg. Vel. (ft/s)	2.61	3.73	
Max Chl Dpth (ft)	4.33	Hydr. Depth (ft)	1.41	1.33	
Conv. Total (cfs)	121032.3	Conv. (cfs)	114823.9	6208.4	
Length Wtd. (ft)	304.84	Wetted Per. (ft)	2927.70	117.32	
Min Ch El (ft)	1609.39	Shear (lb/sq ft)	0.77	0.72	
Alpha	1.02	Stream Power (lb/ft s)	2.00	2.70	
Frctn Loss (ft)	2.69	Cum Volume (acre-ft)	1091.36	23.48	95.89
C & E Loss (ft)	0.00	Cum SA (acres)	607.28	8.62	66.87

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5622.28	6699.32	366.30	429.40	785.38	3.24	0.55	0.85
6699.32	7776.37	7924.99	2357.31	1077.45	70.08	2.19	3.36
7776.37	8853.42	2364.55	1215.57	728.65	20.91	1.67	1.95

8853.42	9930.46	73.07	110.77	336.22	0.65	0.33	0.66
LB 9930.46	RB 10067.73	580.10	155.69	117.32	5.13	1.33	3.73

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.933**

INPUT
Description: RM. 2.933. HORZ. N VALUES USED. AREA TO LT. OF STA. 5666.07 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 328

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5354.28	1609	5361.54	1609.19	5365.08	1609.25	5366.6	1609.34	5370.2	1609.45
5371.55	1609.4	5384.2	1609.86	5394.48	1610.33	5399.42	1610.88	5455.93	1610.14
5473.04	1610.1	5486.59	1610.17	5508.66	1609.89	5545.73	1608.17	5601.97	1608.2
5641.51	1609.5	5658.31	1609.98	5666.07	1610.34	5730.16	1610.17	5732.54	1610.16
5733.6	1610.1	5734.55	1610.05	5737.67	1609.83	5748.01	1609.13	5753.29	1608.71
5758.63	1608.4	5768.44	1607.7	5781.68	1606.33	5782.47	1606.1	5789.29	1606.52
5795.9	1606.9	5810.08	1607.81	5820.51	1608.58	5828.89	1609.08	5833.48	1609.18
5840.83	1609.7	5863.29	1609.56	5908.58	1609.29	5918.56	1608.64	5922.37	1608.15
5930.26	1607.9	5939.45	1606.54	5943.18	1605.48	5949.03	1606.52	5954.39	1607.67
5955.59	1608.1	5956.58	1608.08	5958.11	1608.17	5963.65	1608.29	5986.98	1608.76
5989.17	1608.7	5990.86	1608.77	5993.53	1608.76	5996	1608.76	6095.37	1608.4
6123.28	1608.9	6124.39	1608.92	6151.41	1608.81	6209.4	1608.28	6224.99	1608.2
6253.73	1608.1	6260.22	1608.21	6264.96	1608.15	6273.95	1608.29	6319.19	1607.73
6325.51	1607.8	6361.12	1607.79	6368.72	1607.63	6385.87	1607.52	6391.95	1607.46
6419.39	1607.1	6424.95	1607.11	6435.53	1607.34	6452.34	1607.53	6478.87	1607.5
6482.03	1607.5	6494.79	1607.43	6584.91	1607.36	6588.04	1607.37	6602.74	1607.34
6631.42	1607.8	6667.64	1607.65	6704.5	1607.51	6708.67	1607.52	6717.11	1607.45
6802.39	1606.6	6823.17	1606.44	6838.83	1606.39	6850.65	1606.13	6852.75	1606.02
6856.65	1605.9	6902.74	1604.73	6911.69	1605.82	6922.95	1606.36	6936.4	1606.26
6944.87	1606.3	6951.5	1604.79	6954.8	1604.34	6960.18	1604.93	6970.6	1605.28
6994.33	1605.4	7016.69	1605.48	7028.45	1604.86	7031.37	1604.66	7048.69	1605.48
7050.31	1605.6	7066.17	1605.54	7085.55	1605.63	7134.92	1605.33	7177.44	1605.12
7205.84	1605.3	7206.19	1605.29	7206.74	1605.29	7209.05	1605.32	7326.96	1606.24
7352.31	1606.6	7375.76	1606.66	7376	1606.59	7377.12	1606.37	7380.52	1605.55
7389.59	1604.1	7406.25	1604.95	7409.14	1605.1	7424.31	1604.99	7457.64	1604.86
7481.4	1605	7493.04	1605.06	7517.76	1604.84	7551.33	1604.97	7588.66	1605.55
7603.68	1605.9	7621.35	1605.96	7682.68	1606.27	7695.37	1606.31	7701.17	1605.82
7715.92	1606.2	7751.55	1606.72	7771.67	1606.77	7793.63	1606.82	7798.97	1606.68
7810.77	1606.7	7857.61	1606.8	7870.55	1606.81	7874.1	1606.77	7881.32	1606.83
7902.04	1606.8	7914.35	1606.79	7929.57	1606.26	7974.23	1606.76	7985.72	1606.66
7987.64	1606.7	8013.56	1606.82	8013.95	1606.82	8036.66	1606.87	8061.9	1606.83
8068.42	1606.8	8101.87	1606.95	8143.64	1607.11	8171.88	1607.33	8211.61	1608.11
8222.19	1608.3	8226.68	1608.36	8228.11	1608.96	8229	1609.24	8231.79	1609.26
8242.37	1609.5	8242.64	1609.46	8242.91	1609.4	8245.54	1608.55	8253.8	1608.4
8266.26	1608.2	8272.49	1608.05	8289.31	1607.85	8292.58	1607.83	8297.26	1607.91
8397.61	1608.6	8417.28	1608.69	8424.3	1608.44	8435.5	1608.6	8439.89	1608.52
8457.63	1608.6	8461.25	1608.69	8514.97	1609.03	8538.01	1609.05	8556.6	1609.1
8569.2	1609	8596.34	1608.6	8598.2	1608.56	8598.43	1608.56	8598.49	1608.56
8600.36	1608.5	8643.72	1608.14	8648.87	1608.22	8656.56	1608.29	8674.12	1608.43
8701.28	1608.4	8742.05	1608.32	8765.22	1608.18	8772.62	1608.13	8783.57	1608.15

8785.24	1608.2	8816.13	1608.24	8896.1	1608.44	8994.69	1608.54	9008.86	1608.51
9015.98	1608.4	9029.31	1608.56	9036.39	1608.51	9057.31	1608.5	9063.95	1608.56
9066.33	1608.3	9074.54	1607.13	9075.73	1607.23	9083.01	1607.88	9085.3	1608
9109.44	1607.9	9111.58	1607.83	9111.7	1607.85	9114.65	1607.9	9140.68	1608.22
9143.84	1608.3	9150.69	1607.95	9158.84	1607.84	9161.28	1607.78	9173.68	1607.67
9181.11	1607.4	9184.89	1607.3	9197.78	1607.38	9214.59	1607.54	9217.11	1607.54
9221.81	1607.5	9237.93	1607.31	9248.28	1607.08	9251.17	1607.13	9253.97	1607.13
9256.17	1607.1	9264.01	1607.43	9268.22	1607.58	9270.17	1607.63	9272.29	1607.71
9283.39	1608.4	9283.73	1608.42	9285.08	1608.45	9303.8	1608.49	9304.93	1608.51
9312.94	1608.5	9324.51	1608.31	9335.89	1608.51	9343.49	1608.6	9355.01	1608.75
9363.91	1608.8	9378.61	1608.65	9389.24	1608.74	9394.45	1608.56	9416.16	1608.63
9440.71	1608.8	9449.29	1608.8	9450.46	1608.8	9456.46	1608.75	9462.34	1608.75
9464.06	1608.7	9498.9	1608.47	9505.93	1608.3	9559.17	1608.33	9560.3	1608.34
9569.64	1608.4	9574.34	1608.34	9582.57	1608.96	9611.07	1608.2	9645.16	1607.19
9653.96	1607.8	9654.95	1607.88	9655.34	1607.9	9655.74	1607.89	9662.09	1607.4
9678.3	1607.5	9703.91	1607.92	9721.29	1608.17	9732.09	1608.3	9744.03	1608.34
9756.96	1608.5	9764.27	1608.59	9764.58	1608.59	9777.35	1608.66	9804.71	1608.25
9840.92	1608	9853.75	1608.01	9862.02	1608.13	9903.85	1607.69	9906.94	1607.64
9909.58	1607.5	9921.07	1607	9927.03	1607.32	9931.43	1607.52	9938.93	1607.1
9950.62	1606.2	9957.12	1607.67	9959.94	1608.14	9978.97	1608	9979.02	1607.99
9979.04	1608	9990.74	1604.83	10004.55	1604.71	10007.82	1604.71	10011.42	1605.35
10027.77	1608.21	10055.25	1608.19	10076.39	1608.22	10100.66	1609.05	10101.01	1609.06
10101.15	1609.11	10101.55	1609.06	10120.57	1608.93	10132.24	1608.61	10146.51	1609.17
10149.6	1609.51	10150.26	1609.41	10150.57	1609.36	10192.72	1609.47	10203.29	1609.57
10225.56	1609.71	10234.14	1609.61	10246	1609.72	10253.1	1609.95	10266.09	1610.44
10269.36	1610.61	10289.41	1610.85	10295.46	1610.89				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5354.28	.068	7409.14	.15	8061.9	.1	9611.07	.068	9979.04	.045
10027.77	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9979.04	10027.77	360	404.67	390	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5354.28	5666.07	1610.34

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1608.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.089	0.045	0.068
W.S. Elev (ft)	1608.44	Reach Len. (ft)	360.00	404.67	390.00
Crit W.S. (ft)		Flow Area (sq ft)	4516.40	125.99	12.28
E.G. Slope (ft/ft)	0.009036	Area (sq ft)	4516.40	125.99	12.28
Q Total (cfs)	11309.00	Flow (cfs)	10561.97	737.64	9.39
Top Width (ft)	3323.96	Top Width (ft)	3220.25	48.73	54.98
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	2.34	5.85	0.76
Max Chl Dpth (ft)	4.34	Hydr. Depth (ft)	1.40	2.59	0.22
Conv. Total (cfs)	118970.5	Conv. (cfs)	111111.8	7760.0	98.8
Length Wtd. (ft)	363.38	Wetted Per. (ft)	3222.36	49.46	54.99
Min Ch El (ft)	1604.70	Shear (lb/sq ft)	0.79	1.44	0.13
Alpha	1.24	Stream Power (lb/ft s)	1.85	8.41	0.10
Frctn Loss (ft)	3.39	Cum Volume (acre-ft)	1061.64	22.24	95.84
C & E Loss (ft)	0.01	Cum SA (acres)	586.11	7.89	66.61

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5354.28	6510.47	541.86	331.93	443.02	4.79	0.75	1.63
6510.47	7666.66	8407.45	2827.28	1156.88	74.34	2.45	2.97
7666.66	8822.85	1166.78	968.48	897.53	10.32	1.08	1.20
8822.85	9979.04	445.89	388.71	724.93	3.94	0.54	1.15
LB 9979.04	RB 10027.77	737.64	125.99	49.46	6.52	2.59	5.85
10027.77	10295.46	9.39	12.28	54.99	0.08	0.22	0.76

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.857**

INPUT
Description: RM.2.857 . HORZ. N VALUES USED. AREA TO LT. OF STA. 5591.59 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 329

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5248.42	1604.1	5269.19	1604.52	5274.82	1604.54	5303.67	1604.59	5346.54	1604.71
5403.29	1604.8	5442.77	1604.85	5467.1	1604.97	5581.95	1605.15	5591.59	1605.11
5711.63	1604.5	5725.14	1604.27	5726.98	1604.41	5738.68	1603.43	5744.58	1602.88
5754.99	1604.2	5757.68	1604.58	5781.74	1604.4	5833.2	1604.23	5858.05	1605.06
5868.22	1605.3	5875.77	1605.3	5899.6	1604.86	5907.68	1604.74	5910.38	1604.63
5924.23	1604.3	5926.35	1604.28	5948.87	1604.86	5952.25	1604.97	5953.59	1605.04
5974.99	1605.1	6013.21	1604.91	6026.28	1604.85	6029.33	1604.86	6035.25	1604.86
6056.1	1604.1	6060.22	1604.13	6071.93	1604.2	6108.27	1604.71	6138.69	1604.61
6153.45	1605.6	6176.67	1606.65	6188.6	1606.7	6206.82	1606.62	6240.47	1606.47
6261.24	1606.3	6272.76	1605.46	6282.36	1604.75	6305.86	1606.08	6306.34	1606.11
6306.93	1606.1	6307.74	1606.18	6325.35	1607.14	6342.38	1606.72	6350.28	1606.73
6379.68	1606.1	6401.88	1605.86	6437.98	1605.49	6451.92	1605.5	6470.86	1605.55
6558.03	1605.2	6613.39	1603.97	6672.57	1602.93	6676.6	1603.15	6705.97	1602.91
6729.66	1603	6753.91	1603.17	6766.61	1603.74	6768.51	1603.86	6776.76	1603.28
6780.7	1603	6781.76	1602.96	6794.1	1602.99	6833.87	1604.07	6864.88	1604.79
6869.08	1604.8	6888.22	1604.27	6911.22	1603.16	6911.36	1603.16	6931.64	1603.08
6939.76	1603	6946.99	1603.03	6951.02	1603.07	6980.16	1603.09	6987.12	1603.11
6995.15	1603	7026.82	1602.92	7031.96	1603.38	7042.03	1603.4	7047.56	1602.38
7055.65	1600.7	7069.43	1603.37	7069.45	1603.37	7069.46	1603.37	7069.46	1603.4
7094.86	1603.2	7100.03	1603.23	7101.18	1602.97	7106.2	1602.3	7118.56	1602.1
7122.13	1602.16	7125.29	1602.07	7129.08	1602.03	7133.45	1602.09	7169.72	1602.8
7195.67	1602.72	7200.93	1602.6	7231.17	1602.36	7234.38	1602.36	7240.04	1602.4
7315.25	1602.61	7316.48	1602.6	7338.11	1602.42	7389.24	1601.97	7392.3	1602
7395.9	1601.93	7430.36	1601.45	7430.99	1601.44	7431.08	1601.44	7431.14	1601.4
7431.16	1601.44	7431.23	1601.44	7431.64	1601.44	7501.1	1602.12	7509.95	1602.1
7517.62	1601.85	7538.8	1601.74	7560.18	1602.32	7595.16	1602.64	7612.54	1602.7
7628.25	1602.75	7633.5	1602.75	7665.31	1602.58	7679.69	1602.24	7701.61	1602.1
7717.04	1602.26	7730.66	1602.16	7761.47	1602.39	7763.74	1602.4	7777.34	1602.5

7792.8	1602.64	7818.77	1602.77	7829.59	1602.86	7837.81	1602.92	7857.32	1603
7882.08	1603.27	7885.49	1603.16	7890.7	1603.14	7966.29	1602.94	7969.23	1602.9
7996.13	1603.08	7999.73	1603.11	8027.64	1603.32	8033.06	1603.44	8046.4	1603.5
8079.04	1603.84	8084.38	1603.91	8110.71	1604.08	8147.02	1603.87	8157.23	1603.8
8163.89	1603.79	8171.02	1603.73	8180.18	1603.72	8202.33	1603.64	8247.82	1604
8249.31	1604.01	8250.61	1603.99	8251.38	1603.99	8253.36	1603.99	8258.42	1603.9
8279.17	1603.66	8288.39	1603.71	8328.2	1603.78	8356.36	1603.82	8390.58	1603.9
8439.3	1604.3	8465.11	1604.46	8470.62	1604.47	8489.39	1604.38	8505.82	1604.3
8523.68	1604.43	8539.42	1604.81	8544.26	1604.76	8609.36	1604.67	8609.94	1604.7
8610.54	1604.67	8611.73	1604.65	8682.9	1603.98	8732.53	1603.85	8745.05	1603.9
8753.04	1603.88	8767.04	1603.84	8774.56	1603.69	8783.78	1603.63	8796.22	1603.7
8814.01	1604.4	8831.71	1604.35	8844.19	1604.02	8847.26	1604.06	8870.63	1604.5
8896.11	1604.19	8915.35	1604.04	8934.52	1604.04	8959.16	1603.86	8982.29	1603.5
8990.86	1603.54	8999.38	1603.53	9032.01	1603.22	9048.05	1603.08	9049.13	1603.1
9053.51	1603.21	9063.06	1603.6	9081.05	1603.2	9091.61	1603.49	9091.7	1603.5
9101.45	1603.21	9102.94	1603.15	9119.16	1603.27	9131.92	1603.35	9147.3	1603.4
9148.46	1603.44	9150.33	1603.41	9162.64	1603.14	9183.47	1603.38	9212.74	1603.7
9215.72	1603.76	9216.78	1603.76	9224.07	1603.81	9225.49	1603.82	9228.15	1603.8
9233	1603.84	9237.19	1603.84	9249.53	1604.02	9258.05	1603.91	9270.51	1603.9
9279.4	1603.9	9286.28	1603.95	9303.81	1604.14	9321.87	1604.56	9325.93	1604.6
9332.35	1604.79	9343.68	1604.66	9347.18	1604.71	9362.35	1604.77	9371.03	1604
9375.53	1603.5	9379.01	1603.94	9380.5	1604.07	9383.61	1603.98	9387.82	1603.8
9392.05	1604.01	9412.21	1604.58	9412.76	1604.56	9446.24	1604.38	9482.62	1604
9487.17	1603.86	9490.49	1603.97	9522.39	1603.95	9529.24	1604.02	9534.08	1604
9546.74	1603.81	9570.64	1603.63	9578.04	1603.54	9588.5	1602.6	9589.66	1602.5
9590.4	1602.56	9604.39	1604.39	9615.17	1604.42	9628.69	1604.46	9659.63	1604.5
9677.35	1604.53	9682.87	1604.53	9698.13	1604.28	9709.85	1604.13	9720.63	1604.2
9744.55	1604.38	9746.92	1604.36	9819.82	1604.6	9839.32	1604.57	9843.89	1604.7
9851.55	1604.63	9862.68	1604.54	9875.2	1604.48	9877.47	1604.48	9884.05	1604.4
9912.65	1604.43	9927.31	1604.46	9943.89	1604.42	9946.06	1604.44	9973.71	1604.3
9983.4	1604.29	9984.53	1604.02	9994.89	1601.52	9997.39	1601.54	10009.36	1601.6
10014.27	1602.43	10016.47	1602.88	10026.34	1603.29	10046.72	1604.21	10065.88	1604
10075	1603.87	10082.61	1603.98	10095.68	1604.09	10103.83	1604.11	10115.58	1604.1
10118.17	1604.17	10134.81	1604.31	10165.71	1604.36	10227.15	1604.58	10246.47	1604.6
10265.27	1605.29	10271.62	1605.43	10288.08	1605.31	10292.15	1605.31	10300.5	1605.3
10321.52	1605.31	10347.51	1605.18	10353.26	1605.14	10368.58	1605.28	10391.66	1605.3
10397.25	1605.69	10411.27	1606.22	10421.24	1605.65	10429.35	1605.32	10437.32	1605.5
10445.51	1605.65	10452.06	1605.61	0462.67	1605.59	10467.75	1605.59		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5248.42	.068	7122.13	.15	8544.26	.1	9303.81	.068	9946.06	.045
10046.72	.068								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9946.06	10046.72	320	336.06	320	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5248.42	5591.59	1605.11

E.G. Elev (ft)	1605.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.045	0.068
W.S. Elev (ft)	1605.07	Reach Len. (ft)	320.00	336.06	320.00
Crit W.S. (ft)		Flow Area (sq ft)	5523.30	169.62	159.26
E.G. Slope (ft/ft)	0.009721	Area (sq ft)	5523.30	169.62	159.26

Q Total (cfs)	11309.00	Flow (cfs)	10246.47	779.54	282.99
Top Width (ft)	4207.29	Top Width (ft)	3894.01	100.66	212.62
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	1.86	4.60	1.78
Max Chl Dpth (ft)	4.37	Hydr. Depth (ft)	1.42	1.69	0.75
Conv. Total (cfs)	114699.7	Conv. (cfs)	103923.2	7906.4	2870.2
Length Wtd. (ft)	321.84	Wetted Per. (ft)	3895.56	101.13	212.63
Min Ch El (ft)	1601.52	Shear (lb/sq ft)	0.86	1.02	0.45
Alpha	1.25	Stream Power (lb/ft s)	1.60	4.68	0.81
Frctn Loss (ft)	2.88	Cum Volume (acre-ft)	1020.16	20.87	95.07
C & E Loss (ft)	0.01	Cum SA (acres)	556.72	7.20	65.41

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5248.42	6422.83	322.64	247.93	512.00	2.85	0.48	1.30
6422.83	7597.24	5425.27	2297.34	1034.33	47.97	2.22	2.36
7597.24	8771.65	2343.56	1758.60	1174.45	20.72	1.50	1.33
8771.65	9946.06	2154.99	1219.42	1174.79	19.06	1.04	1.77
LB 9946.06	RB 10046.72	779.54	169.62	101.13	6.89	1.69	4.60
10046.72	10467.75	282.99	159.26	212.63	2.50	0.75	1.78

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.793**

INPUT
Description: RM.2.793. HORZ. N VALUES USED. AREA TO LT. OF STA. 5350.41 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 374

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
5011.3	1601	5109.26	1601.42	5127.7	1601.4	5163.69	1601.18	5231.86	1601.14
5245.82	1601.3	5272.65	1601.06	5287.85	1600.91	5298.86	1601.18	5327.97	1602.21
5336.56	1602.4	5346.48	1602.67	5347.89	1602.68	5350.41	1602.69	5419.33	1602.19
5470.98	1602.1	5490.08	1602.07	5508.23	1601.56	5554.34	1601.26	5556.83	1601.33
5570.91	1601.6	5591.56	1601.89	5635.46	1602.02	5712.13	1601.98	5808.89	1601.54
5842.62	1601.7	5855.49	1601.76	5879.6	1601.82	5923.63	1602.17	5953.29	1602.07
5995.67	1601.9	6058.58	1601.48	6067.29	1601.46	6072.69	1601.52	6093.55	1601.69
6113.32	1601.6	6117.78	1601.6	6121.35	1601.65	6149.35	1601.84	6153.77	1601.87
6177.05	1602.1	6196.42	1602.27	6209.12	1602.28	6228.94	1602.56	6279.99	1602.56
6288.86	1602.6	6290.82	1602.56	6292.03	1602.56	6308.41	1602.85	6311.57	1602.92
6348.87	1603.1	6390.69	1603.07	6395.99	1603.07	6409.3	1603.07	6410.45	1603.01
6412.56	1603	6418.43	1603	6423.77	1602.96	6430.3	1602.96	6434.1	1602.96
6436.83	1603	6441.26	1602.93	6442.26	1602.93	6445.16	1603	6470.5	1603.1
6540.65	1603.4	6553.14	1603.34	6564.23	1603.2	6571.99	1603.24	6588.24	1603.09
6589.61	1603.1	6600.9	1602.58	6610.16	1602.33	6615.01	1602.48	6638.25	1602.98
6656.96	1602.7	6715.94	1601.75	6719.25	1601.83	6722.51	1601.85	6729.1	1601.94
6731.81	1601.7	6738.8	1601.26	6740.68	1601.01	6745.29	1601.33	6745.72	1601.46
6757.09	1601.2	6770.61	1600.9	6797.32	1600.77	6878.15	1599.9	6913.59	1599.73

6914.98	1599.7	6930.61	1599.98	6979.95	1599.71	7004.27	1599.81	7005.06	1599.81
7039.97	1599.8	7071.3	1600.15	7077.18	1600.19	7078.22	1600.15	7080.05	1600.16
7081.67	1600.2	7099.02	1600.01	7108.49	1599.79	7130.77	1599.57	7147.33	1599.2
7151.19	1599.2	7154.32	1598.99	7157.22	1599.05	7163.47	1598.88	7179.88	1599.04
7200.59	1599.3	7205.62	1599.24	7212.37	1599.18	7229.31	1599.07	7241.99	1598.88
7256.41	1598.9	7291.33	1599.09	7292.04	1599.12	7292.82	1599.12	7315.17	1599.27
7330.44	1599.7	7343.06	1599.96	7390.77	1599.08	7393.63	1599.05	7394.02	1599.07
7411.93	1599.2	7426.27	1599.03	7492.65	1599.85	7513.14	1599.99	7514.58	1599.96
7519.24	1599.9	7557.44	1599.7	7600.72	1599.6	7605.94	1599.56	7630.8	1599.51
7631.22	1599.5	7633.72	1599.54	7635.37	1599.55	7657.9	1599.76	7665.57	1599.75
7716.98	1599.9	7718.01	1599.92	7736.11	1599.96	7796.11	1599.48	7804.77	1599.38
7808.61	1599.4	7835.33	1600.07	7838.19	1600.09	7843.8	1600.1	7873.75	1600
7874.98	1600	7880.27	1600.04	7938.61	1600.38	7951.37	1600.28	7968.21	1600.31
8010.16	1600.1	8034.76	1600.11	8059.61	1600.37	8066.1	1600.39	8076.44	1600.41
8092.57	1600.5	8119.11	1600.59	8163.66	1600.72	8172.54	1600.71	8226.94	1600.62
8233.68	1600.6	8266	1601.1	8275.22	1600.96	8298.38	1600.5	8337.61	1600.69
8362.92	1600.8	8375.47	1600.74	8393.28	1600.66	8491.1	1600.24	8496.83	1600.26
8502.89	1600.2	8516.53	1600.4	8534.45	1600.64	8574.6	1600.56	8605.95	1600.52
8627.92	1600.6	8653.93	1600.59	8701.23	1600.51	8702.35	1600.5	8711.36	1600.47
8724	1600.6	8727.19	1600.57	8733.04	1600.55	8740.02	1600.57	8741.41	1600.59
8748.01	1600.6	8750.5	1600.58	8759.54	1600.6	8762.48	1600.55	8767.45	1600.54
8770.32	1600.5	8781.4	1600.23	8783.81	1600.21	8788.77	1599.87	8800.21	1599.97
8802.29	1600.1	8808.93	1600.32	8811.6	1600.26	8815.88	1600.11	8826.43	1599.84
8835.9	1599.7	8845.66	1599.81	8857.19	1599.81	8868.37	1599.79	8875.76	1599.83
8877.69	1599.9	8882.19	1599.99	8893.36	1600.12	8894.69	1600.13	8904.77	1600.24
8911.7	1600.4	8947.6	1601.08	8953.03	1601.04	8960.16	1601.15	8971.4	1601.06
8987.54	1600.8	8996.71	1600.62	9002.77	1600.55	9011.28	1600.55	9016.37	1600.57
9037.15	1600.3	9038.37	1600.27	9054.97	1600.49	9058.79	1600.46	9065.86	1600.48
9072.16	1600.5	9085.66	1600.53	9100.28	1600.66	9100.33	1600.66	9100.39	1600.66
9100.41	1600.7	9109.37	1600.85	9130.24	1601.01	9141.47	1601.07	9153.11	1600.9
9156.91	1600.9	9208	1601.63	9230.24	1601.65	9236.15	1602.32	9238.4	1602.37
9242.93	1602.3	9245.1	1602.14	9248.5	1602.19	9259.21	1602.2	9286.46	1602.18
9304.14	1602.2	9312.93	1602.29	9315.41	1602.31	9345.64	1601.99	9348.15	1601.96
9350.27	1601.9	9351.33	1601.77	9356.33	1601.33	9365.17	1601.09	9372.91	1600.88
9378.66	1600.9	9388.71	1600.88	9394.6	1600.94	9403.61	1600.7	9406.3	1600.32
9414.85	1600.4	9426.7	1600.55	9449.92	1600.63	9458.15	1600.66	9463.5	1600.61
9475.15	1600.5	9481.36	1600.99	9486.88	1601.18	9493.87	1601.37	9505.53	1601.21
9529.94	1600.5	9542.97	1600.48	9546.3	1600.54	9548.5	1600.54	9567.45	1600.69
9583.14	1600.7	9608.39	1600.87	9635.88	1600.68	9651	1600.63	9657.1	1600.67
9680.27	1600.6	9690.41	1600.57	9700.73	1600.54	9714.58	1600.35	9723.52	1600.29
9726.03	1600.3	9733.8	1600.27	9775.6	1600.45	9795.55	1600.62	9808.4	1600.91
9814.53	1601	9817.04	1601.16	9824.29	1601.06	9828.4	1601.02	9835.16	1601.01
9853	1601.2	9869.04	1601.23	9883.28	1601.46	9887.33	1601.51	9889.69	1601.5
9897.28	1601.5	9906.04	1601.36	9921.81	1601.15	9925.03	1600.85	9929.83	1600.01
9940.3	1599.8	9948.53	1599.55	9956.16	1599.35	9963.23	1599.15	9965.88	1599.11
9967.54	1599.1	9969.18	1599.06	9971.62	1599.27	9988.94	1599.05	10009.57	1598.87
10023.77	1598.9	10024.51	1598.87	10024.74	1598.87	10025.15	1598.91	10025.81	1598.92
10037.29	1599	10039.61	1599.17	10041.91	1599.47	10062.81	1601.03	10070.68	1601.59
10078.93	1601.4	10101.3	1600.86	10105.49	1600.72	10110.42	1600.65	10116.13	1600.91
10124.34	1601.3	10147.02	1601.29	10153.71	1601.3	10155.7	1601.92	10157.84	1602.46
10159.07	1600.8	10162.38	1598.11	10165.15	1598.11	10166.51	1598.81	10171.03	1601.56
10173.2	1601.2	10175.01	1601.41	10178.13	1601.31	10179.08	1601.51	10184.09	1601.05
10185	1600.7	10235.54	1601.13	10241.41	1601.17	10307.41	1600.97	10310.49	1600.96
10315.77	1601	10315.98	1601.02	10316.2	1601.01	10316.53	1601.02	10317.75	1601.04
10348.24	1601.7	10354.09	1601.38	10372.41	1601.34	10386.48	1601.34	10400.16	1601.27
10431.78	1601.3	10432.27	1601.31	10432.67	1601.31	10434.24	1601.31	10435.94	1601.51
10447.27	1602.7	10454.14	1602.74	10463.75	1602.62	10464.22	1602.75		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
5011.3	.068	5591.56	.15	8882.19	.1	9948.53	.04	10041.91	.068

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9948.53	10041.91	380	384	440	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
5011.3	5350.41	1602.68

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1602.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.137	0.045	0.068
W.S. Elev (ft)	1602.12	Reach Len. (ft)	380.00	384.00	440.00
Crit W.S. (ft)		Flow Area (sq ft)	5926.80	284.85	415.31
E.G. Slope (ft/ft)	0.008404	Area (sq ft)	5926.80	284.85	415.31
Q Total (cfs)	11309.00	Flow (cfs)	8643.82	1813.03	852.14
Top Width (ft)	4351.49	Top Width (ft)	3859.82	93.38	398.29
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)	1.46	6.36	2.05
Max Chl Dpth (ft)	4.01	Hydr. Depth (ft)	1.54	3.05	1.04
Conv. Total (cfs)	123361.7	Conv. (cfs)	94289.2	19777.1	9295.4
Length Wtd. (ft)	388.86	Wetted Per. (ft)	3860.36	93.43	401.29
Min Ch El (ft)	1598.87	Shear (lb/sq ft)	0.81	1.60	0.54
Alpha	2.90	Stream Power (lb/ft s)	1.17	10.18	1.11
Frctn Loss (ft)	4.03	Cum Volume (acre-ft)	978.10	19.11	92.96
C & E Loss (ft)	0.02	Cum SA (acres)	528.23	6.45	63.17

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5011.30	6245.61	136.01	228.60	702.67	1.20	0.33	0.59
6245.61	7479.92	2827.08	1800.63	787.31	25.00	2.29	1.57
7479.92	8714.22	3129.38	2290.94	1234.34	27.67	1.86	1.37
8714.22	9948.53	2551.36	1606.63	1136.03	22.56	1.41	1.59
LB 9948.53	RB 10041.91	1813.03	284.85	93.43	16.03	3.05	6.36
10041.91	10464.22	852.14	415.31	401.29	7.54	1.04	2.05

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.720

INPUT
Description: RM.2.720. HORZ. N VALUES USED. INEFFECTVE AREA OPTION USED TO BLOCK FLOW TO RT. OF STA. 10434.56 DUE TO RIDGE.

Station Elevation Data num= 457

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4895.17	1598	4948.42	1598.54	4955.14	1598.61	5036.32	1598.18	5068.25	1597.96
5073.77	1598	5126.14	1597.38	5189.65	1597.04	5223.8	1596.74	5231.69	1596.86
5252.45	1597.3	5254.34	1597.31	5254.86	1597.36	5264.23	1598.05	5274.24	1596.78
5277.1	1596.3	5288.21	1599.11	5293.83	1600.64	5299.08	1599.98	5307.48	1599.33
5310.66	1598.5	5327.64	1598.53	5419.86	1598.16	5435.59	1598.13	5443.07	1598.16
5449.71	1598	5453.73	1597.98	5477.47	1598.21	5497.73	1598.51	5534.46	1598.66
5536.78	1598.5	5547.78	1597.6	5552.96	1597.56	5555.86	1597.51	5596.66	1597.33
5651.28	1597.2	5653.42	1597.33	5674.09	1597.48	5732.1	1597.78	5765.17	1597.68
5805.42	1597.4	5876.03	1597.57	5878.6	1597.6	5879.37	1597.6	5880.71	1597.62
5885.82	1597.7	5942.58	1598.32	5949.82	1597.74	5957.21	1597.45	5975.37	1597.09
5977.32	1597.6	5979.75	1597.57	5989.3	1598.17	5989.63	1598.22	5992.96	1598.49
6027.26	1598.5	6027.71	1598.5	6042.23	1598.19	6053.66	1598.35	6088.55	1598.28
6099.9	1598.5	6115.62	1598.81	6150.65	1597.78	6170.19	1597.33	6174.07	1597.24
6178.32	1597.3	6204.98	1597.84	6208.63	1597.89	6221.83	1597.66	6240.3	1597.71
6241.39	1597.7	6252.91	1597.46	6257.1	1597.53	6280.84	1597.56	6338.27	1598.04
6349.97	1597.9	6362.83	1597.71	6372.62	1597.7	6418.88	1597.07	6457.82	1596.9
6495.55	1596.6	6500.83	1596.5	6512.79	1596.55	6521.28	1596.49	6571.1	1595.91
6587.99	1595.7	6594.34	1595.74	6596.61	1595.72	6610.97	1595.68	6632.54	1595.87
6661.37	1596	6682.45	1595.97	6701.75	1595.97	6724.33	1596.12	6725	1596.12
6726.67	1596.1	6726.67	1596.12	6773.39	1596.88	6787.57	1597.24	6822.48	1597.76
6838.27	1597.8	6839.29	1597.77	6858.72	1597.9	6865.4	1597	6869.01	1596.9
6871.81	1596.7	6875.12	1596.8	6886.18	1596.9	6896.89	1596.96	6924.18	1597.3
6933.47	1597.8	6942.63	1598.16	6943.33	1598.13	6949.54	1598.07	6964.66	1597.69
6979.53	1597.6	6997.68	1597.69	7023.16	1597.87	7024.81	1597.86	7074.13	1597.9
7075.46	1597.9	7075.85	1597.92	7081.31	1597.9	7086.55	1597.6	7091.17	1597.29
7095.55	1596.6	7102.32	1596.56	7110.54	1596.08	7115.65	1595.74	7126.71	1596.1
7142.64	1596.3	7143.87	1596.3	7149.93	1596.3	7165.09	1596.51	7218.21	1596.54
7231.44	1596.2	7236.15	1596.43	7240.47	1596.28	7248.36	1594.92	7251.79	1595.22
7252.2	1595.2	7252.59	1595.15	7256.65	1595.2	7261.92	1595.15	7266.99	1595.17
7278.02	1595.2	7286.7	1595.29	7316.36	1595.82	7327.04	1595.97	7333.53	1595.74
7334.97	1595.7	7370.95	1595.82	7388.58	1595.87	7411.6	1595.91	7430.82	1595.9
7460.82	1596.3	7499.52	1595.9	7520.46	1595.93	7545.41	1595.84	7546.86	1595.85
7549.78	1595.8	7574.22	1595.97	7600.6	1596.01	7610.8	1596.04	7630.57	1595.91
7641.39	1595.8	7673.95	1595.66	7687.16	1595.61	7706.05	1595.62	7728.35	1595.4
7736.51	1595.5	7760.23	1595.88	7765.9	1596	7781.44	1596.03	7810.73	1596.02
7818.22	1596.1	7855.55	1596.11	7873.24	1596.12	7893.5	1596.25	7921.1	1596.38
7954.18	1596.4	7969.92	1596.45	7998.13	1596.51	8003.18	1596.56	8007.28	1596.59
8013.28	1596.6	8059.28	1596.76	8073.69	1596.76	8085.32	1596.84	8090.83	1596.84
8093.58	1596.8	8099.68	1596.74	8104.77	1596.67	8110.44	1596.66	8113.63	1596.7
8118.42	1596.8	8124.7	1596.92	8129.84	1596.84	8134.77	1596.7	8167.62	1596.53
8196.13	1596.3	8209.56	1596.38	8211.37	1596.33	8235.77	1596.31	8242.34	1596.32
8247.73	1596.3	8296.54	1596.32	8318.98	1596.34	8321.6	1596.34	8331.14	1596.36
8425.11	1596.5	8444.73	1596.94	8453.32	1597.13	8454.76	1597.11	8456.31	1597.16
8505.15	1596.6	8547.96	1596.6	8549.83	1596.64	8573.98	1596.71	8576.79	1596.74
8582.71	1596.7	8668.69	1597.03	8681.73	1597.07	8681.8	1597.07	8681.89	1597.07
8683.43	1597.1	8722.01	1596.94	8735.05	1596.87	8739.01	1596.8	8744.94	1596.93
8748.71	1596.9	8752.02	1596.76	8752.15	1596.74	8753.84	1596.72	8754.6	1596.71
8757.85	1596.8	8786.97	1597.53	8803.38	1597.67	8823.31	1597.41	8836.83	1597.3
8840.22	1597.2	8842.51	1597.23	8855.53	1597.02	8855.64	1597.02	8855.74	1597.02
8855.81	1597	8860.54	1597.1	8862.12	1597.09	8863.23	1597.07	8863.97	1597.02
8869.12	1596.6	8885.53	1596.85	8902.9	1596.92	8910.69	1596.98	8918.83	1596.96
8933.53	1597.3	8937.83	1597.3	8951.89	1597.69	8966.4	1597.39	8982.16	1597.71
8986.66	1597.7	8994.48	1597.69	9021.32	1597.28	9040.44	1596.99	9041.81	1596.98
9042.53	1597	9043.24	1596.99	9044.06	1596.98	9045.6	1596.99	9046.05	1597
9051.77	1597.3	9068.48	1597.28	9072.23	1597.32	9105.47	1597.09	9137.31	1596.95

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 9137.38    1597 9137.42 1596.95 9167.78 1597.18 9169.18 1597.32  9197.8 1597.51
 9208.26  1597.4 9213.24 1597.61 9221.06 1597.66 9227.45 1597.69 9247.32 1597.74
 9258.96  1597.8 9263.18 1597.74 9264.44 1597.75 9274.78 1597.43 9283.23 1597.19
 9290.37  1597.3 9293.59 1597.27 9295.68 1597.39 9312.95 1597.64 9325.21 1597.82
 9327.29  1597.9 9330.68  1597.4 9334.74 1597.38 9336.07 1597.62 9340.17  1597.9
 9343.48  1597.9 9349.55 1597.76 9369.37 1597.99  9378.7 1597.98 9386.71 1597.79
 9396.33  1597.6 9405.91 1597.74 9415.81 1597.68 9461.68  1597.9 9469.92 1597.74
 9478.66  1597.8 9483.59  1597.8 9510.14 1597.75 9516.53 1597.76 9531.29 1598.12
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 9793.56  1597.3 9805.79 1597.35 9815.16 1597.35 9826.08 1597.43 9830.79  1597.4
  9844.8  1597.4 9868.21  1597.1 9872.78 1597.08 9876.61 1597.05 9881.63 1596.81
  9883.8  1596.8 9901.85 1596.85  9906.3 1597.06 9908.23 1597.18 9913.47  1597.1
 9918.96    1597 9931.65 1596.88 9943.44 1597.23 9952.14 1597.44 9964.54 1597.32
 9981.01    1597 9993.56  1594.1    9999 1592.8210000.73 1592.8910021.37 1593.49
 10022.5  1593.710032.74 1595.3810040.06 1594.8210042.28 1594.7910043.71  1594.3
10045.56  1594.710056.67 1596.8410059.72 1596.5710067.69 1596.6610069.96 1596.64
10079.32  1596.710092.31 1597.4810093.43 1597.5910094.96 1596.9310097.81 1595.86
10098.71  1595.310099.38 1595.2610105.23    159310112.27 1594.6410120.07 1596.01
10122.39  1596.410125.87  1597.310129.34 1597.6510154.27 1596.3710185.51 1596.02
10188.94    159610193.15 1595.8710197.03 1595.8810262.27 1595.8410302.23 1595.79
10305.02  1596.510305.17 1596.5110308.75 1594.7610309.96 1594.7210311.87 1595.03
10316.17  1597.110317.97 1596.49 10319.1 1595.7310320.12 1595.6810342.37 1595.88
10348.16  1595.910349.29 1595.9310350.05 1596.0110357.08 1596.4710360.66 1596.26
10370.09  1596.410375.48 1596.5110394.82 1597.0610417.11 1597.5910420.57 1597.66
10426.65  1597.810431.92 1598.7410434.56 1599.1710435.59 1598.9310438.48 1598.46
 10445.5  1597.210455.87 1597.0110457.46 1597.0110459.77 1596.99 10471.6 1596.05
10475.01  1595.710481.54 1596.1210484.65 1596.3910507.33 1596.4310525.93 1596.43
10534.65  1596.410577.26 1596.7610614.27 1596.78 10621.8 1596.8110629.34 1596.82
10649.35  1596.810655.29  1596.810667.37 1596.8310712.21 1597.0310751.44 1597.14
10794.74    159710822.43 1596.7810823.54 1596.7710840.22 1596.9710894.82 1597.55
10902.85  1597.610919.99 1597.8310927.06 1597.8910930.65 1597.9210948.56 1598.31
10953.73  1598.310956.68 1598.29

Manning's n Values          num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4895.17    .068 6115.62     .15 8668.69      .1 9655.59    .068 9981.01    .045
10056.67    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9981.0110056.67              380  410.52     380             .1       .3

Ineffective Flow     num=       1
   Sta L   Sta R    Elev
10434.5610956.68    1600

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1598.21   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.29   Wt. n-Val.                0.132      0.045     0.068
  W.S. Elev (ft)            1597.91   Reach Len. (ft)          380.00     410.52    380.00
  Crit W.S. (ft)            1597.71   Flow Area (sq ft)       4453.00     261.78    622.20
  E.G. Slope (ft/ft)       0.013401   Area (sq ft)            4453.00     261.78   1110.69
```

Q Total (cfs)	11309.00	Flow (cfs)	6827.85	2269.17	2211.98
Top Width (ft)	5260.78	Top Width (ft)	4326.55	75.66	858.57
Vel Total (ft/s)	2.12	Avg. Vel. (ft/s)	1.53	8.67	3.56
Max Chl Dpth (ft)	5.09	Hydr. Depth (ft)	1.03	3.46	1.68
Conv. Total (cfs)	97692.6	Conv. (cfs)	58982.3	19602.1	19108.1
Length Wtd. (ft)	384.73	Wetted Per. (ft)	4328.01	76.66	373.44
Min Ch El (ft)	1592.82	Shear (lb/sq ft)	0.86	2.86	1.39
Alpha	4.22	Stream Power (lb/ft s)	1.32	24.77	4.96
Frctn Loss (ft)	3.97	Cum Volume (acre-ft)	932.83	16.71	85.25
C & E Loss (ft)	0.05	Cum SA (acres)	492.53	5.70	56.82

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4895.17	6166.63	489.17	299.58	618.62	4.33	0.48	1.63
6166.63	7438.09	1914.40	1432.44	1223.18	16.93	1.17	1.34
7438.09	8709.55	3211.46	1972.64	1271.50	28.40	1.55	1.63
8709.55	9981.01	1212.83	748.34	1214.71	10.72	0.62	1.62
LB 9981.01	RB 10056.67	2269.16	261.78	76.66	20.07	3.46	8.67
10056.67	10956.68	2211.98	622.20	373.44	19.56	1.68	3.56

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.643

INPUT
Description: RM. 2.643. HORZ. N VALUES USED. AREA TO LT OF STA. 4941.8 BLOCKED OUT DUE TO RIDGE.

Station Elevation Data num= 442

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4784.71	1593.6	4786.79	1593.45	4797.34	1594.52	4818.03	1595.14	4821.33	1595.26
4844.11	1595.2	4847.46	1595.22	4852.12	1595.23	4872.45	1595.28	4887.13	1595.23
4895.74	1595.2	4908.09	1595.25	4931.32	1595.41	4937.95	1595.43	4939.43	1595.43
4940.35	1595.4	4941.83	1595.43	4951.45	1595.37	4955.79	1593.64	4958.76	1592.05
4970.47	1592.1	4975.05	1592.17	4982.33	1592.2	4996.02	1594.11	4996.59	1594.23
4996.6	1594.2	4996.97	1594.22	5019.52	1593.82	5037.37	1593.59	5043.7	1593.44
5057.34	1593.7	5058.32	1593.67	5058.68	1593.66	5058.97	1593.65	5059.38	1593.62
5060.19	1593.6	5072.64	1593	5084.54	1593.84	5087.92	1594.13	5095.34	1594.84
5101.01	1594.6	5108.47	1594.39	5118.94	1594.37	5142.87	1594.25	5158.14	1594.18
5205.67	1594.1	5244.07	1594.27	5289.53	1594.29	5357.82	1594.39	5415.48	1594.14
5451.85	1594	5471.56	1593.93	5517.98	1593.42	5573.86	1593.06	5578.11	1593.07
5585.79	1593	5591.68	1593.51	5593.84	1593.67	5594.17	1593.69	5644.61	1593.81
5668.07	1593.8	5678.94	1592.46	5679.49	1592.41	5689.18	1593.04	5690.57	1593.11
5691.29	1593.2	5692.43	1593.3	5693.2	1593.27	5740.74	1593.49	5779.39	1593.68
5780.45	1593.7	5781.21	1593.7	5781.49	1593.71	5781.63	1593.71	5782.1	1593.72
5785.93	1593.9	5801.55	1594.45	5806.06	1594.41	5817.42	1593.76	5818.31	1594.3
5819.24	1594.2	5833.68	1593.52	5835.95	1593.56	5836.77	1593.56	5840.16	1593.55

5871.75	1593.6	5893.55	1593.68	5901.3	1593.69	5949.29	1593.5	5953.52	1593.6
5957.1	1593.7	5960.58	1593.7	5963.82	1593.69	5984.98	1593.99	6002.13	1593.94
6017.51	1593.9	6043.54	1593.9	6056.2	1594.12	6059.92	1593.94	6061.11	1593.83
6089.97	1593.7	6092.03	1593.72	6094.02	1593.76	6106.33	1593.89	6110.69	1593.87
6114.23	1594	6114.76	1593.97	6178.71	1593.46	6179.45	1593.47	6179.83	1593.47
6180.42	1593.5	6181.75	1593.5	6181.86	1593.49	6231.53	1593.73	6232.02	1593.7
6256.43	1592.9	6258.41	1592.92	6265.31	1592.83	6301.74	1593.05	6322.42	1593.19
6352.71	1593.6	6422.81	1594.86	6479.21	1596.03	6484.8	1596.01	6530.08	1595.43
6540.34	1595.3	6541.94	1595.32	6543.89	1595.26	6545.4	1595.22	6546.88	1595.18
6559.54	1594.9	6642.91	1593.25	6670.31	1592.54	6696.92	1592.2	6697.4	1592.24
6699.51	1592.2	6700.41	1592.14	6724.83	1591.7	6741.09	1591.33	6772.29	1590.65
6782.98	1590.4	6802.95	1590.03	6811.66	1589.89	6835.08	1590.16	6862.16	1590.41
6883.15	1590.6	6897.08	1590.94	6899.21	1590.7	6918.19	1590.88	6978.5	1591.37
7028.17	1591.9	7035.7	1591.96	7062.25	1591.97	7113.95	1592.19	7149.24	1592.36
7185.92	1592.7	7239.66	1592.82	7262.58	1592.93	7265.13	1592.96	7273.52	1593.04
7289.6	1593.1	7339.02	1593.23	7361.29	1593.65	7372.51	1593.85	7373.14	1593.86
7375.99	1593.1	7390.3	1589.28	7391.23	1589.27	7392.97	1589.25	7401	1589.15
7402.18	1589.2	7402.88	1589.08	7404.48	1589.27	7411.09	1593.79	7451.31	1593.69
7460.34	1593.5	7460.81	1593.53	7461.25	1593.52	7461.63	1593.53	7463.33	1593.52
7524.81	1593.5	7531.24	1593.52	7552.34	1592.13	7561.15	1591.48	7577.82	1593.5
7579.21	1593.7	7579.95	1593.73	7581.38	1593.87	7581.4	1593.87	7581.8	1593.85
7585.34	1593.8	7602.56	1593.59	7605.5	1593.67	7625.25	1593.78	7642	1593.9
7657.25	1593.8	7659.26	1593.64	7660.21	1593.6	7678.86	1593.3	7707.83	1593.24
7715.25	1592.1	7716.14	1591.98	7720.38	1591.58	7722.62	1591.42	7723.7	1591.38
7730.03	1590.9	7734.12	1590.61	7737.48	1590.35	7745.88	1591.09	7755.08	1591.92
7759.97	1591.9	7765.52	1591.95	7767.25	1591.96	7795.97	1592.19	7805.54	1592.24
7833.54	1592.4	7882.4	1592.43	7974.1	1592.34	7978.23	1592.33	7998.74	1592.36
8054.54	1592	8063.46	1591.95	8075.56	1591.86	8101.18	1591.7	8105.03	1591.73
8105.99	1591.7	8108.99	1591.75	8117.93	1591.98	8123.49	1591.99	8128.49	1591.84
8135.14	1591.8	8141.93	1591.76	8165.1	1591.74	8218.49	1591.96	8221.99	1592.01
8255.87	1591.9	8256.68	1591.87	8257.14	1591.87	8259.46	1591.88	8409.22	1592.5
8440.58	1592.4	8451	1592.68	8456.81	1592.88	8461.34	1592.97	8506.44	1592.88
8525.58	1593.1	8553.14	1593.47	8616.39	1593.14	8626.56	1593.14	8628.75	1593.39
8632.52	1593.3	8638.49	1593.31	8654.54	1592.55	8660.25	1592.39	8677.92	1592.77
8692.19	1592.9	8699.69	1592.99	8727.76	1593.1	8752.54	1592.99	8785.61	1593.04
8822.09	1593.1	8832.57	1593.1	8836.66	1593.07	8843.1	1593.09	8844.61	1593.08
8874.85	1592.6	8882.54	1592.5	8891.16	1592.53	8894.49	1592.55	8908.69	1592.56
8919.51	1592.6	8924.47	1592.63	8931.73	1592.48	8932.41	1592.5	8932.58	1592.51
8932.93	1592.5	8942.14	1593.01	8944.55	1592.93	8951.15	1592.64	8960.09	1592.55
8971.66	1592.4	8981.65	1592.36	8990.91	1592.38	8991.19	1592.5	8992.41	1592.49
8997.76	1592.6	9001.68	1592.51	9019.66	1592.46	9058.05	1592.52	9061.34	1592.57
9076.99	1592.8	9079.55	1592.83	9109.36	1593.09	9124.16	1593.03	9128.19	1592.98
9137.29	1592.8	9144.36	1592.74	9154.69	1592.83	9167.04	1592.49	9168.59	1592.46
9174.1	1592.5	9179.81	1592.48	9184.73	1592.57	9193.2	1592.58	9194.11	1592.71
9215.29	1593.2	9230.35	1593.69	9236.49	1593.7	9254.6	1594.1	9259.31	1594.19
9261.8	1594.2	9263.68	1594.13	9289.32	1593.85	9303.01	1593.95	9303.83	1593.99
9319.31	1593.9	9321.42	1594.25	9329.25	1594.28	9347.7	1594.26	9363.57	1594.24
9376.78	1595.8	9379.37	1596.64	9390.92	1594.94	9391.3	1594.88	9395.73	1594.61
9398.1	1594.3	9405.64	1594.29	9417.27	1594.44	9431.74	1594.36	9436.97	1594.18
9445.33	1594	9458.88	1593.95	9467.34	1593.94	9493.05	1593.74	9519.26	1593.63
9522.83	1593.6	9533.78	1593.49	9539.68	1593.51	9539.99	1593.57	9540.26	1593.7
9540.28	1593.7	9542.72	1593.82	9546.59	1593.95	9554.94	1593.83	9565.44	1594.09
9570.02	1594.1	9585.82	1593.93	9594.41	1593.82	9607.71	1593.84	9619.56	1593.9
9622.2	1593.8	9634.09	1593.77	9641.14	1593.78	9659.74	1594.07	9661.94	1594.01
9669.34	1593.9	9681.11	1593.8	9701.82	1593.38	9705.21	1593.28	9706.35	1593.26
9713.6	1593	9720.13	1592.86	9721.94	1592.79	9721.97	1592.78	9722.98	1592.75
9723.03	1592.6	9729.77	1592.58	9739.14	1592.72	9768.94	1592.82	9775.58	1592.64

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 9779.39  1592.7 9783.16 1592.72  9784.8  1592.7 9789.84 1592.62  9807.9 1592.38
 9815.32  1592.4 9834.62 1592.79 9855.52 1592.96 9857.58 1592.81 9862.46 1592.42
 9864.77  1592.2 9870.31 1592.33 9890.52 1593.01 9901.98 1592.98 9906.02 1592.95
  9920.8  1592.7 9938.31 1592.68 9938.69 1592.68 9938.99 1592.73 9939.63 1592.68
  9940.1  1592.7 9950.96 1592.72 9978.16 1592.84 9978.84 1592.82 9985.02 1593.39
 9985.51  1593.4  9985.6 1593.41  9997.7 1589.81 10001.9 1589.7810008.41 1589.64
10024.19    159010029.51 1590.1610038.85 1593.3610039.74 1593.5110041.45 1593.54
 10046.4  1593.710061.26 1592.1910062.31 1592.0610079.72 1593.5310082.39 1593.89
 10099.4  1592.210103.81  1591.610138.73 1591.9110140.27 1591.9610140.43 1591.96
10173.76  1592.310188.38 1592.2810211.21 1592.3310218.97 1592.4510238.67 1592.49
10256.16  1592.410271.67 1592.4610275.64 1591.9110281.75 1591.0410294.01 1591.66
10294.93  1591.710297.21 1591.7110301.98 1591.7210354.91 1591.8710368.39 1591.88
10397.14  1591.810443.32 1592.1810455.44 1592.38 10479.6 1592.5910488.98 1592.69
10544.73  1592.910552.79  1592.910553.78  1592.9 10554.2 1592.9110554.79 1592.91
10588.37  1592.9 10596.3 1592.89

Manning's n Values          num=       8
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4784.71     .15 5037.37    .068 5871.75     .15 8259.46      .1 9329.25     .15
 9789.84    .068 9985.51    .04510041.45    .068

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9985.5110041.45              400  468.72     400              .1       .3

Blocked Obstructions      num=       1
   Sta L   Sta R    Elev
 4784.71 4941.83 1595.43

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1594.18   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.12   Wt. n-Val.                0.126      0.045      0.068
  W.S. Elev (ft)            1594.06   Reach Len. (ft)          400.00     468.72     400.00
  Crit W.S. (ft)                      Flow Area (sq ft)       5275.14     186.96     969.79
  E.G. Slope (ft/ft)       0.008148   Area (sq ft)            5275.14     186.96     969.79
  Q Total (cfs)            11309.00   Flow (cfs)              7308.66    1229.99    2770.35
  Top Width (ft)            4877.56   Top Width (ft)          4266.77      55.94     554.85
  Vel Total (ft/s)             1.76   Avg. Vel. (ft/s)           1.39       6.58       2.86
  Max Chl Dpth (ft)            4.98   Hydr. Depth (ft)           1.24       3.34       1.75
  Conv. Total (cfs)        125282.2   Conv. (cfs)             80966.0    13626.0    30690.2
  Length Wtd. (ft)          405.77    Wetted Per. (ft)        4270.76      57.02     556.44
  Min Ch El (ft)            1589.64   Shear (lb/sq ft)           0.63       1.67       0.89
  Alpha                        2.57   Stream Power (lb/ft s)     0.87      10.97       2.53
  Frctn Loss (ft)              3.19   Cum Volume (acre-ft)     890.39      14.59      76.18
  C & E Loss (ft)              0.02   Cum SA (acres)           455.05       5.08      50.66

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water
surface.
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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta     Right Sta        Flow       Area       W.P.    % Conv.   Hydr D.   Velocity
  (ft)         (ft)             (cfs)    (sq ft)      (ft)                (ft)     (ft/s)
  4784.71      6084.91         400.10     368.07    740.91      3.54      0.50       1.09
```

6084.91	7385.11	2334.50	1793.11	1077.05	20.64	1.67	1.30
7385.11	8685.31	2769.01	1982.22	1302.33	24.48	1.52	1.40
8685.31	9985.51	1805.05	1131.73	1150.48	15.96	0.98	1.59
LB 9985.51	RB 10041.45	1229.99	186.96	57.02	10.88	3.34	6.58
10041.45	10596.30	2770.35	969.79	556.44	24.50	1.75	2.86

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.554**

INPUT
Description: RM. 2.554. HORZ. N VALUES USED. AREA BLOCKED OUT TO LT. OF STA. 4769.2 .

Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4444.79	1591.7	4454.3	1591.65	4478.65	1591.63	4489.69	1591.11	4492.88	1591.01
4504.26	1590.4	4509.49	1590.46	4532.72	1590.58	4535.85	1590.65	4541.63	1590.8
4547.67	1590.9	4556.23	1591.03	4561.4	1591.03	4631.71	1591.21	4649.85	1591.26
4651.02	1591.3	4652.06	1591.27	4653.53	1591.27	4656.27	1591.25	4696.01	1590.89
4697.24	1590.8	4705.55	1590.44	4708.14	1590.4	4715	1590.11	4721.5	1590.22
4743.17	1590.5	4759.88	1591.14	4762.35	1591.18	4766.23	1591.15	4769.2	1591.14
4823.71	1590.9	4870.64	1590.7	4872.8	1590.7	4873.67	1590.7	4874.97	1590.7
4879.09	1590.7	4897.77	1590.57	4904.11	1590.33	4925.76	1589.86	4948.36	1589.89
4953.84	1589.9	4958.95	1590.01	4960.32	1590.07	4967.18	1590.23	4977.86	1590.48
5000.99	1590.5	5021.62	1590.67	5030.41	1590.68	5044.65	1590.72	5045.46	1590.72
5046.79	1590.7	5047.02	1590.4	5048.39	1589.04	5056.07	1588.61	5060.73	1588.18
5061.72	1588.4	5071.8	1590.72	5075.38	1590.4	5094.28	1589.46	5101.12	1589.91
5101.31	1589.9	5140.44	1589.77	5142.44	1589.77	5185.09	1589.83	5197.16	1590.89
5202.03	1591.2	5203.84	1591.27	5221.67	1591.47	5224.59	1591.04	5235.1	1589.84
5242.62	1589.9	5248.13	1589.89	5269.01	1590.02	5288.26	1590.1	5312.98	1590.18
5327.8	1590.2	5354.24	1590.32	5362.24	1589.94	5379.11	1589.14	5379.97	1589.08
5380.61	1589	5381	1589.02	5382.29	1588.98	5386.64	1589.04	5421.71	1589.36
5435.49	1589.9	5445.04	1590.19	5455.55	1590.08	5459.12	1590.16	5467.63	1590.61
5477.32	1590.9	5489.7	1590.97	5494.03	1591.01	5497.95	1590.94	5507.27	1591.01
5532.07	1591	5544.07	1591.01	5558.68	1590.72	5577.94	1590.47	5583.9	1590.44
5593.3	1590.4	5615.19	1590.35	5621.23	1590.31	5651.25	1589.97	5653.5	1589.91
5665.21	1589.7	5686.25	1589	5708	1588.88	5740.14	1588.98	5749.61	1589.31
5753.77	1589.4	5756.31	1589.43	5762.88	1589.67	5772.43	1590.18	5782.2	1590.21
5782.9	1590.2	5824.22	1589.91	5826.73	1589.93	5831.06	1590.01	5839.41	1590.1
5865.55	1589.9	5893.29	1589.94	5910.26	1589.85	5914.46	1589.83	5923.41	1589.92
5931.07	1590.2	5953.71	1590.31	5958.23	1590.36	5961.58	1590.4	5964.06	1590.42
5970.79	1590.4	6053.16	1590.16	6070.28	1590.21	6074.52	1590.01	6076.58	1589.87
6089.23	1589.1	6089.58	1589.1	6092.42	1589	6095.03	1588.74	6100.1	1588.34
6132.67	1588.2	6142.16	1588.28	6148.31	1588.49	6168.56	1588.77	6174.47	1588.51
6190.95	1588.4	6212.31	1588.51	6229.27	1588.5	6316.9	1589.82	6320.42	1589.89
6322.38	1589.9	6322.48	1589.87	6332.62	1589.87	6335.91	1589.87	6343.49	1589.95
6349.57	1590	6362.31	1590.02	6433.15	1590.11	6445.39	1590.05	6449.45	1590.11
6475.94	1590.5	6481.58	1590.55	6525.41	1591.07	6530.35	1591.06	6544.25	1590.96
6567.91	1590.6	6663	1591.72	6690.45	1591.86	6750.81	1591.13	6812.98	1590.37
6822.55	1590.3	6836.08	1590.07	6906.24	1589.54	6923.29	1589.62	6951.82	1589.59
6960.69	1589.6	6966.75	1589.59	6982.17	1589.45	6996.12	1589.05	6998.33	1589

6999.51	1589	7014.07	1589.54	7023.45	1589.89	7024.03	1589.9	7024.2	1589.9
7037.33	1589.9	7074.64	1590.05	7078.81	1590.05	7080.5	1589.98	7090.45	1589.49
7095.62	1589.8	7103.19	1590.35	7109.42	1589.92	7115.34	1589.73	7128.69	1588.91
7168.54	1589.1	7177.93	1589.21	7177.97	1589.08	7180.44	1588.91	7181.23	1588.93
7181.84	1589	7201.76	1589.81	7210.72	1589.35	7234.76	1588.42	7236.65	1588.4
7303.07	1588	7355.25	1587.92	7384.73	1588.82	7403.43	1589.51	7462.06	1587.87
7496.81	1588	7516.35	1588.16	7531.15	1588.31	7542.7	1590.57	7545.56	1591.14
7546.41	1591.3	7561.51	1590.45	7574.05	1590.71	7581.49	1590.6	7656.27	1590.13
7664.72	1590	7669.96	1589.97	7682.45	1589.65	7687.82	1589.94	7701.74	1591.07
7717.46	1591.1	7732.65	1590.92	7740.43	1590.45	7752.86	1590.37	7807.54	1590.07
7808.74	1590	7809.3	1590	7810.6	1589.94	7819.96	1589.58	7835.64	1589.03
7842.03	1589	7863.94	1588.54	7868	1588.69	7891.51	1589.49	7893.71	1589.57
7893.94	1589.6	7894.18	1589.59	7894.35	1589.59	7917.51	1590.41	7944.21	1590
7981.39	1589.4	7986.28	1588.96	7989.03	1589.13	8000.25	1589.15	8003.3	1589.1
8021.28	1588.9	8032.97	1589.29	8043.35	1589.4	8046.22	1589.29	8084.89	1588.34
8131.88	1588.8	8160.75	1589.43	8172.03	1589.38	8220.56	1589.44	8257.28	1589.45
8283.27	1589.5	8327.02	1589.45	8393.1	1589.66	8400.14	1589.67	8406.04	1589.67
8410.23	1589.7	8468.57	1589.56	8473.95	1589.71	8484.97	1589.7	8488.77	1589.87
8530.64	1589.8	8542.86	1589.62	8544.77	1589.59	8549.42	1589.57	8551.94	1589.53
8573.8	1589.2	8621.83	1588.86	8631.27	1588.88	8657.13	1588.81	8665.84	1588.83
8685.88	1588.9	8710.18	1588.63	8721.65	1588.56	8727.01	1588.6	8736.68	1589.01
8741.59	1589.1	8749.01	1589	8763.71	1589.4	8767.65	1589.46	8776.5	1589.4
8809.14	1589.3	8817.33	1588.94	8824.45	1589.36	8828.91	1588.92	8833.34	1589.44
8835.77	1589.8	8837.63	1589.72	8838.13	1589.62	8845.77	1589.67	8863.53	1589.82
8876.26	1589.9	8879.69	1589.97	8885.71	1590.06	8896.17	1590.37	8897.87	1590.39
8913.88	1590.8	8916.44	1590.79	8927.03	1590.82	8940.52	1590.71	8945.92	1590.84
8959.15	1590.9	8966.83	1590.95	8970.76	1590.97	8991.5	1590.99	9001.27	1590.92
9010.68	1591	9028.92	1590.97	9031.02	1590.94	9038.46	1590.7	9044.18	1590.46
9051.19	1590.3	9051.35	1590.38	9059.35	1590.26	9067.63	1590.61	9096.52	1590.62
9096.82	1590.4	9096.84	1590.38	9105.78	1590.57	9110.78	1590.51	9126.7	1590.64
9140.66	1590.7	9148.32	1590.61	9154.42	1590.65	9168.33	1590.67	9173.78	1590.7
9174.41	1590.7	9177.22	1590.7	9203.53	1590.69	9214.96	1590.71	9224.8	1590.42
9232.19	1590.3	9252.92	1589.55	9257.74	1589.5	9276.29	1589.14	9304.43	1589.12
9309.5	1589.3	9321.21	1589.48	9333.44	1589.42	9341.77	1589.29	9345.42	1589.36
9356.22	1589.4	9366.41	1589.34	9381.28	1589.25	9389.87	1589.21	9406.52	1588.58
9409.36	1588.5	9409.88	1588.5	9440.79	1588.86	9441.12	1588.85	9447.85	1589.01
9451.68	1589.1	9466.26	1589.52	9493.85	1589.3	9495.95	1589.27	9502.15	1589.27
9516.44	1589.4	9520.56	1589.39	9530.86	1586.92	9535.75	1585.78	9541.41	1587.03
9549.17	1588.8	9556.56	1588.73	9565.45	1588.35	9571.46	1588.39	9573.29	1588.4
9590.37	1589	9624.12	1588.88	9626.5	1588.87	9632.37	1588.96	9643.39	1588.71
9646.56	1588.7	9647.47	1588.66	9651.6	1588.67	9671.95	1588.21	9684.04	1588.22
9690.7	1588.3	9697.15	1588.27	9709.04	1588.42	9712.09	1588.54	9730.01	1588.66
9764.6	1589	9766.65	1589	9780.2	1588.76	9783.4	1588.71	9784.14	1588.7
9796.43	1588.7	9821.99	1588.66	9831.32	1588.74	9836.37	1588.74	9851.2	1588.68
9852.64	1588.6	9865.97	1588.22	9872.18	1588.04	9872.39	1588.17	9872.78	1588.22
9898.1	1588.1	9904.69	1588.02	9904.74	1588.02	9912.48	1588.27	9920.81	1588.58
9925.46	1588.6	9926.73	1588.57	9934.39	1588.57	9948.79	1588.83	9958.83	1588.71
9966.91	1588.7	9970.88	1588.65	9974.71	1588.69	9978.72	1588.75	9997.96	1589.11
10009.53	1586.6	10010.52	1586.12	10012.5	1586.07	10019.01	1586.04	10028.05	1590.08
10032.8	1591.6	10047.84	1590.88	10052.13	1590.17	10062.8	1588.73	10072.73	1587.81
10103.98	1587.4	10110.61	1587.31	10114.55	1587.35	10156.37	1586.65	10170.45	1586.43
10176.11	158	6101 83.97	1585.55	10192.35	1585.85	10237.16	1586.88	10251.81	1586.93
10255.25	1586.91	0257.89	1586.89	10277.43	1588.67	10285.5	1589.09	10297.48	1588.79
10300.97	1588.71	0306.85	1588.67	10313.95	1588.81	10320.35	1589.15	10334.16	1589.26
10339.58	1589.41	0352.17	1589.56	10357.81	1589.61	10361.97	1589.58	10363.52	1589.63
10378.79	1589.61	0381.13	1589.64	10392.07	1589.53	10405.89	1589.44	10420.75	1589.71
10426.49	1589.71	0433.62	1589.71	0452.64	1589.81	0457.14	1589.79	10461.07	1589.85

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10465.47  1589.910470.29 1589.8610480.15 1589.6310486.82 1589.5810491.22 1589.52
10504.22  1589.510505.59 1589.4410506.13 1589.4310508.04 1589.4410517.39 1589.41
10521.74  1589.410542.64 1588.8610546.73 1588.84 10548.1 1588.8410562.94 1588.77
10601.52  1588.810608.93 1588.8110611.89 1588.81 10621.1 1588.5810634.57 1588.57
10648.15  1588.710659.12 1589.15

Manning's n Values        num=       5
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4444.79     .15 7863.94      .1 8809.14     .15 9997.96    .045 10032.8     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9997.96 10032.8               400  529.54     400              .1       .3

Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
 4444.79  4769.2 1591.14
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1590.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.134	0.045	0.150
W.S. Elev (ft)	1590.91	Reach Len. (ft)	400.00	529.54	400.00
Crit W.S. (ft)		Flow Area (sq ft)	6577.70	107.90	1514.30
E.G. Slope (ft/ft)	0.007578	Area (sq ft)	6577.70	107.90	1514.30
Q Total (cfs)	11309.00	Flow (cfs)	8256.64	668.97	2383.39
Top Width (ft)	5401.63	Top Width (ft)	4756.99	32.69	611.95
Vel Total (ft/s)	1.38	Avg. Vel. (ft/s)	1.26	6.20	1.57
Max Chl Dpth (ft)	5.36	Hydr. Depth (ft)	1.38	3.30	2.47
Conv. Total (cfs)	129913.1	Conv. (cfs)	94848.9	7684.8	27379.4
Length Wtd. (ft)	412.11	Wetted Per. (ft)	4760.41	34.06	614.11
Min Ch El (ft)	1586.04	Shear (lb/sq ft)	0.65	1.50	1.17
Alpha	2.07	Stream Power (lb/ft s)	0.82	9.29	1.84
Frctn Loss (ft)	4.15	Cum Volume (acre-ft)	835.97	13.00	64.77
C & E Loss (ft)	0.01	Cum SA (acres)	413.61	4.60	45.30

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4444.79	5833.08	675.55	826.50	915.70	5.97	0.90	0.82
5833.08	7221.38	1366.83	1395.73	1179.15	12.09	1.18	0.98
7221.38	8609.67	3281.68	2177.93	1346.96	29.02	1.62	1.51
8609.67	9997.96	2932.58	2177.55	1318.61	25.93	1.65	1.35
LB 9997.96	RB 10032.80	668.97	107.90	34.06	5.92	3.30	6.20
10032.80	10659.12	2383.39	1514.30	614.11	21.08	2.47	1.57

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.454**

INPUT
Description: RM. 2.454. HORZ. N VALUES USED. INEFFECTIVE AREA OPTION USED TO BLOCK OUT FLOW TO RT. OF STA. 10500 TO REDUCE FLOW IN THIS OVERBANK , WHICH WAS NOT CONSIDERED TO OCCUR.

Station Elevation Data num= 485

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4639.26	1588.7	4642.64	1588.71	4681.32	1587.61	4701.19	1587.45	4711.47	1587.43
4732.19	1588	4742.15	1588.22	4746.23	1588.28	4774.34	1588.72	4778.44	1588.74
4780.72	1588.7	4844.29	1588.74	4845	1588.71	4869.86	1588.11	4907.52	1587.41
4923.63	1587.5	4940.65	1587.57	4958.62	1588.26	4958.94	1588.27	4959.48	1588.26
4961.43	1588.3	5009.37	1588.05	5027.56	1588.5	5037.36	1589.04	5041.08	1588.95
5043.19	1585.9	5044.96	1584.85	5057.03	1585.57	5061.61	1585.29	5072.91	1588.46
5094.2	1587.5	5097.03	1587.26	5103.5	1587.24	5134.62	1587.42	5165.01	1587.7
5174.42	1587.6	5181.58	1587.66	5192.54	1588.2	5200.65	1588.65	5223.88	1589.9
5230.73	1590.3	5233.33	1590.2	5234.2	1590.19	5257.15	1589.67	5267.07	1589.47
5286.1	1589.1	5308.64	1588.59	5317.11	1588.41	5326.05	1587.83	5343.53	1587.82
5345.4	1587.7	5347.55	1587.65	5364.64	1587.21	5372.79	1587.01	5382.62	1586.97
5387.29	1587	5397.41	1587.12	5412.47	1587.23	5413.18	1587.22	5414.07	1587.29
5429.13	1588.5	5433.38	1588.48	5456.52	1588.46	5462.34	1588.46	5464.51	1588.49
5517.86	1588.5	5532.96	1588.38	5548.03	1588.32	5559.41	1588.44	5588.12	1588.55
5597.7	1588	5622.85	1586.03	5626.89	1586.02	5652.37	1585.9	5666.74	1585.78
5682.36	1585.7	5696.55	1585.73	5716.68	1586.85	5734.99	1587.83	5744.53	1587.55
5752.12	1587.5	5799.9	1587.14	5817.7	1586.99	5821.61	1586.95	5823.44	1586.94
5828.85	1586.9	5885.72	1586.36	5899.75	1586.15	5904.22	1585.97	5921.78	1585.16
5925.28	1585.1	5929.24	1585.09	5950.06	1584.87	5964.74	1584.78	5973.15	1585.37
5979.25	1585.9	5992.44	1586.71	6004.16	1586.55	6024.7	1586.64	6050.52	1586.85
6054.38	1586.6	6064	1586.68	6070.47	1586.62	6104.13	1587.37	6111.76	1587.52
6112.58	1587.5	6142.85	1587.32	6179.35	1587.09	6182.48	1587.09	6183.81	1587.08
6184.24	1587.1	6185.08	1587.08	6187.15	1587.05	6250.99	1586.85	6268.55	1587.02
6270.05	1587	6293.06	1586.04	6300.27	1585.77	6305.28	1585.54	6327.31	1585.57
6341	1585.6	6351.99	1586.02	6374.41	1586.15	6383.02	1586.49	6388.77	1586.76
6398.04	1587.2	6407.9	1587.1	6439.17	1586.89	6448.82	1586.77	6467.18	1587.12
6478.83	1587	6492.07	1587.02	6529.62	1586.9	6535.86	1586.89	6540.99	1586.9
6547.18	1586.7	6548.87	1586.73	6555.98	1586.44	6566.33	1586.1	6568.4	1586.01
6571.94	1585.9	6579.63	1585.75	6610.81	1585.29	6624.83	1586.01	6636.04	1586.58
6645.88	1586.6	6702.8	1586.9	6742.49	1587.04	6745.19	1586.95	6768.35	1586.15
6776.09	1586	6778.22	1585.89	6785.81	1585.59	6796.89	1585.55	6841.75	1585.6
6865.65	1586.7	6869.61	1586.81	6874.25	1586.84	6898.75	1586.68	6905.32	1586.63
6905.61	1586.6	6905.97	1586.63	6906.65	1586.63	6946.77	1586.72	6960.88	1586.67
6970.14	1586.7	6996.1	1586.43	7004.26	1586.46	7029.41	1586.43	7044.98	1586.51
7053.98	1586.5	7056.65	1586.51	7064.87	1587.28	7066.08	1587.44	7091.66	1586.1
7095.04	1585.9	7095.13	1585.9	7095.24	1585.9	7095.48	1585.9	7118.64	1586.06
7141.06	1586.3	7145.31	1586.7	7160.86	1586.9	7161.15	1586.9	7161.68	1586.89
7168.29	1586.6	7202.96	1586.47	7258.44	1585.87	7262.84	1585.83	7264.27	1585.81
7270.4	1585.8	7278.38	1585.95	7299.21	1584.96	7311.3	1584.36	7316.55	1584.35
7349.48	1584.9	7358.67	1585.13	7388.07	1586.66	7409.46	1586.81	7441.26	1586.71
7470.47	1586	7551.14	1584.5	7555.37	1584.48	7577.43	1584.39	7602.02	1584.28
7607.21	1584.2	7609.04	1584.33	7616.47	1584.49	7627.61	1584.56	7629.11	1584.56
7631.73	1584.6	7710.12	1584.51	7749.64	1584.65	7759.95	1584.47	7799.57	1584.68
7832.92	1585.3	7846.72	1585.62	7858.25	1585.85	7874.11	1585.86	7885.29	1585.41
7915.19	1585.4	7917.81	1585.39	7921.01	1585.29	7930.56	1585.16	7935.75	1585.24
7965.52	1585.2	7976.71	1585.15	7978.46	1585.08	7981.97	1584.93	7990.61	1584.61
8005.37	1585	8010.35	1585.16	8014.53	1585.16	8029.23	1585.39	8049.25	1585.55
8067.31	1585.7	8082.06	1585.84	8085.34	1585.62	8099.67	1584.47	8113.96	1584.99

8119.02	1585.2	8135.95	1585.15	8156.76	1585.14	8159.02	1585.15	8161	1585.15
8172.15	1582.6	8183.16	1580.51	8199.92	1580.64	8213.36	1583.48	8219.37	1583.89
8227.02	1585	8231.93	1584.68	8245.26	1584.17	8247.79	1583.88	8251.11	1583.43
8251.49	1578.6	8252.09	1578.31	8269.36	1582.13	8274.17	1583.33	8276.54	1583.31
8284.54	1583.3	8291.72	1583.51	8297.43	1583.65	8323.87	1584.67	8349.27	1585.03
8352.24	1585.1	8383.42	1585.17	8472.74	1585.74	8506.85	1585.84	8526.69	1586.36
8538.82	1585.9	8559.81	1586.72	8594.97	1586.3	8627.61	1585.73	8628.85	1585.72
8652.45	1586.1	8668.88	1585.17	8669.31	1585.17	8679.01	1584.44	8694.22	1586.26
8695.61	1586.3	8710.92	1586.2	8744.04	1586.02	8754.74	1585.84	8762.24	1585.75
8770.62	1585.8	8804.07	1585.39	8804.36	1585.4	8804.5	1585.34	8804.92	1585.37
8828.9	1584.7	8829.44	1584.73	8840.43	1585.27	8857.47	1585.77	8860.24	1585.77
8862.06	1585.8	8895.06	1585.76	8921.13	1585.77	8956	1585.65	8963.88	1585.82
8988.59	1585.7	9053.71	1586.28	9065.83	1586.34	9071.67	1586.2	9078.55	1586.16
9094.47	1586	9113.32	1586.16	9116.17	1586	9118.42	1586.12	9118.99	1586.12
9121.02	1586.1	9123.87	1586.13	9177.05	1585.35	9193.92	1585.44	9219.83	1585.46
9226.96	1585.5	9232.16	1585.3	9243.74	1584.3	9253.33	1583.76	9268.36	1583.46
9272.11	1583.4	9277.59	1583.91	9284.1	1584.67	9299.77	1585.53	9305.96	1585.64
9308.66	1585.6	9325.03	1585.8	9336.36	1585.54	9342.18	1585.52	9352.41	1585.51
9367.8	1585.6	9385.94	1585.42	9386.45	1585.42	9387.88	1585.41	9405.26	1585.59
9423.19	1586.2	9426.21	1586.18	9428.92	1586.18	9442.85	1585.86	9447.18	1585.76
9455.85	1583.8	9461.77	1582.58	9468.07	1583.65	9475.44	1585.12	9478.33	1585.08
9515.39	1584.9	9522.27	1584.88	9552.43	1584.88	9566.39	1584.46	9577.54	1584.5
9578.11	1584.1	9607.38	1584.33	9609	1584.34	9610.44	1584.34	9632.62	1584.32
9640.93	1584.5	9659.94	1584.98	9692.93	1585.24	9700.76	1585.32	9709.29	1585.28
9728.12	1585.3	9751.64	1585.19	9773.29	1585.13	9776.36	1585.06	9794.04	1584.55
9794.43	1584.4	9794.46	1584.21	9806.04	1584.27	9826.31	1584.24	9826.4	1583.98
9826.52	1584.1	9829.48	1584.22	9841.95	1584.48	9842.47	1584.48	9843.15	1584.5
9906.55	1585	9913.95	1585.02	9926.37	1585.2	9931.74	1585.16	9935.7	1585.07
9948.88	1584.8	9964.99	1586.85	9966.38	1586.94	9969.23	1585.68	9980.13	1580.99
9991.52	1583.2	9994.32	1583.7	10012.45	1584.08	10020.32	1584.17	10024.19	1584.17
10051.81	1584.2	10061.54	1584.25	10066.46	1584.34	10067.43	1584.33	10082.74	1584.41
10089.83	1584.3	10103.8	1584.11	10118.48	1583.99	10121.58	1583.97	10129.92	1583.9
10141.86	1583.7	10156.47	1583.61	10160.13	1583.63	10163.61	1583.66	10165.64	1583.64
10191.26	1583.5	10199.79	1583.54	10210.36	1583.6	10222.61	1583.53	10237.41	1583.79
10249.84	1583.8	10260.68	1583.97	10271.8	1584.06	10277.21	1584.2	10286.51	1584.23
10297.52	1584.2	10311.11	1583.87	10314.09	1583.83	10315.89	1583.75	10320.2	1583.86
10334.13	1584.2	10344.03	1584.15	10352.06	1584.15	10363	1584.17	10370.92	1584.19
10377.64	1584.1	10396.64	1583.75	10416.11	1583.46	10427.87	1583.46	10430.39	1583.11
10456.41	1583.1	10478.51	1583.42	10484.29	1583.54	10491.65	1583.47	10500.73	1583.8
10516.24	1584.3	10520.91	1584.42	10524.35	1584.48	10556.7	1584.41	10567.29	1584.41
10570.66	1584.4	10613.52	1584.16	10637.03	1584.03	10642.88	1584	10652.79	1584.08
10658.01	1584.1	10658.92	1584.14	10691.76	1584.32	10693.86	1584.33	10698.51	1584.4
10723.31	1583.2	10728.67	1582.93	10729.77	1582.91	10745.24	1582.62	10773.82	1584.04
10783.01	1583.6	10785.33	1583.45	10798.71	1583.72	10800.98	1583.75	10803.53	1583.43
10805.35	1583	10810	1583.01	10849.35	1583.86	10851.32	1584.03	10851.47	1584.03
10851.71	1584	10861.6	1584.25	10893.14	1585.59	10893.81	1585.61	10894.29	1585.63
10895.16	1585.6	10927.11	1585.55	10935.18	1585.6	10955.12	1585.78	10966.8	1585.99
10993.11	1585.8	11021.32	1586.44	11029.18	1586.52	11053.16	1586.15	11054.68	1586.17
11057.17	1586.2	11083.47	1586.75	11087.96	1586.72	11105.89	1586.81	11109.96	1586.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4639.26	.15	9966.38	.045	10024.19	.15

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9966.38	10024.19	480	399.74	360	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
10500	11109.96	1587

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1586.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.150	0.045	0.150
W.S. Elev (ft)	1586.63	Reach Len. (ft)	480.00	399.74	360.00
Crit W.S. (ft)	1585.95	Flow Area (sq ft)	4532.18	176.68	1333.14
E.G. Slope (ft/ft)	0.014069	Area (sq ft)	4532.18	176.68	2498.12
Q Total (cfs)	11309.00	Flow (cfs)	6751.14	1444.98	3112.88
Top Width (ft)	4596.27	Top Width (ft)	3485.38	57.12	1053.77
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.49	8.18	2.33
Max Chl Dpth (ft)	8.32	Hydr. Depth (ft)	1.30	3.09	2.80
Conv. Total (cfs)	95344.9	Conv. (cfs)	56918.1	12182.5	26244.3
Length Wtd. (ft)	441.64	Wetted Per. (ft)	3494.65	58.55	475.87
Min Ch El (ft)	1580.99	Shear (lb/sq ft)	1.14	2.65	2.46
Alpha	3.25	Stream Power (lb/ft s)	1.70	21.68	5.75
Frctn Loss (ft)	4.45	Cum Volume (acre-ft)	784.96	11.27	46.35
C & E Loss (ft)	0.02	Cum SA (acres)	375.77	4.06	37.65

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4639.26	5971.04	228.12	209.49	236.64	2.02	0.89	1.09
5971.04	7302.82	291.77	365.00	655.60	2.58	0.56	0.80
7302.82	8634.60	3664.28	2171.75	1272.01	32.40	1.72	1.69
8634.60	9966.38	2566.97	1785.94	1330.40	22.70	1.34	1.44
LB 9966.38	RB 10024.19	1444.98	176.68	58.55	12.78	3.09	8.18
10024.19	11109.96	3112.88	1333.14	475.87	27.53	2.80	2.33

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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.378**

INPUT
Description: RM. 2.378. HORZ. N VALUES USED.

Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4470.09	1582.3	4470.98	1582.29	4480.23	1582.54	4485.95	1582.28	4504.07	1582.37
4545.73	1581.9	4568.5	1582.32	4576.85	1582.32	4585.52	1582.29	4643.63	1582.03
4656.83	1582.1	4670.74	1582.21	4693.67	1582.26	4706.35	1583.11	4723.05	1582.85
4728.45	1583.1	4730.89	1582.88	4739.71	1582.7	4745.73	1581.58	4747.22	1581.7
4750.24	1582.5	4834.72	1581.89	4875.69	1581.88	4876.7	1581.87	4877.89	1581.77
4899.74	1580.3	4906.92	1580.23	4923.37	1580.01	4933.35	1579.79	4942.04	1579.75
4963.8	1579.7	4984.65	1580.96	4988.22	1581.25	5004.48	1581.15	5047.36	1580.95

5068.47	1580.9	5072.85	1580.83	5076.04	1580.83	5081.63	1580.8	5095.23	1580.71
5113.32	1580.6	5165.08	1580.33	5191.45	1580.07	5192.14	1580.19	5193.75	1580.42
5209.81	1583.2	5216.35	1583.13	5242.88	1582.92	5284.87	1582.38	5300.55	1582.26
5323.45	1581.6	5359.24	1581.54	5401.76	1581.23	5409.36	1580.65	5416.48	1580.17
5418.68	1580	5422.31	1579.71	5439.83	1579.73	5465.02	1579.77	5473.43	1580.14
5476.75	1580.4	5485.74	1581.01	5495.73	1581.46	5503.33	1581.36	5506.55	1581.35
5558.48	1581.2	5566.97	1581.19	5567.61	1581.19	5568.08	1581.19	5568.31	1581.19
5571.28	1581.2	5610.74	1581.47	5619.17	1582.53	5628.74	1583.13	5646.88	1582.79
5660.09	1582.6	5683.91	1582.26	5697.4	1582.1	5703.24	1581.97	5734.94	1581.91
5743.8	1581.8	5766.27	1581.49	5780.5	1581.45	5782.8	1581.46	5805.84	1580.06
5821.06	1579.2	5830.95	1579.13	5876.95	1579.28	5896.27	1580.25	5903.05	1580.48
5908.35	1580.8	5917.86	1581.47	5927.97	1581.5	5931.15	1581.49	5945.51	1581.25
5972.99	1581.2	5986.44	1581.13	5994.29	1581.15	6015.29	1581.05	6042.84	1581.17
6052.14	1581.2	6072.15	1581.27	6074.12	1581.28	6082.44	1581.28	6089.72	1580.9
6120.13	1579.4	6141.9	1579.71	6185.76	1579.85	6197.25	1580.49	6201.44	1580.69
6208.02	1581.1	6214.55	1581.47	6218.48	1581.69	6228.72	1581.67	6241.32	1581.73
6289.78	1581.5	6293.1	1581.52	6301.7	1581.56	6317.78	1581.64	6336.54	1581.75
6359.69	1581.9	6374.84	1581.98	6376.49	1581.99	6378.18	1581.98	6382.5	1582
6399.51	1581.4	6411.02	1581.09	6425.29	1580.8	6436.58	1580.76	6448.47	1580.88
6460.47	1581.5	6462.2	1581.61	6464.16	1581.69	6483.09	1581.85	6490.5	1581.76
6545.26	1581.9	6578.24	1581.47	6598.8	1581.49	6619.41	1581.49	6659.78	1581.96
6661.65	1582	6663.23	1582.03	6664.16	1582.17	6670.53	1583.09	6680.41	1583.38
6686.49	1583.6	6728.82	1583.35	6785.84	1582.74	6787.81	1582.72	6788.57	1582.71
6789.15	1582.7	6790.11	1582.7	6807.71	1582.64	6810.05	1582.52	6823.45	1581.87
6827.25	1581.9	6831.66	1581.53	6845.35	1581.62	6871.12	1581.13	6881.61	1582.19
6882.9	1582.3	6889.93	1582.22	6892.37	1582.19	6937.22	1581.46	6960.07	1581.25
6976.05	1581.2	6988.48	1582.38	6995.92	1583.09	7002.58	1583.24	7007.06	1583.17
7020.45	1583.3	7054.25	1583.11	7082.59	1582.65	7093.17	1582.55	7119.58	1582.39
7121.45	1582.4	7122.09	1582.35	7131.58	1582.28	7140.26	1582.11	7172.29	1580.47
7204.18	1580.5	7218.76	1580.45	7226.98	1580.53	7251.27	1581.28	7270.84	1581.96
7289.38	1581.8	7294.94	1581.78	7325.5	1581.27	7341.18	1580.95	7348.52	1580.94
7369.31	1580.8	7378.59	1580.78	7397.47	1580.66	7411.51	1580.48	7422.39	1581.19
7430.74	1581.7	7439.29	1582.25	7447.79	1582.2	7459.61	1582.08	7510.21	1581.44
7515.93	1581.4	7527.37	1581.32	7571.11	1581.1	7579.54	1581.1	7586.73	1581.1
7592.31	1581.1	7612.69	1579.77	7614.89	1579.59	7617.86	1579.33	7618.62	1579.34
7620.83	1579.3	7625.36	1579.31	7648.44	1579.52	7653.61	1579.23	7665.56	1579.75
7667.26	1579.8	7670.43	1579.93	7715.8	1580.31	7767.08	1580.6	7791.47	1581.01
7801.45	1581.3	7802.39	1577.24	7804.2	1574.82	7817.3	1578.3	7821.44	1578.97
7823.24	1579.9	7838.61	1579.75	7842.91	1579.7	7847.7	1579.81	7872.3	1580
7875.48	1580	7885.8	1579.94	7898.22	1580.28	7902.66	1580.54	7903.28	1580.58
7904.84	1580.6	7988.43	1580.11	7991.2	1580.12	7996.39	1580.34	8008.2	1580.73
8019.35	1580.7	8038.29	1580.83	8042	1580.89	8052.85	1580.92	8080.17	1581
8104.65	1581.2	8113.4	1581.03	8135.38	1581.16	8137.54	1581.16	8147.04	1580.63
8156.35	1580.3	8162.1	1580.33	8167.68	1580.48	8180.25	1580.55	8191.4	1580.75
8209.63	1580.8	8212.4	1580.83	8218.73	1580.89	8241.06	1581.09	8243.86	1581.12
8246.2	1581.2	8247.59	1581.21	8261.95	1581.58	8284.67	1581.64	8292.97	1581.74
8297.4	1581.7	8308.42	1581.96	8313.42	1582.26	8325.4	1582.1	8364.66	1581.58
8377.24	1581.5	8387.59	1581.45	8391.79	1581.47	8393.03	1581.46	8407.7	1581.31
8419.83	1581.3	8424.99	1581.26	8442.48	1581.14	8465.78	1580.94	8467.23	1580.94
8476.29	1580.8	8484.49	1580.8	8506.46	1580.99	8508.39	1581	8509.3	1580.99
8589.32	1580.3	8607.83	1580.24	8620.31	1580.29	8656.14	1580.33	8682.9	1580.46
8693.33	1580.4	8706.11	1580.69	8714.37	1580.84	8740.3	1581.62	8765.44	1581.98
8768.82	1580.6	8785.99	1580.88	8795.26	1581.1	8796.29	1581.09	8796.79	1581.08
8828.83	1580.6	8847.84	1580.29	8876.44	1579.8	8924.37	1582.15	8935.7	1582.67
8939.86	1582.8	8941.83	1582.94	8949.38	1583.31	8952.34	1583.25	8986.79	1583.27
8993.87	1583.2	9003.11	1583.24	9011.03	1583.27	9047.92	1583	9088.36	1582.16
9113.27	1582.1	9140.04	1582.09	9154.31	1582.07	9181.55	1579.68	9192.6	1578.93

9195.91	1579	9198.75	1579.18	9216.24	1579.95	9227.08	1580.55	9238.23	1580.99
9250.92	1581.4	9257.55	1581.8	9278.39	1581.52	9285.77	1581.46	9299.31	1581.36
9305.35	1581.2	9326.25	1580.92	9332.63	1580.75	9334.74	1580.65	9342.47	1579.7
9357.43	1577.9	9359.19	1578.13	9360.64	1578.16	9385.81	1580.57	9395.16	1580.57
9404.8	1580.6	9406.66	1580.66	9407.48	1580.66	9426.5	1580.62	9431.54	1580.62
9447.88	1580.5	9469.76	1580.45	9495.17	1580.4	9504.6	1580.35	9514.93	1580.38
9522.21	1580.4	9554.56	1580.48	9572.43	1580.49	9578.91	1580.48	9593.09	1580.6
9613.86	1580.8	9630.1	1580.88	9653.46	1581.18	9658.43	1581.26	9661.59	1581.32
9668.43	1581.4	9706.83	1581.52	9709.03	1581.52	9713.32	1581.54	9714.47	1581.51
9716.67	1581.5	9728.25	1581.22	9743.12	1580.88	9750.03	1580.56	9759.99	1580.44
9764.57	1580.4	9777.08	1580.03	9802.58	1579.55	9815.12	1579.32	9841.52	1580.11
9849.88	1580.1	9864.23	1579.94	9868.25	1580.14	9874.18	1580.54	9882.89	1581.1
9893.84	1580.8	9902.25	1580.77	9926.25	1580.75	9946.44	1580.2	9948.27	1580.2
9950.45	1580.2	9964.87	1580.4	9972.62	1580.53	9985.72	1580.46	9995.96	1577.95
10004.63	1576.2	10015.8	1579.02	10021.25	1579.79	10041.76	1579.53	10059.07	1579.77
10064.19	1579.8	10081.45	1580.03	10105.93	1579.91	10114.45	158	10129.16	1580.2
10129.76	1580.2	10130.05	1580.23	10132.14	1580.21	10144.42	1580.17	10145.23	1580.19
10160.99	1580.2	10178.47	1580.74	10192.83	1580.96	10209.87	1580.75	10218.57	1580.74
10259.03	1580.5	10308.01	1580.24	10310.04	1580.28	10319.25	1580.74	10327.25	1580.72
10331.04	1580.6	10333.72	1580.54	10338.88	1580.22	10352.08	1580.09	10398.36	1580.39
10406.57	1580.5	10416.27	1580.75	10416.95	1580.84	10422.8	1580.83	10439.43	1580.27
10484.93	1580.4	10496.83	1580.01	10508.86	1580.07	10520.32	1579.97	10523.56	1580.06
10527.92	1580.1	10545.37	1579.91	10553.93	1580.09	10560.87	1579.85	10565.82	1579.73
10580.1	1579.2	10598.02	1578.99	10604.97	1579.05	10633.83	1580.29	10645.72	1580.74
10649.89	1580.6	10663.51	1580.31	10670.86	1579.71	10680.27	1579.91	10682.37	1580.19
10690.33	1580.2	10703.17	1580.24	10715.14	1580.52	10729.02	1580.93	10741.84	1580.92
10775.13	1581.1	10779	1580.88	10789.71	1580.17	10793.94	1580.13	10797.35	1580.2
10804.09	1580.4	10819.7	1580.46	10836.22	1580.77	10853.2	1583.66	10861.76	1584.44
10869.66	1584.5	10877	1584.19	10890.82	1582.04	10914.67	1581.86	10919.35	1581.98
10925.1	1581.8	10928.54	1581.76	10968.56	1581.23	10982.85	1581.16	10988.16	1581.15
10993.98	1580.9	10999.11	1580.71	11008.24	1580.81	11028.47	1580.53	11029.97	1580.52
11032.11	1580.7	11051.68	1581.97	11054.67	1582.06				

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4470.09	.15	7823.24	.1	8589.32	.15	9802.58	.068	9985.72	.045
10059.07	.15								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9985.72	10059.07	520	402.78	320	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1582.34	Element			
Vel Head (ft)	0.10	Wt. n-Val.	0.128	0.045	0.150
W.S. Elev (ft)	1582.23	Reach Len. (ft)	520.00	402.78	320.00
Crit W.S. (ft)		Flow Area (sq ft)	6121.73	240.40	1661.61
E.G. Slope (ft/ft)	0.007577	Area (sq ft)	6121.73	240.40	1661.61
Q Total (cfs)	11309.00	Flow (cfs)	7656.43	1512.42	2140.15
Top Width (ft)	5727.35	Top Width (ft)	4703.14	73.35	950.86
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	1.25	6.29	1.29
Max Chl Dpth (ft)	7.41	Hydr. Depth (ft)	1.30	3.28	1.75
Conv. Total (cfs)	129921.2	Conv. (cfs)	87959.4	17375.1	24586.7
Length Wtd. (ft)	475.42	Wetted Per. (ft)	4710.66	74.24	951.47
Min Ch El (ft)	1576.20	Shear (lb/sq ft)	0.61	1.53	0.83
Alpha	3.36	Stream Power (lb/ft s)	0.77	9.64	1.06
Frctn Loss (ft)	5.07	Cum Volume (acre-ft)	726.26	9.36	29.16
C & E Loss (ft)	0.03	Cum SA (acres)	330.65	3.46	29.37

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4470.09	5849.00	1086.24	1151.58	1035.48	9.61	1.11	0.94
5849.00	7227.90	1020.79	1126.01	1074.58	9.03	1.05	0.91
7227.90	8606.81	2712.28	1942.63	1379.26	23.98	1.41	1.40
8606.81	9985.72	2837.11	1901.51	1221.34	25.09	1.56	1.49
LB 9985.72	RB 10059.07	1512.42	240.40	74.24	13.37	3.28	6.29
10059.07	11054.67	2140.15	1661.61	951.47	18.92	1.75	1.29

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.302**

INPUT
Description: RM.2.302 . HORZ. N VALUES USED.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4327.1	1576.6	4330.78	1576.65	4338.25	1576.69	4344.63	1576.7	4358.84	1576.79
4368.5	1576.9	4375.49	1576.79	4402.45	1576.7	4469.44	1576.27	4482.03	1576.24
4485.85	1576.3	4494.3	1576.2	4498.01	1576.2	4501.43	1576.17	4515.57	1575.63
4517.44	1575.7	4548.31	1576.08	4563.65	1576.09	4576.09	1576.11	4595.55	1576.07
4612.07	1576.2	4650.01	1575.86	4666.93	1575.67	4675.99	1575.74	4687.8	1575.9
4695.5	1574.6	4697.8	1574.2	4713.25	1574.92	4725.98	1575.45	4740.71	1575.83
4743.45	1575.9	4761.5	1576.9	4763.56	1576.97	4770.06	1577.13	4786.09	1577.46
4795.54	1577.3	4822.33	1577	4829.67	1576.93	4854.93	1576.14	4859.48	1576.01
4862.1	1576	4867.05	1575.98	4872.71	1575.94	4888.42	1575.83	4913.44	1575.84
4918.04	1575.6	4922.42	1575.65	4929.44	1575.52	4942.86	1575.39	4967.7	1575.15
4979.7	1575.2	4982.52	1575.28	5000.56	1575.57	5024.64	1576.28	5065.37	1575.82
5076.38	1575.9	5085.76	1575.92	5094.96	1575.86	5102.52	1575.83	5116.8	1575.82
5132.29	1575.8	5140.69	1574.15	5152.65	1574.34	5153.65	1574.97	5166.97	1574.75
5182.33	1573.2	5184.58	1573.85	5186.99	1574.41	5189.93	1574.49	5226.15	1574.97
5230.88	1575	5235.01	1574.96	5247.68	1574.98	5277.33	1574.72	5288.5	1574.79
5342.28	1575	5342.64	1574.97	5343.29	1574.95	5344.34	1574.92	5358.39	1574.51
5368.05	1573.6	5370.87	1573.68	5372.67	1573.29	5381.82	1573.23	5423.75	1572.82
5433.31	1572.9	5438.9	1573.08	5445.99	1573.47	5468.27	1574.47	5473.41	1574.71
5492.66	1574.7	5506.5	1574.47	5551.36	1575.07	5557.34	1575.1	5576.93	1575.26
5592.29	1575.3	5599.31	1575.04	5604.42	1575.04	5614.51	1575.36	5618.35	1575.61

5621.12	1575.6	5632.27	1576.13	5637.65	1576.63	5641.3	1576.55	5656.2	1576.36
5670.18	1576.3	5721.09	1575.86	5725.35	1575.84	5731.92	1575.85	5749.92	1575.79
5778.7	1575.8	5793.48	1575.75	5797.69	1575.7	5806.22	1575.46	5820.31	1574.85
5830.45	1574.4	5862.69	1573.92	5881.79	1573.95	5884.83	1574.03	5906.81	1574.15
5910.46	1574.2	5915.58	1574.29	5936.29	1574.79	5954.68	1574.82	5966.36	1575.02
5982.72	1575	5995.02	1574.98	6000.3	1574.85	6005.34	1575.56	6008.1	1575.33
6012.8	1576	6025.05	1575.31	6041.4	1576.8	6058.5	1576.45	6121.64	1578.08
6126.52	1578.3	6126.91	1577.96	6151.67	1578.07	6157.9	1578.65	6160.61	1578.64
6162.93	1578.2	6197.96	1576.56	6200.24	1576.51	6201.21	1576.41	6215.17	1574.62
6220.29	1575.1	6232.48	1575.37	6252.29	1575.66	6269.26	1577.49	6271.87	1577.72
6272.86	1577.9	6273.69	1577.87	6288.33	1577.8	6365.8	1577.35	6368	1577.46
6380.75	1576.7	6386.55	1576.08	6393.68	1575.89	6416.91	1576.06	6425.76	1576.07
6431.68	1576.3	6444.53	1576.98	6448.79	1577	6467.53	1576.99	6500.43	1577.27
6511.37	1577.3	6544.6	1577.03	6609.15	1576.89	6624.83	1576.94	6639.68	1576.98
6667.25	1575.1	6667.25	1575.08	6667.26	1575.08	6667.27	1575.08	6694.75	1574.95
6699.17	1575.2	6703.44	1575.63	6709.52	1576.46	6714.35	1576.55	6724.11	1576.53
6739.68	1576.9	6761.33	1577.17	6785.05	1577.02	6806.02	1577.08	6812.65	1577
6854.93	1576.3	6866.72	1576.41	6870.79	1576.51	6882.77	1576.58	6936.06	1577.01
6939.34	1576.8	6944.75	1576.6	6962.19	1575.64	6963.1	1575.7	6964.86	1575.68
6968.74	1575.5	6989.21	1575.26	7001.67	1575.09	7005.02	1574.98	7007.1	1575.1
7007.56	1575.1	7008.91	1575.17	7011.85	1575.24	7022.01	1575.76	7033.4	1576.27
7053.29	1576.2	7073.34	1576.22	7104.4	1576.28	7143.95	1577.01	7160.89	1576.89
7161.01	1573.4	7165.8	1570.44	7167.78	1573.45	7168.57	1570.85	7174.36	1573.1
7178.81	1575.2	7189.35	1574.91	7193.64	1574.82	7194.7	1574.75	7198.85	1574.71
7203.14	1575	7215.71	1575.4	7237.06	1575.91	7252.33	1576.48	7258.26	1576.37
7263.19	1576.4	7271.95	1576.61	7283.42	1576.7	7318.95	1576.5	7341.17	1576.45
7356.73	1576.3	7363.29	1576.26	7381.2	1576.22	7478.56	1575.91	7508.44	1575.74
7548.52	1575.5	7603.28	1575.51	7715.85	1575.51	7723.42	1575.52	7727.27	1575.54
7733.93	1575.5	7739.24	1575.48	7810.09	1575.42	7827.58	1575.54	7850.23	1575.69
7859.09	1575.4	7869.48	1574.57	7882.49	1574.9	7902.1	1575.04	7908.38	1575.31
7921.93	1574.9	7929.06	1575.44	7956.26	1575.82	8004.84	1576.04	8034.53	1575.9
8048.39	1576.1	8073.28	1575.91	8078.35	1575.87	8095.24	1576.05	8125.91	1576.35
8126.93	1576.4	8136.37	1576.36	8169.15	1576.17	8173.63	1576.17	8175.51	1576.17
8236.55	1576.2	8271.7	1576.23	8271.92	1576.24	8285.1	1576.24	8293.25	1576.26
8294.19	1576.3	8318.22	1576.34	8335.4	1576.45	8340.48	1576.46	8370.82	1576.85
8379.23	1576.8	8393.68	1576.61	8408.63	1576.47	8424.16	1576.35	8432.76	1576.35
8434.45	1576.3	8445.61	1576.37	8471.48	1576.38	8512.34	1576.48	8550.68	1577.11
8554.31	1577.1	8558.94	1577.08	8563.37	1577.08	8599.83	1577.12	8605.66	1577.18
8612.06	1577.2	8649.6	1576.98	8652.07	1576.93	8663.76	1576.8	8671.98	1576.78
8700.76	1576.6	8714.55	1576.48	8728.26	1576.42	8733.35	1576.4	8734.57	1576.4
8754.4	1576.2	8754.92	1576.19	8769.78	1575.79	8782.84	1575.88	8788.09	1575.87
8811.59	1575.4	8814.02	1575.41	8817.99	1575.42	8831.64	1575.27	8873.08	1575.03
8874.09	1575	8875.16	1575.03	8881.21	1575.04	8890.21	1575.17	8902.38	1575.58
8909.67	1575.8	8917.56	1575.74	8923.45	1576.12	8944.52	1576.67	8957.51	1577.05
8978.4	1577.5	9005.36	1578.24	9018.54	1577.87	9024.37	1578.35	9054.86	1579.88
9056.16	1579.9	9059.84	1579.93	9072.42	1579.23	9100.01	1575.85	9157.8	1576.49
9166.49	1576.8	9201.08	1576.51	9224.74	1576.53	9230.59	1576.42	9238.35	1576.75
9245.21	1577	9248.28	1576.97	9319.38	1576.68	9330.45	1576.73	9338.42	1576.81
9350.11	1576.8	9365.87	1576.93	9379.29	1576.76	9384.69	1576.79	9419.53	1577.54
9422.57	1577.6	9423.07	1577.61	9426.89	1577.59	9485.8	1577.36	9514.83	1575.91
9524.19	1575.7	9537.45	1575.2	9545.74	1574.83	9551.85	1575.34	9563.69	1576.87
9574.14	1577.5	9575.34	1577.35	9575.82	1577.32	9594.73	1577.09	9601.58	1577.01
9617.27	1576.7	9620.22	1576.78	9625.46	1576.81	9633.82	1576.63	9640.62	1576.53
9640.79	1576.5	9641.42	1576.44	9650.13	1575.88	9661.07	1575.27	9677.44	1575.04
9678.9	1575	9685.81	1575.04	9725.32	1575.64	9731.82	1575.87	9737.75	1576.56
9749.99	1576.6	9770.18	1576.31	9781.51	1576.24	9794.53	1576.15	9817.44	1576.4
9822.39	1576.4	9839.17	1576.17	9841.89	1576.16	9858.54	1575.78	9864.07	1575.74

9888.35	1574.9	9904.65	1574.53	9912.47	1574.41	9916.61	1574.56	9928.84	1574.39
9953.02	1572.7	9964.83	1572.12	9972.91	1571.72	9983.03	1571.86	9988.82	1571.94
9991.76	1572.41	10016.18	1576.74	10024.56	1576.8	10044.5	1577.06	10054.04	1577.41
10065.94	157	810077.61	1578.12	10081.56	1578.04	10097.56	1577.62	10105.91	1577.62
10118.5	1577.61	0131.99	1577.29	10138.98	1577.24	10155.7	1577.03	10172.86	1576.93
10188.23	1576.81	0201.03	1576.81	0215.22	1576.87	10255.55	1577.18	10256.27	1577.19
10263.57	1578.11	0271.97	1573.96	10276.75	1573.06	10290.35	1575.26	10293.01	1575.42
10294.96	1575.41	0301.45	1574.91	10304.64	1575.25	10305.03	1575.86	10312.99	1575.77
10320.62	1576.21	0324.71	1576.21	0335.23	1576.87	10336.59	1576.97	10354.08	1577
10365.32	1576.71	0377.94	1576.35	10388.21	1576.02	10399.24	1576.21	10407.41	1576.22
10413.42	1576.21	0424.65	1576.54	10452.02	1576.78	10465.02	1576.66	10470.94	1576.62
10483.27	1576.81	0494.44	1576.78	10512.67	1576.69	10524.22	1576.67	10549.59	1576.63
10560.18	1576.61	0562.44	1576.59	10568.24	1576.62	10577.46	1576.97	10580.33	1577.18
10607.33	1576.91	0619.18	1576.75	10627.13	1576.58	10638.42	1576.64	10652.98	1576.53
10663.87	1576.91	0665.18	1577.15	10672.52	1577.19	10678.9	1577.18	10691.35	1576.61
10711.16	157	710712.16	1577.01	10714.42	1577.06	10724.93	1577.23	10740.34	1577.09
10741.09	1577.11	0759.15	1577.51	10760.93	1577.55	10791.19	1577.81	10804.66	1577.89
10815.62	157	810827.79	1578.11	0837.84	1578.14	10847.83	1578.26	10877.59	1577.69
10887.1	1577.61	0894.41	1577.49	10898.94	1577.61	10905.07	1577.65	10927.25	1578.16
10934.81	1578.31	0955.96	1578.38						

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4327.1	.1	5226.15	.15	7160.89	.1	8004.84	.15	9928.84	.045
10016.18	.15								

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9928.84	10016.18	280	118.36	118	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1577.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.	0.128	0.045	0.150
W.S. Elev (ft)	1576.79	Reach Len. (ft)	280.00	118.36	118.00
Crit W.S. (ft)		Flow Area (sq ft)	4640.21	315.87	154.68
E.G. Slope (ft/ft)	0.016169	Area (sq ft)	4640.21	315.87	154.68
Q Total (cfs)	11309.00	Flow (cfs)	8005.21	3112.91	190.88
Top Width (ft)	4772.53	Top Width (ft)	4352.78	87.34	332.41
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)	1.73	9.86	1.23
Max Chl Dpth (ft)	6.35	Hydr. Depth (ft)	1.07	3.62	0.47
Conv. Total (cfs)	88937.3	Conv. (cfs)	62955.3	24480.8	1501.1
Length Wtd. (ft)	252.37	Wetted Per. (ft)	4363.89	87.84	333.77
Min Ch El (ft)	1571.72	Shear (lb/sq ft)	1.07	3.63	0.47
Alpha	5.90	Stream Power (lb/ft s)	1.85	35.77	0.58
Frctn Loss (ft)	3.44	Cum Volume (acre-ft)	662.03	6.79	22.49
C & E Loss (ft)	0.11	Cum SA (acres)	276.60	2.72	24.66

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4327.10	5727.54	3580.04	1777.34	1308.16	31.66	1.36	2.01
5727.54	7127.97	1360.99	950.40	838.24	12.03	1.13	1.43
7127.97	8528.41	2261.17	1215.44	1365.52	19.99	0.90	1.86
8528.41	9928.84	803.01	697.03	851.97	7.10	0.82	1.15
LB 9928.84	RB 10016.18	3112.91	315.87	87.84	27.53	3.62	9.86
10016.18	10955.96	190.88	154.68	333.77	1.69	0.47	1.23

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
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.

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.279**

INPUT
Description: RM.2.279 . BLOCKED OUT INEFF. AREA BELOW EL.1570 AND BETWEEN STA. 5994 AND 6170 AT RET. BASIN. HORZ. N VALUES USED.

Station Elevation Data num= 482

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4265.03	1573.9	4268.87	1573.75	4287.66	1573.56	4288.69	1573.53	4289.44	1573.51
4298.34	1573.6	4303.69	1573.83	4315.59	1573.8	4330.1	1573.63	4334.29	1573.69
4338.84	1573.9	4340.61	1573.93	4348.57	1574.18	4351.65	1574.27	4356.66	1574.3
4373.5	1574.3	4380.22	1574.36	4434.76	1573.96	4474.83	1573.61	4481.99	1573.55
4492.63	1573	4493.55	1572.99	4495.54	1573.03	4540.04	1573.72	4553.5	1573.69
4554.34	1573.7	4557.8	1573.66	4586.72	1573.58	4590.46	1573.53	4602.05	1573.54
4615.83	1573.6	4631.18	1573.63	4636.53	1572.81	4641.11	1572.14	4660.56	1573.06
4671.07	1573.5	4680.03	1573.62	4729.16	1573.83	4729.26	1573.83	4729.45	1573.83
4740.7	1573.6	4743.97	1573.63	4756.63	1573.58	4765.51	1573.42	4784.85	1573.42
4796.97	1573.5	4805.73	1573.53	4808.3	1573.46	4818.19	1573.16	4868.53	1572.42
4901.2	1572.2	4913.37	1572.19	4920.65	1571.89	4927.91	1571.79	4933.85	1571.89
4938.87	1571.9	4947.91	1571.52	4952.96	1571.51	4959.59	1571.67	4961.55	1571.75
4990.49	1572.2	4993.97	1572.2	5002.56	1572.24	5012.22	1572.25	5020.96	1572.35
5025.28	1572.4	5038.05	1572.52	5044.34	1572.61	5051.27	1572.66	5112.34	1572.87
5118.72	1572.9	5135.47	1572.67	5145.9	1572.64	5146.41	1572.63	5149.16	1572.55
5163.33	1572.1	5164.32	1572.07	5165.75	1571.98	5166.87	1571.99	5169.33	1571.98
5170.94	1572	5186.12	1572.24	5192.75	1572.45	5197.35	1572.5	5212.96	1572.22
5230.28	1572.4	5236.67	1572.53	5243.14	1572.67	5250.71	1572.88	5270.89	1573.09
5317.04	1572.9	5353.24	1572.44	5356.54	1572.6	5360.6	1572.93	5365.06	1572.75
5371.62	1572.2	5374.91	1571.96	5385.22	1569.08	5390.98	1567.31	5392.38	1567.44
5410.85	1572.7	5411.21	1572.78	5424.49	1572.5	5430.17	1572.55	5445.28	1572.66
5481.83	1572.3	5486.91	1572.28	5502.22	1572.27	5515.88	1572.25	5535.4	1572.19
5547.71	1572.2	5550.9	1572.17	5569.54	1572.19	5579.35	1571.67	5593.89	1571
5604.44	1570.6	5608.78	1570.43	5612.24	1570.41	5614.89	1570.37	5660.4	1570.54
5669.93	1571.3	5677.33	1571.84	5682.42	1571.75	5693.48	1571.58	5695.98	1571.63
5697.48	1571.6	5723.1	1571.97	5734.02	1572.2	5747.91	1572.75	5757.57	1572.93
5762.84	1572.7	5768.17	1572.66	5775	1572.53	5781.18	1572.3	5787.75	1572.01
5796.61	1572.1	5807.43	1572.22	5826.74	1572.42	5845.62	1572.59	5855.45	1573.03
5877.44	1573.6	5882.05	1573.77	5884.63	1573.82	5891.39	1573.87	5893.16	1573.82
5894.83	1573.8	5908.62	1573.74	5911.97	1573.74	5916.64	1573.67	5923.32	1573.61
5943.84	1573.4	5961.14	1573.15	5978.13	1572.93	5994	1570.18	6032.47	1563.13
6045.5	1563.3	6105.44	1563.75	6107.66	1563.77	6113.81	1563.83	6124.62	1564.15

6152.2	1568.1	6187.85	1572.85	6190.06	1573.48	6199.13	1575.36	6234.23	1575.38
6240.78	1575.4	6245.43	1575.4	6249.85	1575.44	6293.33	1575.04	6316.47	1574.82
6332.62	1573.9	6338.59	1573.56	6344.67	1573.26	6364.4	1573.19	6382.37	1573.1
6395.53	1573.6	6413.38	1574.19	6427.06	1574.15	6444.68	1574.1	6492.68	1573.96
6548.68	1573.5	6574.23	1573.08	6581.39	1573.06	6585.7	1572.77	6603.5	1571.73
6614.24	1572	6624.23	1571.98	6642.38	1571.87	6654.55	1572.29	6671.24	1572.93
6671.74	1572.9	6672.18	1572.94	6751.56	1573.88	6753.76	1572.48	6760.82	1571.49
6770.04	1573.7	6793.1	1573.46	6793.16	1573.31	6797.09	1571.71	6800.61	1572.85
6805.21	1572.7	6813.96	1572.43	6818.29	1572.44	6823.27	1572.41	6829.03	1572.39
6831.02	1572.3	6832.56	1572.3	6833.47	1572.32	6837.25	1572.31	6842.97	1572.3
6867.03	1572.2	6867.27	1572.54	6877.61	1574.04	6882.67	1574.56	6885.5	1574.21
6904.48	1572.1	6909.13	1572.51	6921.34	1573.34	6938.98	1573.54	6960.89	1573.8
6967.16	1573.9	6992.4	1574.04	7103.92	1573.66	7111.58	1573.64	7117.32	1573.63
7183.05	1573	7242.27	1573.4	7254.09	1573.53	7270.75	1573.5	7336.42	1573.47
7351.45	1573.3	7374.28	1573.15	7384.69	1573.17	7408.6	1572.95	7420.9	1572.88
7427.08	1572.4	7438.36	1571.82	7440.32	1571.82	7441.82	1571.83	7466.25	1572
7484.05	1571.6	7486.87	1571.6	7499.11	1571.48	7505.03	1571.83	7518.99	1572.77
7528.11	1572.7	7546.9	1572.42	7604.41	1572.51	7617.07	1572.5	7654.79	1572.4
7741.99	1572.2	7769.86	1572.18	7831.94	1572.6	7834.2	1572.47	7837.63	1572.56
7850.94	1572.4	7870.34	1572.43	7873.4	1572.41	7873.83	1572.4	7887.4	1572.22
7906.57	1572.1	7909.16	1572	7916.71	1571.79	7931.95	1571.12	7933.08	1571.29
7936.79	1571.9	7945.34	1573.16	7948.43	1573.47	7964.36	1572.96	7972.98	1572.21
8000.84	1572.3	8031.51	1572.41	8046.04	1572.52	8051.79	1572.52	8055.81	1572.57
8065.82	1572.5	8073.44	1572.42	8074.22	1572.41	8076.18	1572.39	8097.58	1571.95
8109.13	1571.8	8113.3	1571.8	8120.99	1571.73	8143.06	1572.08	8167.9	1572.51
8182.69	1572.6	8213.02	1573.77	8224	1573.71	8250.37	1573.67	8251.66	1573.7
8259.55	1573.7	8276.9	1573.73	8288.16	1573.71	8296.58	1573.73	8331.24	1573.62
8342.31	1573.4	8343.79	1573.7	8357.82	1573.55	8373.55	1573.47	8392.89	1573.35
8469.05	1572.6	8477.22	1572.71	8481.59	1572.67	8513.79	1572.86	8513.88	1572.6
8529.93	1573.2	8536.85	1573.4	8582.51	1573.02	8602.19	1572.85	8606.52	1572.8
8608.3	1572.8	8613.27	1572.67	8621.99	1572.71	8653.24	1572.73	8663.28	1572.7
8665.51	1572.7	8692.2	1572.09	8694.38	1572.14	8717.8	1572.02	8732.13	1571.95
8734.45	1571.9	8752.5	1571.84	8769.24	1572.02	8780.44	1572.17	8802.42	1572.4
8804.67	1572.4	8829.9	1572.43	8835.06	1572.45	8850.35	1572.51	8862.3	1572.62
8872.24	1572.6	8880.55	1572.59	8900.72	1572.66	8904.58	1572.67	8925.04	1572.83
8926.06	1572.8	8929.64	1572.86	8944.83	1572.82	8950.58	1572.87	8971.27	1573.12
8977.73	1573.2	8981.52	1573.24	9013.99	1573.43	9019.84	1573.26	9045.96	1573.24
9052.53	1573.2	9065.07	1573.39	9067.45	1573.35	9069.56	1573.56	9071.41	1573.58
9088.51	1573.6	9101.67	1573.29	9105.57	1573.48	9115.81	1573.73	9118.95	1573.78
9120.62	1573.8	9138.79	1573.74	9146.48	1573.68	9167.6	1573.65	9199.91	1573.3
9211.23	1573.2	9217.39	1573.22	9220.23	1573.21	9230.09	1573.86	9233.44	1573.74
9278.65	1573.5	9280.44	1573.52	9288.44	1573.5	9290.76	1573.59	9317.87	1573.99
9321.61	1574	9322.06	1574.03	9329.75	1574.02	9416.34	1573.53	9422.19	1573.53
9429.27	1573.5	9438.03	1573.42	9490.03	1573.45	9509.41	1574.34	9521.03	1575.17
9534.66	1575.2	9561.3	1575.24	9578.83	1574.2	9586.7	1573.96	9594.02	1573.65
9603.08	1574.7	9616.2	1576.04	9617.46	1576.08	9621.47	1576.31	9622.98	1576.35
9658.17	1575.6	9667.41	1575.42	9679.8	1574.24	9686.57	1573.65	9689.45	1574.31
9703.33	1577.5	9708.72	1577.25	9733.93	1577.45	9754.74	1577.38	9769.84	1577.18
9784.2	1577.1	9845.72	1576.9	9875.65	1576.12	9881.9	1575.94	9887.1	1575.75
9911.99	1575.1	9931.99	1574.95	9970.15	1574.23	9975.79	1572.28	9977.5	1571.68
9986.13	1571.2	10000.13	1570.42	10008.25	1572.13	10019.65	1575.25	10039.26	1576.05
10039.39	1576.1	10040.56	1576.07	10082.21	1576.4	10088.17	1576.5	10089.6	1576.6
10107.29	1578.2	10110.49	1578.31	10117.09	1577.34	10118.87	1577.08	10126.74	1576.21
10135.68	1575.9	10148.81	1575.85	10163.62	1576	10200.91	1576.33	10225.21	1576.55
10229.41	1576.6	10235.38	1575.44	10238.94	1574.73	10240.43	1574.51	10252.36	1570.58
10254.58	1569.9	10255.1	1569.98	10255.54	1570.07	10271.73	1574.02	10275.12	1574.13
10286	1574.1	10315.31	1574.62	10334.42	1575.15	10336.99	1575.29	10341.25	1575.46

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10358.42  1575.710364.56 1575.1510372.18 1574.8710375.27 1574.99 10400.1 1576.29
10401.47  1576.410401.51 1576.3610401.66 1576.36 10448.4 1574.9910450.33    1575
10453.89  1575.110456.72 1575.1110461.37 1575.0910481.87 1575.44 10485.3 1575.48
 10486.7  1575.510511.35 1575.99 10541.3  1576.410543.26 1576.4610561.89 1575.78
10568.97  1575.310577.05 1575.6110579.21 1575.6910579.92  1575.710620.24  1575.7
10631.43  1575.810643.59 1575.9410650.57 1576.0710665.92 1576.7910668.76 1576.97
10682.34  1577.210696.74 1574.9210696.96  1574.910697.05 1574.8710697.53 1574.89
10717.05    1576 10739.3 1576.07

Manning's n Values          num=       8
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
 4265.03      .1 5410.85     .15 6800.61      .1 8055.81     .15 8481.59      .1
 9101.67     .15 9911.99    .04510039.39     .15

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9911.9910039.39              800   96.77      96             .1       .3

Ineffective Flow     num=       1
   Sta L   Sta R    Elev
    5994    6170    1570

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1573.68   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                0.132      0.045      0.150
  W.S. Elev (ft)            1573.60   Reach Len. (ft)          800.00      96.77      96.00
  Crit W.S. (ft)            1570.71   Flow Area (sq ft)       5142.16      85.73      50.26
  E.G. Slope (ft/ft)       0.011730   Area (sq ft)            5142.16      85.73      50.26
  Q Total (cfs)            11309.00   Flow (cfs)             10738.50     490.52      79.98
  Top Width (ft)            4053.93   Top Width (ft)          3985.49      41.64      26.80
  Vel Total (ft/s)             2.14   Avg. Vel. (ft/s)           2.09       5.72       1.59
  Max Chl Dpth (ft)           10.47   Hydr. Depth (ft)           1.29       2.06       1.88
  Conv. Total (cfs)        104418.5   Conv. (cfs)            99151.0     4529.1      738.5
  Length Wtd. (ft)           779.70   Wetted Per. (ft)        3991.31      42.37      27.83
  Min Ch El (ft)            1570.42   Shear (lb/sq ft)           0.94       1.48       1.32
  Alpha                        1.22   Stream Power (lb/ft s)     1.97       8.48       2.10
  Frctn Loss (ft)              0.10   Cum Volume (acre-ft)     630.59       6.24      22.21
  C & E Loss (ft)              0.03   Cum SA (acres)           249.80       2.54      24.17

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.   Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  4265.03       5676.77        2530.85    1298.84    1078.84     22.38      1.21       1.95
  5676.77       7088.51        5242.12    2128.41     883.86     46.35      2.42       2.46
  7088.51       8500.25        2080.44    1184.04    1246.16     18.40      0.95       1.76
  8500.25       9911.99         885.09     530.87     782.44      7.83      0.68       1.67
  LB 9911.99    RB 10039.39     490.52      85.73      42.37      4.34      2.06       5.72
  10039.39      10739.30         79.98      50.26      27.83      0.71      1.88       1.59

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.261**

INPUT
Description: RM. 2.261. HORZ. N VALUES USED. UPSTREAM EDGE OF CAP CANAL. RAS.I.D.3 =SEC. STA.49+50=CAP STA.479+00=(5) 72"DIA. RAS. I.D.2=SEC. STA.58+10=CAP STA.471+03=(3) 72"DIA RAS.I.D.1=SEC.STA. 73+00=CAP STA.456+50=(2)60" DIA RAS.I.D.4&5=SEC.STA.100+00&102+30=CAP STA.429+20&427+15 =(3) 72"DIA/EA.

Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71
5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77
5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53
6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24
7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89

7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48
7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19
8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76
9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.4	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06
10199.79	1571.2	10216.14	1572.53	10238.57	1571.16	10244.57	1571.15	10247.77	1571.17
10292.94	1576.6	10314.28	1576.75	10322.46	1576.78	10330.24	1576.85	10331.52	1576.85
10342.54	157	710353.36	1576.87	10363.5	1576.84	10377.66	1576.78	10386.92	1576.78
10404.98	1576.1	10417.27	1576.9	10420.3	1576.93	10421.82	1576.86	10442.08	1575.88
10444.5	1575.8	10445.01	1575.75	10470.55	1575.33	10472.82	1575.39	10487.11	1575.25
10501.53	1575.1	10515.54	1575.23	10535.23	1576.54	10540.36	1576.54	10553.28	1575.48
10567.76	1575.4	10591.47	1575.52	10596.97	1575.63	10602.07	1575.59		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4349.26	.1	9192.94	.15	9949.1	.04	510039.47	.15

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9949.1	10039.47	200	200.58	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1573.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.100	0.045	0.150
W.S. Elev (ft)	1573.56	Reach Len. (ft)	200.00	200.58	200.00
Crit W.S. (ft)	1561.96	Flow Area (sq ft)	32439.20	162.67	353.08
E.G. Slope (ft/ft)	0.000036	Area (sq ft)	32439.20	162.67	353.08
Q Total (cfs)	11309.00	Flow (cfs)	11226.94	54.06	28.01
Top Width (ft)	5122.47	Top Width (ft)	4820.22	74.10	228.15
Vel Total (ft/s)	0.34	Avg. Vel. (ft/s)	0.35	0.33	0.08
Max Chl Dpth (ft)	16.16	Hydr. Depth (ft)	6.73	2.20	1.55
Conv. Total (cfs)	1887113.0	Conv. (cfs)	1873419.0	9020.7	4673.3
Length Wtd. (ft)	200.58	Wetted Per. (ft)	4829.91	74.75	228.61
Min Ch El (ft)	1570.01	Shear (lb/sq ft)	0.02	0.00	0.00
Alpha	1.01	Stream Power (lb/ft s)	0.01	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	285.49	5.97	21.77
C & E Loss (ft)		Cum SA (acres)	168.94	2.41	23.89

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4349.26	5749.22	428.02	2691.36	1012.02	3.78	2.67	0.16
5749.22	7149.18	3598.81	11004.73	1403.34	31.82	7.86	0.33
7149.18	8549.14	6676.24	15938.12	1402.00	59.03	11.38	0.42
8549.14	9949.10	523.87	2804.98	1012.56	4.63	2.77	0.19
LB 9949.10	RB 10039.47	54.06	162.67	74.75	0.48	2.20	0.33
10039.47	10602.07	28.01	353.08	228.61	0.25	1.55	0.08

CULVERT **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.252**

INPUT
Description: CULVERTS ACROSS CAP CANAL
Distance from Upstream XS = 25
Deck/Roadway Width = 160
Weir Coefficient = 2.8
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 36

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
3778.9	1573.16		3935.44	1573.66		4002.7	1574	
4172.27	1574.22		4291.03	1574.26		4357.67	1574.2	
4390.75	1572.8		4414.56	1568.95		4491.44	1568.9	
4526.71	1572.71		4562.88	1573.8		4856.47	1573.83	
5266.74	1573.83		5303.49	1574.9		5398.9	1575	
5460.86	1573.67		5714.85	1573.19		5801.62	1572.03	
5824.78	1571.9		5855.78	1572.91		6153.43	1572.93	
6347.31	1572.9		6588.98	1572.93		7286.17	1572.93	

7403.63	1573.25	7905.82	1573.3	8097.17	1573.11
8300.29	1573.14	8306.43	1572.8	8410.8	1572.82
8508.59	1573.79	9436.01	1573.8	9530.22	1574.31
9716.23	1575.51	9730.42	1577.18	10431.6	1577.28

Upstream Bridge Cross Section Data
Station Elevation Data num= 499

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4349.26	1572.1	4359.98	1572.17	4369.44	1571.81	4383.67	1570.09	4383.82	1570.08
4395.8	1569.7	4407.82	1569.32	4408.08	1569.31	4420.62	1568.58	4441.8	1568.43
4481.73	1568.7	4512.79	1569.42	4516.83	1569.85	4537.78	1570.49	4557.27	1571.6
4560.8	1571.6	4583.03	1573.22	4590.2	1573.75	4592.05	1573.76	4610.53	1572.71
4623.3	1573.2	4636.58	1573.23	4647.26	1573.2	4661.53	1573.03	4663.08	1572.97
4663.64	1572.9	4687.6	1571.99	4691.74	1571.86	4719.14	1571.06	4736.33	1573.09
4737.14	1573.1	4738.25	1573.07	4770.97	1570.81	4793.2	1570.74	4830.14	1568.29
4830.93	1568.3	4846.29	1568.05	4855.1	1567.98	4882.71	1568.83	4885.98	1568.88
4891.09	1568.6	4915.77	1566.44	4927.66	1566.75	4940.89	1567.87	4952.23	1567.96
4967.75	1567.9	4987.23	1570.96	5007.01	1571.12	5016.73	1569.99	5043.63	1569.96
5047.88	1570	5054.03	1570.11	5056.57	1569.91	5072.53	1569.72	5098.67	1569.81
5100.76	1569.9	5117.31	1572.8	5125.88	1571.4	5147.11	1573.22	5148.5	1573.77
5155.24	1573.8	5174.46	1573.84	5178.28	1573.82	5204.95	1574.18	5210.66	1574.21
5235.24	1574.3	5240.42	1574.27	5249.96	1574.18	5259.22	1574.13	5268.04	1574.09
5272.46	1574.2	5285.47	1574.66	5303.13	1575.15	5334.89	1575.44	5341.19	1575.4
5374.3	1574.8	5389.16	1574.9	5391.8	1574.78	5395.95	1574.73	5396.29	1574.71
5412.32	1574.2	5431.18	1573.37	5437.91	1573.83	5455.32	1573.72	5461.29	1573.77
5486.08	1573.7	5491.38	1573.38	5496.65	1573.47	5531.03	1573.39	5540.57	1573.18
5559.47	1573.8	5573.76	1574.1	5591.33	1573.73	5605.51	1573.49	5616.97	1573.51
5638.66	1573.3	5646.31	1573.34	5674.93	1573.23	5676.13	1573.23	5689.54	1572.88
5695.24	1572.8	5721.29	1571.79	5762.48	1571.64	5772.68	1571.86	5774.73	1571.86
5777.8	1571.9	5784.45	1569.26	5808.26	1561.91	5822.47	1561.62	5824.99	1561.44
5833.61	1561.4	5851.61	1563.04	5859.38	1563.99	5871.66	1565.72	5893.63	1571.36
5913.91	1572.4	5934.92	1572.89	5953.53	1573.26	5978.13	1572.79	5978.25	1572.79
5979.01	1572.8	6002.43	1571.95	6006.38	1571.82	6030.54	1570.82	6042.47	1570.45
6059.83	1570	6073.14	1569.47	6083.99	1569.14	6106.89	1568.03	6107.5	1568.01
6111.37	1568.1	6133.3	1567.96	6149.22	1567.98	6154.9	1568	6175.28	1567.51
6179.49	1567.5	6195.27	1567.45	6200.76	1567.47	6225.2	1567.41	6230.84	1567.39
6250.31	1567.5	6255	1567.55	6278.98	1567.53	6284.2	1567.5	6309.15	1567.26
6313.04	1567.2	6340.93	1567.33	6346.77	1567.39	6371.83	1567.2	6375.55	1567.12
6380.62	1567	6407.02	1567.01	6410.5	1567.01	6437.13	1565.96	6441.43	1565.96
6455.68	1566	6460.75	1566.03	6480.57	1565.95	6508.11	1565.79	6515.66	1565.8
6541.82	1565.4	6546.76	1565.33	6568.69	1565.25	6574.05	1565.28	6600.43	1564.92
6603.51	1564.9	6637.13	1565.11	6641.39	1565.06	6645.55	1564.98	6686.6	1564.59
6692.37	1564.6	6712.92	1564.17	6741.25	1563.9	6745.21	1563.85	6759.59	1563.66
6763.03	1563.7	6787.79	1563.75	6807.81	1563.47	6810.54	1563.45	6847.56	1562.53
6849.34	1562.5	6850.23	1562.48	6881.24	1562.26	6882.17	1562.26	6903.18	1562.33
6906.05	1562.3	6927.87	1560.89	6936.34	1560.67	6937.1	1560.61	6969.07	1560.45
6969.16	1560.5	6973.81	1560.45	6988.76	1560.57	6989.12	1560.58	6996.22	1561.05
7013.21	1560.2	7019.04	1560.16	7019.61	1560.21	7022.16	1560.11	7044.06	1561.48
7049.26	1560.4	7066.49	1558.21	7068.36	1558.22	7069.64	1558.27	7093.1	1561.24
7105.67	1561.1	7118.57	1560.93	7132.54	1560.87	7146.04	1560.79	7157.28	1561.02
7171.67	1560.9	7185.79	1560.81	7202.38	1560.56	7213.69	1560.59	7219.5	1560.83
7235.59	1561.1	7252.02	1560.81	7259.23	1561.13	7273.69	1558.53	7280.83	1558.13
7299.69	1558	7302.83	1557.89	7314.22	1557.51	7322.79	1557.57	7324.13	1557.58
7325.41	1557.5	7325.61	1557.5	7325.78	1557.48	7327.92	1557.4	7353.58	1557.89
7367.34	1558.9	7374.12	1560.66	7402.17	1560.56	7402.69	1560.54	7423.75	1560.84
7424.87	1560.7	7426.81	1560.53	7446.77	1560.1	7461.74	1560.45	7467.82	1560.9
7484.9	1561.1	7488.23	1561.24	7503.42	1559.63	7516.04	1559.65	7532.78	1561.48

7541.12	1561.5	7559.94	1558.48	7561.33	1558.52	7581.54	1558.62	7581.91	1558.65
7583.3	1558.6	7613.17	1560.29	7622.23	1560.27	7650.88	1562.13	7668.31	1562.49
7669.2	1562.6	7686.9	1561.12	7689.77	1561.47	7707.63	1562.39	7727.54	1559.7
7727.64	1559.7	7727.72	1559.69	7728.23	1559.65	7752.88	1560.12	7759.62	1560.08
7777.76	1560.6	7793.13	1561.01	7808.93	1563.31	7811.87	1563.27	7830.4	1564.03
7834.06	1564.1	7853.87	1563.59	7856.24	1563.52	7871.65	1563.45	7874.06	1563.38
7896.14	1563.5	7899.5	1563.5	7916.82	1563.11	7918.93	1563.1	7961.63	1562.88
7962.49	1562.9	7963.44	1562.87	7985.78	1562.9	7986.14	1562.83	8004.06	1562.68
8025.67	1563	8046.65	1562.92	8049.22	1563.41	8050.04	1563.41	8068.95	1563.33
8069.53	1563.3	8093.81	1563.86	8095.03	1563.87	8117.93	1564.63	8121.91	1563.34
8139.37	1563.2	8155.96	1563.08	8162.18	1563.21	8168.33	1563.11	8176.08	1563.09
8197.37	1563	8215.84	1562.71	8229.03	1562.68	8252.88	1564.1	8264.5	1563.53
8270.98	1563.7	8274.4	1563.68	8299.42	1563.69	8307.13	1563.54	8324.97	1563.99
8330.44	1563.8	8347.51	1564.27	8351.44	1564.36	8365.99	1564.69	8369.9	1564.89
8389.21	1564.7	8393.25	1564.74	8397.46	1564.92	8411.82	1565.09	8431.78	1565.09
8435.84	1565.1	8457.63	1565.05	8461.36	1565.23	8464.1	1565.34	8486.07	1565.64
8489.84	1565.6	8511.01	1566.11	8514.71	1566.08	8533.82	1566.36	8537.09	1566.36
8557.17	1566.4	8563.63	1565.48	8588.57	1565.79	8594.41	1566.56	8596.5	1566.6
8618.51	1566.7	8621.77	1566.74	8643.52	1566.92	8646.85	1566.94	8667.75	1567.31
8671.44	1567.4	8690.16	1567.78	8693.94	1567.82	8714.48	1567.72	8717.41	1567.75
8732.58	1567.8	8735.75	1568.11	8754.95	1568.77	8759.03	1568.81	8780.71	1568.93
8785.16	1568.8	8805.36	1568.99	8808.32	1569.29	8826.46	1569.87	8830.2	1569.98
8846.35	1570.4	8850.26	1570.04	8867.45	1570.21	8871.64	1570.19	8891.77	1570.47
8897.82	1570.7	8914.78	1571.31	8921.47	1571.33	8938.85	1571.64	8945.92	1572.19
8953.77	1571.8	8968.42	1571.49	8975.51	1571.5	8988.81	1571.78	8996.5	1571.76
9015	1569.5	9015.47	1569.54	9024.58	1569.36	9032.84	1569.33	9033.45	1569.33
9034.55	1569.4	9038.39	1569.97	9055.78	1572.92	9071.33	1570.71	9074.98	1570.75
9084.52	1571.1	9101.17	1571.89	9121.96	1571.87	9132.33	1572.41	9143.59	1572.23
9177.01	1572.7	9181.71	1572.74	9192.94	1572.54	9216.6	1571.86	9246.85	1572.06
9271.41	1572.5	9282.05	1572.45	9302.89	1572.61	9330.03	1572.87	9338.47	1572.82
9360.42	1572.7	9381.07	1573.33	9421.7	1573.18	9433.06	1573.23	9447.9	1573.04
9494.85	1572	9500.46	1572.11	9510.58	1572.73	9544.75	1573.94	9550.13	1574.33
9554.73	1574.3	9559.81	1574.39	9591.65	1574.74	9616.86	1572.62	9619.09	1572.46
9621.95	1572.9	9631.35	1574.78	9643.89	1575.27	9649.97	1575.8	9651.73	1575.8
9663.8	1575.7	9674.73	1575.49	9700.8	1575.28	9714.46	1577.33	9727	1577.02
9744.81	1575.4	9754.52	1574.57	9759.87	1574.82	9781.35	1575.33	9789.76	1575.51
9802.65	1575.4	9810.03	1574.99	9825.56	1574.79	9834.5	1574.58	9853.64	1574.66
9858.6	1574.7	9878.13	1573.88	9882.94	1573.93	9902.06	1573.87	9907.54	1573.89
9924.91	1573.5	9929.34	1573.5	9943.73	1578.05	9949.1	1578.33	9967.44	1572.95
9972.68	1572.7	9984.29	1570.54	9996.25	1570.01	9996.82	1570.39	9999.96	1570.05
10013.72	1570.5	10017.93	1571.77	10023.52	1572.09	10039.47	1572.56	10042.32	1572.42
10045.73	1572.6	10066.16	1572.56	10070.42	1572.44	10088.07	1572.4	10093.58	1572.44
10110.51	1572.8	10115.94	1572.89	10133.3	1572.42	10138.2	1572.56	10152.43	1572.28
10154.44	1572.2	10158.66	1571.96	10173.16	1570.16	10183.85	1569.94	10193.14	1571.06
10199.79	1571.2	10216.14	1572.53	10238.57	1571.16	10244.57	1571.15	10247.77	1571.17
10292.94	1576.6	10314.28	1576.75	10322.46	1576.78	10330.24	1576.85	10331.52	1576.85
10342.54	1577	10353.36	1576.87	10363.5	1576.84	10377.66	1576.78	10386.92	1576.78
10404.98	1576.1	10417.27	1576.9	10420.3	1576.93	10421.82	1576.86	10442.08	1575.88
10444.5	1575.8	10445.01	1575.75	10470.55	1575.33	10472.82	1575.39	10487.11	1575.25
10501.53	1575.1	10515.54	1575.23	10535.23	1576.54	10540.36	1576.54	10553.28	1575.48
10567.76	1575.4	10591.47	1575.52	10596.97	1575.63	10602.07	1575.59		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4349.26	.1	9192.94	.15	9949.1	.04	510039.47	.15

Bank Sta: Left	Right	Coeff Contr.	Expan.
9949.11	10039.47	.1	.3

Downstream Deck/Roadway Coordinates
num= 36

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
3778.9	1572.66		3935.44	1573.16		4002.7	1573.5	
4172.27	1573.72		4291.03	1573.76		4357.67	1573.7	
4390.75	1572.3		4414.56	1568.45		4491.44	1568.4	
4526.71	1572.21		4562.88	1573.3		4856.47	1573.33	
5266.74	1573.33		5303.49	1574.4		5398.9	1574.5	
5460.86	1573.17		5714.85	1572.69		5801.62	1571.53	
5824.78	1571.4		5855.78	1572.41		6153.43	1572.43	
6347.31	1572.4		6588.98	1572.43		7286.17	1572.43	
7403.63	1572.75		7905.82	1572.8		8097.17	1572.61	
8300.29	1572.64		8306.43	1572.3		8410.8	1572.32	
8508.59	1573.29		9436.01	1573.3		9530.22	1573.81	
9716.23	1575.01		9730.42	1576.68		10431.6	1576.78	

Downstream Bridge Cross Section Data
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3625.97	1565.5	3632.59	1565.55	3656.69	1565.43	3670.32	1565.61	3685.64	1565.83
3703.88	1565.8	3715.98	1565.84	3731.62	1569.85	3766.14	1568.83	3779.77	1565.5
3790.08	1565.4	3803.14	1565.47	3851.91	1565.64	3856.4	1565.67	3873.41	1565.52
3899.75	1565	3925.19	1565.02	3959.9	1570.78	3965.15	1571.13	4006.22	1567.56
4008.3	1567.6	4012.16	1567.58	4020.39	1567.33	4049.92	1564.77	4078.79	1564.81
4108.82	1564.7	4133.24	1571.32	4140.44	1571.65	4165.95	1564.07	4166.01	1564.07
4166.38	1564.1	4208.01	1569.06	4215.59	1568.67	4241.71	1571	4247.24	1570.97
4253.51	1570.9	4267.78	1570.92	4278.31	1571.37	4292.05	1571.22	4309.15	1569.92
4323.38	1570.7	4325.23	1570.75	4343.13	1566.91	4362.37	1567.88	4376.85	1567.95
4401.99	1568.1	4417.09	1567.21	4445.07	1567.73	4469.07	1568.11	4484.02	1567.93
4492.99	1567.7	4521.03	1568.78	4528.85	1568.41	4539.23	1568.96	4570.77	1572.62
4571.53	1572.6	4573.76	1572.6	4590.5	1573.89	4613.75	1571.72	4618.83	1571.28
4622.04	1571.3	4642.73	1572.53	4643.94	1572.5	4645.31	1572.38	4646.77	1572.43
4663.49	1572.2	4667.67	1572.12	4694.25	1570.5	4704.93	1570.51	4719.91	1571.95
4729.86	1571.8	4745.36	1572.39	4749.8	1572.43	4762.47	1572.52	4772.53	1572.27
4774.87	1572.2	4786.1	1572.18	4800.75	1570.65	4808.38	1572.1	4829.71	1571.4
4838.11	1571.6	4845.85	1571.56	4889.44	1570.56	4889.72	1570.55	4889.81	1570.56
4921.94	1572.6	4943.64	1571.21	4955.75	1570.45	4970.46	1571.48	4982.07	1572.68
4988.87	1572.9	4991.39	1572.99	4992.29	1572.97	5005.11	1572.36	5051.7	1569.27
5073.44	1572.5	5101.78	1572.66	5104.71	1572.83	5108.73	1573.09	5109.43	1573.08
5112.37	1573.1	5116.5	1572.79	5173.45	1572.91	5175.9	1573.14	5202.46	1573.03
5218.29	1573	5224.66	1572.58	5236.09	1572.53	5273.97	1572.27	5282.08	1572.4
5303.03	1572.3	5310.71	1572.19	5324.72	1572.25	5343.71	1572.33	5361.65	1572.1
5378.57	1572.1	5418.95	1575.17	5433.29	1575.26	5459.13	1575	5493.99	1574.9
5501.97	1574.9	5509.68	1574.44	5523.68	1573.5	5543.04	1572.13	5557.18	1571.95
5584.82	1571.4	5598.88	1571.52	5613.49	1571.07	5623.01	1570.67	5626.04	1570.54
5634.22	1569.7	5655.07	1561.31	5656.41	1560.84	5657.57	1560.81	5660.38	1560.78
5694.92	1560.9	5702.53	1561.05	5717.56	1566.72	5723.51	1569.79	5746.38	1570.67
5755.66	1570.8	5758.3	1570.68	5773.84	1569.13	5780.45	1568.87	5807.63	1569.17
5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96

6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49
6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7
6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
7867.2	1559.1	7886.38	1559.95	7912.54	1560.36	7912.67	1560.37	7935.49	1560.59
7949.09	1560.5	7954.1	1560.5	7958.26	1560.57	7970.55	1560.53	7994.48	1566.17
8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87
8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
8270.5	1554.3	8288.83	1555.7	8295.32	1555.89	8307.63	1558.89	8310.76	1560.59
8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
8377.18	1561.6	8380.27	1561.66	8404.61	1561.91	8415.47	1562.14	8436.55	1562.05
8438.21	1562.1	8459.8	1562.89	8461.09	1562.91	8481.78	1562.83	8484.82	1563.14
8503.98	1563.6	8505.95	1563.6	8510.97	1563.65	8551.82	1564.36	8557.83	1564.44
8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
8825.79	1567.4	8836.1	1567.34	8848.28	1567.13	8856.1	1567.16	8883.37	1567.63
8889.52	1567.8	8894.81	1567.75	8901.15	1567.52	8912.17	1567.35	8927.49	1567.78
8935.05	1567.9	8949.24	1568.22	8956.34	1568.22	8978.6	1568.38	8982.37	1568.66
9012.09	1568.8	9030.23	1568.57	9049.15	1569.91	9055.98	1570.57	9081.9	1571.86
9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
9599.89	1572.8	9603.16	1572.75	9609.05	1572.62	9632.08	1573.43	9644.83	1572.95
9675.34	1573.1	9684.59	1573.3	9687.16	1573.46	9695.67	1573.48	9716.26	1573.95
9727.97	1573.9	9734.41	1573.94	9737.25	1573.91	9742.93	1573.85	9779.14	1575.73
9781.05	1575.8	9781.25	1575.72	9782.91	1575.88	9813.37	1568.4	9817.33	1568.12
9822.3	1567.6	9832.96	1568.6	9854.98	1566.21	9855.44	1566.21	9860.61	1566.22
9877.06	1567	9878.67	1567.04	9898.07	1568.33	9911.74	1569.02	9923.22	1569.07
9941.11	1569	9948.16	1569.71	9965.35	1570.68	9977.72	1575.36	9985.5	1575.6

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 9988.16  1575.6  9994.4 1575.2110016.91 1569.6610021.29 1569.5410040.06 1577.33
 10045.4  1577.410051.38 1577.2810065.78  1576.710076.98 1576.66 10113.7 1576.53
10138.07  1576.610147.19 1576.8810169.12 1576.7810170.27 1576.5310171.93 1575.99
10174.76  1575.210188.98 1569.9110194.75  1569.810209.58 1574.9710220.06 1574.76
10237.94    157510241.72  1575.210244.41 1575.1310249.36 1575.1910270.25 1575.77
10299.93  1575.310305.03 1575.2310308.94 1575.1610309.74 1575.1210333.08 1574.77
10348.08  1574.410348.82 1574.38

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 3625.97     .08  9994.4    .04510040.06     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
        9994.410040.06             .1       .3

Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 3625.97    7300  1560.5    850010348.82  1560.5

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  5

Culvert Name     Shape      Rise    Span
Culvert #3      Circular       6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 19     162       .012                   .9                1
Number of Barrels =  5
Upstream   Elevation =  1561
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4920    4928    4936    4944    4952
Downstream Elevation =  1560
Centerline Stations
    Sta.    Sta.    Sta.    Sta.    Sta.
    4860    4868    4876    4884    4892

Culvert Name     Shape      Rise    Span
Culvert #2      Circular       6
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .012                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1560
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Centerline Stations
    Sta.    Sta.    Sta.
    5790    5798    5806
Downstream Elevation =  1558.7
Centerline Stations
    Sta.    Sta.    Sta.
    5680    5688    5696

Culvert Name     Shape      Rise    Span
Culvert #1      Circular      5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  5     190       .012                   .9                1
Number of Barrels =  2
Upstream   Elevation =  1555.2
Centerline Stations
    Sta.    Sta.
    7300    7306
Downstream Elevation =  1554.4
Centerline Stations
    Sta.    Sta.
    7200    7206

Culvert Name     Shape      Rise    Span
Culvert #4      Circular      6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.8
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006
Downstream Elevation =  1567
Centerline Stations
    Sta.    Sta.    Sta.
    9990    9998   10006

Culvert Name     Shape      Rise    Span
Culvert #5      Circular      6
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 10     180       .024                   .9                1
Number of Barrels =  3
Upstream   Elevation =  1567.7
Centerline Stations
    Sta.    Sta.    Sta.
   10220   10228   10236
Downstream Elevation =  1567
```

Centerline Stations

Sta.	Sta.	Sta.
10170	10178	10186

CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 2.223**

INPUT
Description: RM. 2.223 . DOWNSTREAM EDGE OF CAP CANAL.

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3625.97	1565.5	3632.59	1565.55	3656.69	1565.43	3670.32	1565.61	3685.64	1565.83
3703.88	1565.8	3715.98	1565.84	3731.62	1569.85	3766.14	1568.83	3779.77	1565.5
3790.08	1565.4	3803.14	1565.47	3851.91	1565.64	3856.4	1565.67	3873.41	1565.52
3899.75	1565	3925.19	1565.02	3959.9	1570.78	3965.15	1571.13	4006.22	1567.56
4008.3	1567.6	4012.16	1567.58	4020.39	1567.33	4049.92	1564.77	4078.79	1564.81
4108.82	1564.7	4133.24	1571.32	4140.44	1571.65	4165.95	1564.07	4166.01	1564.07
4166.38	1564.1	4208.01	1569.06	4215.59	1568.67	4241.71	1571	4247.24	1570.97
4253.51	1570.9	4267.78	1570.92	4278.31	1571.37	4292.05	1571.22	4309.15	1569.92
4323.38	1570.7	4325.23	1570.75	4343.13	1566.91	4362.37	1567.88	4376.85	1567.95
4401.99	1568.1	4417.09	1567.21	4445.07	1567.73	4469.07	1568.11	4484.02	1567.93
4492.99	1567.7	4521.03	1568.78	4528.85	1568.41	4539.23	1568.96	4570.77	1572.62
4571.53	1572.6	4573.76	1572.6	4590.5	1573.89	4613.75	1571.72	4618.83	1571.28
4622.04	1571.3	4642.73	1572.53	4643.94	1572.5	4645.31	1572.38	4646.77	1572.43
4663.49	1572.2	4667.67	1572.12	4694.25	1570.5	4704.93	1570.51	4719.91	1571.95
4729.86	1571.8	4745.36	1572.39	4749.8	1572.43	4762.47	1572.52	4772.53	1572.27
4774.87	1572.2	4786.1	1572.18	4800.75	1570.65	4808.38	1572.1	4829.71	1571.4
4838.11	1571.6	4845.85	1571.56	4889.44	1570.56	4889.72	1570.55	4889.81	1570.56
4921.94	1572.6	4943.64	1571.21	4955.75	1570.45	4970.46	1571.48	4982.07	1572.68
4988.87	1572.9	4991.39	1572.99	4992.29	1572.97	5005.11	1572.36	5051.7	1569.27
5073.44	1572.5	5101.78	1572.66	5104.71	1572.83	5108.73	1573.09	5109.43	1573.08
5112.37	1573.1	5116.5	1572.79	5173.45	1572.91	5175.9	1573.14	5202.46	1573.03
5218.29	1573	5224.66	1572.58	5236.09	1572.53	5273.97	1572.27	5282.08	1572.4
5303.03	1572.3	5310.71	1572.19	5324.72	1572.25	5343.71	1572.33	5361.65	1572.1
5378.57	1572.1	5418.95	1575.17	5433.29	1575.26	5459.13	1575	5493.99	1574.9
5501.97	1574.9	5509.68	1574.44	5523.68	1573.5	5543.04	1572.13	5557.18	1571.95
5584.82	1571.4	5598.88	1571.52	5613.49	1571.07	5623.01	1570.67	5626.04	1570.54
5634.22	1569.7	5655.07	1561.31	5656.41	1560.84	5657.57	1560.81	5660.38	1560.78
5694.92	1560.9	5702.53	1561.05	5717.56	1566.72	5723.51	1569.79	5746.38	1570.67
5755.66	1570.8	5758.3	1570.68	5773.84	1569.13	5780.45	1568.87	5807.63	1569.17
5814.4	1569	5836.64	1567.23	5843.56	1567.1	5862.89	1566.52	5870.07	1566.31
5884.94	1566.3	5905.94	1566.4	5917.29	1566.3	5968.5	1566.15	6002.79	1565.73
6005.64	1565.7	6038.78	1565.71	6064.14	1565.82	6081.91	1565.8	6092.63	1565.76
6130.44	1565.7	6156.9	1565.45	6164.01	1565.45	6176.36	1565.48	6185.14	1565.48
6235.15	1565.8	6247.71	1565.58	6261.29	1565.46	6270.76	1565.32	6298.34	1564.82
6303.88	1564.7	6324.98	1565.32	6328.94	1565.41	6334.93	1565.22	6361.44	1564.96
6384.5	1564.5	6415.25	1564.38	6422.27	1564.4	6427.96	1564.28	6442.94	1564.03
6471	1563.5	6479.55	1563.45	6500.58	1564.08	6502.58	1564.07	6533.37	1563.82
6536.48	1563.9	6552.68	1563.64	6555.17	1563.63	6573.91	1564.17	6580.08	1564.45
6597.19	1565	6614.03	1564.92	6622.95	1565.48	6646.12	1565.42	6652.65	1565.51
6670.79	1565.8	6682.7	1565.75	6690.91	1566.14	6712.08	1568.49	6727.67	1569.04
6742.66	1571.9	6746.55	1572.06	6749.03	1572.01	6774.37	1571.7	6787.31	1571.46
6791.05	1570.2	6815.76	1566.76	6828.27	1566.11	6841.93	1565.75	6866.03	1565.49
6878.11	1566.4	6888.09	1566.83	6905.06	1569.94	6907.68	1570.11	6915.25	1569.27
6943.47	1565.8	6955.47	1562.43	6971.77	1561.21	6988.03	1560.62	6991.84	1560.7

6997.15	1560.9	6998.72	1560.91	7010.69	1561.93	7016.98	1562.26	7029.31	1561.08
7040.96	1562.1	7069.85	1561.53	7075.15	1560.97	7096.87	1561.5	7099.56	1561.51
7121.49	1561.3	7123.41	1561.4	7152.34	1561.76	7153.51	1562.02	7163.39	1559.56
7178.63	1558.6	7208.99	1561.35	7218.73	1562.58	7219.69	1563.06	7247.59	1563.12
7253.13	1563.4	7266.6	1563.43	7283.43	1562.99	7297.63	1562.55	7305.66	1562.46
7314.94	1562.2	7346.94	1562.47	7371	1562.46	7379.71	1562.57	7387.68	1562.13
7402.73	1561.2	7407.43	1561.03	7413.07	1561.04	7436.53	1561.34	7447.02	1561.35
7470.41	1561.3	7479.49	1561.42	7488.6	1561.32	7504.13	1561.88	7508.75	1561.8
7521.11	1561.2	7539.77	1560.4	7551.18	1560.04	7554.62	1560.11	7571.97	1560.01
7575.04	1560.3	7575.86	1560.38	7601.72	1561.12	7605.75	1561.15	7621.82	1561.44
7625.79	1561.6	7642.46	1561.43	7646.44	1561.4	7665.12	1568.62	7671.4	1568.6
7696.11	1564.3	7710.83	1563.75	7721.3	1563.32	7729.9	1563.08	7744.93	1562.45
7764.43	1561.2	7769.12	1560.76	7789.03	1560.12	7793.39	1560.09	7812.32	1559.85
7827.26	1559.8	7830.3	1559.98	7839.84	1559.15	7858.21	1559.19	7860.85	1559.04
7867.2	1559.1	7886.38	1559.95	7912.54	1560.36	7912.67	1560.37	7935.49	1560.59
7949.09	1560.5	7954.1	1560.5	7958.26	1560.57	7970.55	1560.53	7994.48	1566.17
8012.56	1566.2	8029.71	1560.45	8071.64	1560.25	8088.58	1562.76	8098.6	1560.87
8109.05	1559.7	8118.88	1559.15	8120.58	1559.11	8143.22	1559.05	8143.97	1559.01
8164.9	1559.1	8167.44	1559.02	8192.2	1559.89	8211.79	1555.35	8221.94	1553.17
8223.37	1553	8224.08	1553.02	8245.4	1553.1	8246.21	1553.14	8247.73	1553.21
8270.5	1554.3	8288.83	1555.7	8295.32	1555.89	8307.63	1558.89	8310.76	1560.59
8314.09	1560.8	8320.01	1560.78	8343.41	1560.9	8348.66	1560.92	8376.41	1561.6
8377.18	1561.6	8380.27	1561.66	8404.61	1561.91	8415.47	1562.14	8436.55	1562.05
8438.21	1562.1	8459.8	1562.89	8461.09	1562.91	8481.78	1562.83	8484.82	1563.14
8503.98	1563.6	8505.95	1563.6	8510.97	1563.65	8551.82	1564.36	8557.83	1564.44
8586.71	1564.7	8594.85	1564.82	8610.89	1564.96	8623.24	1565.23	8636.44	1565.45
8642.42	1565.6	8647.67	1565.73	8647.83	1565.74	8677.5	1565.9	8678.77	1565.84
8694.59	1566.2	8703.7	1566.34	8704.47	1566.32	8723.57	1566.43	8726.34	1566.47
8745.24	1566.7	8753.77	1566.79	8772.83	1567.03	8781.01	1567.06	8809.6	1567.28
8825.79	1567.4	8836.1	1567.34	8848.28	1567.13	8856.1	1567.16	8883.37	1567.63
8889.52	1567.8	8894.81	1567.75	8901.15	1567.52	8912.17	1567.35	8927.49	1567.78
8935.05	1567.9	8949.24	1568.22	8956.34	1568.22	8978.6	1568.38	8982.37	1568.66
9012.09	1568.8	9030.23	1568.57	9049.15	1569.91	9055.98	1570.57	9081.9	1571.86
9082.04	1571.7	9083.81	1571.67	9108.37	1571.79	9110.85	1571.71	9118.39	1570.78
9145.4	1570.6	9154.39	1570.31	9164.33	1570.23	9176.86	1569.94	9192.77	1569.7
9206.85	1569.9	9223.5	1569.31	9228.29	1567.96	9232.68	1569.12	9261.09	1569.62
9267.23	1568.2	9277.31	1568.26	9302.75	1568.18	9321.47	1568.1	9332.53	1568.42
9344.78	1571.4	9347.23	1571.97	9353.68	1571.82	9371.2	1568.93	9376.48	1569.14
9390.7	1573	9396.19	1572.67	9425.15	1573.18	9430.62	1573.95	9442.4	1573.93
9455.06	1573.8	9456.43	1573.8	9492.89	1573.78	9492.91	1573.78	9493.13	1573.78
9516.76	1573.8	9535.52	1572.76	9557.48	1573.19	9561.19	1573.14	9575.22	1572.96
9599.89	1572.8	9603.16	1572.75	9609.05	1572.62	9632.08	1573.43	9644.83	1572.95
9675.34	1573.1	9684.59	1573.3	9687.16	1573.46	9695.67	1573.48	9716.26	1573.95
9727.97	1573.9	9734.41	1573.94	9737.25	1573.91	9742.93	1573.85	9779.14	1575.73
9781.05	1575.8	9781.25	1575.72	9782.91	1575.88	9813.37	1568.4	9817.33	1568.12
9822.3	1567.6	9832.96	1568.6	9854.98	1566.21	9855.44	1566.21	9860.61	1566.22
9877.06	1567	9878.67	1567.04	9898.07	1568.33	9911.74	1569.02	9923.22	1569.07
9941.11	1569	9948.16	1569.71	9965.35	1570.68	9977.72	1575.36	9985.5	1575.6
9988.16	1575.6	9994.4	1575.21	10016.91	1569.66	10021.29	1569.54	10040.06	1577.33
10045.4	1577.41	10051.38	1577.28	10065.78	1576.71	10076.98	1576.66	10113.7	1576.53
10138.07	1576.61	10147.19	1576.88	10169.12	1576.78	10170.27	1576.53	10171.93	1575.99
10174.76	1575.21	10188.98	1569.91	10194.75	1569.81	10209.58	1574.97	10220.06	1574.76
10237.94	157	10241.72	1575.21	10244.41	1575.13	10249.36	1575.19	10270.25	1575.77
10299.93	1575.31	10305.03	1575.23	10308.94	1575.16	10309.74	1575.12	10333.08	1574.77
10348.08	1574.41	10348.82	1574.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3625.97	.08	9994.4	.04	510040.06	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9994.4	10040.06	400	1069.12	900	.1	.3

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
3625.97	7300	1560.5	8500	10348.82	1560.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1563.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.080		
W.S. Elev (ft)	1563.75	Reach Len. (ft)	400.00	1069.12	900.00
Crit W.S. (ft)	1561.49	Flow Area (sq ft)	4516.87		
E.G. Slope (ft/ft)	0.003990	Area (sq ft)	4516.87		
Q Total (cfs)	11309.00	Flow (cfs)	11309.00		
Top Width (ft)	1579.16	Top Width (ft)	1579.16		
Vel Total (ft/s)	2.50	Avg. Vel. (ft/s)	2.50		
Max Chl Dpth (ft)	10.75	Hydr. Depth (ft)	2.86		
Conv. Total (cfs)	179027.8	Conv. (cfs)	179027.8		
Length Wtd. (ft)	403.79	Wetted Per. (ft)	1584.94		
Min Ch El (ft)	1569.54	Shear (lb/sq ft)	0.71		
Alpha	1.00	Stream Power (lb/ft s)	1.78		
Frctn Loss (ft)	1.75	Cum Volume (acre-ft)	200.65	5.59	20.96
C & E Loss (ft)	0.01	Cum SA (acres)	154.25	2.24	23.36

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
5218.08	6810.19	253.66	160.83	107.83	2.24	1.51	1.58
6810.19	8402.29	10909.28	4237.66	1362.41	96.47	3.12	2.57
8402.29	9994.40	146.06	118.38	114.71	1.29	1.03	1.23

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.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 2.020

INPUT
Description: RM. 2.020 HYDRAULIC BASELINE CROSSES NEAR APACHE TRAIL.

Station Elevation Data num= 497

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4416.03	1564.7	4419.76	1564.68	4427.4	1564.64	4478.38	1564.37	4487.59	1564.26
4512.93	1564.1	4528.39	1564.09	4531.87	1564.42	4536.52	1564.52	4543.78	1564.77
4551.69	1565.8	4564.13	1566.02	4580.37	1566.02	4581.22	1565.98	4582.47	1565.98

4632.37	1565.3	4651.33	1564.52	4651.47	1564.51	4651.58	1564.51	4651.85	1564.5
4663.64	1564.2	4668.38	1563.98	4675.87	1563.66	4696.32	1564.08	4699.99	1564.17
4707.97	1564	4719.09	1563.86	4725.98	1563.82	4727.53	1563.83	4804.25	1563.5
4824.99	1563.1	4836.57	1563.21	4870.07	1562.71	4873.06	1562.62	4883.14	1561.74
4883.67	1561.7	4883.8	1561.69	4901.53	1562.5	4908.73	1562.63	4940.66	1562.54
4969.42	1562.5	5012.29	1562.15	5022.34	1562.06	5025.97	1562.62	5048.24	1565.68
5054.13	1565.6	5072.06	1565.45	5080.52	1565.42	5101.59	1565.09	5113.22	1564.86
5118.64	1564.3	5127.53	1562.98	5132.7	1562.43	5184.75	1562.05	5206.87	1562
5228.41	1562.1	5236.62	1561.86	5237.16	1561.84	5237.94	1561.88	5242.23	1562.12
5261.11	1563.1	5271.58	1562.89	5293.88	1562.42	5300.62	1562.4	5310.37	1562.45
5319.79	1562.7	5332.69	1562.95	5344.87	1562.7	5366.12	1562.29	5413.64	1561.57
5439.89	1561.1	5456.03	1561.16	5459.38	1561.1	5471.54	1561.15	5483.08	1561.19
5517.43	1561.3	5526.3	1561.41	5569.71	1562.12	5579.31	1562.3	5582.62	1562.34
5593.06	1562.4	5622.23	1562.39	5635.67	1561.27	5642.42	1560.86	5646.08	1560.47
5654.72	1560.3	5659.38	1560.48	5660.17	1560.47	5669.61	1560.46	5712.05	1560.34
5721.16	1559	5725.68	1558.12	5731.78	1559.4	5738.32	1561.07	5752.6	1561.41
5772.83	1561.4	5789.07	1561.01	5808.36	1562.06	5834.45	1563.46	5847.45	1562.8
5852.59	1562.6	5859.1	1562.45	5903.95	1562.01	5934.26	1561.58	5945.12	1561.4
5962.01	1561.3	6008.96	1560.78	6019.74	1561.29	6049.6	1562.7	6052.87	1562.83
6073.49	1563.1	6107.82	1562.85	6145.96	1562.11	6182.97	1561.94	6184.27	1561.93
6185.89	1561.9	6191.97	1561.94	6242.7	1562.22	6263.54	1562.06	6266.24	1562.06
6271.41	1562.2	6287.57	1562	6301.58	1561.95	6307.39	1561.96	6340.53	1562.57
6379.1	1563.5	6409.55	1562.43	6429.48	1561.97	6436.61	1562.11	6481.23	1563.42
6497.46	1563.9	6512.13	1564.17	6512.56	1564.17	6528.06	1561.99	6535.33	1560.93
6555.96	1563.1	6556.71	1563.15	6557.11	1563.15	6597.45	1562.79	6610.75	1562.9
6624.53	1563.1	6628.57	1563.07	6652.13	1563.18	6659.71	1563.21	6666.11	1563.17
6695.65	1563.1	6708.51	1563.14	6728.89	1563.27	6730.52	1563.3	6751.65	1563.51
6767.88	1563.7	6802.96	1563.97	6804.89	1563.99	6840.18	1563.18	6853.92	1562.91
6891.71	1563.2	6897.73	1563.14	6901.62	1563.22	6904.2	1563.3	6904.99	1563.31
6906.68	1563.3	6911.08	1563.3	6934.2	1563.38	6939.88	1562.65	6960.12	1562.41
6967.4	1563.5	6997.8	1563.83	7003.54	1563.81	7006.74	1563.8	7036.76	1563.73
7042.45	1563.8	7068.93	1563.64	7085.04	1563.62	7090.07	1563.49	7098.84	1563.46
7119.04	1563.5	7132.08	1563.42	7142.8	1563.31	7155.49	1563.26	7177.52	1562.82
7183.47	1562.8	7205.68	1562.13	7212.72	1562.1	7224.16	1561.79	7231.82	1561.72
7261.2	1562	7281.11	1561.75	7288.92	1561.68	7305.12	1561.46	7320.57	1561.01
7324.32	1561	7328.21	1560.96	7344.46	1561.01	7349.29	1561.25	7373.9	1560.66
7381.67	1560.4	7401.74	1560.3	7408.27	1560.93	7417.42	1562.23	7440.46	1563.42
7441.68	1563.5	7443.91	1563.56	7448.94	1562.55	7458.24	1560.82	7465.48	1560.68
7484.34	1560.2	7538.29	1559.36	7563.41	1559.19	7617.81	1559.01	7634.77	1559.28
7638.55	1559.3	7650.23	1559.32	7661.22	1559.38	7675.85	1558.7	7694.35	1558.73
7711.09	1559.3	7731.88	1559.29	7734.08	1559.41	7739.34	1559.26	7762.81	1559.34
7767.51	1559.4	7781.64	1558.92	7789.61	1558.78	7793.19	1558.86	7794.39	1558.87
7803.71	1559.1	7827.63	1559.93	7839.51	1560.25	7846.92	1562.16	7850.54	1562.76
7865.35	1557	7867.04	1556.07	7872.06	1556.06	7914.63	1555.73	7915.76	1556.27
7925.26	1560.7	7926.95	1561.49	7943.88	1561.77	7948.8	1561.8	7974.14	1561.98
8002.17	1561.6	8011.3	1561.76	8025.62	1561.5	8029.53	1561.45	8033.6	1561.3
8042.88	1559.7	8069.25	1559.5	8071.56	1559.38	8074.05	1559.28	8081.25	1559.46
8087.89	1559.5	8090.8	1559.69	8091.04	1559.69	8091.32	1559.69	8112.61	1558.85
8122.6	1558.9	8136.87	1558.57	8145.51	1558.62	8166.35	1558.19	8169.19	1558.2
8173.24	1558.2	8183.14	1558.6	8189.88	1558.69	8198.4	1558.08	8209.99	1557.9
8228.93	1558.2	8232.41	1558.24	8235.05	1558.27	8247.7	1558.3	8253.43	1558.32
8254.23	1558.3	8272.17	1558.61	8273.58	1558.61	8277.31	1558.62	8298.11	1559.09
8314.21	1558.7	8329.54	1558.99	8340.69	1559.07	8349.78	1558.95	8359.56	1559.16
8369.87	1559.2	8403.57	1560.53	8415.35	1560.89	8420.7	1560.84	8436.23	1560.04
8442.36	1560	8448.83	1559.65	8458.26	1559.53	8466.34	1559.28	8514.84	1558.96
8527.37	1558.9	8540.77	1558.71	8557.29	1559.36	8574.95	1559.38	8587.84	1558.67
8614.95	1558.7	8619.29	1558.74	8624.34	1558.93	8630.51	1559.22	8642.77	1559.81

8645.14	1559.9	8660.68	1559.87	8668.92	1559.97	8677.86	1560.06	8735.41	1560.04
8744.07	1560	8754.97	1559.91	8766.22	1559.88	8807.9	1560.03	8815.29	1559.85
8826.38	1560.2	8835.26	1559.72	8841.77	1559.79	8850.74	1559.8	8854.03	1559.71
8868.57	1559.2	8878.75	1558.8	8881.32	1558.69	8888.14	1558.7	8902	1558.43
8909.5	1558.4	8918.97	1558.25	8921.82	1558.15	8923.1	1558.21	8931.77	1558.27
8937.66	1558.4	8943.98	1558.22	8952.65	1558.27	8965.17	1558.31	9004.26	1558.85
9008.41	1558.9	9008.86	1558.91	9009.3	1558.92	9009.77	1558.92	9010.52	1558.94
9065.04	1560.1	9069.96	1560.21	9075.38	1560.4	9084.27	1560.68	9104.21	1560.86
9108.4	1561	9114.67	1561.02	9150.47	1561.6	9160.82	1561.77	9163.69	1561.82
9189.84	1562	9234.74	1562.22	9240.3	1562.26	9245.64	1562.3	9249.02	1562.33
9252.21	1562.3	9270.21	1562.41	9272.06	1562.42	9294.74	1562.42	9301.9	1562.42
9329.43	1562.2	9359.25	1562.15	9372.12	1562.02	9385.27	1562.13	9396.02	1561.86
9408.48	1561.7	9416.71	1561.88	9433.04	1562.35	9442.2	1562.61	9473.44	1562.78
9497.73	1562.7	9501.59	1562.65	9505.34	1562.62	9534.3	1562.51	9561.11	1562.48
9563.95	1562.5	9568.6	1562.56	9577.56	1562.61	9592.98	1562.7	9612.57	1562.83
9624.12	1562.9	9635.21	1563.11	9641.9	1562.91	9648.37	1562.67	9657.52	1562.24
9666.44	1562.1	9669.93	1562.4	9685.73	1563.15	9701.34	1563.26	9730.48	1563.46
9730.6	1563.5	9730.67	1563.46	9730.99	1563.45	9752.33	1563.06	9753.78	1563.1
9771.17	1563.5	9788.67	1563.43	9809.78	1563.5	9822.43	1563.36	9829.57	1563.55
9831.42	1563.6	9863.72	1564.07	9895.44	1564.38	9904.13	1564.49	9912.86	1564.43
9929.31	1564.5	9959.35	1564.47	9980.27	1563.98	9996.46	1563.04	10000.98	1561.55
10007.24	1559.3	10024.99	1563.71	10025.45	1563.83	10026.29	1563.81	10053.97	1562.81
10060.39	1562.8	10062.63	1562.67	10107.32	1563.11	10122.28	1563.78	10129.23	1564
10143.42	1564.5	10146.04	1564.48	10153.09	1564.38	10170.67	1563.48	10177.98	1563.64
10188.63	1563.7	10193.55	1563.71	10204.41	1563.92	10215.68	1563.34	10216.65	1563.32
10224.76	1563.4	10242.98	1563.41	10264.07	1563.69	10268.96	1563.54	10280.26	1563.55
10293.39	156	10309.12	1564.23	10310.9	1564.24	10328.53	1564.49	10346.01	1564.32
10349.7	1564.3	10352.72	1564.06	10374.27	156	10376.77	1563.03	10380.57	1563.1
10392	1563.4	10401.67	1563.77	10410.54	1563.21	10410.89	1563.19	10418.5	1563.35
10442.7	1563.9	10443.45	1563.92	10445.29	1563.89	10454.58	1563.81	10457.78	1563.98
10471.52	1564.1	10482.78	1564.13	10485.83	1564.12	10494.29	1564.27	10513.91	1564.39
10528.86	1564.3	10540.81	1563.98	10574.84	1563.98	10590.15	1563.88	10601.09	1564.11
10624.42	1564.3	10634.43	1564.29	10654.42	1564.31	10665.38	1564.29	10669.94	1564.22
10681.93	1564.3	10687.01	1564.31	10690.85	1564.36	10699.96	1564.8	10711.65	1565.21
10749.2	1565.2	10755.36	1565.12	10767.07	1565.12	10801.02	1563.16	10805.77	1562.82
10826.67	1564.2	10843.54	1564.93	10845.62	1564.98	10846.3	1564.95	10848.87	1564.9
10853.38	1564.8	10895.48	1564.26	10907.08	1562.7	10913.98	1560.32	10925.13	1559.71
10936.63	1560.9	10949.32	1563.17	10973.86	1565.98	10974.35	1566.03	10974.9	1565.96
10986.28	1564.5	10995.21	1564.43	11007.73	1565.32	11020.06	1566.17	11021.46	1566.33
11026.1	1566.2	11026.78	1566.19						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4416.03	.08	9929.31	.045	10025.45	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9929.31	10025.45	500	646.55	500	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev
8100	8400	1560

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1562.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1562.01	Reach Len. (ft)	500.00	646.55	500.00

Crit W.S. (ft)	1560.32	Flow Area (sq ft)	5000.52	25.09	49.56
E.G. Slope (ft/ft)	0.004721	Area (sq ft)	5000.52	25.09	49.56
Q Total (cfs)	11309.00	Flow (cfs)	11160.48	67.60	80.92
Top Width (ft)	2622.56	Top Width (ft)	2570.19	18.59	33.79
Vel Total (ft/s)	2.23	Avg. Vel. (ft/s)	2.23	2.69	1.63
Max Chl Dpth (ft)	6.28	Hydr. Depth (ft)	1.95	1.35	1.47
Conv. Total (cfs)	164596.5	Conv. (cfs)	162434.9	983.9	1177.7
Length Wtd. (ft)	501.36	Wetted Per. (ft)	2574.52	19.39	34.25
Min Ch El (ft)	1559.30	Shear (lb/sq ft)	0.57	0.38	0.43
Alpha	1.00	Stream Power (lb/ft s)	1.28	1.03	0.70
Frctn Loss (ft)	3.74	Cum Volume (acre-ft)	156.95	5.29	20.44
C & E Loss (ft)	0.00	Cum SA (acres)	135.20	2.01	23.02

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4416.03	5794.35	420.64	338.16	375.94	3.72	0.90	1.24
5794.35	7172.67	80.24	102.63	228.95	0.71	0.45	0.78
7172.67	8550.99	7314.70	3078.50	1296.39	64.68	2.38	2.38
8550.99	9929.31	3344.89	1481.24	673.24	29.58	2.20	2.26
LB 9929.31	RB 10025.45	67.60	25.09	19.39	0.60	1.35	2.69
10025.45	11026.78	80.92	49.56	34.25	0.72	1.47	1.63

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.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: SIGNAL BUTTE
REACH: SPILLWAY RS: 1.898

INPUT
Description: RM .1.898

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4844.98	1559.8	4853.05	1559.81	4868.58	1559.9	4871.63	1559.82	4881.93	1559.91
4891.47	1559.9	4913.16	1559.71	4938.3	1559.77	4951.15	1559.75	4955.54	1559.77
4962.12	1559.7	4963.86	1559.52	4969.01	1559.4	4991.64	1558.63	4997.02	1558.74
5003.56	1558.9	5009.1	1558.94	5020.05	1558.87	5024.48	1558.95	5028.6	1559
5041.07	1559	5048.47	1559.11	5077.56	1558.92	5079.15	1558.91	5086.68	1558.82
5094.78	1558.9	5096.83	1558.9	5114.98	1559.32	5130.87	1559.51	5140.39	1559.62
5157.29	1559.7	5162.12	1559.66	5190.51	1559.89	5191.99	1559.88	5193.84	1559.88
5206.76	1559.9	5208.91	1559.89	5232.07	1559.77	5262.76	1559.99	5264.07	1560

5271.31	1560.1	5273.65	1560.07	5280.87	1560.06	5292.09	1559.92	5295.51	1559.85
5302.67	1559.5	5304.33	1559.54	5311.57	1559.38	5318.04	1559.22	5325.47	1558.97
5342.29	1558.4	5353.02	1558.42	5404.06	1557.89	5415.79	1555.21	5422.97	1553.45
5425.95	1553.4	5433.08	1553.52	5455.19	1557.8	5455.35	1557.83	5455.6	1557.82
5472.63	1557.6	5478.73	1557.38	5482.9	1557.65	5492.59	1557.98	5496.46	1557.97
5533.95	1557.9	5535.27	1557.82	5535.84	1557.8	5545.03	1557.23	5548.42	1557.04
5548.72	1557	5550.05	1557.05	5553.38	1557.14	5572.82	1557.62	5578.03	1557.51
5582.61	1557.4	5596.96	1557	5611.01	1556.89	5611.15	1556.9	5626.23	1557.21
5629.93	1557.2	5630.92	1557.24	5664.04	1557.3	5675.75	1557.4	5685.06	1557.43
5691.57	1557.5	5700.46	1557.57	5755.17	1556.61	5756.4	1556.59	5756.64	1556.59
5764.6	1556.7	5806.21	1556.79	5824.09	1556.79	5827.56	1556.77	5832.65	1556.81
5901.84	1557.2	5924.44	1557.32	5952.42	1557.07	5972.72	1556.94	6003.79	1556.69
6062.2	1556.3	6079.37	1556.31	6080.31	1556.2	6089.66	1555.38	6091.83	1555.56
6095.41	1555.8	6100.93	1556.1	6102.61	1556.16	6106.62	1556.3	6108.59	1556.26
6113.93	1556.2	6186.62	1556.49	6187.15	1556.49	6187.32	1556.49	6187.34	1556.49
6187.38	1556.5	6187.67	1556.49	6235.88	1556.87	6235.89	1556.87	6235.95	1556.87
6236.3	1556.9	6250.68	1556.99	6255.64	1557.08	6270.87	1557.31	6290.18	1557.62
6303.45	1557.9	6316.34	1558.1	6327.48	1557.86	6351.01	1557.43	6370.91	1557.43
6381.94	1557.5	6395.91	1557.45	6429.42	1557.37	6475.23	1557.09	6542.35	1556.92
6547.1	1556.8	6547.98	1556.79	6552.93	1556.35	6565.86	1557	6590.71	1558.63
6601.18	1558.7	6604.87	1558.74	6610.52	1558.87	6618.52	1558.96	6627.93	1558.88
6637.74	1559	6644.15	1558.97	6649.1	1558.96	6664.8	1559.06	6670.33	1559.07
6674.5	1559	6678.69	1558.91	6701.21	1558.98	6715.08	1559.11	6735.16	1558.31
6780.65	1557	6794.4	1557.15	6814.09	1557.35	6829.13	1557.55	6850.77	1557.63
6869.08	1557.2	6881.15	1557.26	6888.35	1555.59	6890.31	1555.03	6893.6	1555.54
6902.7	1557.6	6908.77	1557.74	6927.7	1557.79	6940.28	1557.8	6941.88	1557.79
6942.79	1557.8	6947.6	1557.77	6965.31	1557.74	6979.95	1557.66	6985.96	1557.93
7009.46	1559.3	7026.72	1559.45	7050.52	1559.67	7074.47	1558.94	7075.42	1558.91
7076.77	1558.9	7155.78	1558.62	7194.82	1558.61	7252.02	1558.78	7278.03	1558.7
7282.61	1558.7	7314.16	1558.35	7322.41	1558.47	7351.68	1558.93	7376.25	1559.23
7389.08	1559.3	7394.16	1559.4	7410.62	1559.41	7429.48	1559.36	7518.97	1558.88
7537.55	1558.5	7581.35	1558.13	7590.84	1558.12	7603.09	1558.45	7619.65	1558.89
7621.43	1558.8	7640.02	1558.62	7709.83	1558.39	7754.63	1557.33	7766.02	1557.5
7788.58	1558.1	7799.39	1558.29	7810.49	1558.46	7821.18	1558.67	7836.86	1558.93
7850.69	1558.7	7872.21	1558.14	7882.24	1558.39	7889.02	1558.64	7893.49	1558.73
7900.96	1558.9	7921.43	1559.08	7983.31	1558.81	8007.16	1558.22	8046.86	1557.43
8052.88	1557.3	8056.28	1557.27	8061.51	1557.18	8082.85	1556.87	8091.25	1556.99
8097.87	1556.9	8108.52	1556.9	8121.9	1556.95	8122.86	1556.94	8131.17	1557.01
8153.49	1557.4	8161.24	1557.43	8168.99	1557.6	8178	1557.68	8183	1557.48
8184.12	1557.5	8188.5	1557.61	8197.29	1557.95	8224.71	1558.27	8230.22	1558.34
8233.72	1558.4	8242.54	1558.59	8248.34	1558.7	8250.42	1558.72	8268.4	1556.67
8279.25	1555.3	8290.14	1556.58	8296.86	1557.25	8301.63	1557.79	8304.49	1558.05
8304.9	1558.1	8310.74	1557.84	8317.04	1557.53	8331.71	1555.83	8332.25	1555.77
8332.65	1555.8	8332.73	1555.77	8346.53	1555.78	8352.87	1555.73	8364.66	1555.87
8372.54	1556.2	8378.85	1556.57	8383.16	1556.74	8387.58	1556.8	8389.29	1556.77
8469	1556.7	8487.25	1556.69	8487.82	1556.68	8488.53	1556.69	8489.03	1556.69
8491.63	1556.7	8492.99	1556.72	8496.61	1556.75	8537.09	1556.99	8553.04	1557.01
8594.81	1557	8611.6	1557.04	8615.64	1557.03	8616.47	1557	8637.31	1556.32
8643.02	1556.2	8648.72	1556.36	8653.43	1556.44	8670.97	1556.87	8685.36	1557.16
8694.59	1557.4	8697.67	1557.38	8710.11	1557.56	8712.43	1557.59	8712.78	1557.59
8713.22	1557.6	8728.75	1557.27	8740.77	1556.98	8746.59	1556.82	8807.12	1556.85
8828.69	1556.9	8841.88	1556.98	8843.52	1556.96	8845.46	1556.98	8861.98	1556.9
8867.01	1556.8	8880.73	1556.71	8964.21	1556.74	8973.01	1556.71	8986.68	1556.85
9002.33	1556.9	9070.12	1557.07	9084.44	1557.12	9088.58	1557.05	9117.8	1556.76
9126.36	1556.8	9128.85	1556.76	9189.62	1556.57	9201.39	1556.56	9212.14	1556.54
9244.68	1556.4	9249.74	1556.39	9254.13	1556.68	9257.22	1556.57	9279.41	1557.1
9283.38	1557.3	9288.05	1557.29	9358.31	1556.89	9373.35	1556.94	9393.24	1556.84

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 9408.78  1556.9  9416.7  1556.6 9424.72 1556.37 9433.76 1556.74  9449.8 1557.55
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 9509.45    1557 9509.55    1557 9512.28 1557.16 9524.08 1557.87 9524.76 1557.91
  9546.3  1558.1 9546.44 1558.12 9546.54 1558.11 9555.93 1557.66 9563.55 1557.38
 9572.27  1557.3 9623.15  1557.5 9637.31 1557.56 9638.63  1557.6 9641.41    1558
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 9737.15  1556.3 9743.25 1556.33 9747.19 1556.85 9747.78 1556.98 9747.97    1557
 9754.68    1558 9757.07 1558.41 9763.64  1557.8 9771.54 1556.85  9773.2 1556.95
 9780.27  1557.3 9787.74 1557.04 9795.71  1557.3 9808.82 1557.19 9811.22 1556.74
 9813.54  1556.3 9816.68 1557.08 9817.76 1557.38 9819.29 1557.39 9822.38 1557.35
 9832.27  1557.3 9837.66 1557.28 9892.77 1557.69 9897.49 1557.72 9898.65 1557.74
 9902.47  1557.8 9904.66 1557.81 9936.19  1558.1 9952.79 1558.17 9964.49    1558
 9972.28  1558.3 9979.87 1558.71  9985.7 1559.84 9987.91 1560.24 9990.07 1559.03
 9997.02  1554.610004.22 1557.5610010.42 1559.9410014.83  1559.310018.94 1558.29
10019.99  1558.310025.38 1558.2510036.63 1558.5810061.93 1558.7110070.51 1558.78
10074.17  1558.810088.42 1558.8510092.56 1558.6610102.88 1558.4610128.47 1558.45
10143.52  1558.210176.79 1557.9810187.07 1557.9210200.87 1557.8410206.79 1557.84
10213.49  1557.810227.79 1557.8610271.11 1557.8310310.06 1557.7310335.02 1557.73
10340.76  1557.710347.95 1557.6810372.98  1557.710386.46 1557.7810410.78 1557.53
10427.24  1557.310432.13 1557.3810440.66 1557.3710493.46 1557.43 10511.5 1557.36
10543.31  1557.410547.37 1557.38 10555.4 1557.3510571.86 1557.4810620.33 1557.82
10657.56  1557.410657.63 1557.3610659.03 1557.3710677.45  1557.5 10679.4 1557.45
10681.43  1557.510683.51 1557.4610692.04 1557.2910692.41 1557.2910695.79 1557.15
10707.26  1556.710720.37 1555.88 10724.2 1555.9510736.26 1556.6810743.48  1556.8
10750.94  1556.9 10775.5 1556.9310803.56 1556.92 10816.6 1556.8910824.65 1557.01
10847.39  1557.110850.05 1557.1310860.07  1557.210867.95 1557.28 10882.2  1557.3
10895.02  1557.410933.86 1557.6810951.76 1557.5610956.47  1557.610967.75 1557.97
11020.59  1557.811026.16 1557.7311034.85  1557.8 11038.2 1558.06 11047.5 1558.96
11061.66  1555.311062.57 1555.0711075.53 1558.4311078.83  1559.111091.75 1558.57
11097.54  1558.711104.24 1558.67 11126.2 1558.8511155.34 1558.8511158.16 1558.99
11177.58  1559.211179.15 1559.2411180.68 1559.23 11196.3  1559.811203.96 1560.04
11214.06    156011216.87 1560.01

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
 4844.98     .08 9987.91    .04510010.42     .08

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
       9987.9110010.42               500  542.03     500              .1        .3

CROSS SECTION OUTPUT     Profile #PF 1

  E.G. Elev (ft)            1558.35   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.09   Wt. n-Val.                0.080      0.045      0.080
  W.S. Elev (ft)            1558.26   Reach Len. (ft)          500.00     542.03     500.00
  Crit W.S. (ft)                      Flow Area (sq ft)       4036.26      26.83     728.65
  E.G. Slope (ft/ft)        0.013506  Area (sq ft)            4036.26      26.83     728.65
  Q Total (cfs)            11309.00   Flow (cfs)              9808.24     142.14    1358.62
  Top Width (ft)            4466.49   Top Width (ft)          3525.42      14.76     926.31
  Vel Total (ft/s)             2.36   Avg. Vel. (ft/s)           2.43       5.30       1.86
  Max Chl Dpth (ft)            4.86   Hydr. Depth (ft)           1.14       1.82       0.79
  Conv. Total (cfs)        97311.0    Conv. (cfs)             84397.4     1223.1   11690.6
  Length Wtd. (ft)          503.20    Wetted Per. (ft)        3528.51      16.54     927.24
  Min Ch El (ft)            1554.60   Shear (lb/sq ft)           0.96       1.37       0.66
  Alpha                        1.06   Stream Power (lb/ft s)     2.34       7.24       1.24
```

Frctn Loss (ft)	5.02	Cum Volume (acre-ft)	105.09	4.90	15.98
C & E Loss (ft)	0.00	Cum SA (acres)	100.22	1.77	17.51

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.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4844.98	6130.71	2641.27	998.16	763.31	23.36	1.31	2.65
6130.71	7416.45	1601.80	718.17	709.72	14.16	1.01	2.23
7416.45	8702.18	2166.41	897.69	788.18	19.16	1.14	2.41
8702.18	9987.91	3398.76	1422.24	1267.30	30.05	1.12	2.39
LB 9987.91	RB 10010.42	142.14	26.83	16.54	1.26	1.82	5.30
10010.42	11216.87	1358.62	728.65	927.24	12.01	0.79	1.86

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.

CROSS SECTION ***RIVER: SIGNAL BUTTE***
REACH: SPILLWAY **RS: 1.795**

INPUT
Description: RM 1.795

Station Elevation Data num= 462

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4479.61	1554.9	4490.24	1554.7	4504.08	1554.4	4507.84	1554.34	4512.4	1554.43
4513.34	1554.4	4515.48	1553.5	4517.78	1552.75	4520.22	1552.48	4543.75	1552.66
4634.43	1552.9	4659.27	1552.87	4697.2	1552.73	4729.91	1553.03	4737.15	1552.99
4756.53	1553	4774.75	1552.85	4804.97	1552.78	4831.66	1553.12	4860.29	1553.5
4862.16	1553.5	4873.86	1553.63	4875.9	1553.64	4878.62	1553.68	4979.06	1553.93
4979.53	1553.9	4993.96	1552.74	4995.4	1552.68	4997.3	1552.66	5020.17	1552.32
5022.7	1552.2	5030.04	1550.89	5032.64	1550.45	5035.63	1550.65	5047.99	1551.46
5050.71	1551.9	5058.83	1552.76	5090.69	1552.26	5094.38	1552.22	5096.24	1552.28
5110.14	1552.7	5190.37	1553.01	5197.59	1553.05	5199.79	1553.05	5209.36	1552.94
5235.19	1552.7	5242.61	1552.71	5251.58	1552.75	5266.84	1552.79	5275.91	1552.79
5277.07	1552.8	5278.66	1552.84	5295	1552.7	5316.69	1552.51	5321.18	1552.44
5329.96	1552.3	5335.31	1552.34	5339.59	1552.25	5358.89	1552.34	5359.2	1552.34
5359.6	1552.3	5375.38	1552.52	5376.68	1552.46	5383.3	1552.41	5458.14	1551.5
5460.89	1551.5	5461.12	1551.46	5494.91	1551.46	5496.42	1551.46	5498.68	1551.41
5516.05	1551.1	5521.4	1551.19	5523.27	1551.25	5547.93	1551.77	5550.6	1551.8
5559.37	1551.9	5581.63	1552.29	5585.07	1552.37	5588.92	1552.48	5589.41	1552.42
5623.19	1552.1	5634.52	1552.12	5653.74	1552.13	5695.13	1551.88	5733.25	1551.64
5742.79	1551.6	5748.32	1551.55	5754.55	1551.22	5763.35	1550.99	5767.09	1551.1
5776.05	1551.3	5809.89	1551.17	5843.64	1551.17	5853.8	1550.84	5856.79	1550.71
5859.96	1550.9	5866.17	1551.07	5867.65	1551.18	5917.29	1551.57	5969.13	1550.85
5975.97	1550.7	6007.22	1551.15	6025.13	1551.12	6061.93	1551.57	6093.71	1552
6094.9	1552	6117.03	1552.04	6118.3	1552.04	6119.12	1551.99	6130.63	1551.23
6136.64	1551.4	6137.83	1551.46	6185.14	1551.46	6221.62	1551.53	6247.81	1551.5
6258.64	1551.5	6272.7	1551.86	6277.52	1551.94	6327.98	1552.24	6364.64	1552.18
6367.66	1552.2	6376.73	1552.19	6383.7	1552.02	6411.2	1551.12	6435.07	1549.89
6440.32	1549.2	6442.98	1548.67	6450.65	1550.13	6454.45	1551.15	6456.31	1551.2

6460.19	1551.3	6465.81	1551.16	6527.07	1551.32	6587.91	1551.54	6602.17	1551.7
6605.56	1551.7	6609.39	1551.71	6613.07	1551.71	6616.71	1551.74	6625.69	1551.84
6635.77	1552	6684.81	1552.33	6706.87	1552.75	6711.56	1552.81	6715.18	1552.72
6726.77	1552.4	6731.82	1552.36	6746.66	1552.14	6760.75	1552	6770.7	1552.17
6779.06	1552.4	6799.63	1552.84	6809.69	1553.06	6816.58	1553.28	6821.5	1553.31
6826.86	1553.3	6858.75	1553.48	6860.53	1553.51	6873.25	1553.61	6877.61	1553.64
6877.88	1553.6	6880.77	1553.64	6920.15	1553.64	6927	1553.06	6940.52	1552.3
6951.43	1552.6	6957.59	1552.84	6962.6	1552.95	6975.12	1553.27	6988.35	1553.33
7041.64	1554.3	7076.26	1553.41	7137.42	1552.76	7152.24	1553.08	7185.55	1552.93
7190.14	1552.4	7192.56	1552.5	7204.25	1552.76	7212.26	1552.95	7220.69	1553.14
7238.39	1552.2	7249.97	1551.53	7253.26	1551.63	7285.13	1552.84	7311.59	1551.79
7313.08	1551.7	7320.46	1551.73	7333.89	1551.87	7354.18	1552.39	7370.89	1550.96
7373.64	1550.5	7384.09	1549.45	7389.61	1549.01	7395.6	1549.05	7405.97	1547.63
7409.74	1547.9	7412.54	1548.26	7424.63	1549.52	7435.97	1550.26	7443.35	1551.31
7448.91	1551.8	7457.79	1553.04	7457.85	1553.05	7457.98	1553.06	7480.59	1553.04
7483.72	1553.1	7489.86	1553.06	7514.19	1553.06	7519.69	1552.99	7525.13	1553.04
7556.53	1552.7	7561.85	1552.74	7575.11	1552.54	7583.81	1554.64	7594.76	1557.43
7595.53	1557.4	7596.01	1557.43	7618.37	1557.31	7624.85	1557.25	7649.55	1556.5
7652.81	1555.5	7654.5	1554.73	7661.2	1552.33	7669.22	1552.3	7676.78	1552.35
7678.81	1552.7	7752.25	1553.4	7789.27	1553.67	7807.08	1553.19	7812.73	1553.12
7834.61	1552.9	7917.1	1552.36	7925.67	1552.36	7944.35	1551.98	7948.8	1551.83
7956.08	1552.1	7976.57	1551.59	8003.78	1552.53	8005.67	1552.59	8023.45	1552.08
8053.01	1552	8077.13	1552.32	8097.86	1552.52	8163.97	1552.95	8170.6	1553
8175.1	1553	8179.33	1553.07	8181.26	1553.08	8187.47	1553.1	8196.69	1553.11
8215.03	1553.1	8221.65	1552.49	8226.58	1552.07	8245.33	1550.31	8249.1	1549.85
8253.83	1550.6	8265.83	1552.37	8272.65	1553.01	8276.08	1553.25	8278.92	1553.58
8319.69	1553.5	8323.86	1553.45	8361.76	1553.07	8377.2	1552.28	8383.06	1551.97
8387.66	1551.8	8405.09	1552.19	8422.56	1552.48	8429.85	1552.46	8464.18	1551.95
8469.75	1551.9	8478.91	1551.59	8480.35	1551.6	8491.77	1549.9	8502.42	1552.48
8502.49	1552.5	8502.61	1552.53	8502.86	1552.54	8535.84	1553.08	8540.37	1552.98
8545.84	1552.8	8558.77	1552.57	8563.13	1552.52	8576.11	1552.32	8591.32	1551.95
8593.59	1551.9	8614.49	1551.75	8620.72	1551.7	8647.39	1551.9	8683.93	1552.09
8721.45	1552.6	8743.21	1552.45	8744.73	1552.46	8754.17	1552.58	8779.28	1552.6
8796.69	1552.9	8798.21	1552.67	8800.12	1552.76	8827.58	1552.87	8845.06	1552.78
8854.24	1552.8	8859.81	1552.81	8870.45	1552.88	8871.86	1552.89	8881.66	1552.88
8895.54	1552.9	8907.8	1552.98	8912.7	1552.98	8928.05	1552.91	8964.12	1552.74
8967.68	1552.8	8980.32	1552.6	9003.03	1552.33	9062.99	1552.64	9070.67	1552.66
9092.94	1552.4	9097.57	1552.39	9105.4	1552.23	9182.14	1552.98	9215.62	1552.7
9218.96	1552.7	9219.03	1552.67	9220.53	1552.62	9221.79	1552.92	9229.5	1552.48
9242.38	1552	9243.74	1552.03	9251.99	1552.16	9255.93	1552.34	9269.01	1551.78
9282.98	1552.1	9309.37	1552.57	9354.31	1552.6	9369.07	1552.6	9371.36	1552.59
9371.95	1552.6	9372.09	1552.63	9372.31	1552.64	9381.59	1553.26	9382.36	1553.32
9382.71	1553.3	9408.78	1553.12	9453.55	1552.79	9453.86	1552.79	9453.97	1552.79
9454.24	1552.8	9454.33	1552.79	9454.51	1552.79	9497.73	1552.94	9504.4	1552.86
9511.24	1552.8	9523.22	1552.64	9531.17	1552.36	9534.36	1552.32	9542.42	1552.26
9548.86	1552.3	9559.22	1552.36	9604.67	1552.53	9608.22	1552.49	9610.88	1552.44
9616.24	1552.5	9672.02	1552.61	9740.74	1552.89	9743.34	1552.9	9743.68	1552.9
9744.79	1552.9	9748.1	1552.91	9751.1	1552.89	9798.59	1552.84	9809.71	1552.81
9811.35	1552.8	9827.51	1549.2	9839.04	1552.72	9860.3	1552.28	9860.43	1552.28
9860.72	1552.3	9878.33	1551.04	9901.96	1549.82	9903.07	1549.83	9904.21	1549.81
9949.44	1549.3	9949.94	1549.35	9953.19	1549.38	9959.43	1549.6	9963.65	1549.68
9965.01	1549.7	9969.76	1549.46	9975.67	1549.68	9982.47	1549.78	9993.78	1548.11
9994.14	1548	9994.71	1547.95	10008.91	1548	10017.95	1547.95	10031	1551.4
10032.14	1551.7	10032.97	1551.73	10046.02	1552.33	10054.72	1552.73	10055.41	1552.77
10055.86	1552.8	10081.86	1553.02	10085.42	1552.97	10095.92	1553.02	10100.05	1552.83
10148	1552.2	10154.08	1552.48	10162.8	1552.41	10169.12	1552.36	10178	1552.38
10242.45	1551.7	10251.24	1551.47	10258.07	1552.33	10260.59	1552.29	10262.79	1552.25

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10375.41  1551.510391.54 1551.5310400.87 1551.5410414.69  1551.510426.77 1551.52
10427.31  1551.5   10498 1551.9310509.46    155210525.11 1552.0510529.17 1552.08
10536.67  1552.110545.41  1552.210576.09 1552.3310579.01 1552.3410579.88 1552.37
10593.22  1552.710622.25 1552.8710640.67 1553.0310675.77  1553.310679.22 1553.25
10690.67    155310697.05 1552.9710700.39 1552.7410701.39 1552.5510708.06 1550.57
 10720.3  1553.610721.45 1553.7910739.12 1553.3410754.13 1553.2110766.23 1553.36
10788.15  1553.710806.66 1553.5110832.15 1553.1810857.38 1553.1710863.99 1553.13
10867.04  1553.710870.11 1554.3310878.55 1554.4110879.99 1554.4110891.72 1554.38
10898.73  1554.410905.95 1554.5710911.12 1554.5510919.02 1554.4610935.67  1554.6
10978.87 1554.9111004.65 1555.03

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 4479.61     .08 9982.47    .04510054.72     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       9982.4710054.72               520  524.67     500              .1       .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)            1553.33   Element                  Left OB    Channel   Right OB
  Vel Head (ft)                0.13   Wt. n-Val.                0.080      0.045      0.080
  W.S. Elev (ft)            1553.20   Reach Len. (ft)          520.00     524.67     500.00
  Crit W.S. (ft)                      Flow Area (sq ft)       4964.23     244.46     655.44
  E.G. Slope (ft/ft)       0.007629   Area (sq ft)            4964.23     244.46     655.44
  Q Total (cfs)            11309.00   Flow (cfs)              8655.42    1579.58    1074.00
  Top Width (ft)            5583.74   Top Width (ft)          4833.01      72.25     678.48
  Vel Total (ft/s)             1.93   Avg. Vel. (ft/s)           1.74       6.46       1.64
  Max Chl Dpth (ft)            5.57   Hydr. Depth (ft)           1.03       3.38       0.97
  Conv. Total (cfs)        129476.4   Conv. (cfs)            99095.6   18084.6    12296.2
  Length Wtd. (ft)           518.45   Wetted Per. (ft)        4837.15      72.90     679.22
  Min Ch El (ft)            1547.95   Shear (lb/sq ft)           0.49       1.60       0.46
  Alpha                        2.26   Stream Power (lb/ft s)     0.85      10.32       0.75
  Frctn Loss (ft)              4.71   Cum Volume (acre-ft)      53.43       3.21       8.03
  C & E Loss (ft)              0.00   Cum SA (acres)            52.25       1.23       8.30

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.

FLOW DISTRIBUTION OUTPUT    Profile #PF 1

  Left Sta      Right Sta        Flow       Area       W.P.     % Conv.   Hydr D.   Velocity
  (ft)          (ft)             (cfs)    (sq ft)      (ft)                (ft)      (ft/s)
  4479.61       5855.32        1712.38    1084.03    1188.67     15.14      0.91       1.58
  5855.32       7231.04        3254.45    1567.73    1141.09     28.78      1.37       2.08
  7231.04       8606.75        1883.18    1131.52    1147.29     16.65      0.99       1.66
  8606.75       9982.47        1805.40    1180.94    1360.10     15.96      0.87       1.53
  LB 9982.47    RB 10054.72    1579.58     244.46      72.90     13.97      3.38       6.46
  10054.72      11004.65       1074.00     655.44     679.22      9.50      0.97       1.64

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.
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CROSS SECTION **RIVER: SIGNAL BUTTE**
REACH: SPILLWAY **RS: 1.696**

INPUT
Description: RM 1.696 . DOWNSTREAM END OF STUDY. SECTION I.D.NO.'S ARE IN RIVER MILES ALONG HYDRAULIC BASELINE WITH R.M. 5.00 ASSUMED AT UPSTREAM END OF PROJECT AT SPILLWAY. CROSS-SECTIONS ARE CODED FROM LT. TO RT., LOOKING DOWNSTREAM WITH STA. 10,000 AT THE HYDRAULIC BASELINE. STARTING D/S WSEL BASED ON NORMAL DEPTH (SLOPE AREA METHOD) WITH 0.011 FT./FT SLOPE.

Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4413	1551	4425.04	1550.94	4437.83	1550.57	4442.29	1550.52	4449.88	1550.43
4452.11	1550.4	4457.96	1550.41	4460.25	1550.33	4465.96	1550.31	4501.97	1550.44
4550.8	1550.7	4553.36	1550.58	4556.28	1550.47	4561.86	1550.21	4567.75	1548.08
4579.92	1549.6	4612.64	1550.09	4617.28	1550.21	4626.38	1550.36	4628.82	1550.41
4659.48	1551.2	4664.15	1551.13	4679.26	1550.96	4699.13	1550.25	4699.94	1550.21
4701.62	1550.1	4705.35	1550.1	4748.3	1549.6	4796.19	1549.21	4828.49	1549.22
4862.4	1549.1	4873.56	1549.21	4884.8	1549.16	4923.57	1549.79	4968.43	1548.96
4989.62	1548.9	4994.46	1548.96	5001.32	1549.04	5021.72	1549.12	5060.43	1549.19
5096.01	1549	5107.84	1549	5127.86	1548.98	5132.21	1549.06	5143.39	1549.09
5202.31	1549	5235.78	1549	5269.68	1548.73	5318.34	1548.76	5343.85	1548.56
5346.75	1548.6	5347.97	1548.56	5363.86	1548.76	5370.64	1548.77	5380.01	1548.67
5410.62	1548.4	5430.2	1548.21	5440.8	1548.12	5449.46	1547.4	5456.49	1546.8
5457.5	1546.9	5458.42	1546.91	5466.29	1547.31	5479.5	1547.18	5494.13	1546.87
5497.27	1546.8	5498.42	1546.65	5507.6	1545.21	5515.68	1546.29	5518.86	1546.74
5530.55	1547.4	5533.68	1547.47	5564.47	1547.25	5582.57	1547.07	5586.98	1546.02
5594.63	1546	5605.87	1547.36	5617.28	1547.47	5622.24	1547.32	5630.09	1547.33
5645.45	1547.5	5662.84	1547.39	5668.87	1547.39	5674.33	1547.35	5696.11	1547.57
5708.81	1547.5	5713.28	1547.45	5717.42	1547.21	5722.88	1547.01	5729.34	1546.96
5731.48	1547	5731.94	1546.97	5732.82	1546.92	5738.2	1547.23	5751.11	1547.8
5774.28	1548	5780.29	1548.06	5787.65	1547.59	5807.99	1547.28	5814.56	1547.05
5822.29	1546.8	5824.31	1546.98	5834.27	1547.47	5843.83	1547.44	5845.84	1547.47
5891.47	1548	5905.97	1548.27	5931.37	1549.19	5933.12	1549.25	5934.14	1549.29
5953.62	1549.4	5956.53	1549.44	5970.12	1549.82	5972.5	1549.77	5982.91	1549.24
5991.28	1549	5992.56	1549.01	5994.15	1548.98	6014.69	1548.39	6020.82	1548.2
6028.31	1547.9	6098.54	1546.55	6099.38	1546.52	6099.73	1546.52	6099.95	1546.45
6103.51	1545.4	6107.99	1544.06	6109.1	1544.22	6124.96	1546.6	6133.04	1546.58
6139.15	1546.6	6148.78	1546.7	6158.6	1547.33	6170.14	1547.82	6186.7	1547.53
6196.13	1547.5	6199.03	1547.52	6213.06	1547.42	6228.15	1547.11	6259.46	1546.89
6264.71	1546.8	6267.57	1546.79	6273.55	1546.7	6306.93	1547.09	6316.45	1547.3
6322.04	1547.3	6334.42	1547.06	6337.61	1546.58	6340.8	1547.01	6341.47	1546.81
6357.92	1547.1	6362.57	1547.23	6366.26	1547.3	6397.7	1547.71	6405.23	1547.93
6427.98	1548.7	6433.87	1548.7	6439.41	1548.7	6458.31	1548.7	6467.54	1547.72
6475.65	1546.9	6483.6	1545.94	6492.62	1545.05	6511.77	1543.17	6524.31	1544.27
6540.17	1545.5	6558.95	1547.34	6568.66	1547.52	6574.02	1547.57	6598.48	1547.78
6615.12	1548	6632.78	1548.41	6659.94	1548.66	6664.62	1548.73	6675.9	1549.33
6678.93	1549.8	6684.45	1550.41	6702.31	1551.14	6710.51	1552.59	6715.56	1552.46
6721.42	1552.3	6732.92	1551.93	6734.44	1551.59	6744.59	1550	6752.92	1548.66
6753.55	1548.6	6778.93	1548.93	6818.11	1548.49	6826.68	1548.42	6845.23	1548.22
6846.62	1548.2	6848.14	1548.18	6851.33	1548.14	6852.56	1548.15	6894.04	1548.15
6941.92	1548.2	6951.75	1548.12	6985.98	1548.22	6993.98	1548.18	6995.51	1548.2
7060.73	1546.9	7062.68	1546.9	7066.04	1546.83	7067.72	1546.77	7078.71	1546.33
7087.54	1546.5	7099.63	1546.69	7110.5	1546.69	7129.61	1546.7	7185.65	1546.86
7242.88	1547	7299.42	1546.92	7310.78	1546.81	7318.51	1546.78	7354.73	1547.25
7387.72	1547.7	7396.37	1547.76	7418.36	1547.73	7424.04	1547.75	7425.72	1547.71
7429.4	1547.7	7456.28	1547.88	7533	1548.28	7567.26	1548.25	7568.18	1548.25
7568.71	1548.3	7600.95	1548.32	7664.85	1548.36	7672.44	1548.31	7681.17	1548.22

7752.88	1547.2	7769.65	1546.85	7769.85	1546.85	7776.36	1546.69	7787.1	1547.26
7807.98	1547.6	7832.55	1547.65	7836.89	1547.7	7858.8	1547.9	7860.81	1547.9
7861.47	1547.8	7865.13	1546.95	7874.56	1544.76	7876.1	1544.4	7884.1	1545.87
7886.66	1546.4	7891.35	1546.52	7905.85	1546.72	7915.14	1547.1	7927.84	1547.24
7983.64	1548	7987.37	1547.99	7989.96	1547.95	8009.09	1548.25	8012.46	1548.32
8017.16	1548.4	8022.05	1548.66	8025.58	1548.75	8063.24	1548.51	8076.71	1548.49
8098.23	1548	8116.6	1548.06	8142.22	1547.89	8145.69	1547.91	8151.71	1547.98
8154	1548	8155.7	1548.04	8156.59	1548.04	8192.13	1547.98	8209.95	1547.94
8229.56	1547.8	8247.38	1547.69	8287.09	1547.58	8288.65	1547.57	8290.7	1547.43
8299.38	1547.1	8305.16	1546.83	8310.47	1546.76	8318.45	1546.77	8330.92	1546.72
8353.37	1546.9	8376.89	1547.08	8387.04	1547.3	8392.74	1547.12	8399.02	1546.71
8400.29	1546.8	8427.78	1546.89	8435.89	1546.87	8437.1	1546.87	8438.94	1546.92
8469.6	1547.7	8515.12	1547.07	8520.39	1546.98	8521.44	1546.98	8523.81	1546.99
8552.58	1546.9	8552.79	1546.9	8557.79	1547.14	8561.95	1547.17	8566.68	1547.05
8573.38	1546.6	8577.49	1546.94	8581.67	1547.29	8585.11	1547.6	8645.13	1547.41
8646.05	1547.4	8648.66	1547.42	8663.24	1547.49	8676.3	1547.47	8684.26	1547.33
8693.53	1547.3	8726.67	1547.44	8733.33	1547.47	8734.57	1547.47	8760.72	1547.36
8778.64	1547.4	8783.22	1547.44	8798.75	1547.92	8825.4	1548.54	8837.75	1548.4
8847.43	1548.4	8859.37	1548.47	8867.12	1548.39	8877.93	1548.29	8911.89	1548.14
8930.43	1547.9	8953.99	1547.56	8955.61	1546.49	8967.16	1547.03	8996.31	1546.86
9009.21	1547	9014.79	1545.57	9023.95	1544.93	9027.36	1545.1	9036.12	1546.52
9041.79	1547.3	9065.84	1547.03	9079.22	1547.1	9121.99	1547.3	9140.65	1546.74
9141.1	1546.7	9152.66	1547.41	9176.3	1547.44	9184.8	1547.44	9202.51	1547.44
9252.37	1547.5	9253.83	1547.55	9292.42	1547.62	9355.99	1547.99	9367.45	1548.03
9386.34	1548.1	9387.8	1548.1	9409.89	1548.23	9419.49	1548.43	9439.6	1548.26
9446.97	1548.3	9457.45	1548.28	9461.22	1548.9	9462.33	1548.88	9463.96	1549.05
9471.46	1548.3	9481.45	1549.53	9488.02	1549.52	9502.83	1549.5	9524.55	1549.41
9531.19	1549.4	9547.26	1549.09	9552.78	1549.12	9572.57	1548.92	9585.46	1548.84
9600.19	1548.8	9601.14	1548.78	9604.83	1548.78	9617.99	1548.43	9641.88	1547.92
9654.02	1548	9655.26	1548.06	9656.08	1548.04	9656.96	1548.04	9659.77	1547.95
9676.81	1547.5	9690.45	1548.27	9691.55	1548.35	9702.79	1548.49	9708.3	1548.55
9729.95	1548.7	9735.16	1548.75	9758.39	1548.69	9766.86	1548.69	9773.19	1548.64
9782.5	1548.6	9783.85	1548.54	9789.19	1548.44	9793.76	1548.49	9818.04	1548.29
9830.72	1548.1	9847.77	1547.88	9851.15	1547.85	9860.97	1547.71	9876.97	1548.18
9880.39	1548.3	9882.2	1548.23	9896.38	1547.98	9907.41	1548.06	9930.46	1548.07
9934.85	1548.1	9936.1	1548.08	9938.42	1548.05	9952.13	1547.92	9970.42	1547.6
9977.41	1547.6	9986.7	1545.56	9991.92	1544.33	9995.05	1544.44	10000.99	1544.39
10004.83	1544.4	10009.78	1544.57	10030.5	1545.49	10039.92	1545.77	10051.75	1546.13
10069.72	1548	10078.77	1548.37	10083.66	1548.34	10088.58	1548.34	10091.43	1548.33
10097.26	1548.3	10134.25	1550.59	10146.07	1548.92	10146.45	1548.93	10147.33	1548.93
10165.19	1549.7	10181.5	1548.59	10191.27	1548.63	10206.68	1548.42	10215.07	1546.93
10221	1545.9	10225.82	1545.18	10234.58	1546.41	10243	1547.17	10261.91	1547.22
10271.74	1547.1	10280.85	1546.86	10295.99	1547.25	10300.1	1547.19	10305.55	1547.25
10306.66	1547.3	10315.31	1547.81	10328.23	1547.15	10333.19	1546.89	10346.97	1547.03
10408.19	1547.6	10430.23	1547.61	10442.25	1547.66	10449.47	1547.78	10454.5	1547.22
10459.31	1546.7	10465.72	1547.61	10468.75	1547.86	10480.59	1547.62	10500.17	1547.48
10503.51	1546.8	10509.41	1545.71	10517.74	1546.71	10529.27	1547.59	10529.63	1547.55
10534.29	1547.5	10598.6	1547.31	10623.28	1547.45	10625.13	1547.45	10659.99	1547.8
10673.24	1548	10678.13	1548.03	10684.71	1547.28	10686.02	1547.14	10686.33	1547.15
10694.92	1547.5	10717.08	1547.39	10746.64	1547.46	10768.23	1547.4	10779.18	1547.4
10787.29	1547.4	10791.7	1547.49	10801.25	1547.63	10845.25	1548.01	10860.13	1548.15
10904.64	1548.3	10926.23	1548.38	10933.68	1548.33	10969.34	1549.51	10998.36	1551.91

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4413	.08	9938.42	.04	10069.72	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9938.42	10069.72	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1548.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.080	0.045	0.080
W.S. Elev (ft)	1548.48	Reach Len. (ft)			
Crit W.S. (ft)	1548.04	Flow Area (sq ft)	3987.56	288.85	744.36
E.G. Slope (ft/ft)	0.011004	Area (sq ft)	3987.56	288.85	744.36
Q Total (cfs)	11309.00	Flow (cfs)	8176.29	1688.12	1444.59
Top Width (ft)	4818.20	Top Width (ft)	3920.04	131.30	766.86
Vel Total (ft/s)	2.25	Avg. Vel. (ft/s)	2.05	5.84	1.94
Max Chl Dpth (ft)	5.31	Hydr. Depth (ft)	1.02	2.20	0.97
Conv. Total (cfs)	107806.8	Conv. (cfs)	77943.2	16092.6	13771.0
Length Wtd. (ft)		Wetted Per. (ft)	3923.65	131.80	767.79
Min Ch El (ft)	1544.33	Shear (lb/sq ft)	0.70	1.51	0.67
Alpha	1.70	Stream Power (lb/ft s)	1.43	8.80	1.29
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

FLOW DISTRIBUTION OUTPUT Profile #PF 1

Left Sta (ft)	Right Sta (ft)	Flow (cfs)	Area (sq ft)	W.P. (ft)	% Conv.	Hydr D. (ft)	Velocity (ft/s)
4413.00	5794.35	971.26	448.43	398.29	8.59	1.13	2.17
5794.35	7175.71	3029.22	1315.73	1066.32	26.79	1.24	2.30
7175.71	8557.06	2525.98	1286.49	1323.84	22.34	0.97	1.96
8557.06	9938.42	1649.82	936.92	1135.20	14.59	0.83	1.76
LB 9938.42	RB 10069.72	1688.12	288.85	131.80	14.93	2.20	5.84
10069.72	10998.36	1444.59	744.36	767.79	12.77	0.97	1.94

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:SIGNAL BUTTE

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8
SPILLWAY	5.000	.03	.03	.03					
SPILLWAY	4.994	.013	.013	.013					
SPILLWAY	4.991	.013	.15	.013					
SPILLWAY	4.986	.03	.09	.03					
SPILLWAY	4.968	.03	.03	.03					
SPILLWAY	4.929	.03	.03	.03					
SPILLWAY	4.914	.068	.03	.03					
SPILLWAY	4.902	.068	.045	.068					
SPILLWAY	4.852	.068	.045	.068					
SPILLWAY	4.776	.068	.045	.068					
SPILLWAY	4.697	.068	.045	.068					
SPILLWAY	4.620	.068	.045	.068					
SPILLWAY	4.575	.068	.045	.068					
SPILLWAY	4.518	.068	.045	.068					
SPILLWAY	4.443	.068	.045	.068					
SPILLWAY	4.367	.068	.045	.068					
SPILLWAY	4.311	.068	.045	.068					
SPILLWAY	4.239	.068	.045	.068					
SPILLWAY	4.171	.068	.045	.068					
SPILLWAY	4.101	.068	.045	.068					
SPILLWAY	4.026	.15	.068	.045	.068				
SPILLWAY	3.956	.15	.068	.045	.068				
SPILLWAY	3.885	.15	.068	.045	.068				
SPILLWAY	3.817	.15	.068	.045	.068				
SPILLWAY	3.747	.15	.068	.045	.068				
SPILLWAY	3.674	.15	.068	.045	.068				
SPILLWAY	3.603	.15	.068	.045	.068				
SPILLWAY	3.532	.15	.068	.045	.068				
SPILLWAY	3.462	.15	.068	.045	.068				
SPILLWAY	3.386	.15	.068	.045	.068				
SPILLWAY	3.310	.15	.1	.15	.068	.045	.068		
SPILLWAY	3.235	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.161	.15	.068	.068	.045	.068			
SPILLWAY	3.082	.15	.068	.12	.068	.045	.068		
SPILLWAY	3.006	.068	.15	.068	.1	.045	.1		

SPILLWAY	2.933	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.857	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.793	.068	.15	.1	.045	.068			
SPILLWAY	2.720	.068	.15	.1	.068	.045	.068		
SPILLWAY	2.643	.15	.068	.15	.1	.15	.068	.045	.068
SPILLWAY	2.554	.15	.1	.15	.045	.15			
SPILLWAY	2.454	.15	.045	.15					
SPILLWAY	2.378	.15	.1	.15	.068	.045	.15		
SPILLWAY	2.302	.1	.15	.1	.15	.045	.15		
SPILLWAY	2.279	.1	.15	.1	.15	.1	.15	.045	.15
SPILLWAY	2.261	.1	.15	.045	.15				
SPILLWAY	2.252	Culvert							
SPILLWAY	2.223	.08	.045	.08					
SPILLWAY	2.020	.08	.045	.08					
SPILLWAY	1.898	.08	.045	.08					
SPILLWAY	1.795	.08	.045	.08					
SPILLWAY	1.696	.08	.045	.08					

SUMMARY OF REACH LENGTHS
River: SIGNAL BUTTE

Reach	River Sta.	Left	Channel	Right
SPILLWAY	5.000	33.7	33.7	33.7
SPILLWAY	4.994	12.96	12.96	12.96
SPILLWAY	4.991	27.8	27.8	27.8
SPILLWAY	4.986	92.6	92.6	92.6
SPILLWAY	4.968	208.34	208.34	208.34
SPILLWAY	4.929	125	76.23	25
SPILLWAY	4.914	120	67.17	25
SPILLWAY	4.902	350	261.94	230
SPILLWAY	4.852	330	402.55	425
SPILLWAY	4.776	490	418.55	365
SPILLWAY	4.697	425	406.56	380
SPILLWAY	4.620	160	235.25	230
SPILLWAY	4.575	275	300.41	290
SPILLWAY	4.518	370	394.81	390
SPILLWAY	4.443	380	401.96	390
SPILLWAY	4.367	275	294.8	290
SPILLWAY	4.311	325	379.86	380
SPILLWAY	4.239	225	363.96	440
SPILLWAY	4.171	290	364.78	370
SPILLWAY	4.101	450	400.93	315
SPILLWAY	4.026	340	365.6	370
SPILLWAY	3.956	310	377.63	300
SPILLWAY	3.885	320	359.41	280
SPILLWAY	3.817	400	370.17	365
SPILLWAY	3.747	390	385.69	400
SPILLWAY	3.674	430	372.11	425
SPILLWAY	3.603	375	374.47	300
SPILLWAY	3.532	260	371.74	350
SPILLWAY	3.462	400	399.38	400
SPILLWAY	3.386	450	404.63	380
SPILLWAY	3.310	380	395.59	410
SPILLWAY	3.235	375	388.39	390
SPILLWAY	3.161	425	416.26	375
SPILLWAY	3.082	370	403.32	390
SPILLWAY	3.006	300	382.27	400
SPILLWAY	2.933	360	404.67	390
SPILLWAY	2.857	320	336.06	320
SPILLWAY	2.793	380	384	440
SPILLWAY	2.720	380	410.52	380
SPILLWAY	2.643	400	468.72	400
SPILLWAY	2.554	400	529.54	400
SPILLWAY	2.454	480	399.74	360
SPILLWAY	2.378	520	402.78	320
SPILLWAY	2.302	280	118.36	118
SPILLWAY	2.279	800	96.77	96
SPILLWAY	2.261	200	200.58	200
SPILLWAY	2.252	Culvert		
SPILLWAY	2.223	400	1069.12	900
SPILLWAY	2.020	500	646.55	500
SPILLWAY	1.898	500	542.03	500
SPILLWAY	1.795	520	524.67	500
SPILLWAY	1.696	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: SIGNAL BUTTE

Reach	River Sta.	Contr.	Expan.
SPILLWAY	5.000	.1	.3
SPILLWAY	4.994	.1	.3
SPILLWAY	4.991	.1	.3
SPILLWAY	4.986	.1	.3
SPILLWAY	4.968	.1	.3
SPILLWAY	4.929	.1	.3
SPILLWAY	4.914	.1	.3
SPILLWAY	4.902	.1	.3
SPILLWAY	4.852	.1	.3
SPILLWAY	4.776	.1	.3
SPILLWAY	4.697	.1	.3
SPILLWAY	4.620	.1	.3
SPILLWAY	4.575	.1	.3
SPILLWAY	4.518	.1	.3
SPILLWAY	4.443	.1	.3
SPILLWAY	4.367	.1	.3
SPILLWAY	4.311	.1	.3
SPILLWAY	4.239	.1	.3
SPILLWAY	4.171	.1	.3
SPILLWAY	4.101	.1	.3
SPILLWAY	4.026	.1	.3
SPILLWAY	3.956	.1	.3
SPILLWAY	3.885	.1	.3
SPILLWAY	3.817	.1	.3
SPILLWAY	3.747	.1	.3
SPILLWAY	3.674	.1	.3
SPILLWAY	3.603	.1	.3
SPILLWAY	3.532	.1	.3
SPILLWAY	3.462	.1	.3
SPILLWAY	3.386	.1	.3
SPILLWAY	3.310	.1	.3
SPILLWAY	3.235	.1	.3
SPILLWAY	3.161	.1	.3
SPILLWAY	3.082	.1	.3
SPILLWAY	3.006	.1	.3
SPILLWAY	2.933	.1	.3
SPILLWAY	2.857	.1	.3
SPILLWAY	2.793	.1	.3
SPILLWAY	2.720	.1	.3
SPILLWAY	2.643	.1	.3
SPILLWAY	2.554	.1	.3
SPILLWAY	2.454	.1	.3
SPILLWAY	2.378	.1	.3
SPILLWAY	2.302	.1	.3
SPILLWAY	2.279	.1	.3
SPILLWAY	2.261	.1	.3
SPILLWAY	2.252	Culvert	
SPILLWAY	2.223	.1	.3
SPILLWAY	2.020	.1	.3
SPILLWAY	1.898	.1	.3
SPILLWAY	1.795	.1	.3
SPILLWAY	1.696	.1	.3

Profile Output Table - Standard Table 1

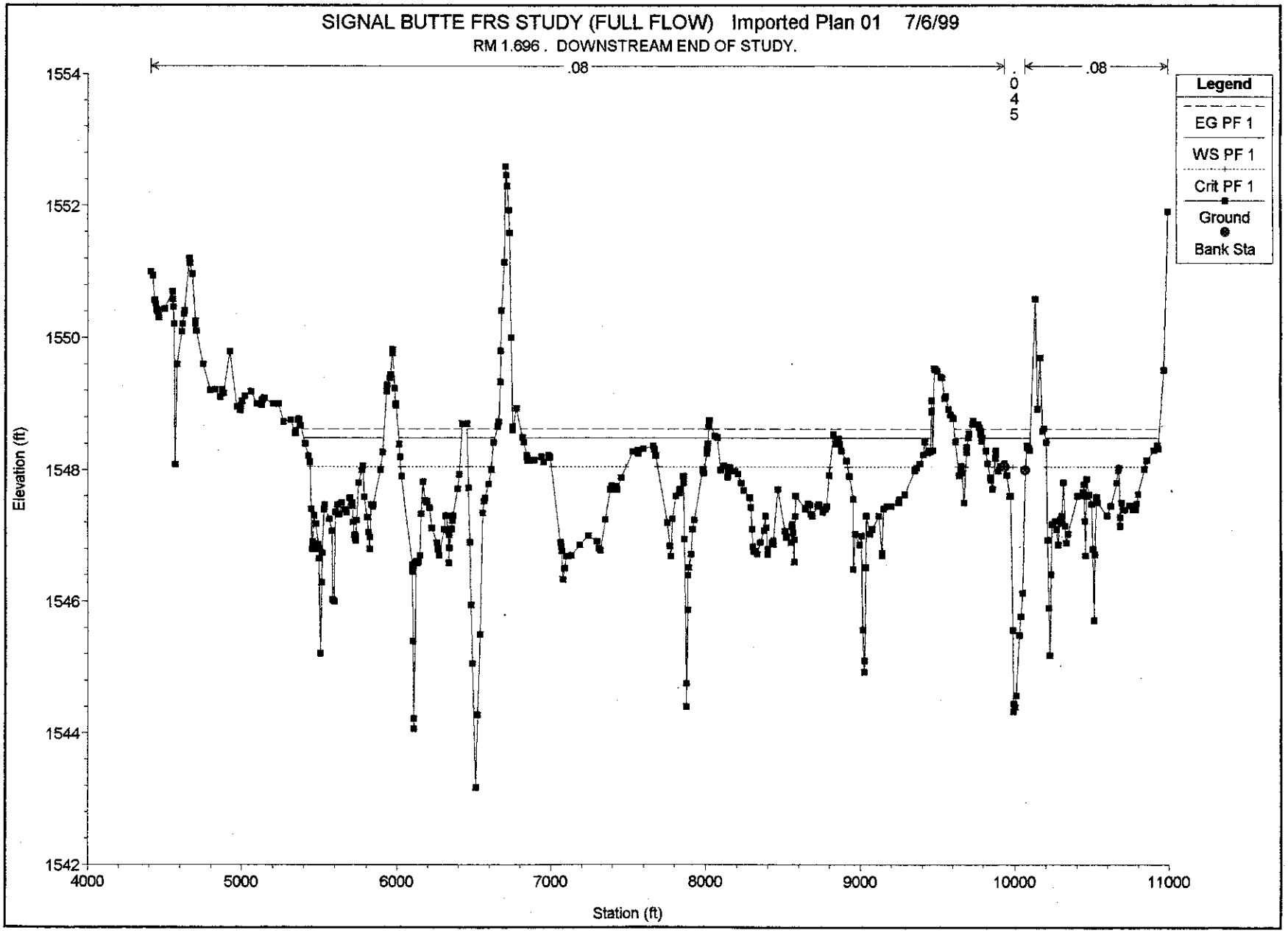
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
SPILLWAY	5.000	11309.00	1709.00	1721.38	1714.32	1721.61	0.000294	3.87	2925.77	297.57	0.22
SPILLWAY	4.994	11309.00	1712.15	1718.39	1718.39	1721.32	0.001495	13.73	823.65	140.72	1.00
SPILLWAY	4.991	11309.00	1711.45	1717.92	1718.24	1721.22	0.229302	14.58	775.44	138.58	1.09
SPILLWAY	4.986	11309.00	1696.37	1700.21	1703.02	1710.89	0.574158	26.22	431.35	137.61	2.61
SPILLWAY	4.968	11309.00	1695.93	1706.00	1701.61	1706.62	0.000974	6.35	1779.83	210.14	0.38
SPILLWAY	4.929	11309.00	1695.98	1705.24		1706.30	0.001878	8.28	1365.12	176.75	0.53
SPILLWAY	4.914	11309.00	1695.98	1705.64		1706.00	0.000750	5.36	3006.96	477.83	0.34
SPILLWAY	4.902	11309.00	1695.20	1703.48	1703.39	1705.68	0.012178	12.05	1050.79	314.32	0.86
SPILLWAY	4.852	11309.00	1692.70	1700.55	1700.55	1702.11	0.012628	11.61	1656.68	963.84	0.87
SPILLWAY	4.776	11309.00	1688.02	1696.30	1696.44	1697.28	0.010957	10.73	2234.95	1358.66	0.80
SPILLWAY	4.697	11309.00	1685.90	1691.57	1691.30	1692.10	0.008939	8.35	2954.62	1857.09	0.70
SPILLWAY	4.620	11309.00	1682.19	1687.19		1687.70	0.013140	8.33	2779.07	1954.57	0.81
SPILLWAY	4.575	11309.00	1679.69	1684.83		1685.33	0.010532	8.52	2903.98	2075.47	0.75
SPILLWAY	4.518	11309.00	1674.88	1682.43		1682.94	0.006733	8.04	3249.18	2199.10	0.62
SPILLWAY	4.443	11309.00	1672.10	1678.53		1679.16	0.015819	10.33	2647.94	1961.70	0.92
SPILLWAY	4.367	11309.00	1667.22	1674.78	1674.42	1675.04	0.007293	8.31	3904.47	2428.58	0.64
SPILLWAY	4.311	11309.00	1667.54	1671.33	1671.33	1671.93	0.018144	9.55	2558.06	1938.63	0.95
SPILLWAY	4.239	11309.00	1662.74	1668.01	1667.09	1668.16	0.006891	5.65	4155.97	2617.09	0.58
SPILLWAY	4.171	11309.00	1659.67	1665.75		1666.06	0.009498	8.19	3393.59	2376.29	0.71
SPILLWAY	4.101	11309.00	1656.34	1663.13	1662.81	1663.37	0.007808	8.32	4294.19	3110.87	0.66
SPILLWAY	4.026	11309.00	1653.97	1659.45		1659.74	0.009842	8.53	3759.71	2568.15	0.73
SPILLWAY	3.956	11309.00	1650.81	1655.98		1656.16	0.010357	7.76	4648.45	3043.55	0.73
SPILLWAY	3.885	11309.00	1648.10	1653.10		1653.21	0.008565	5.09	4789.87	2892.68	0.61
SPILLWAY	3.817	11309.00	1646.11	1650.51		1650.72	0.007325	6.36	4407.19	2608.63	0.61
SPILLWAY	3.747	11309.00	1643.34	1647.10		1647.32	0.010850	5.55	3528.38	2596.10	0.68
SPILLWAY	3.674	11309.00	1640.73	1643.41		1643.51	0.008710	3.92	4691.95	3006.37	0.57
SPILLWAY	3.603	11309.00	1636.85	1639.58		1639.65	0.009365	4.98	5961.31	3354.27	0.63
SPILLWAY	3.532	11309.00	1633.73	1636.04		1636.09	0.010126	3.69	6728.53	3473.16	0.60
SPILLWAY	3.462	11309.00	1627.25	1633.28		1633.42	0.009138	6.12	6677.90	3600.59	0.65
SPILLWAY	3.386	11309.00	1623.40	1629.88	1628.28	1629.96	0.008074	5.18	6756.79	3233.20	0.60
SPILLWAY	3.310	11309.00	1620.77	1625.86	1625.31	1626.01	0.009804	7.20	5584.69	3144.29	0.70
SPILLWAY	3.235	11309.00	1618.89	1622.05		1622.15	0.010346	6.01	4845.22	3244.86	0.68
SPILLWAY	3.161	11309.00	1614.50	1618.58		1618.68	0.008249	5.15	4595.33	3322.66	0.60
SPILLWAY	3.082	11309.00	1612.65	1614.68	1613.23	1614.76	0.010313	4.51	5087.80	2878.43	0.63
SPILLWAY	3.006	11309.00	1609.39	1611.13		1611.24	0.008731	3.73	4268.74	3043.69	0.57

SPILLWAY	2.933	11309.00	1604.70	1608.44		1608.55	0.009036	5.85	4654.67	3323.96	0.64
SPILLWAY	2.857	11309.00	1601.52	1605.07		1605.14	0.009721	4.60	5852.18	4207.29	0.62
SPILLWAY	2.793	11309.00	1598.87	1602.12		1602.25	0.008404	6.36	6626.96	4351.49	0.64
SPILLWAY	2.720	11309.00	1592.82	1597.91	1597.71	1598.21	0.013401	8.67	5336.98	5260.78	0.82
SPILLWAY	2.643	11309.00	1589.64	1594.06		1594.18	0.008148	6.58	6431.90	4877.56	0.63
SPILLWAY	2.554	11309.00	1586.04	1590.91		1590.97	0.007578	6.20	8199.90	5401.63	0.60
SPILLWAY	2.454	11309.00	1580.99	1586.63	1585.95	1586.81	0.014069	8.18	6042.00	4596.27	0.82
SPILLWAY	2.378	11309.00	1576.20	1582.23		1582.34	0.007577	6.29	8023.74	5727.35	0.61
SPILLWAY	2.302	11309.00	1571.72	1576.79		1577.23	0.016169	9.86	5110.76	4772.53	0.91
SPILLWAY	2.279	11309.00	1570.42	1573.60	1570.71	1573.68	0.011730	5.72	5278.16	4053.93	0.70
SPILLWAY	2.261	11309.00	1570.01	1573.56	1561.96	1573.56	0.000036	0.33	32954.95	5122.47	0.04
SPILLWAY	2.252	Culvert									
SPILLWAY	2.223	11309.00	1569.54	1563.75	1561.49	1563.85	0.003990		4516.87	1579.16	0.00
SPILLWAY	2.020	11309.00	1559.30	1562.01	1560.32	1562.09	0.004721	2.69	5075.17	2622.56	0.41
SPILLWAY	1.898	11309.00	1554.60	1558.26		1558.35	0.013506	5.30	4791.74	4466.49	0.69
SPILLWAY	1.795	11309.00	1547.95	1553.20		1553.33	0.007629	6.46	5864.13	5583.74	0.62
SPILLWAY	1.696	11309.00	1544.33	1548.48	1548.04	1548.62	0.011004	5.84	5020.77	4818.20	0.69

Profile Output Table - Standard Table 2

Reach	River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
SPILLWAY	5.000	1721.61	1721.38	0.23	0.02	0.27		11309.00		297.57
SPILLWAY	4.994	1721.32	1718.39	2.93	0.07	0.00		11309.00		140.72
SPILLWAY	4.991	1721.22	1717.92	3.30	0.07	0.04		11309.00		138.58
SPILLWAY	4.986	1710.89	1700.21	10.67	9.58	0.74		11309.00		137.61
SPILLWAY	4.968	1706.62	1706.00	0.63	0.27	0.04		11309.00		210.14
SPILLWAY	4.929	1706.30	1705.24	1.07	0.09	0.21		11309.00		176.75
SPILLWAY	4.914	1706.00	1705.64	0.36	0.14	0.18	2310.80	8998.20		477.83
SPILLWAY	4.902	1705.68	1703.48	2.20	3.38	0.19	289.94	11019.06		314.32
SPILLWAY	4.852	1702.11	1700.55	1.56			2651.96	8153.26	503.78	963.84
SPILLWAY	4.776	1697.28	1696.30	0.98	4.66	0.17	893.97	5500.44	4914.59	1358.66
SPILLWAY	4.697	1692.10	1691.57	0.53	4.39	0.01	2756.80	4674.44	3877.76	1857.09
SPILLWAY	4.620	1687.70	1687.19	0.51	2.36	0.00	5981.02	4323.43	1004.55	1954.57
SPILLWAY	4.575	1685.33	1684.83	0.50	2.40	0.00	3628.30	3695.88	3984.82	2075.47
SPILLWAY	4.518	1682.94	1682.43	0.51	3.76	0.01	5649.62	5183.30	476.08	2199.10
SPILLWAY	4.443	1679.16	1678.53	0.63	4.01	0.11	5534.63	3284.25	2490.12	1961.70
SPILLWAY	4.367	1675.04	1674.78	0.26	3.09	0.03	7801.33	1850.32	1657.35	2428.58
SPILLWAY	4.311	1671.93	1671.33	0.60	3.59	0.14	7405.31	3784.79	118.90	1938.63
SPILLWAY	4.239	1668.16	1668.01	0.15	2.08	0.02	8885.67	1294.66	1128.66	2617.09
SPILLWAY	4.171	1666.06	1665.75	0.32	2.67	0.02	8783.34	2303.62	222.04	2376.29
SPILLWAY	4.101	1663.37	1663.13	0.24	3.62	0.01	7577.11	1761.12	1970.77	3110.87
SPILLWAY	4.026	1659.74	1659.45	0.29	3.54	0.03	7128.70	2029.41	2150.90	2568.15
SPILLWAY	3.956	1656.16	1655.98	0.18	2.93	0.02	6448.27	1175.06	3685.66	3043.55
SPILLWAY	3.885	1653.21	1653.10	0.11	2.48	0.01	5976.36	769.95	4562.69	2892.68
SPILLWAY	3.817	1650.72	1650.51	0.21	3.40	0.00	6634.22	2727.59	1947.19	2608.63
SPILLWAY	3.747	1647.32	1647.10	0.22	3.77	0.04	6452.99	3253.97	1602.04	2596.10
SPILLWAY	3.674	1643.51	1643.41	0.10	3.85	0.01	7802.16	1360.55	2146.29	3006.37
SPILLWAY	3.603	1639.65	1639.58	0.07	3.55	0.01	8866.15	426.02	2016.83	3354.27
SPILLWAY	3.532	1636.09	1636.04	0.05	2.66	0.01	10461.28	514.05	333.67	3473.16
SPILLWAY	3.462	1633.42	1633.28	0.14	3.44	0.02	9115.68	2193.09	0.23	3600.59
SPILLWAY	3.386	1629.96	1629.88	0.08	3.94	0.01	9985.92	1322.38	0.70	3233.20
SPILLWAY	3.310	1626.01	1625.86	0.16	3.85	0.02	9729.38	1579.62	0.00	3144.29
SPILLWAY	3.235	1622.15	1622.05	0.11	3.47	0.00	10611.43	654.16	43.41	3244.86
SPILLWAY	3.161	1618.68	1618.58	0.11	3.92	0.01	10580.76	621.59	106.65	3322.66
SPILLWAY	3.082	1614.76	1614.68	0.08	3.51	0.00	10995.46	242.83	70.70	2878.43
SPILLWAY	3.006	1611.24	1611.13	0.11	2.69	0.00	10728.90	580.10		3043.69
SPILLWAY	2.933	1608.55	1608.44	0.11	3.39	0.01	10561.97	737.64	9.39	3323.96

SPILLWAY	2.857	1605.14	1605.07	0.07	2.88	0.01	10246.47	779.54	282.99	4207.29
SPILLWAY	2.793	1602.25	1602.12	0.13	4.03	0.02	8643.82	1813.03	852.14	4351.49
SPILLWAY	2.720	1598.21	1597.91	0.29	3.97	0.05	6827.85	2269.17	2211.98	5260.78
SPILLWAY	2.643	1594.18	1594.06	0.12	3.19	0.02	7308.66	1229.99	2770.35	4877.56
SPILLWAY	2.554	1590.97	1590.91	0.06	4.15	0.01	8256.64	668.97	2383.39	5401.63
SPILLWAY	2.454	1586.81	1586.63	0.18	4.45	0.02	6751.14	1444.98	3112.88	4596.27
SPILLWAY	2.378	1582.34	1582.23	0.10	5.07	0.03	7656.43	1512.42	2140.15	5727.35
SPILLWAY	2.302	1577.23	1576.79	0.45	3.44	0.11	8005.21	3112.91	190.88	4772.53
SPILLWAY	2.279	1573.68	1573.60	0.09	0.10	0.03	10738.50	490.52	79.98	4053.93
SPILLWAY	2.261	1573.56	1573.56	0.00			11226.94	54.06	28.01	5122.47
SPILLWAY	2.252	Culvert								
SPILLWAY	2.223	1563.85	1563.75	0.10	1.75	0.01	11309.00			1579.16
SPILLWAY	2.020	1562.09	1562.01	0.08	3.74	0.00	11160.48	67.60	80.92	2622.56
SPILLWAY	1.898	1558.35	1558.26	0.09	5.02	0.00	9808.24	142.14	1358.62	4466.49
SPILLWAY	1.795	1553.33	1553.20	0.13	4.71	0.00	8655.42	1579.58	1074.00	5583.74
SPILLWAY	1.696	1548.62	1548.48	0.13			8176.29	1688.12	1444.59	4818.20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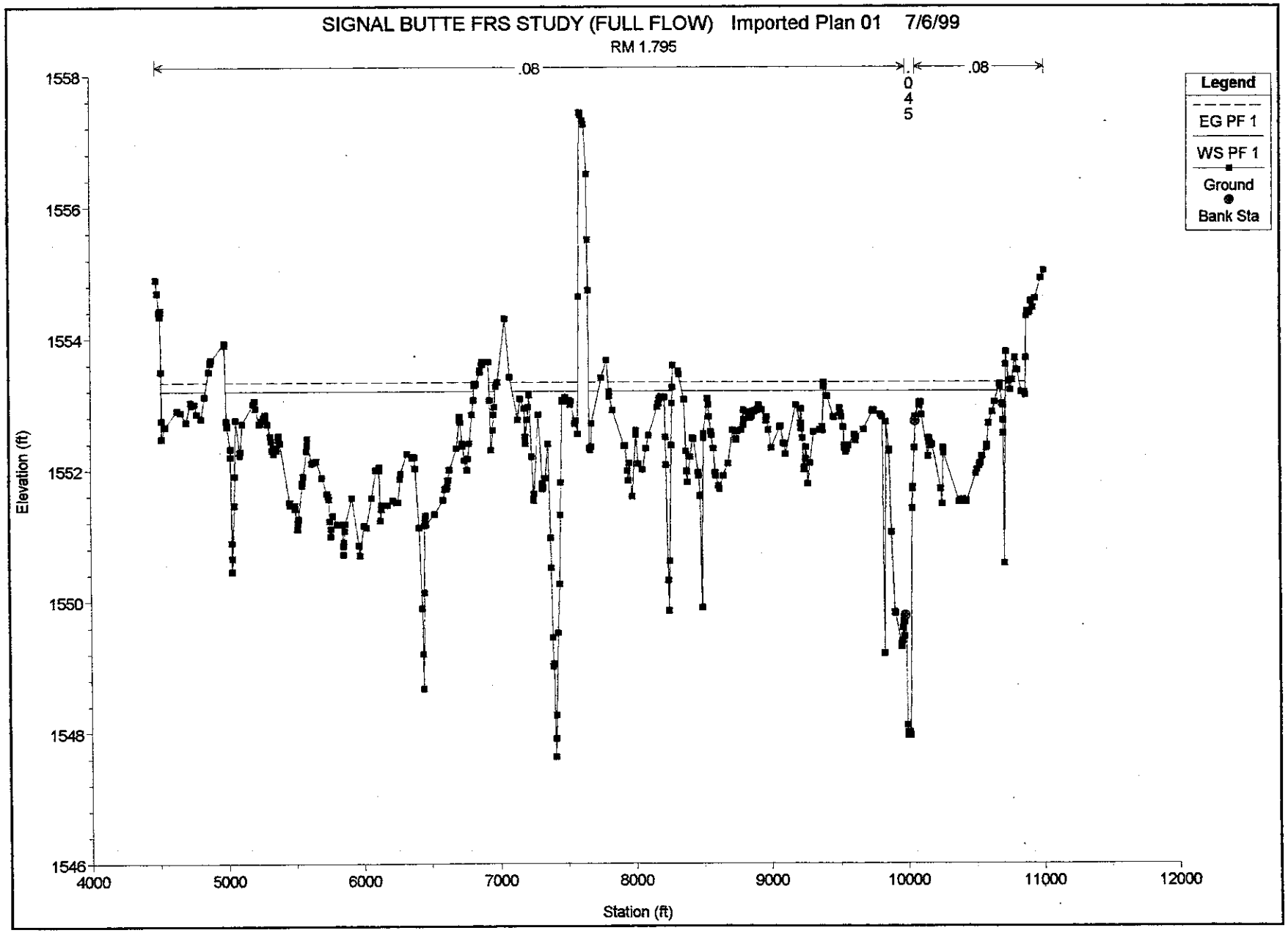
RM 1.696 . DOWNSTREAM END OF STUDY.
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1554
1552
1550
1548
1546
1544
1542
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)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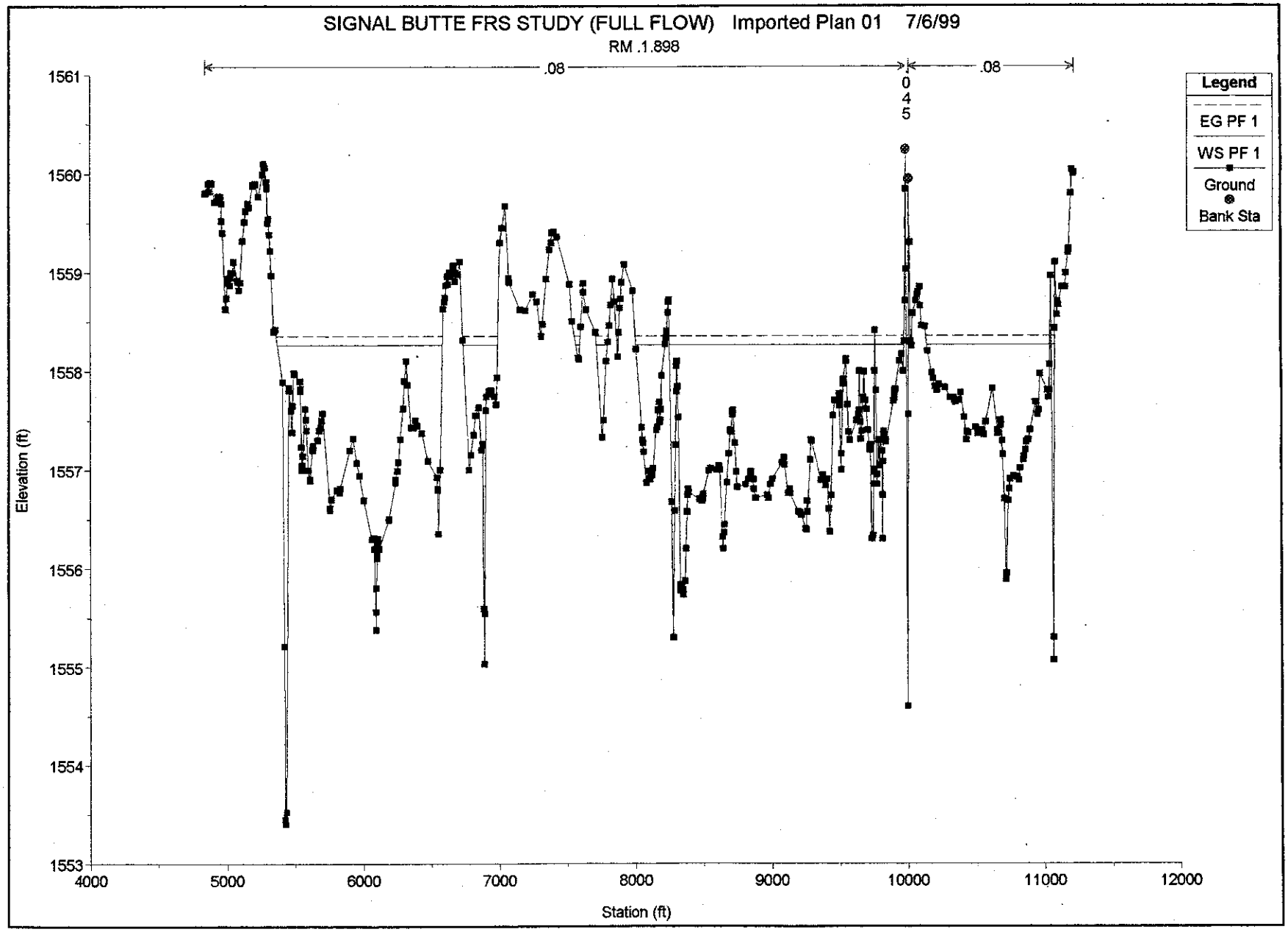
RM 1.795
.08
.045
.08
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1558
1556
1554
1552
1550
1548
1546
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)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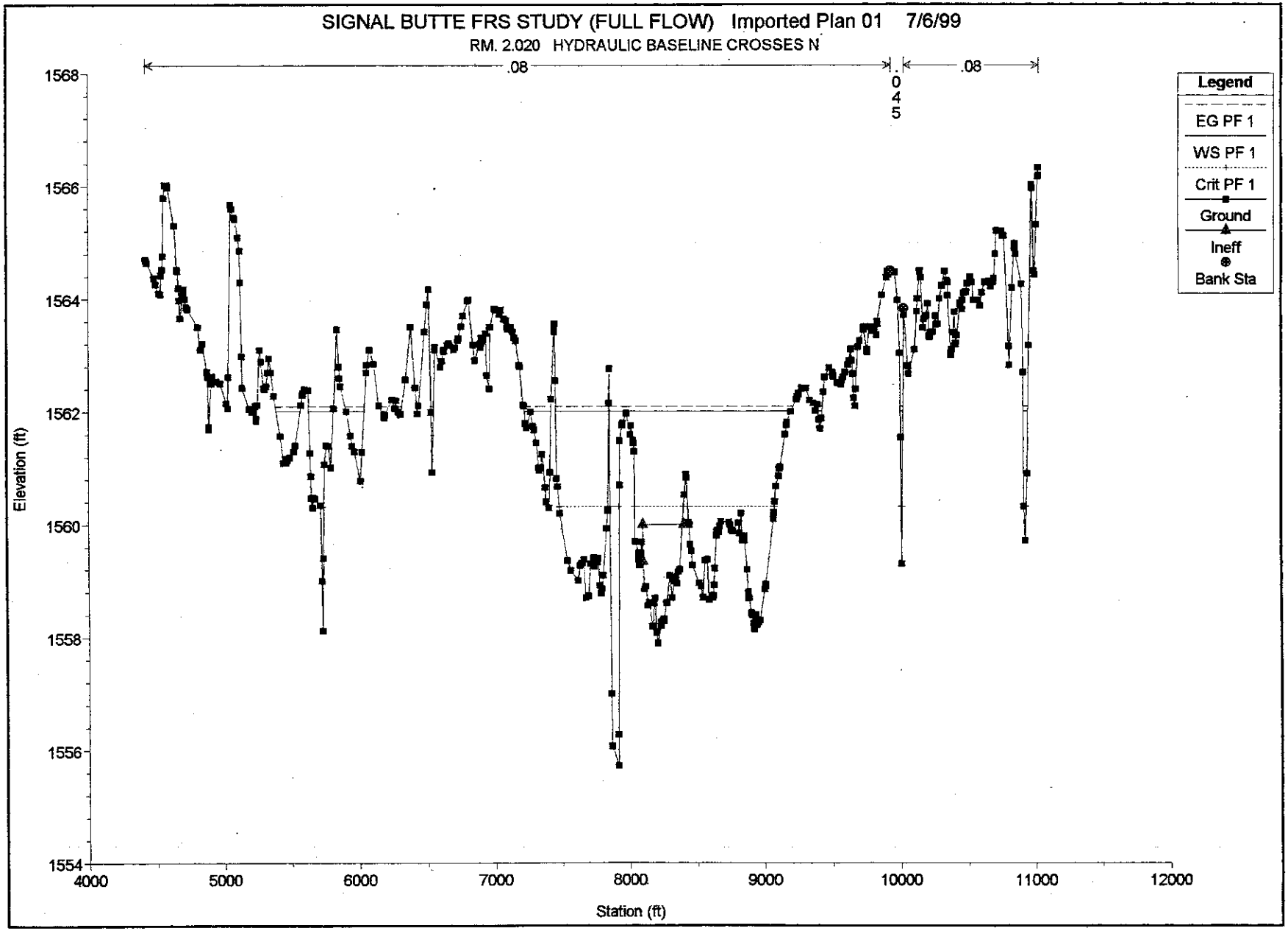
RM .1.898
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1561
1560
1559
1558
1557
1556
1555
1554
1553
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)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RM. 2.020 HYDRAULIC BASELINE CROSSES N
.08
.045
.08
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1568
1566
1564
1562
1560
1558
1556
1554
4000
5000
6000
7000
8000
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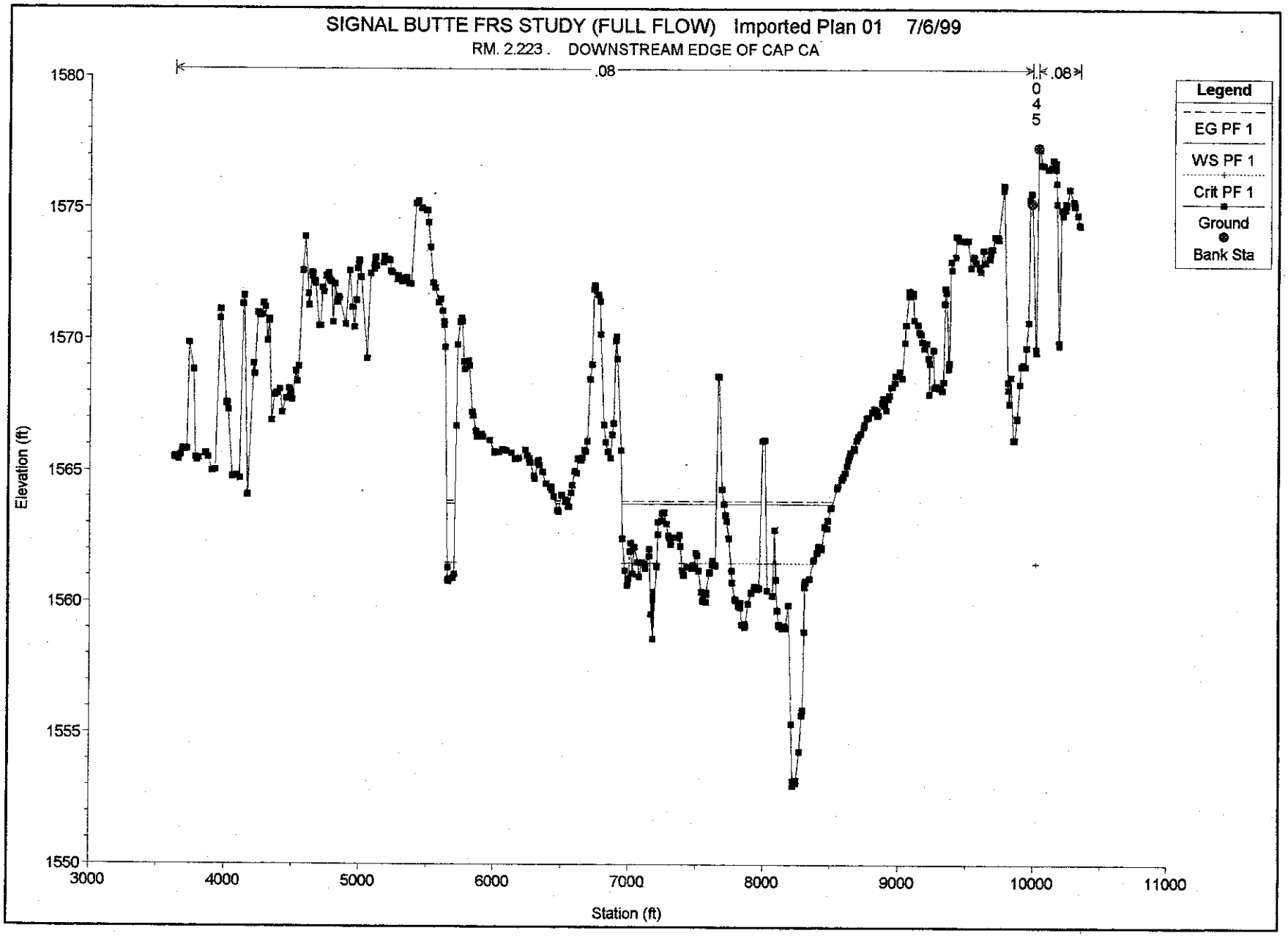
10000
11000
12000
Station (ft)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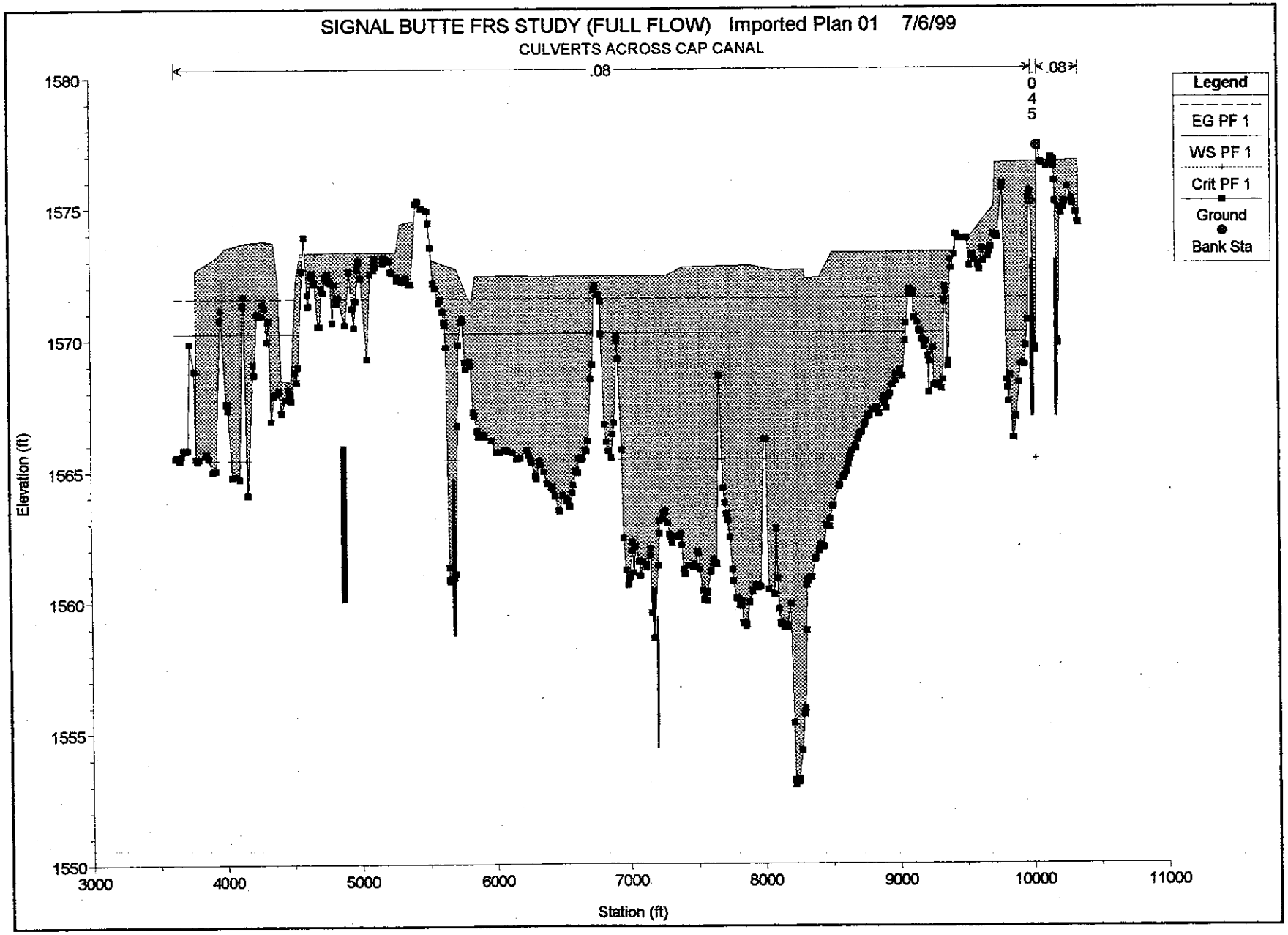
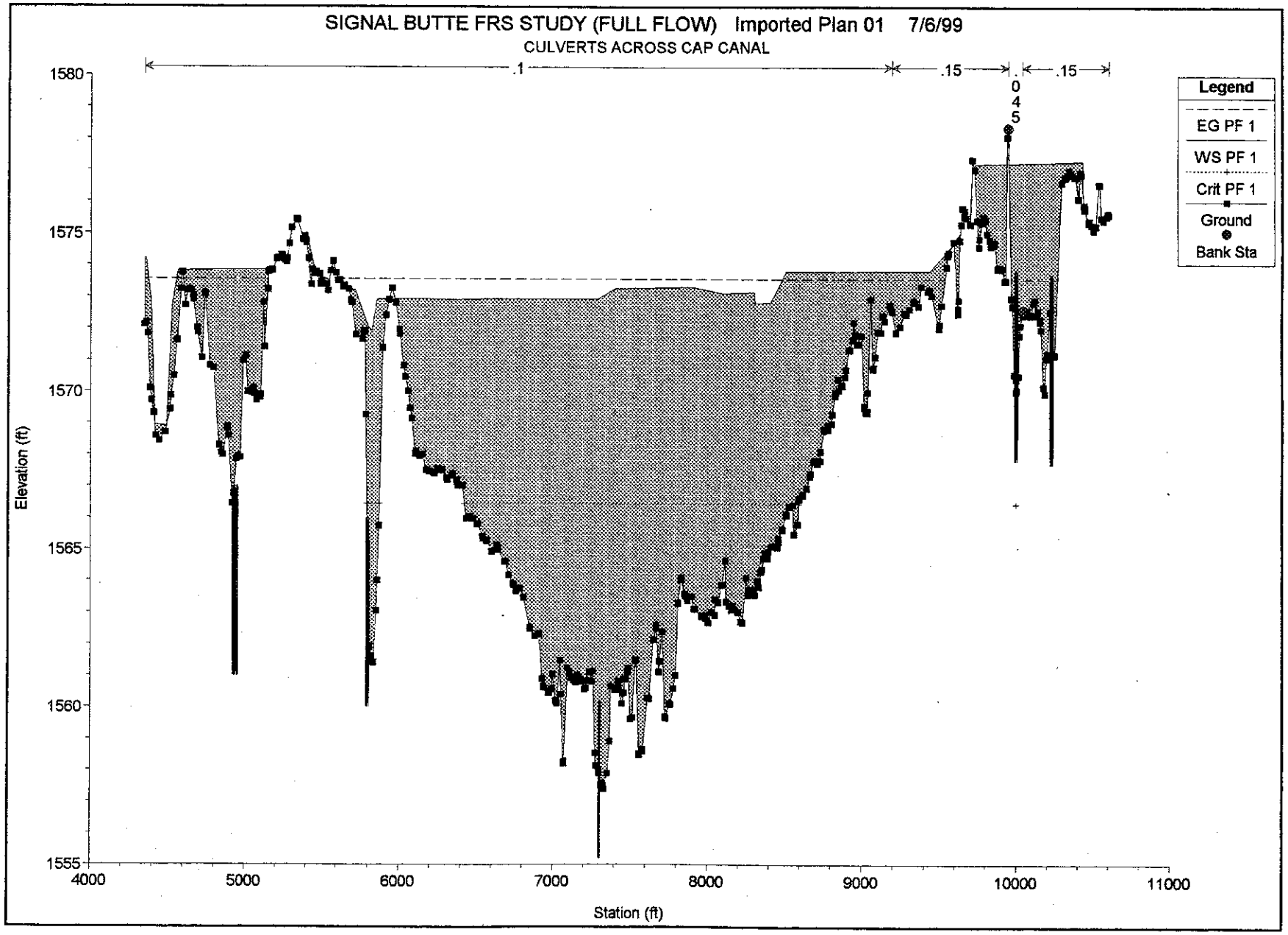
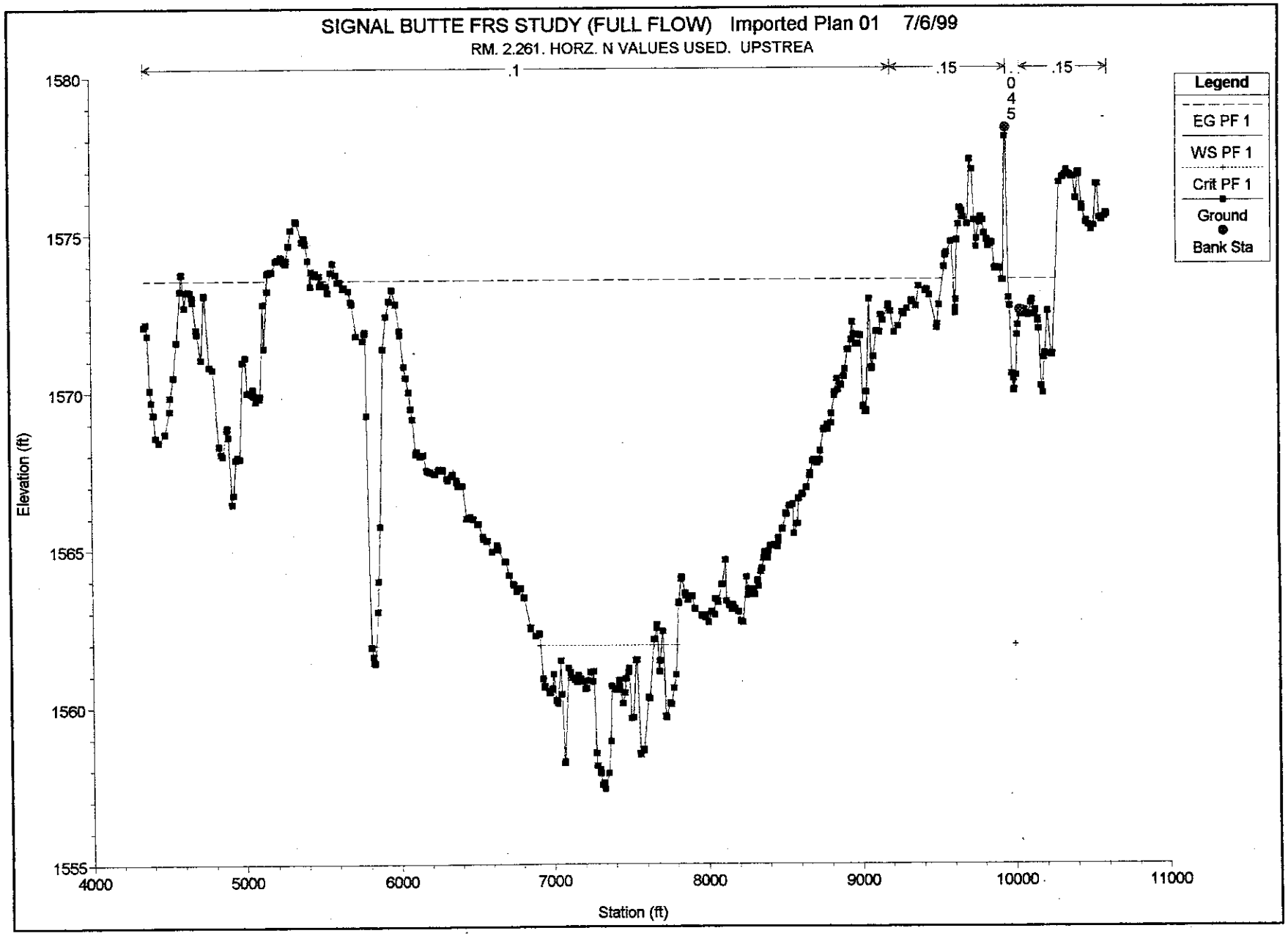
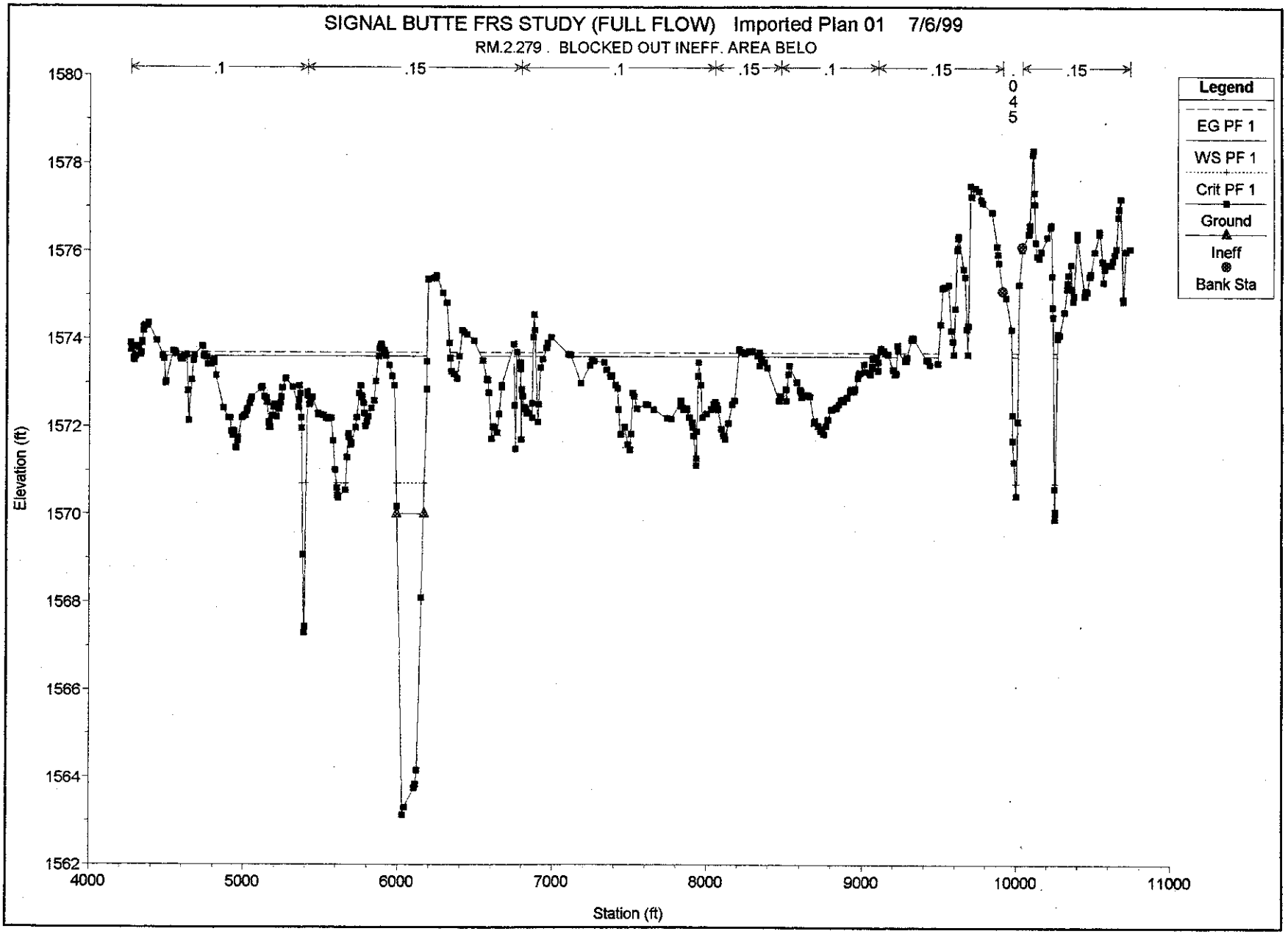
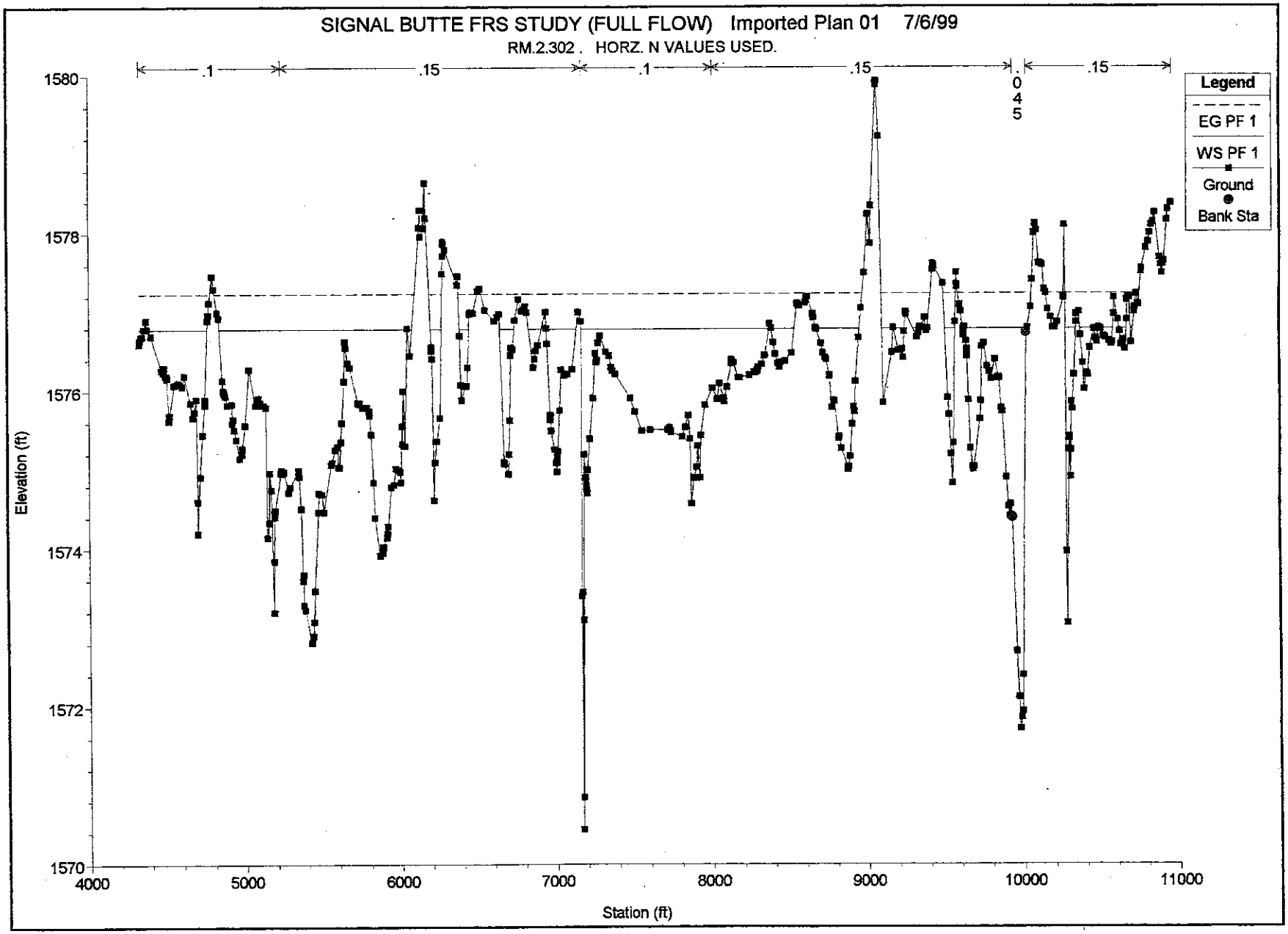
RM. 2.223 . DOWNSTREAM EDGE OF CAP CA
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

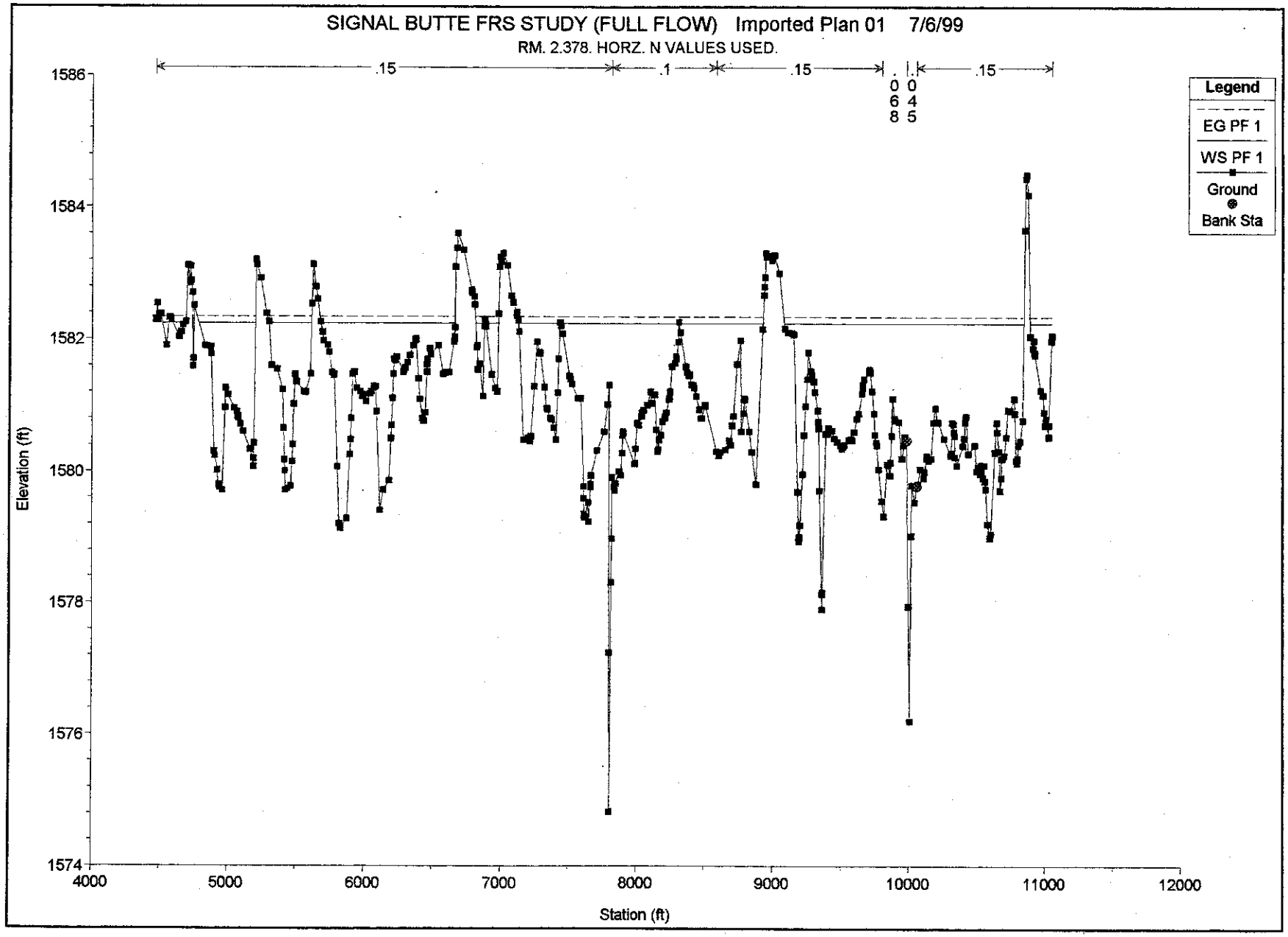

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.08
.08
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
1550
3000
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

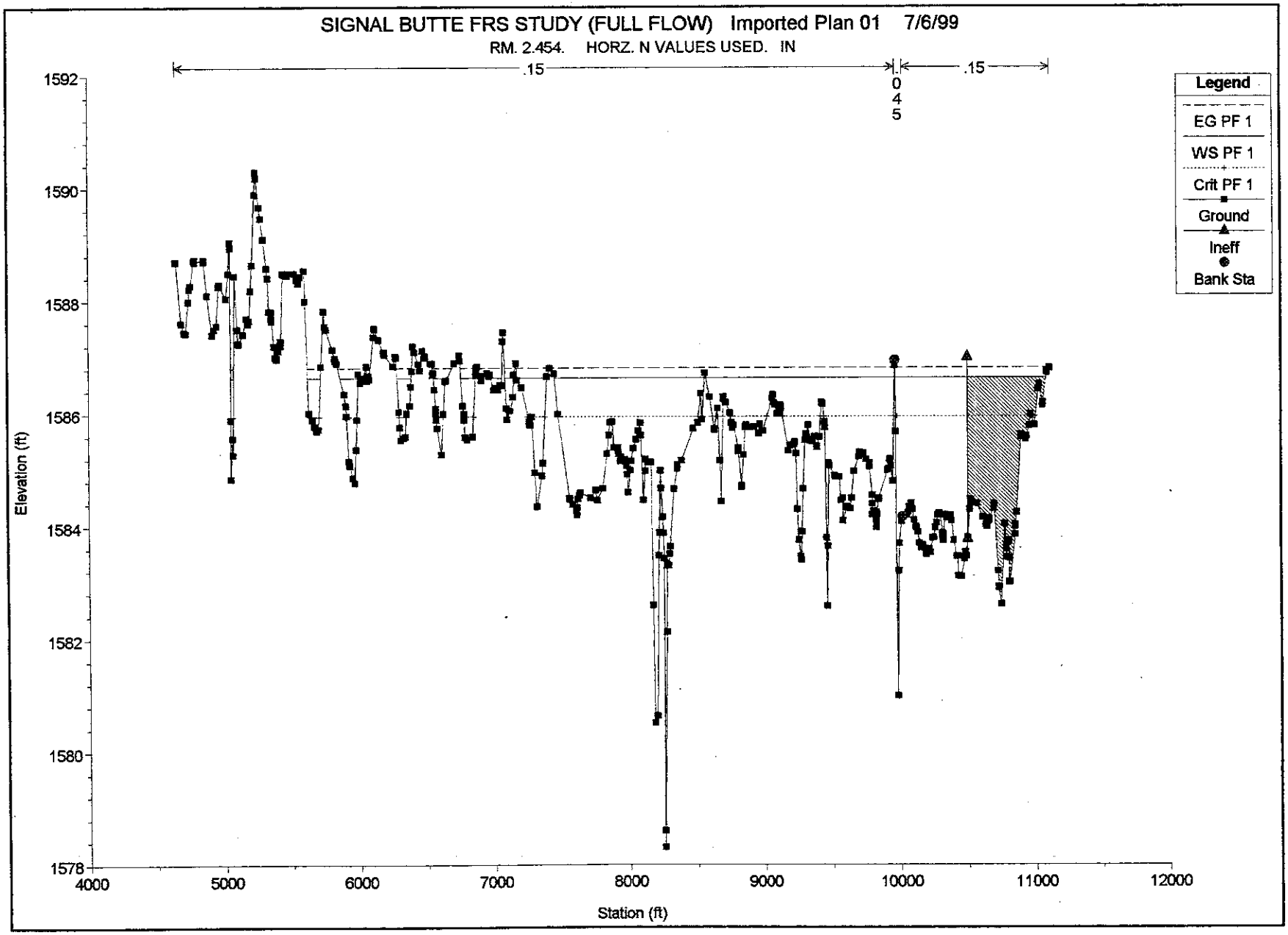

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
CULVERTS ACROSS CAP CANAL
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

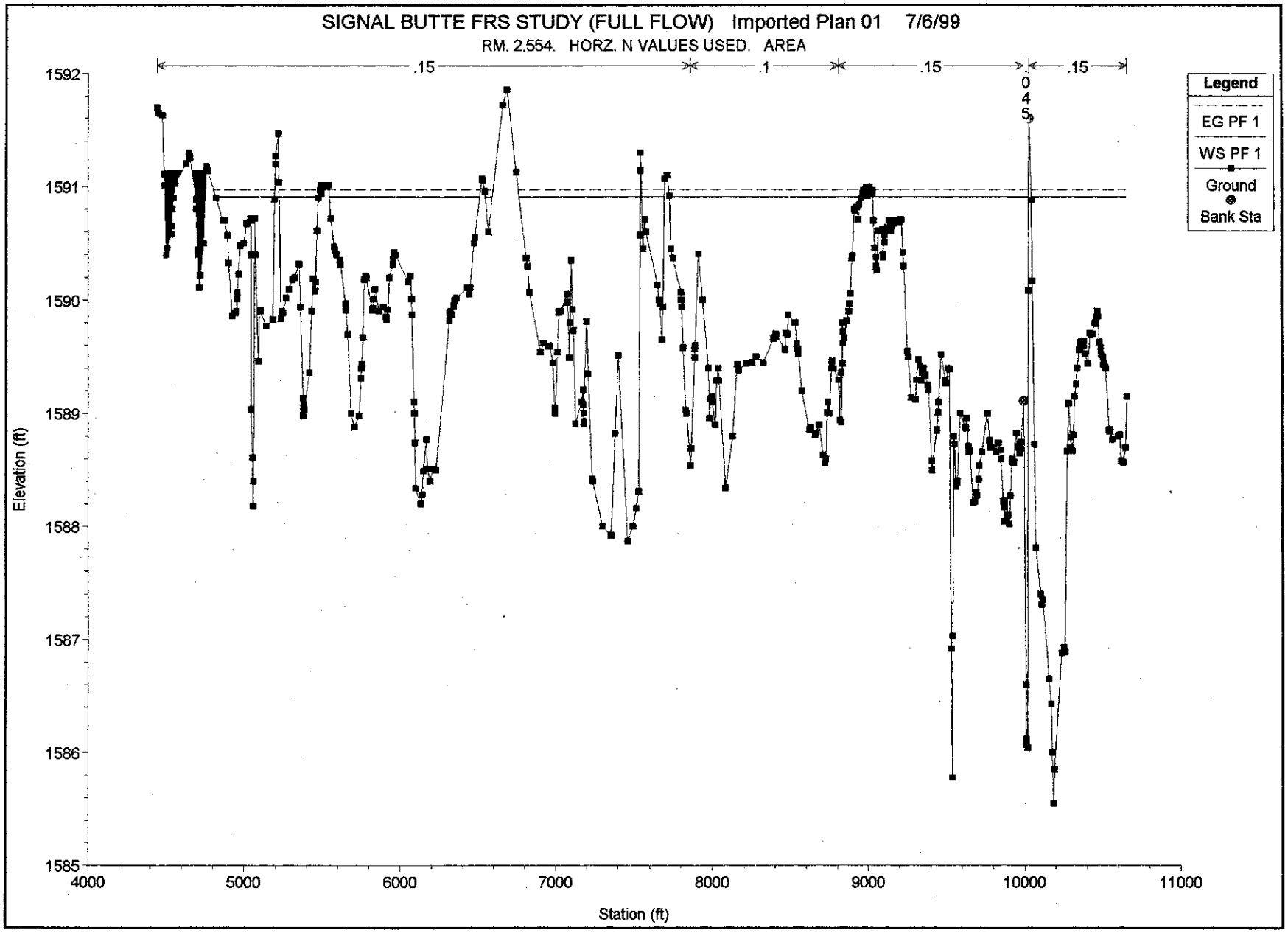

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.261. HORZ. N VALUES USED. UPSTREA
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1580
1575
1570
1565
1560
1555
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

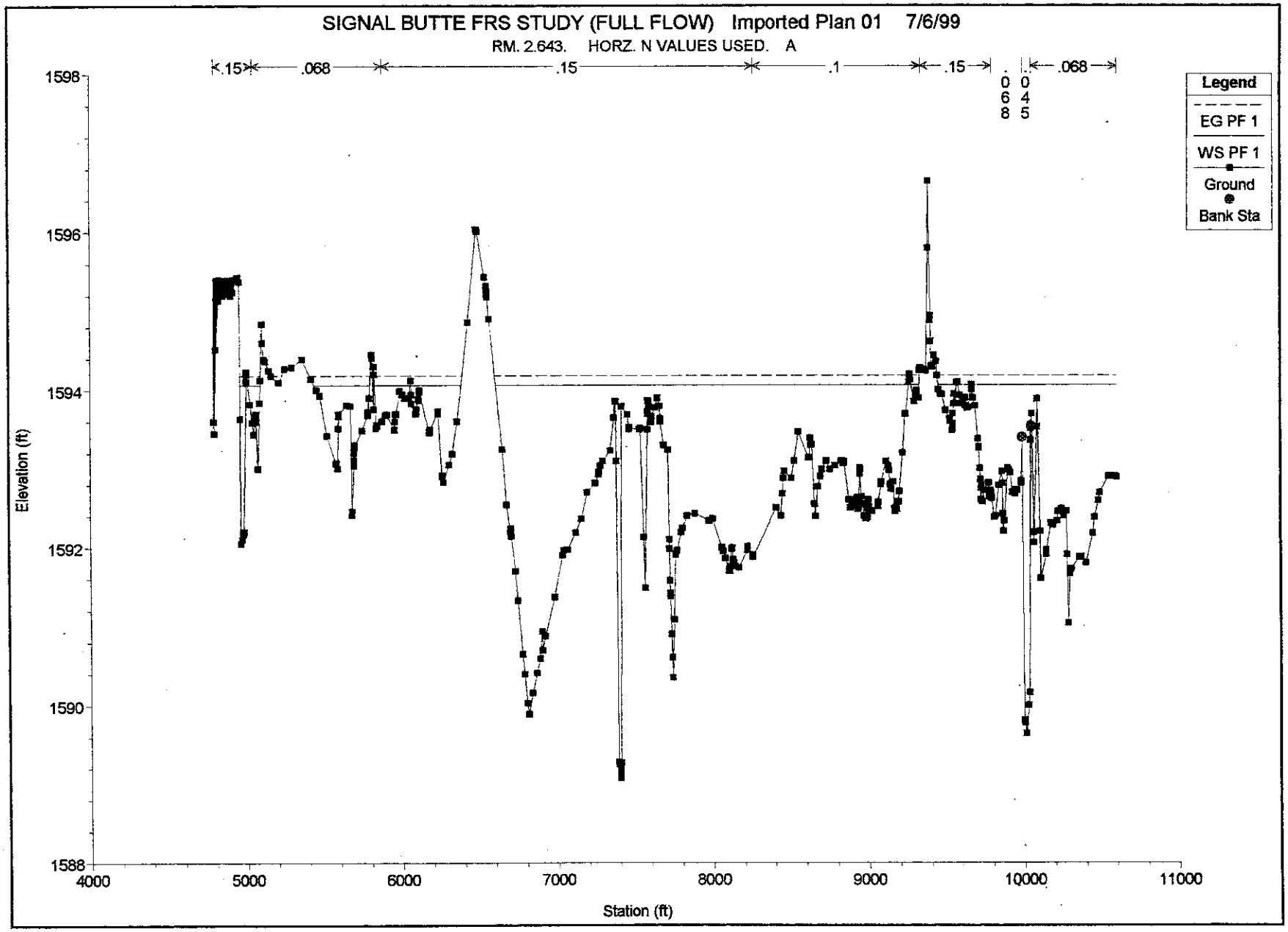

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.2.279 . BLOCKED OUT INEFF. AREA BELO
.1
.15
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
1568
1566
1564
1562
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

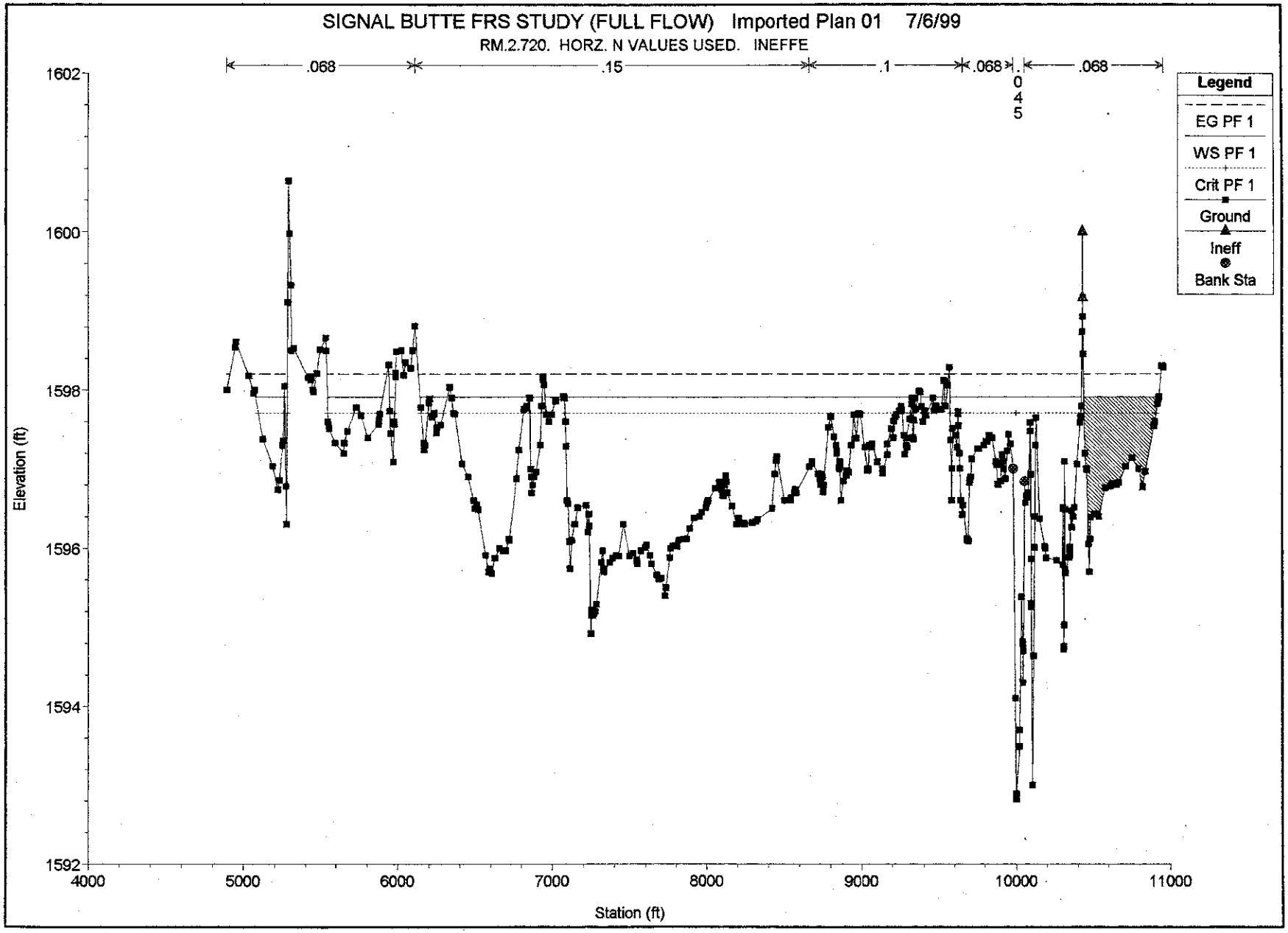

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.2.302 . HORZ. N VALUES USED.
.1
.15
.1
.15
.045
.15
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1580
1578
1576
1574
1572
1570
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

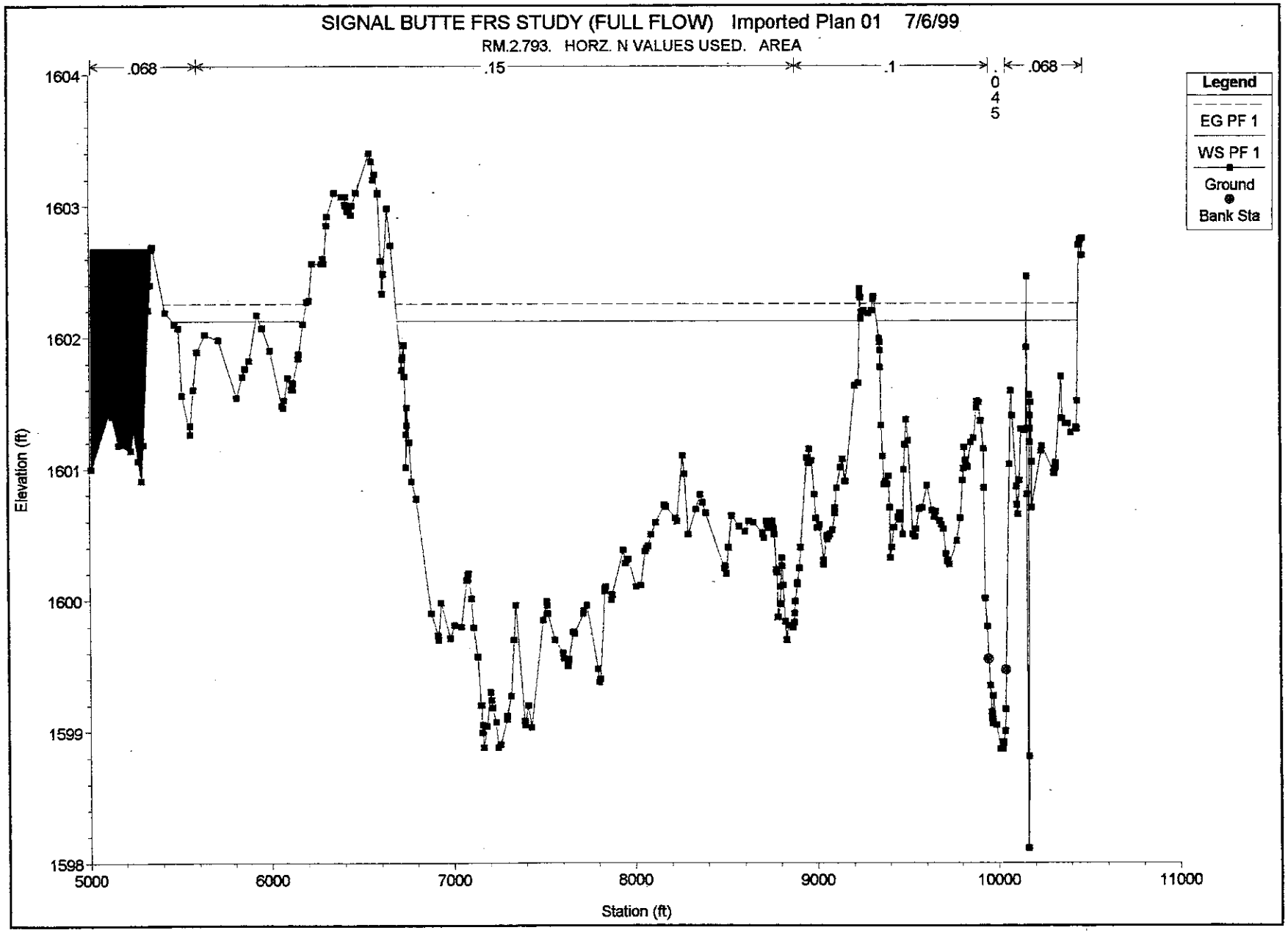

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.378. HORZ. N VALUES USED.
.15
.1
.15
.0064
.0085
.15
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1586
1584
1582
1580
1578
1576
1574
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

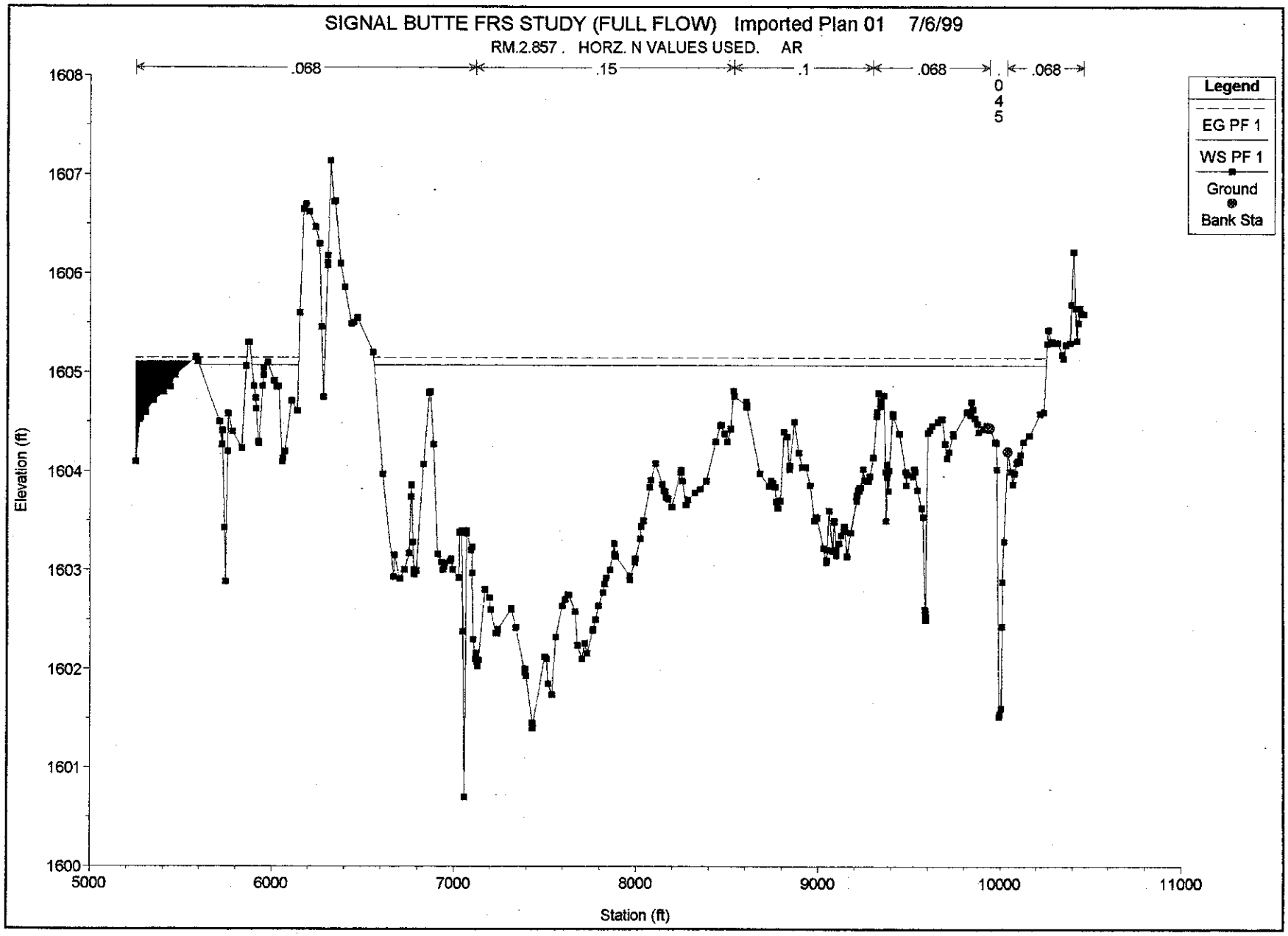

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.454. HORZ. N VALUES USED. IN
.15
0
4
5
.15
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1592
1590
1588
1586
1584
1582
1580
1578
4000
5000
6000
7000
8000
9000
10000
11000
12000
Station (ft)

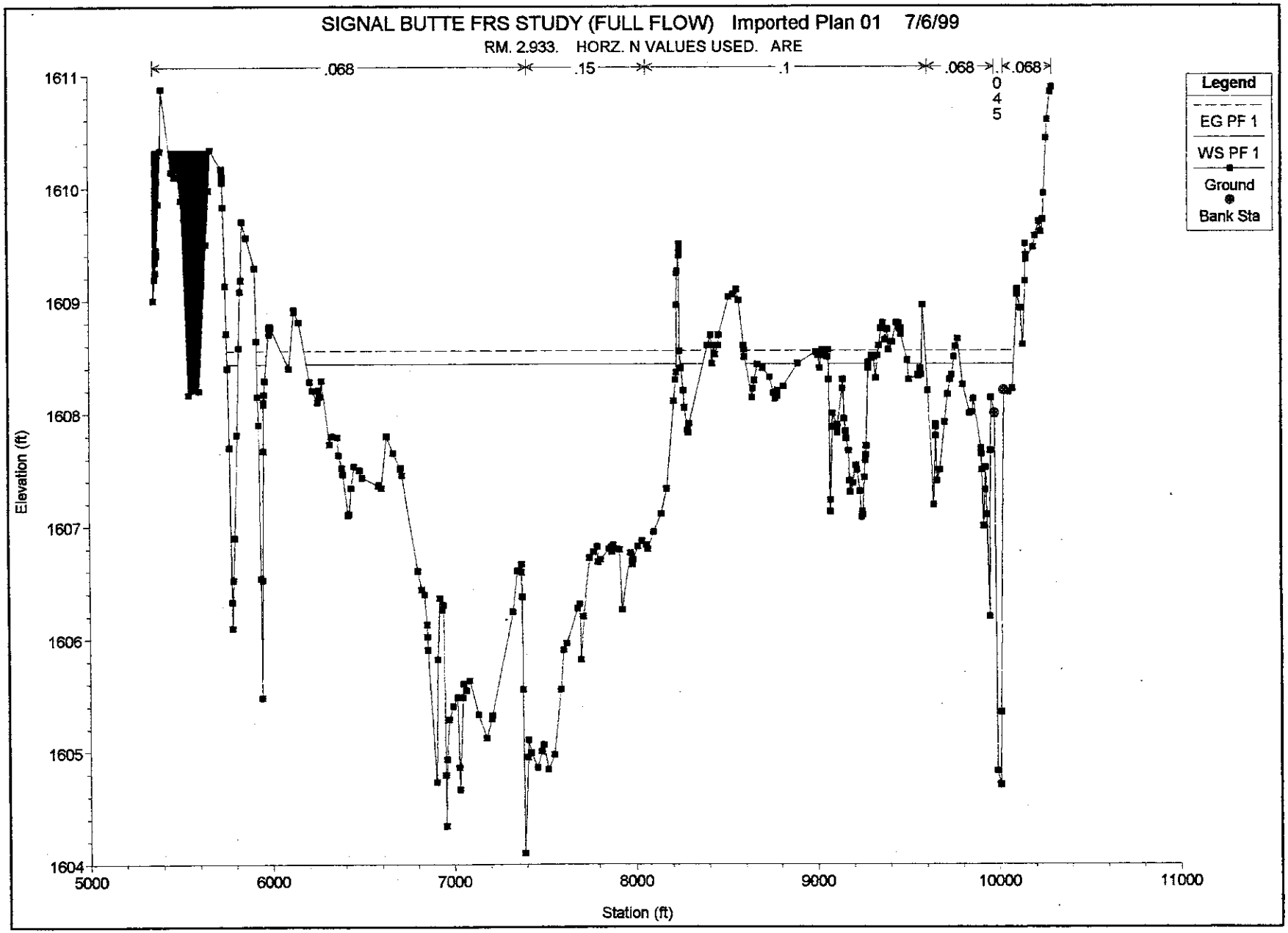

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.554. HORZ. N VALUES USED. AREA
.15
.1
.15
.15
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1592
1591
1590
1589
1588
1587
1586
1585
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

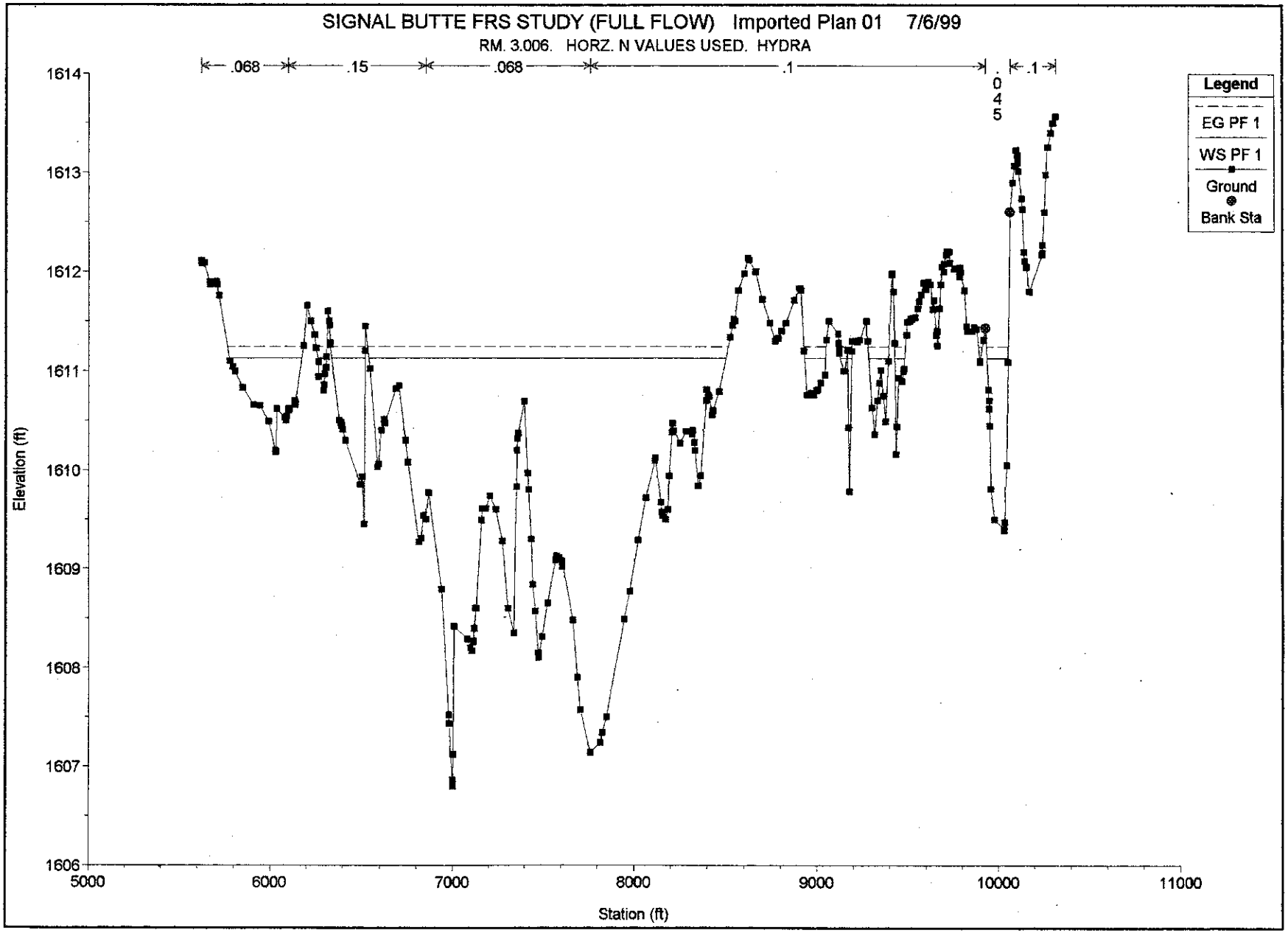

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.643. HORZ. N VALUES USED. A
.15
.068
.15
.1
.15
.068
0 0
6 4
8 5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1598
1596
1594
1592
1590
1588
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

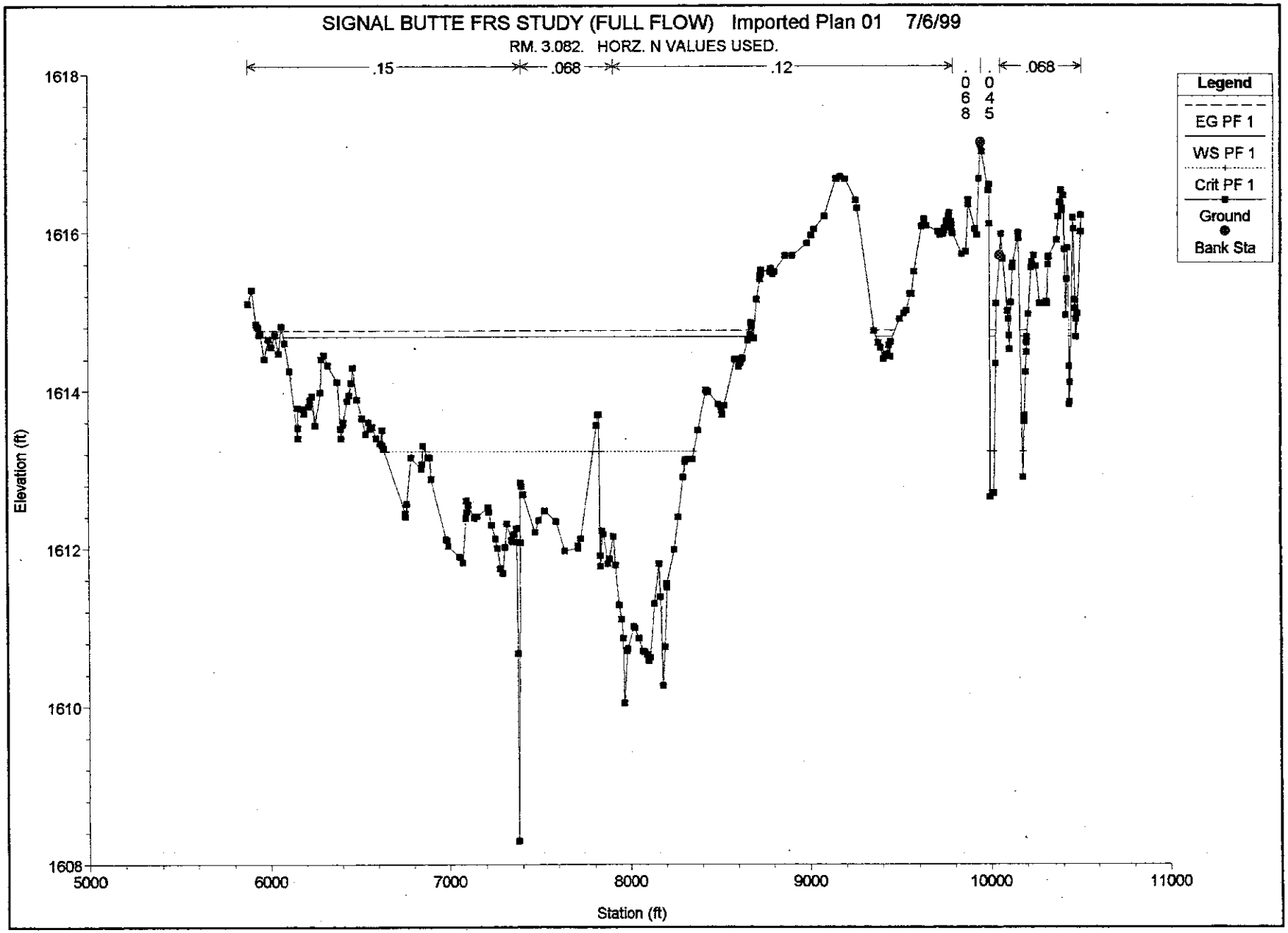

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.2.720. HORZ. N VALUES USED. INEFFE
.068
.15
.1
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1602
1600
1598
1596
1594
1592
4000
5000
6000
7000
8000
9000
10000
11000
Station (ft)

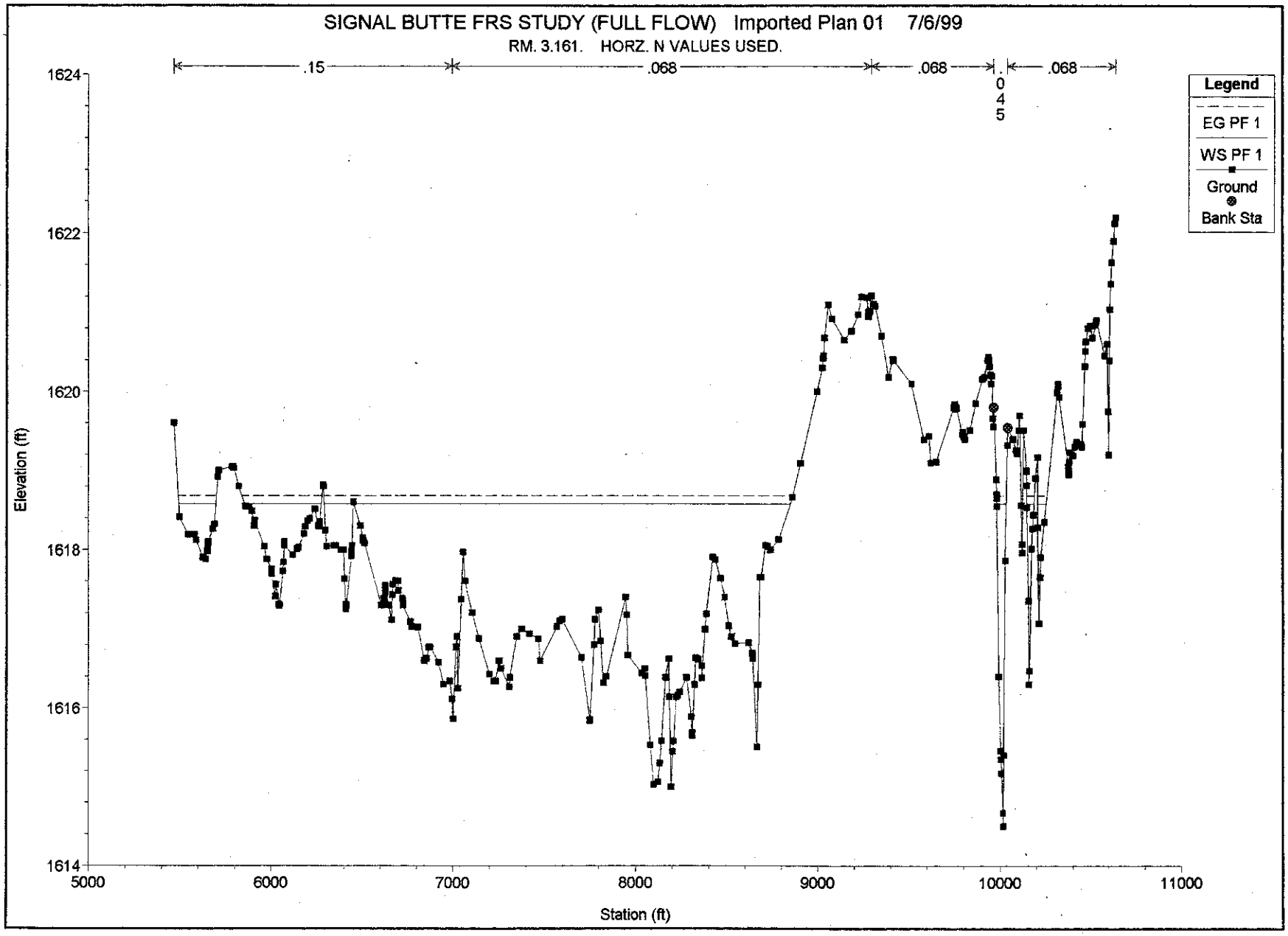

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.2.793. HORZ. N VALUES USED. AREA
.068
.15
.1
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1604
1603
1602
1601
1600
1599
1598
5000
6000
7000
8000
9000
10000
11000
Station (ft)

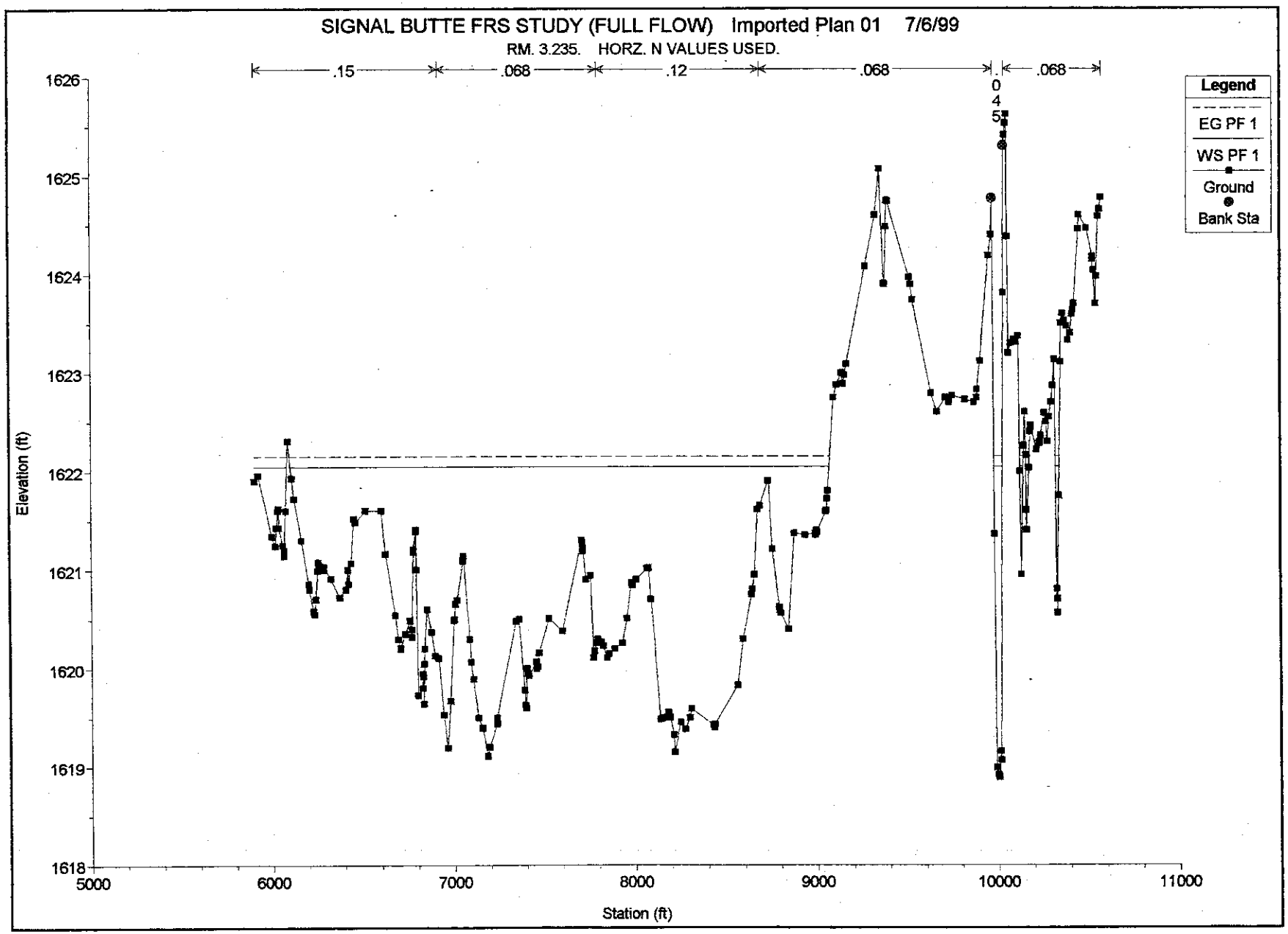

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.2.857 . HORZ. N VALUES USED. AR
.068
.15
.1
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1608
1607
1606
1605
1604
1603
1602
1601
1600
5000
6000
7000
8000
9000
10000
11000
Station (ft)

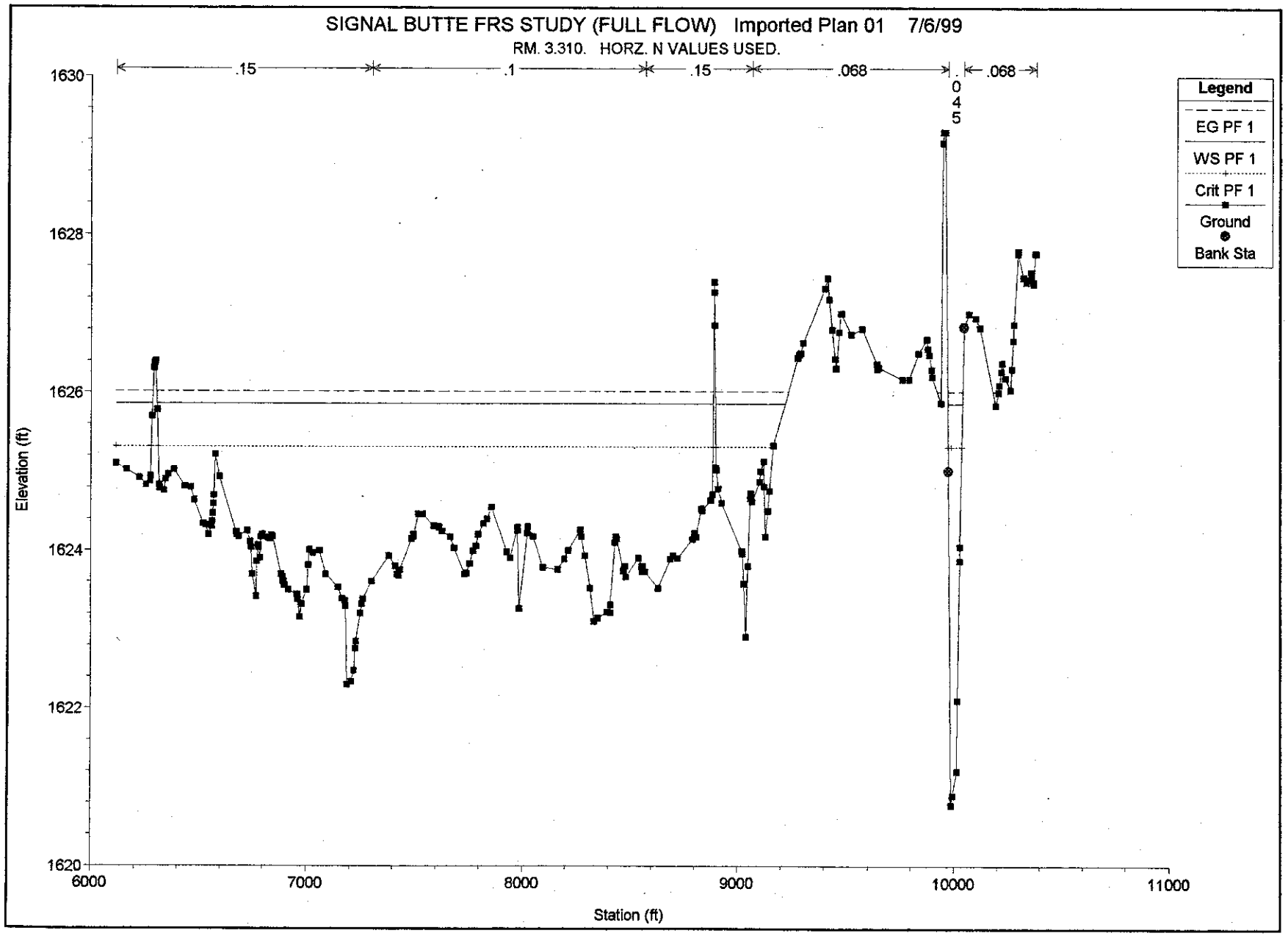

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 2.933. HORZ. N VALUES USED. ARE
.068
.15
.1
.068
.068
0
4
5
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1611
1610
1609
1608
1607
1606
1605
1604
5000
6000
7000
8000
9000
10000
11000
Station (ft)

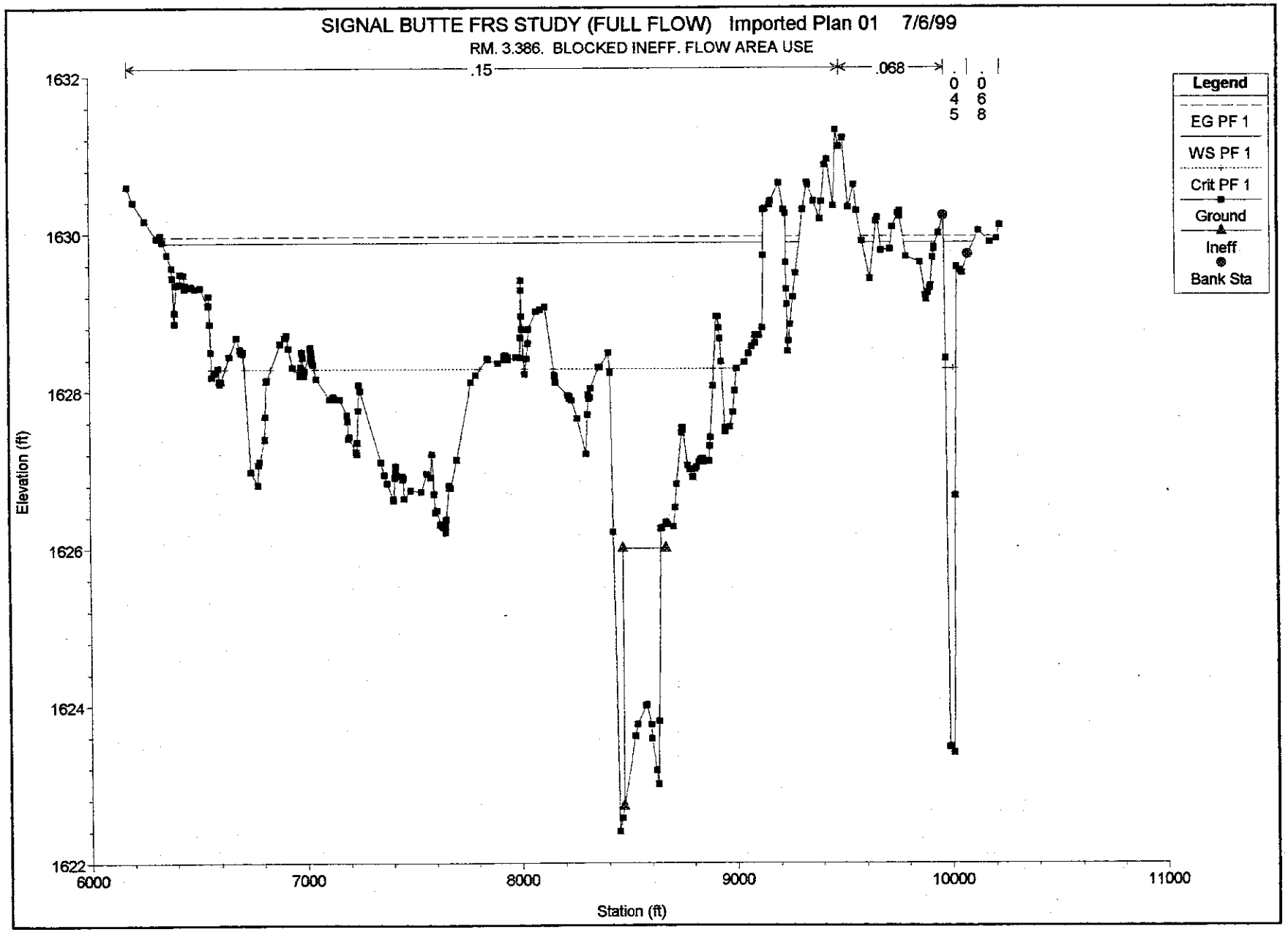

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.006. HORZ. N VALUES USED. HYDRA
.068
.15
.068
.1
.045
.1
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1614
1613
1612
1611
1610
1609
1608
1607
1606
5000
6000
7000
8000
9000
10000
11000
Station (ft)

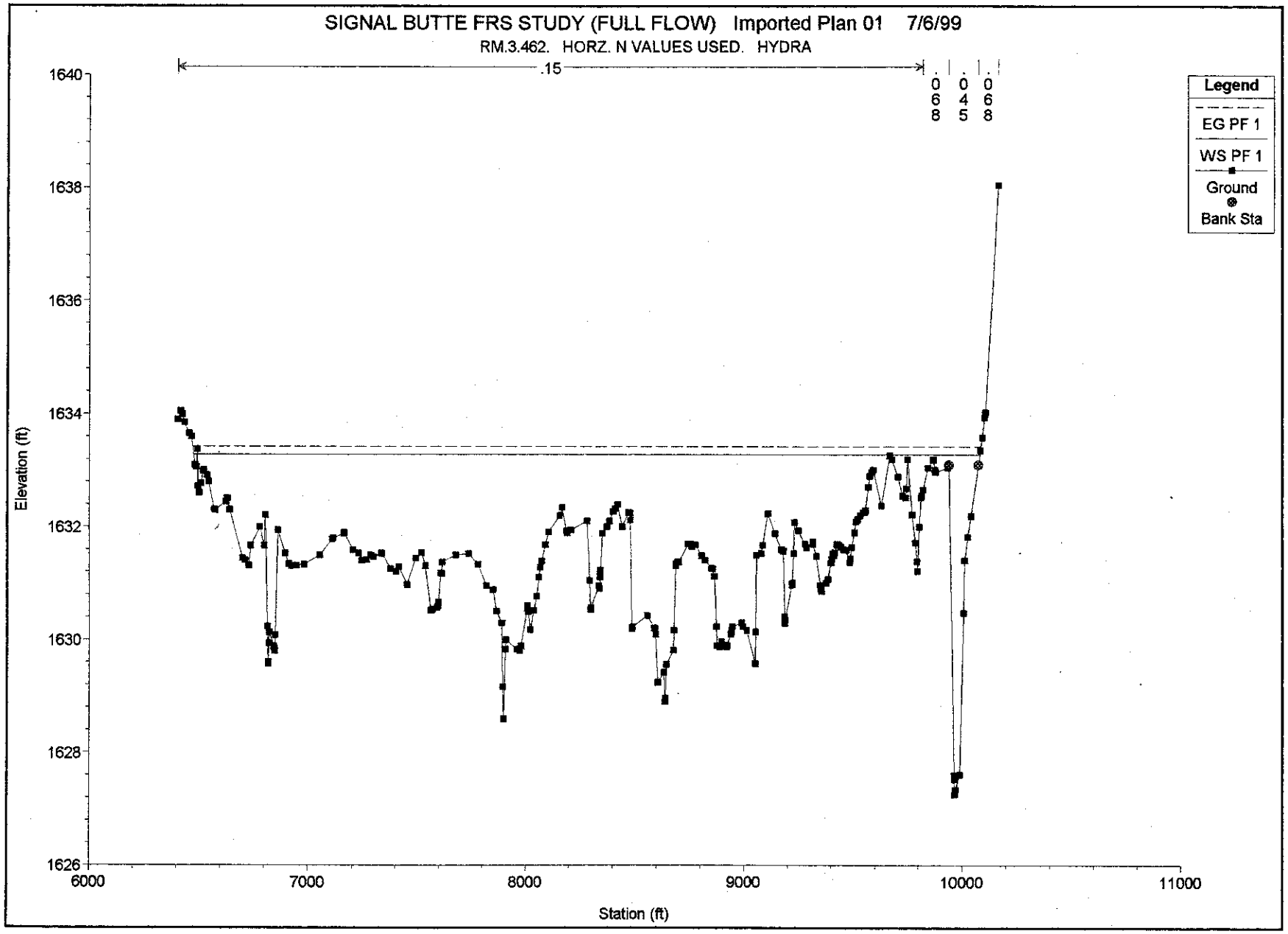

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.082. HORZ. N VALUES USED.
.15
.068
.12
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1618
1616
1614
1612
1610
1608
5000
6000
7000
8000
9000
10000
11000

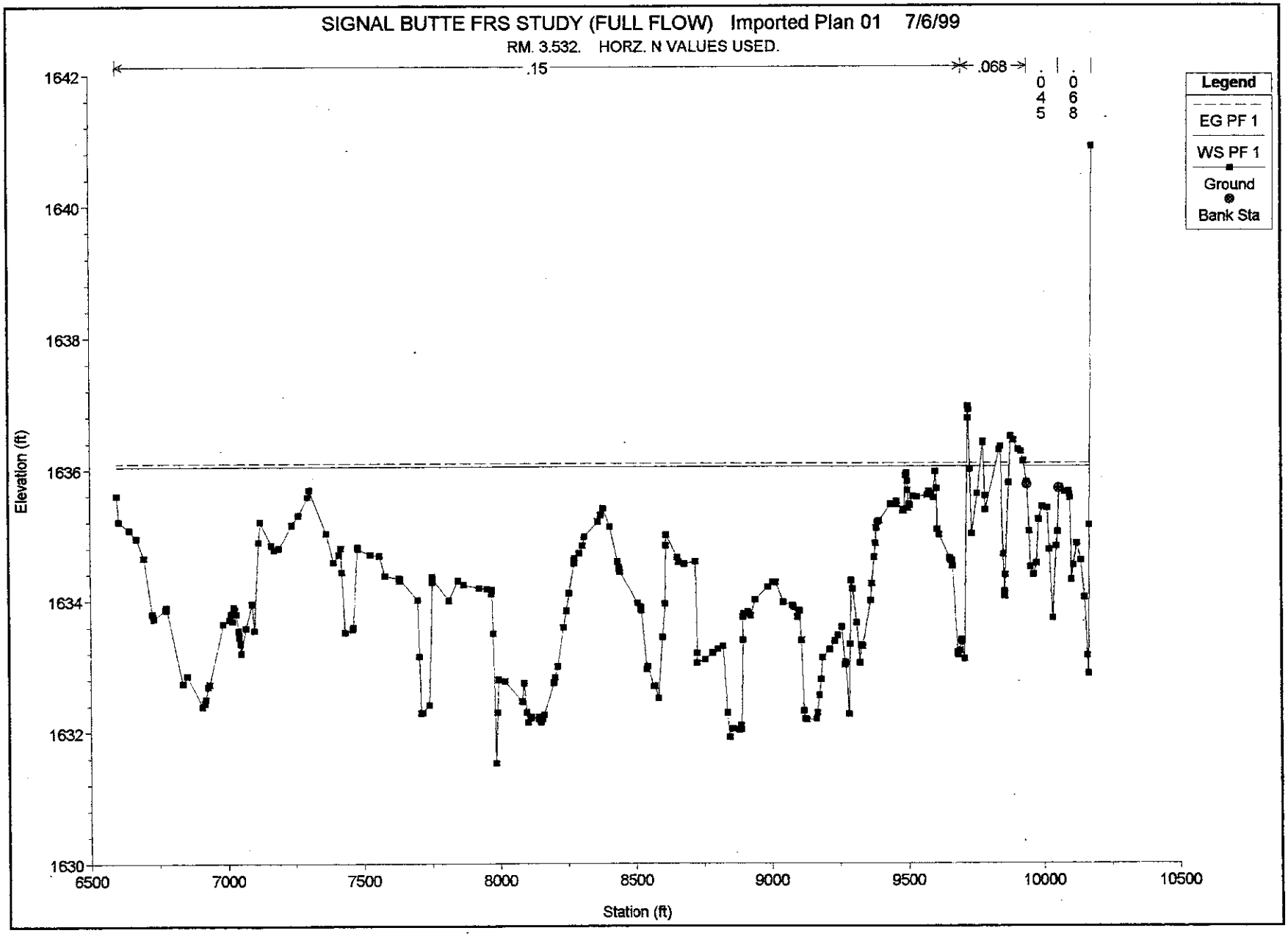

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.161. HORZ. N VALUES USED.
.15
.068
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1624
1622
1620
1618
1616
1614
5000
6000
7000
8000
9000
10000
11000
Station (ft)

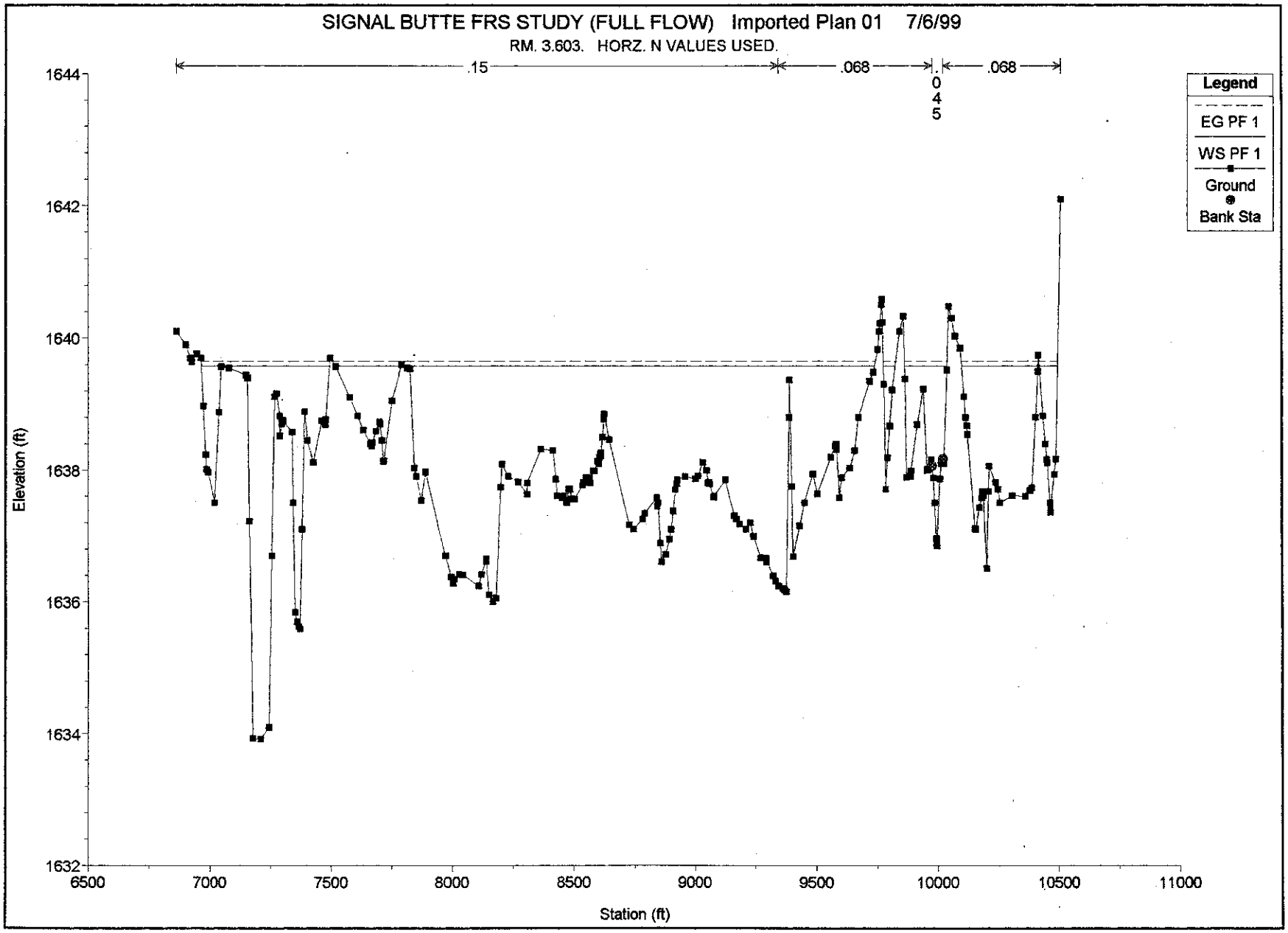

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.235. HORZ. N VALUES USED.
.15
.068
.12
.068
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1618
1619
1620
1621
1622
1623
1624
1625
1626
5000
6000
7000
8000
9000
10000
11000

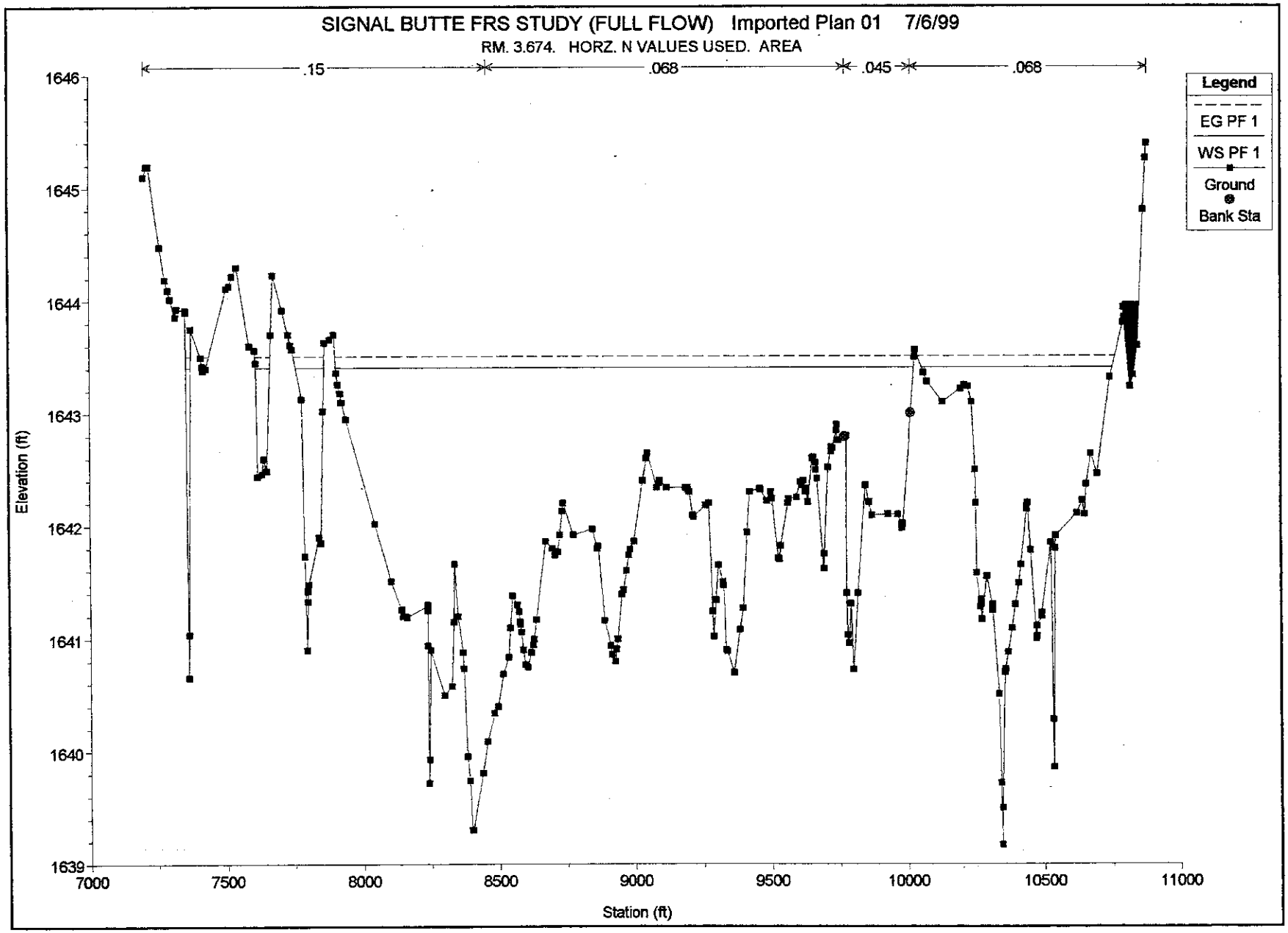

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.310. HORZ. N VALUES USED.
.15
.1
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1630
1628
1626
1624
1622
1620
6000
7000
8000
9000
10000
11000
Station (ft)

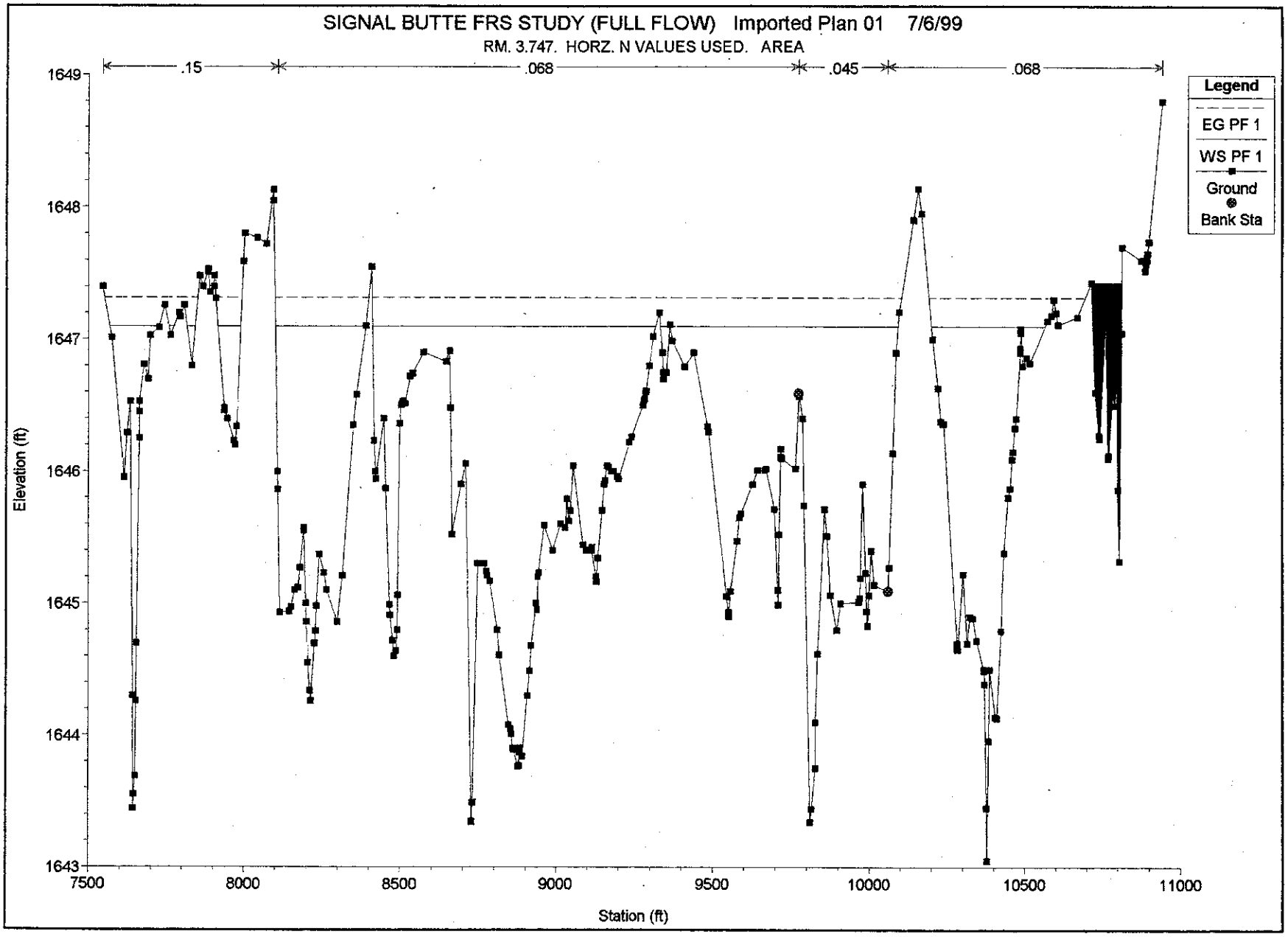

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.386. BLOCKED INEFF. FLOW AREA USE
.15
.068
0 0
4 6
5 8
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1632
1630
1628
1626
1624
1622
6000
7000
8000
9000
10000
11000
Station (ft)

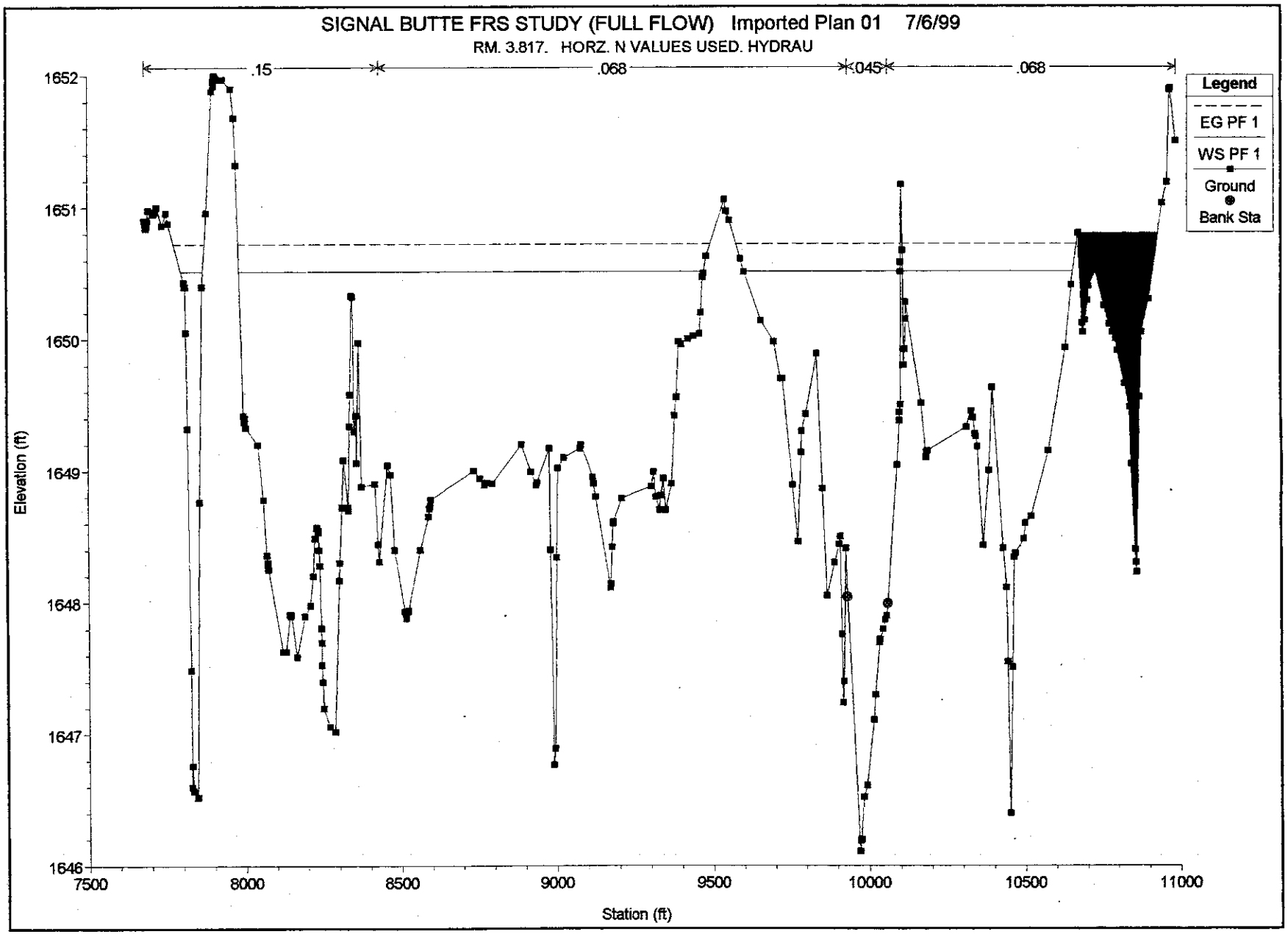

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.3.462. HORZ. N VALUES USED. HYDRA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1640
1638
1636
1634
1632
1630
1628
1626
6000
7000
8000
9000
10000
11000
Station (ft)

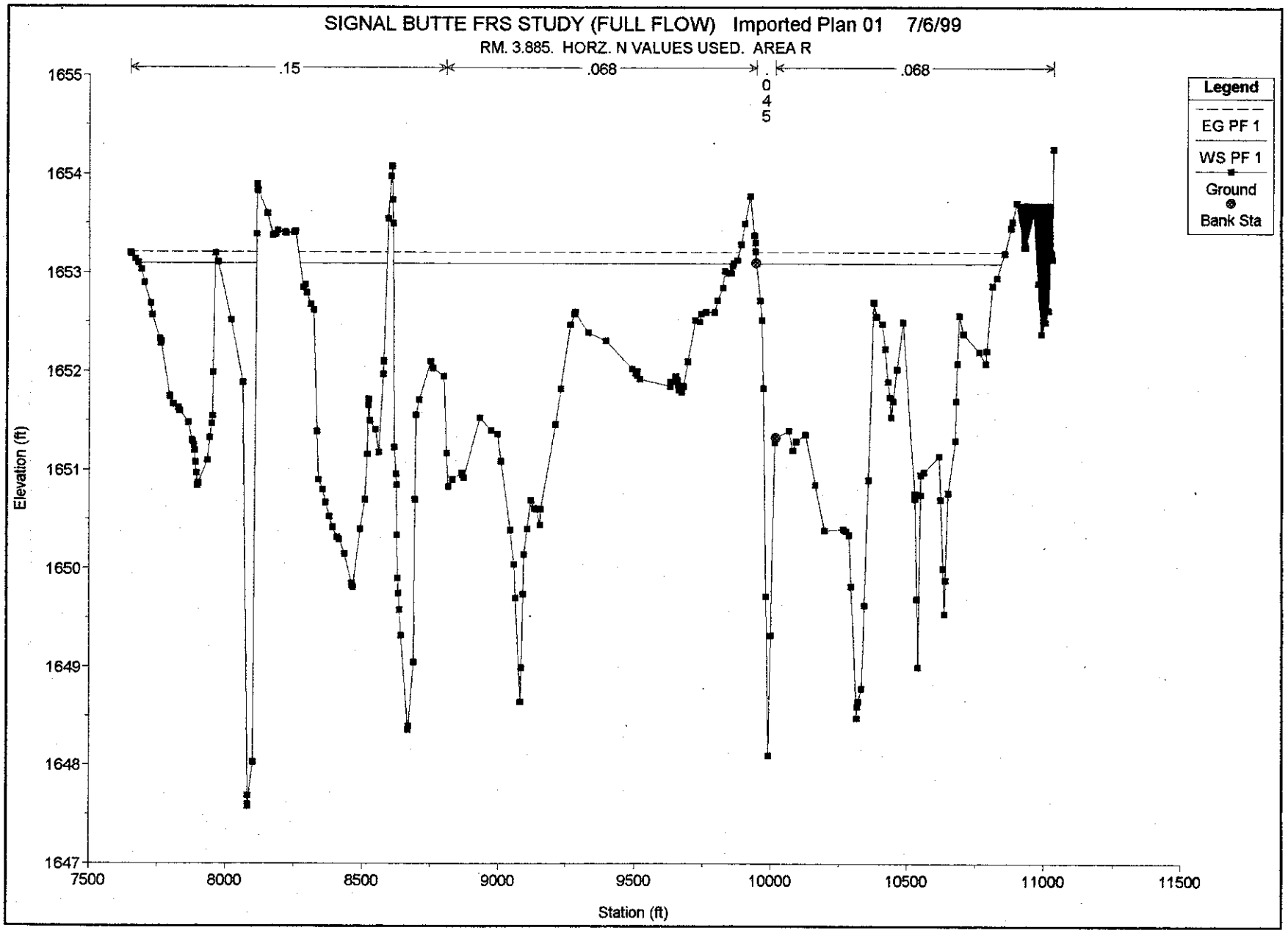

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.532. HORZ. N VALUES USED.
.15
.068
0 0
4 6
5 8
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1642
1640
1638
1636
1634
1632
1630
6500
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)

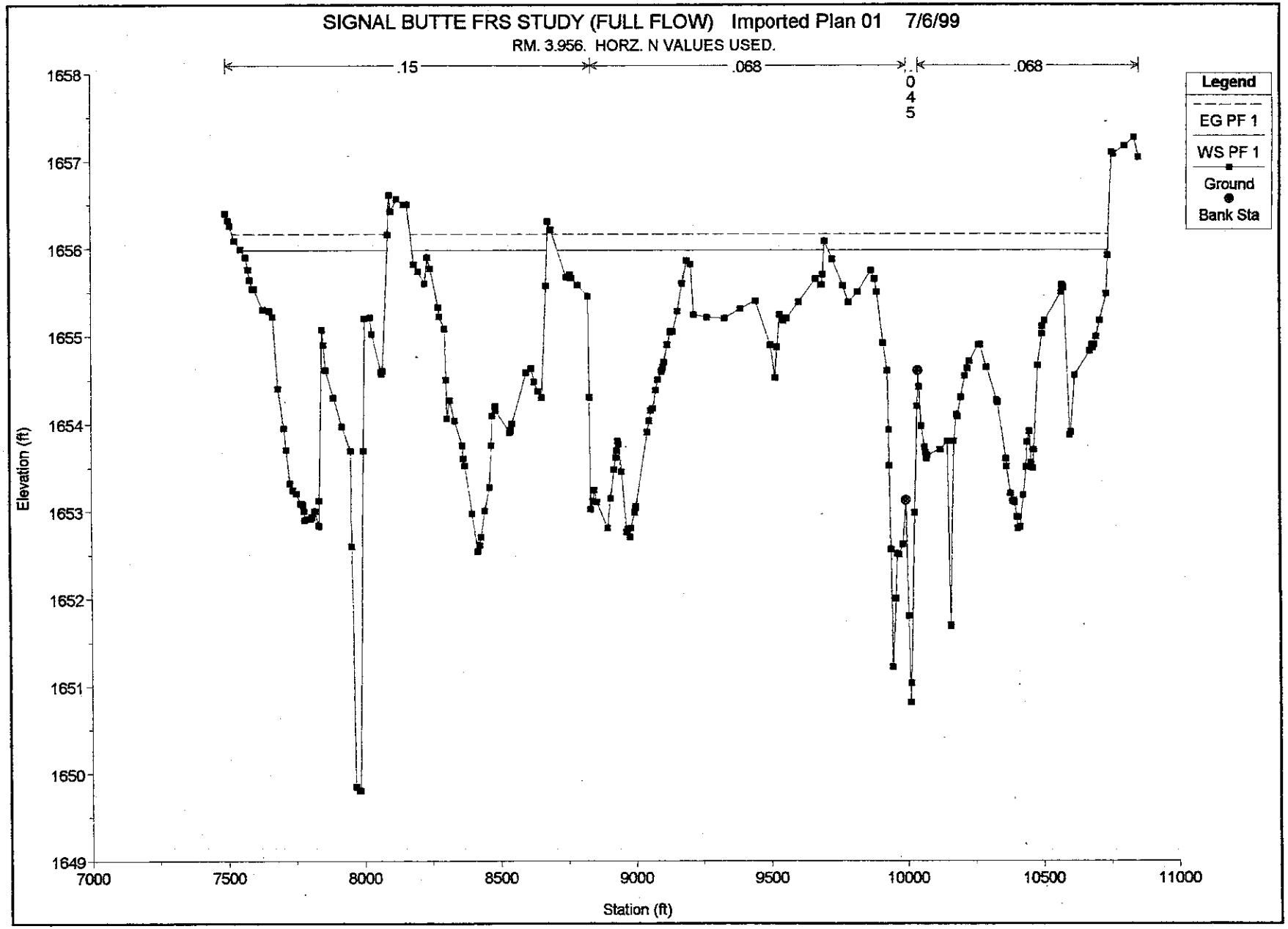

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.603. HORZ. N VALUES USED.
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1644
1642
1640
1638
1636
1634
1632
6500
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

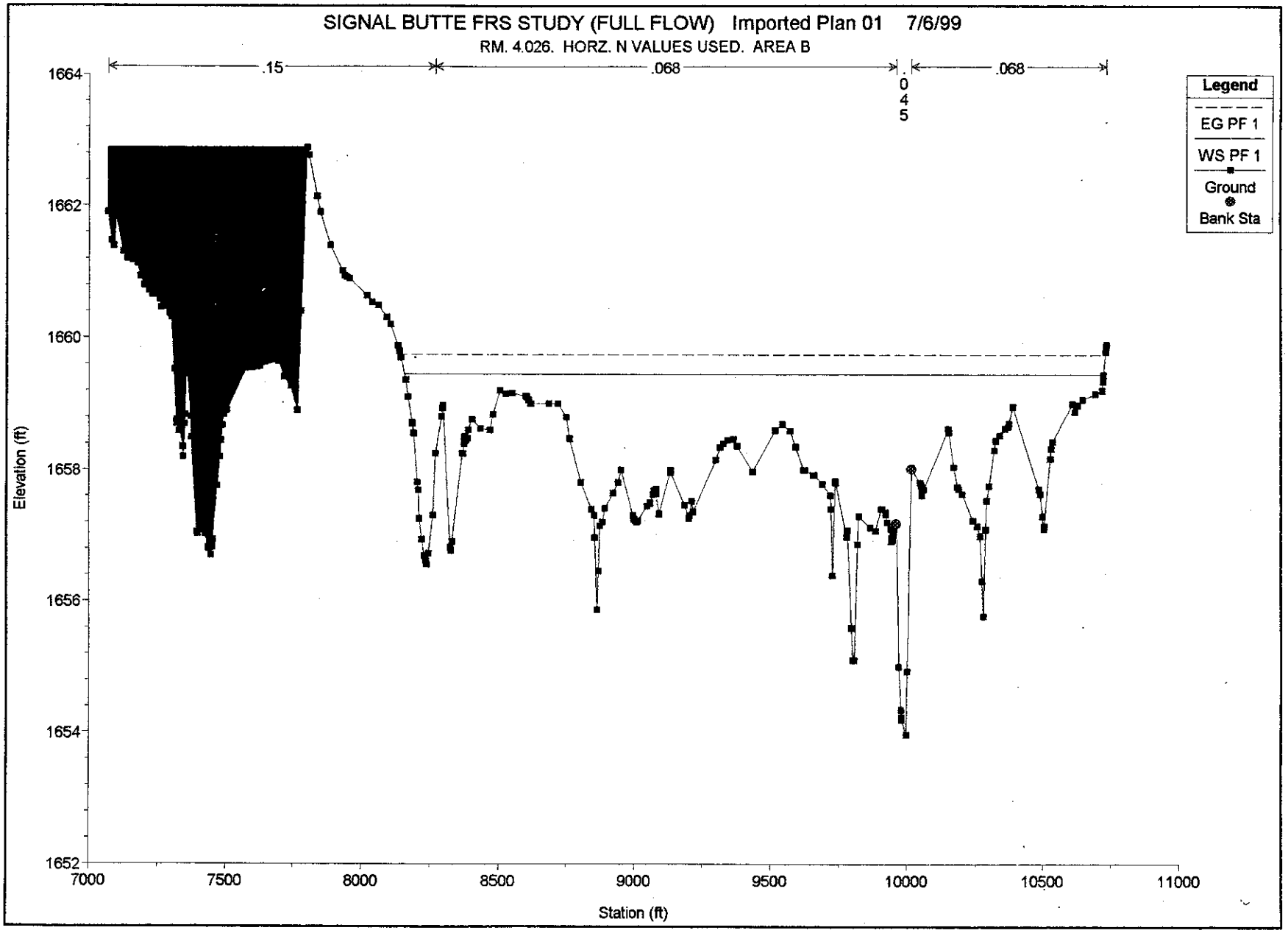

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.674. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1646
1645
1644
1643
1642
1641
1640
1639
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

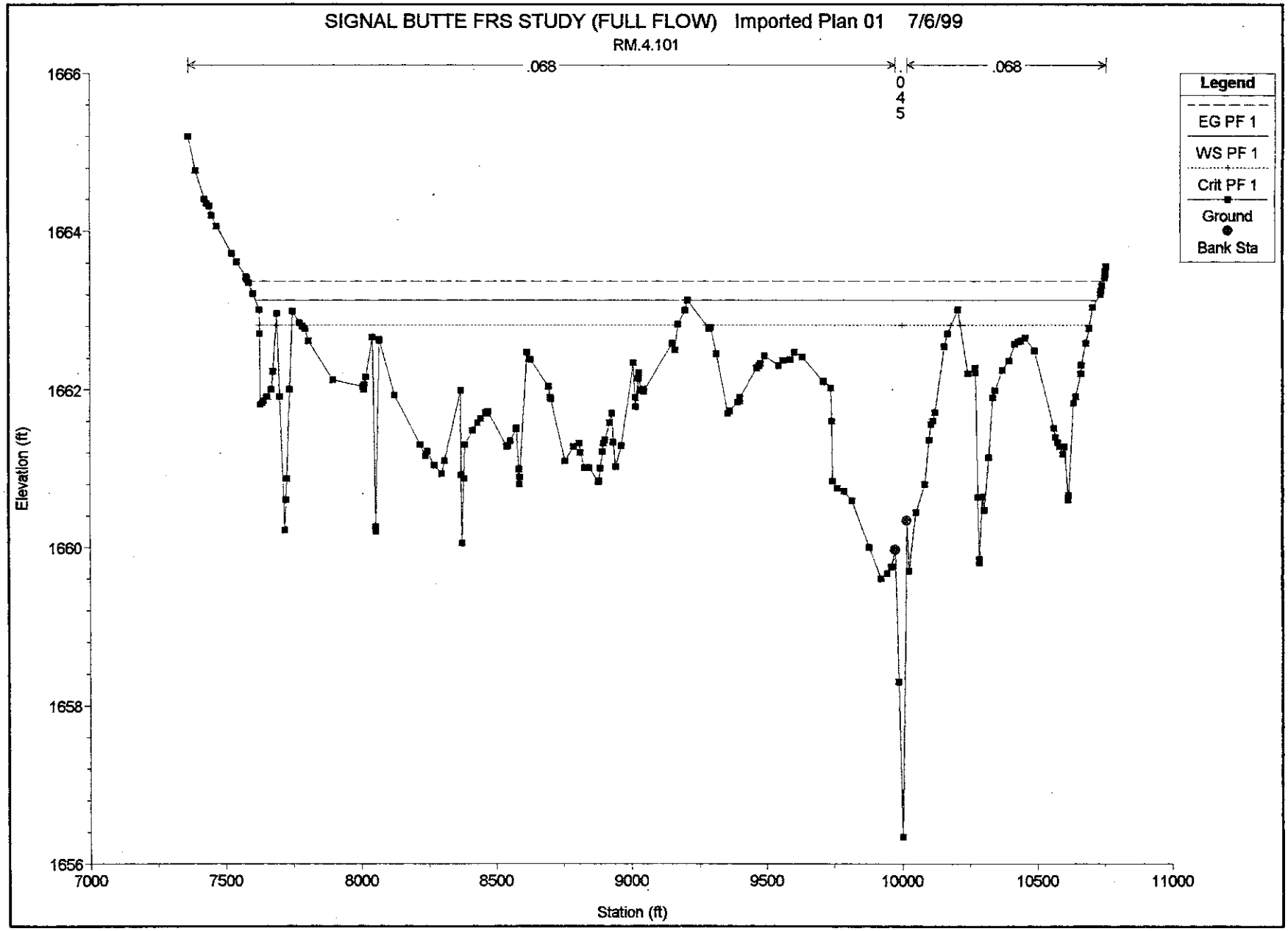

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.747. HORZ. N VALUES USED. AREA
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1649
1648
1647
1646
1645
1644
1643
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

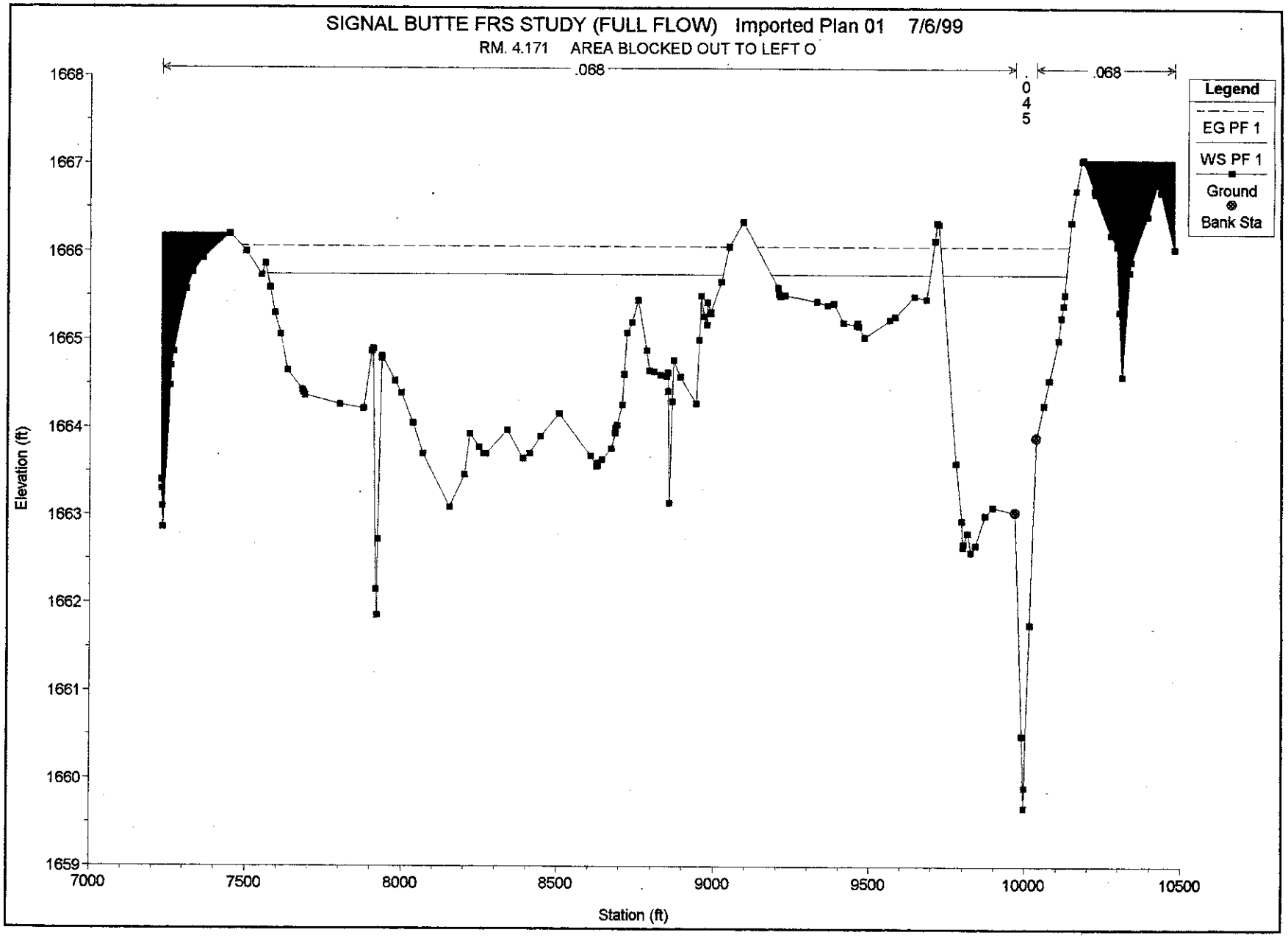

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.817. HORZ. N VALUES USED. HYDRAU
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1652
1651
1650
1649
1648
1647
1646
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

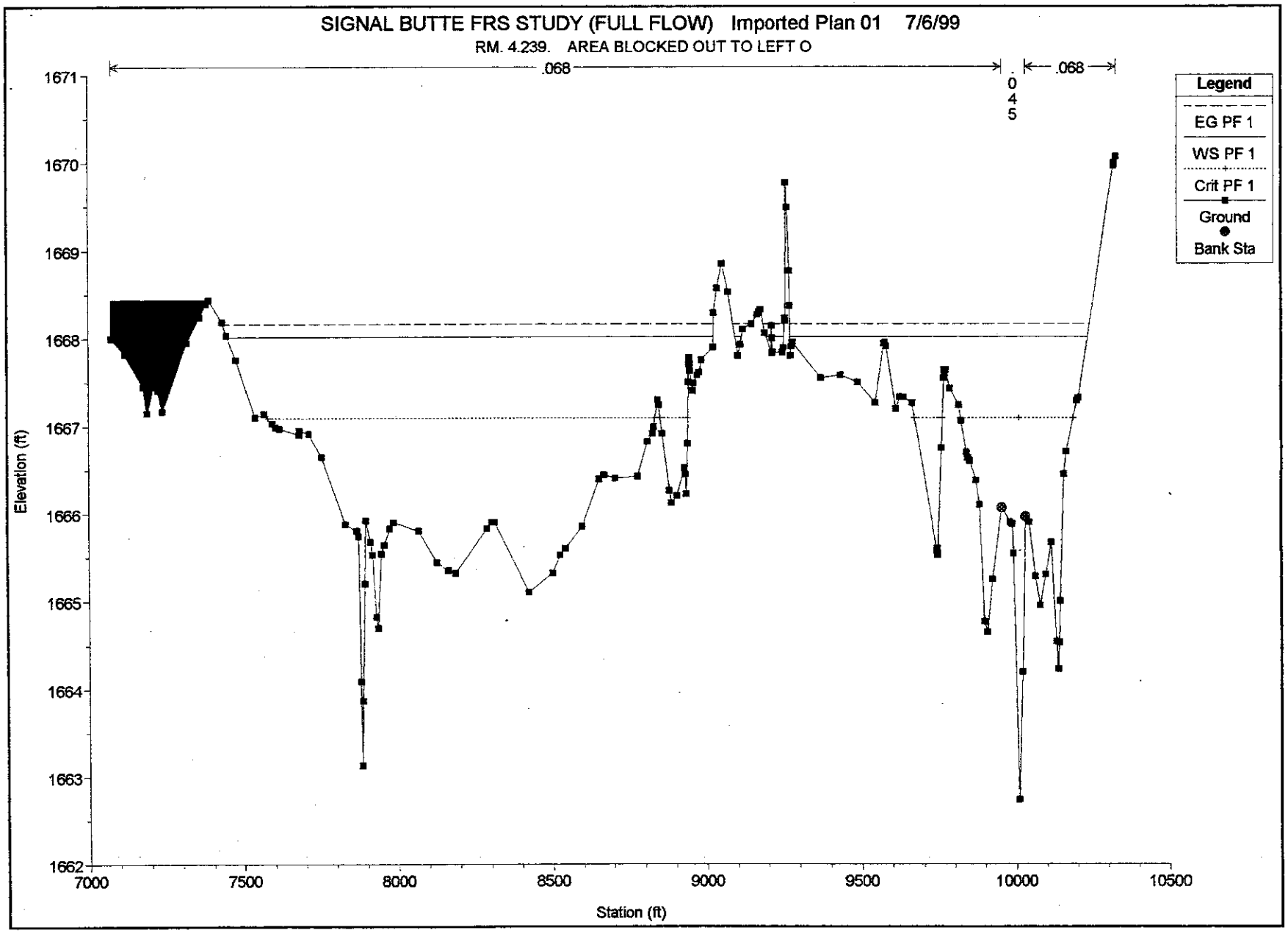

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.885. HORZ. N VALUES USED. AREA R
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1655
1654
1653
1652
1651
1650
1649
1648
1647
7500
8000
8500
9000
9500
10000
10500
11000
11500
Station (ft)

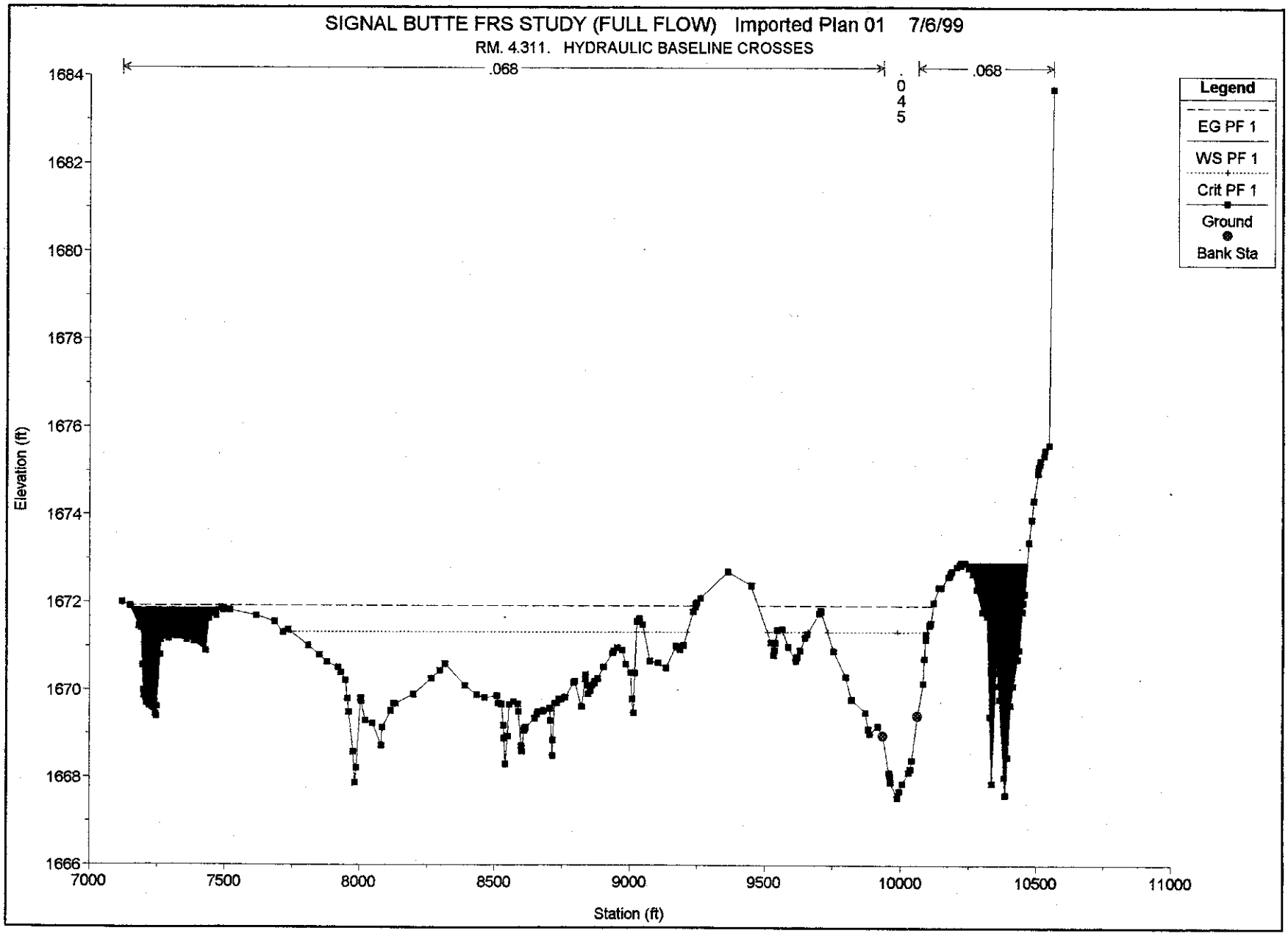

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 3.956. HORZ. N VALUES USED.
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1658
1657
1656
1655
1654
1653
1652
1651
1650
1649
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

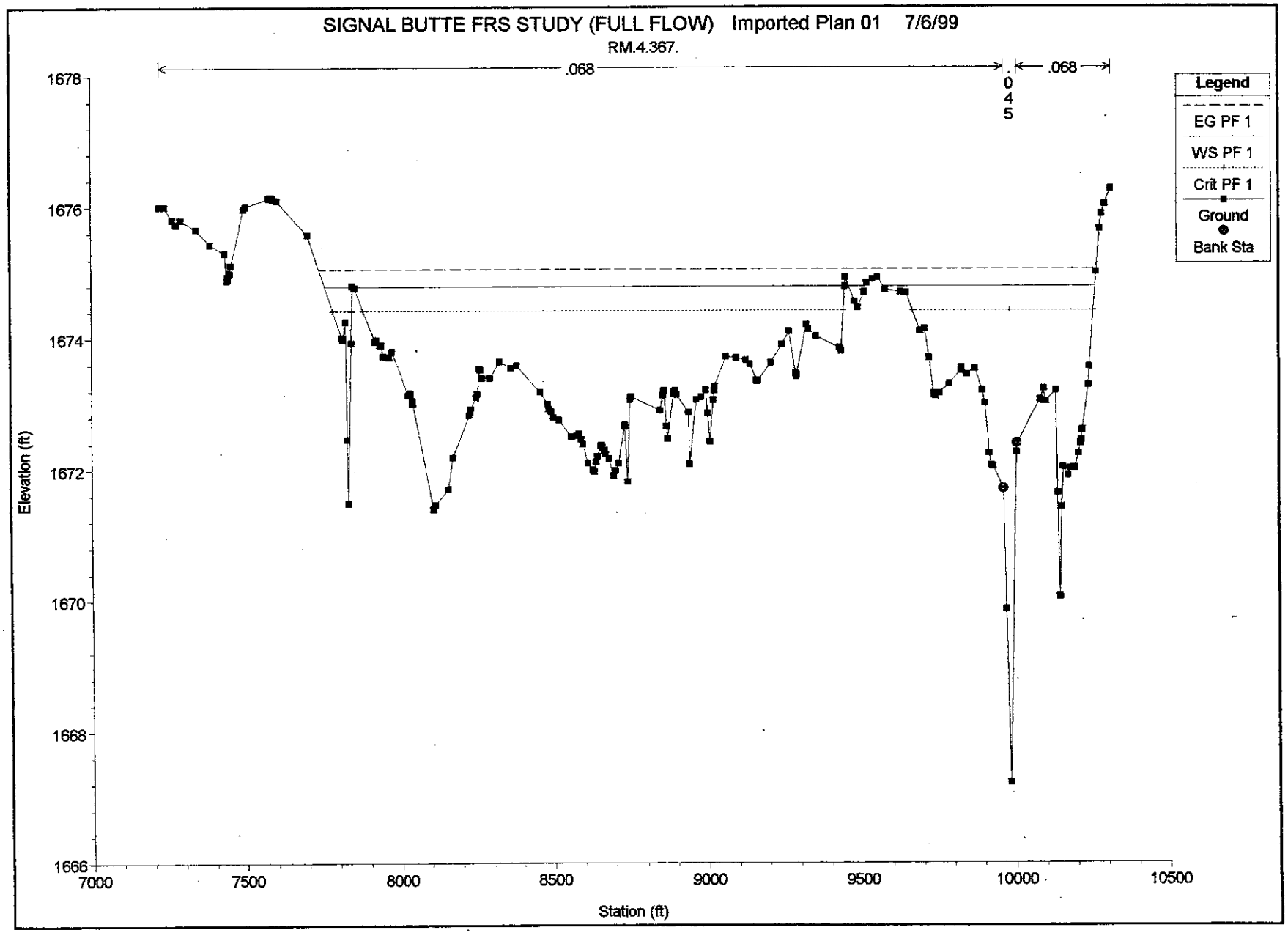

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.026. HORZ. N VALUES USED. AREA B
.15
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1664
1662
1660
1658
1656
1654
1652
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

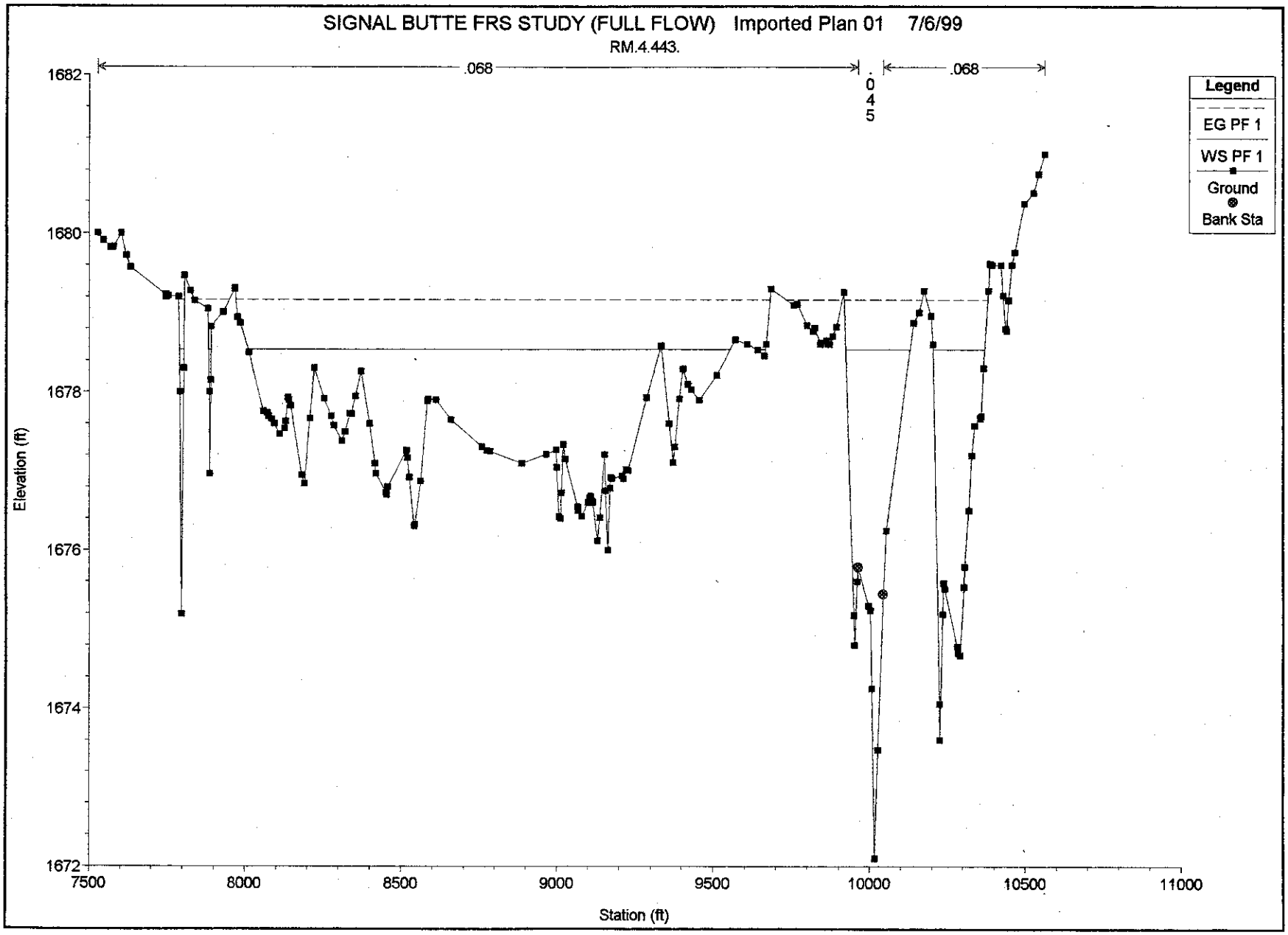

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.4.101
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1666
1664
1662
1660
1658
1656
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.171 AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1668
1667
1666
1665
1664
1663
1662
1661
1660
1659
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.239. AREA BLOCKED OUT TO LEFT O
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1671
1670
1669
1668
1667
1666
1665
1664
1663
1662
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.311. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
1672
1670
1668
1666
7000
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.4.367.
.068
.068
0
4
5
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1678
1676
1674
1672
1670
1668
1666
7000
7500
8000
8500
9000
9500
10000
10500
Station (ft)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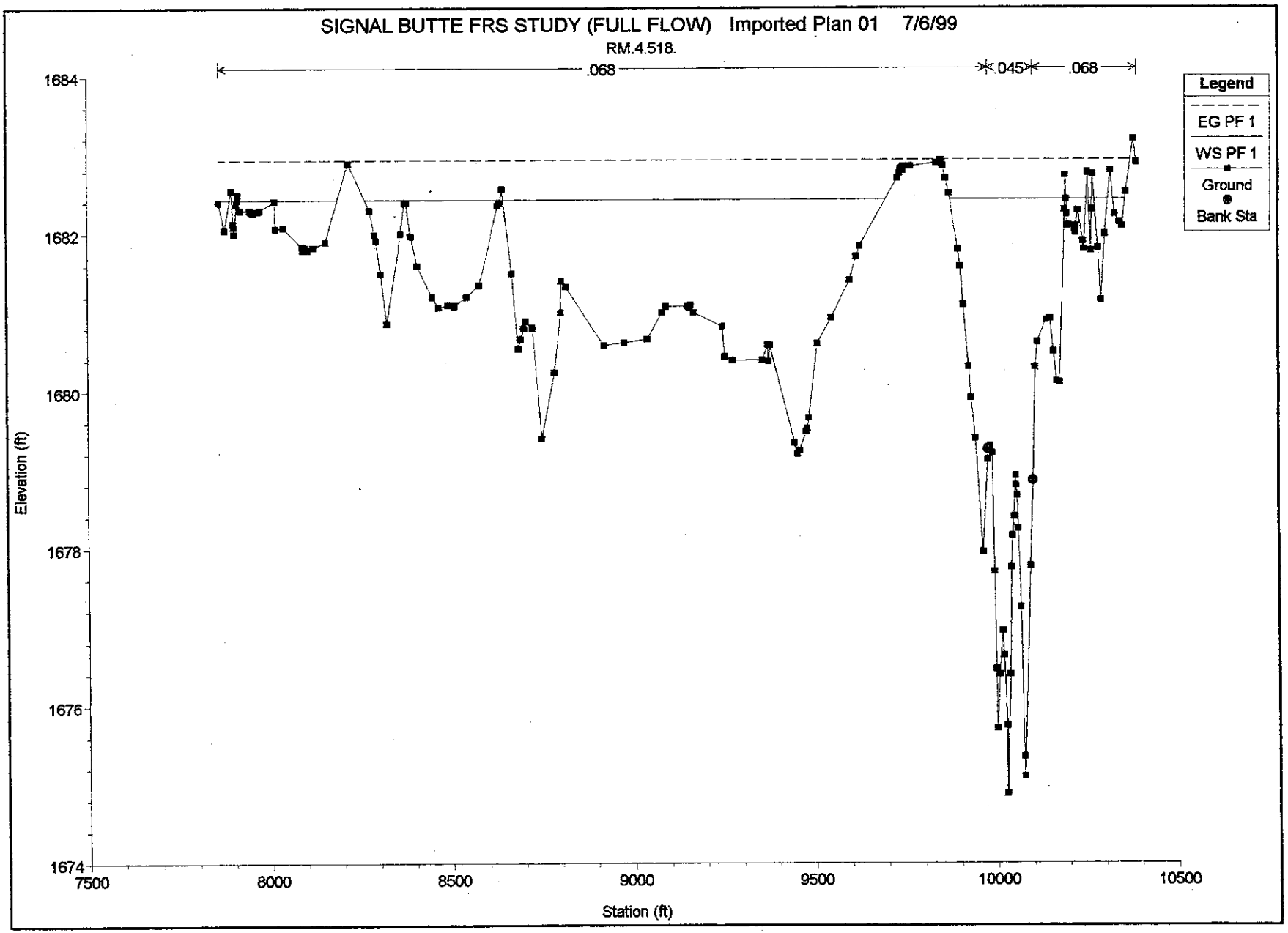
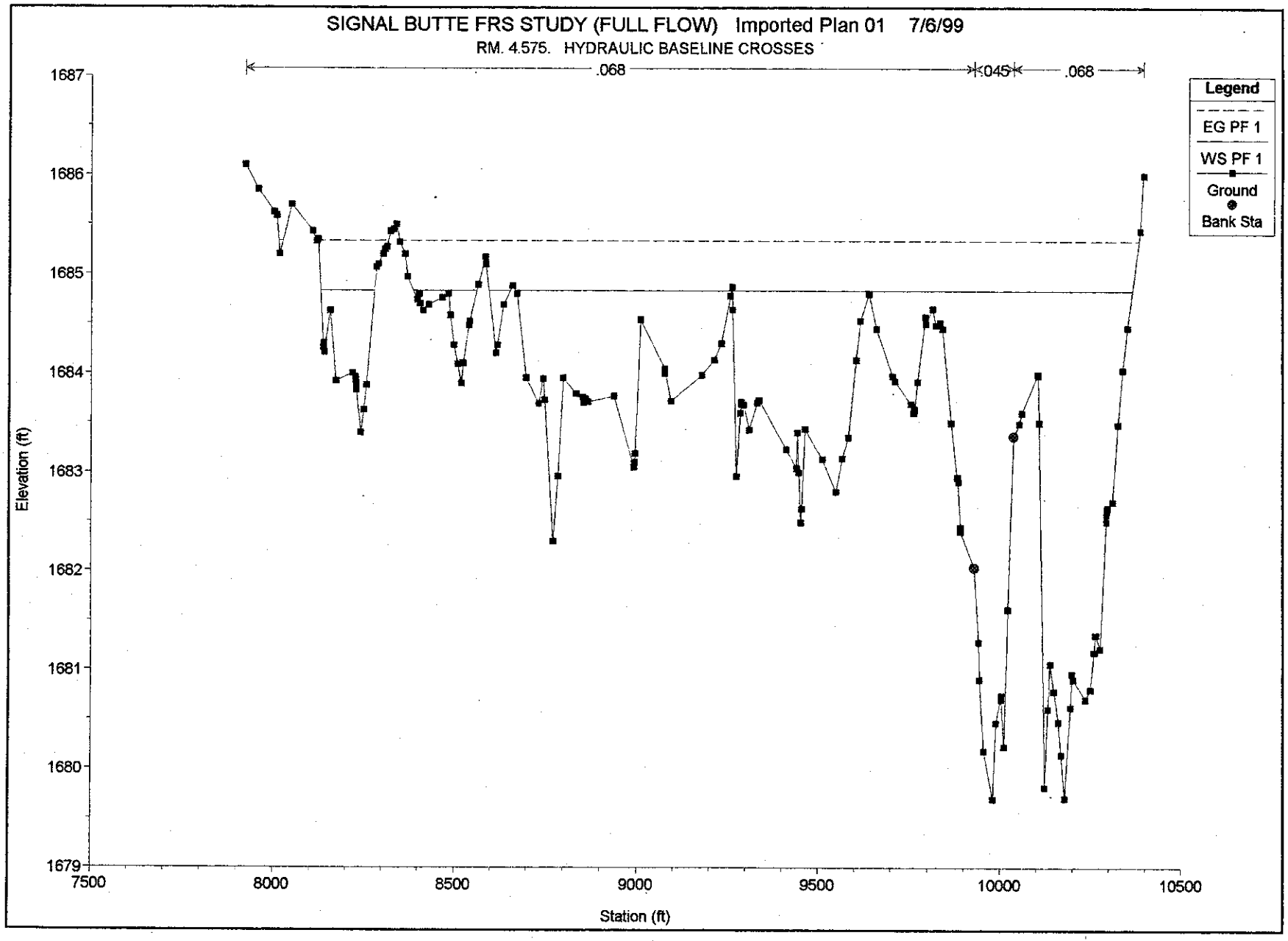
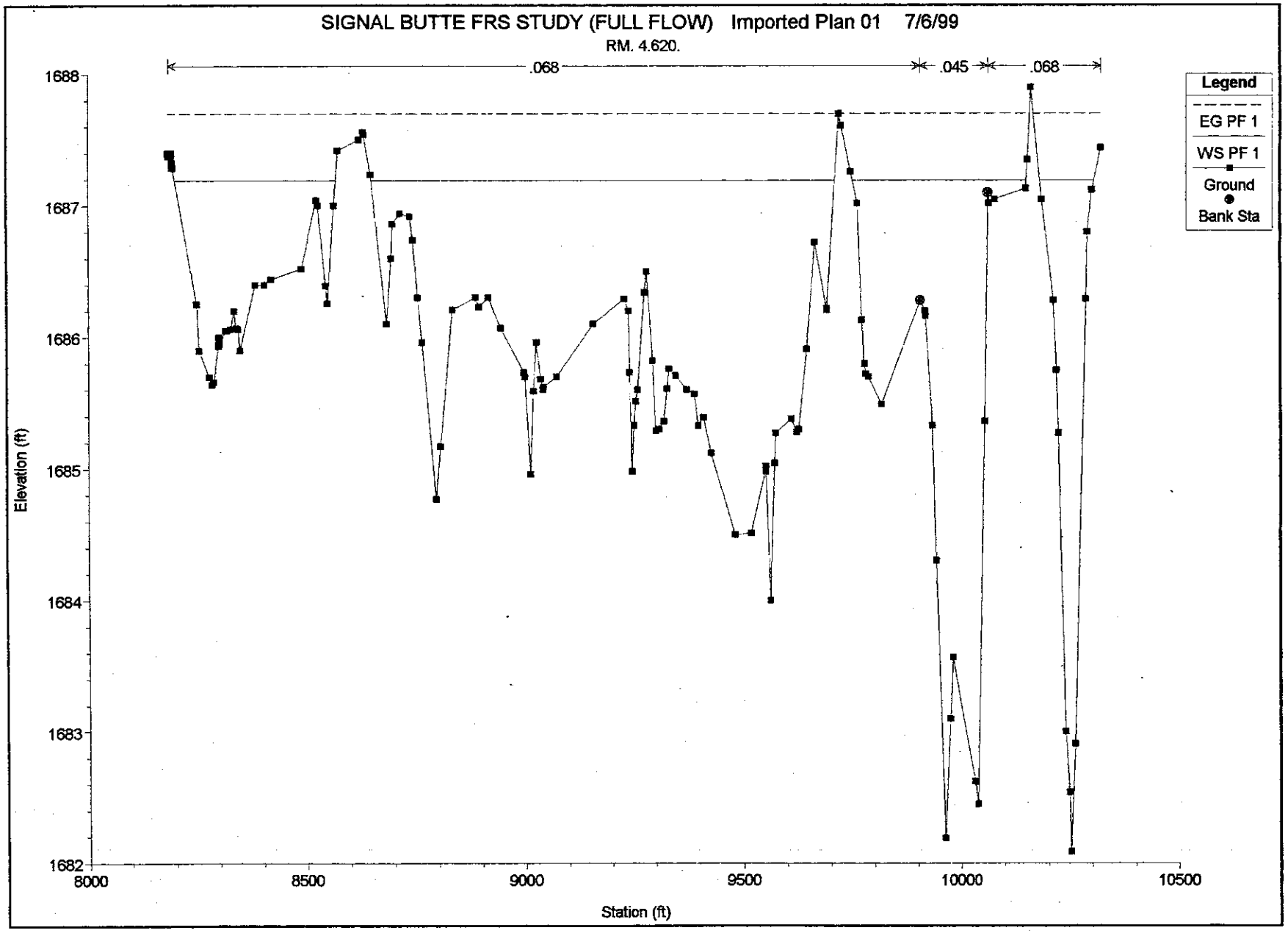
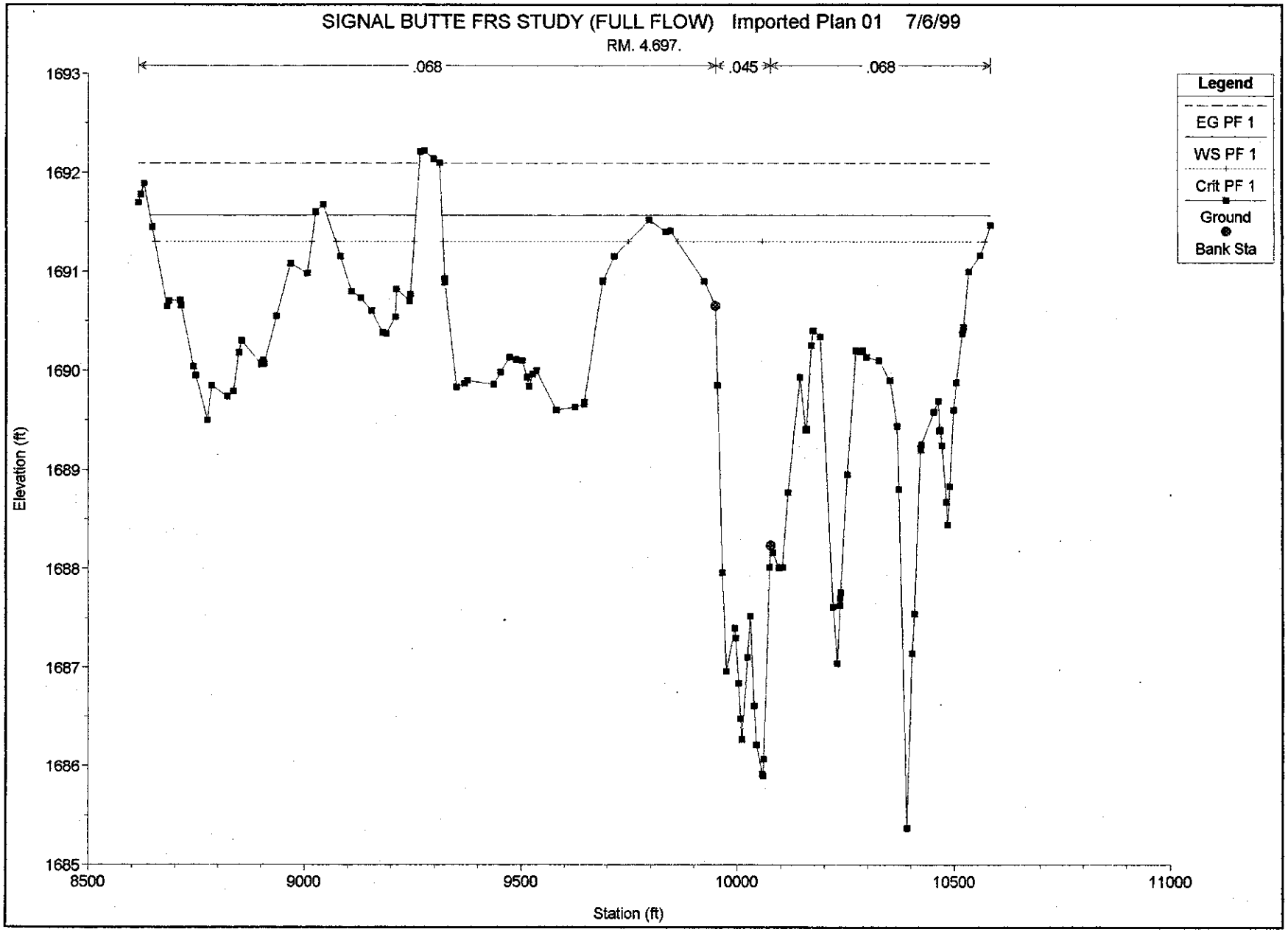
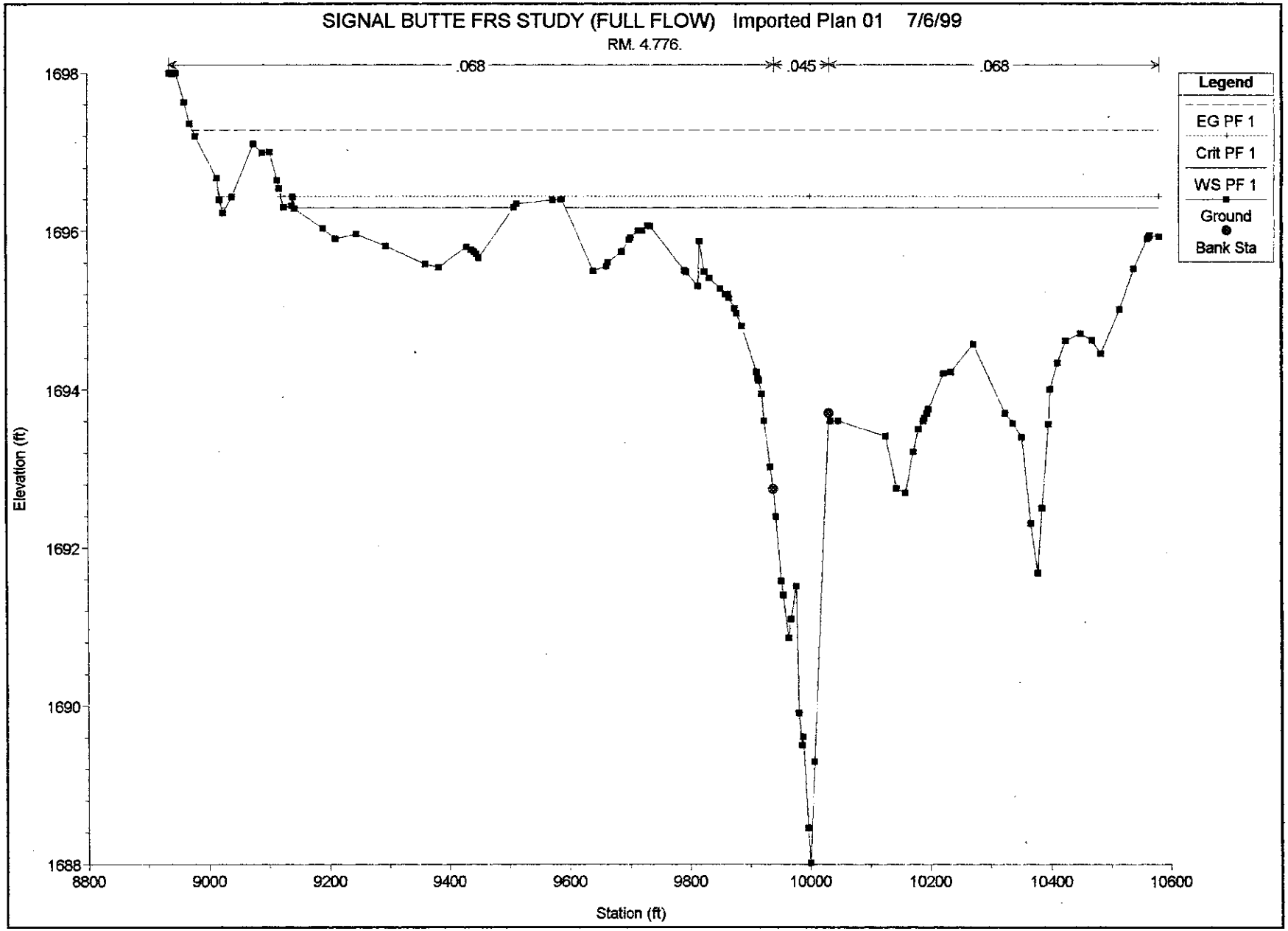
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1682
1680
1678
1676
1674
1672
7500
8000
8500
9000
9500
10000
10500
11000
Station (ft)

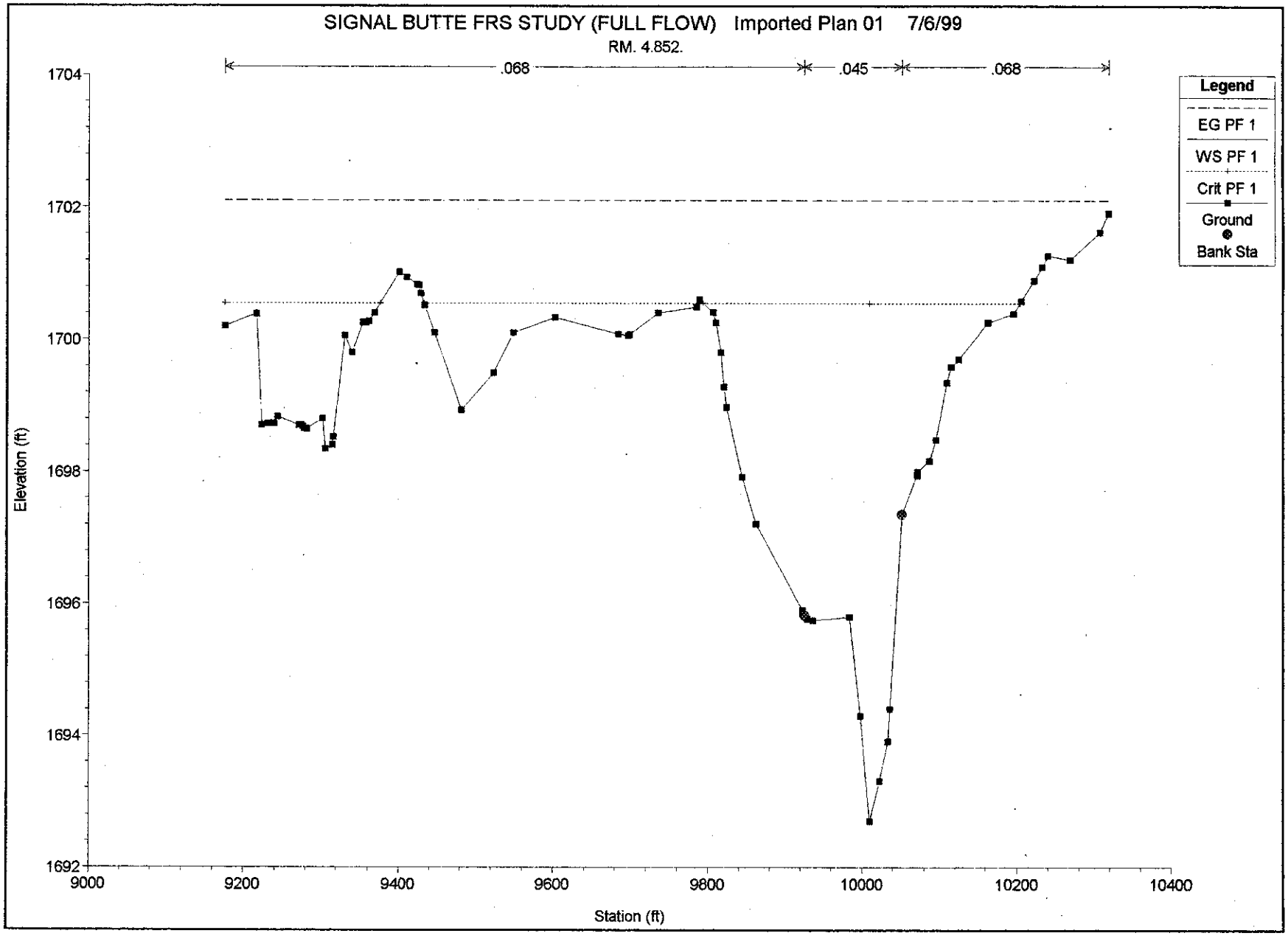

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.4.518.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1684
1682
1680
1678
1676
1674
7500
8000
8500
9000
9500
10000
10500
Station (ft)

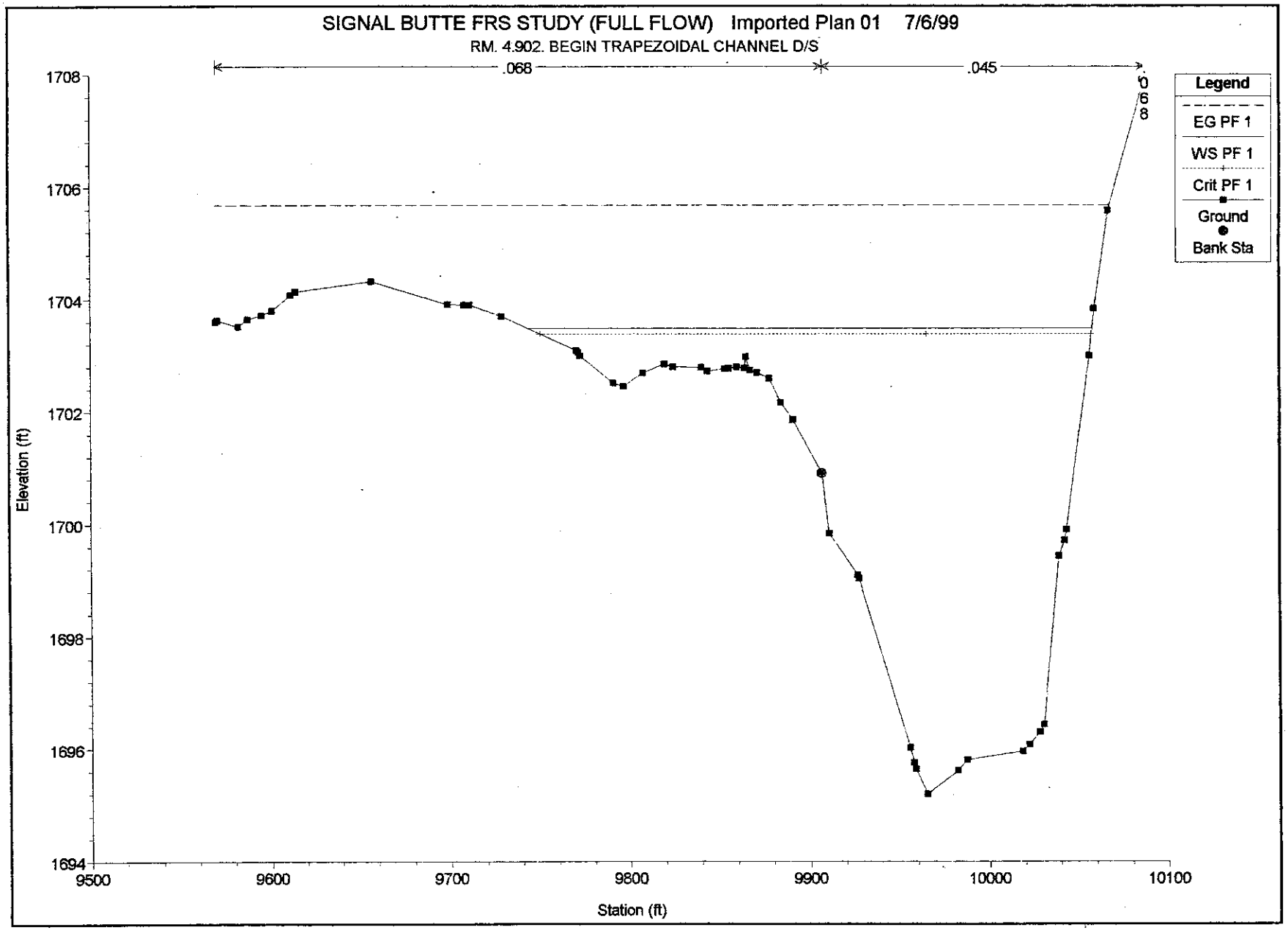

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.575. HYDRAULIC BASELINE CROSSES
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1687
1686
1685
1684
1683
1682
1681
1680
1679
7500
8000
8500
9000
9500
10000
10500
Station (ft)

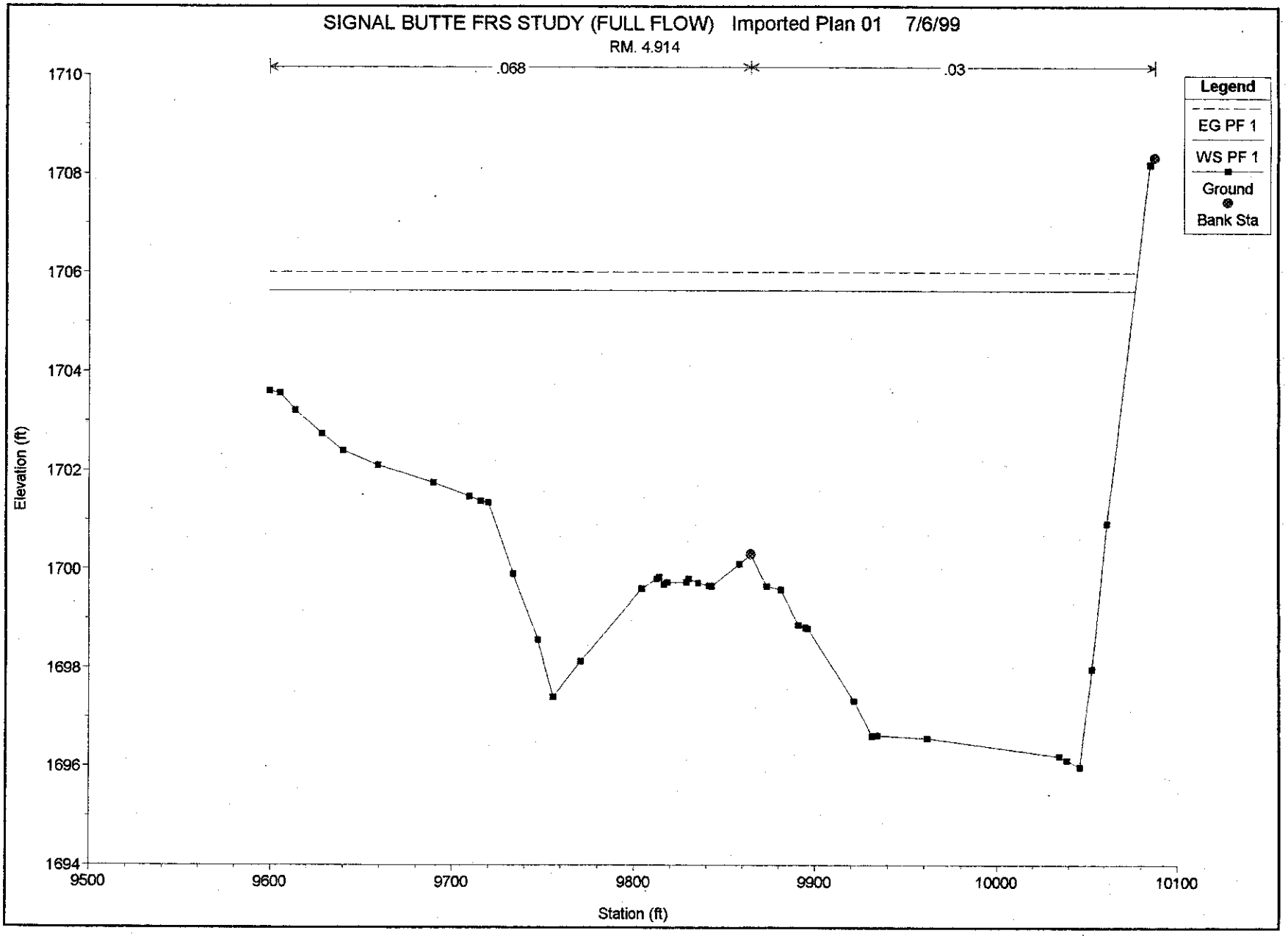

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.620.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1688
1687
1686
1685
1684
1683
1682
8000
8500
9000
9500
10000
10500
Station (ft)

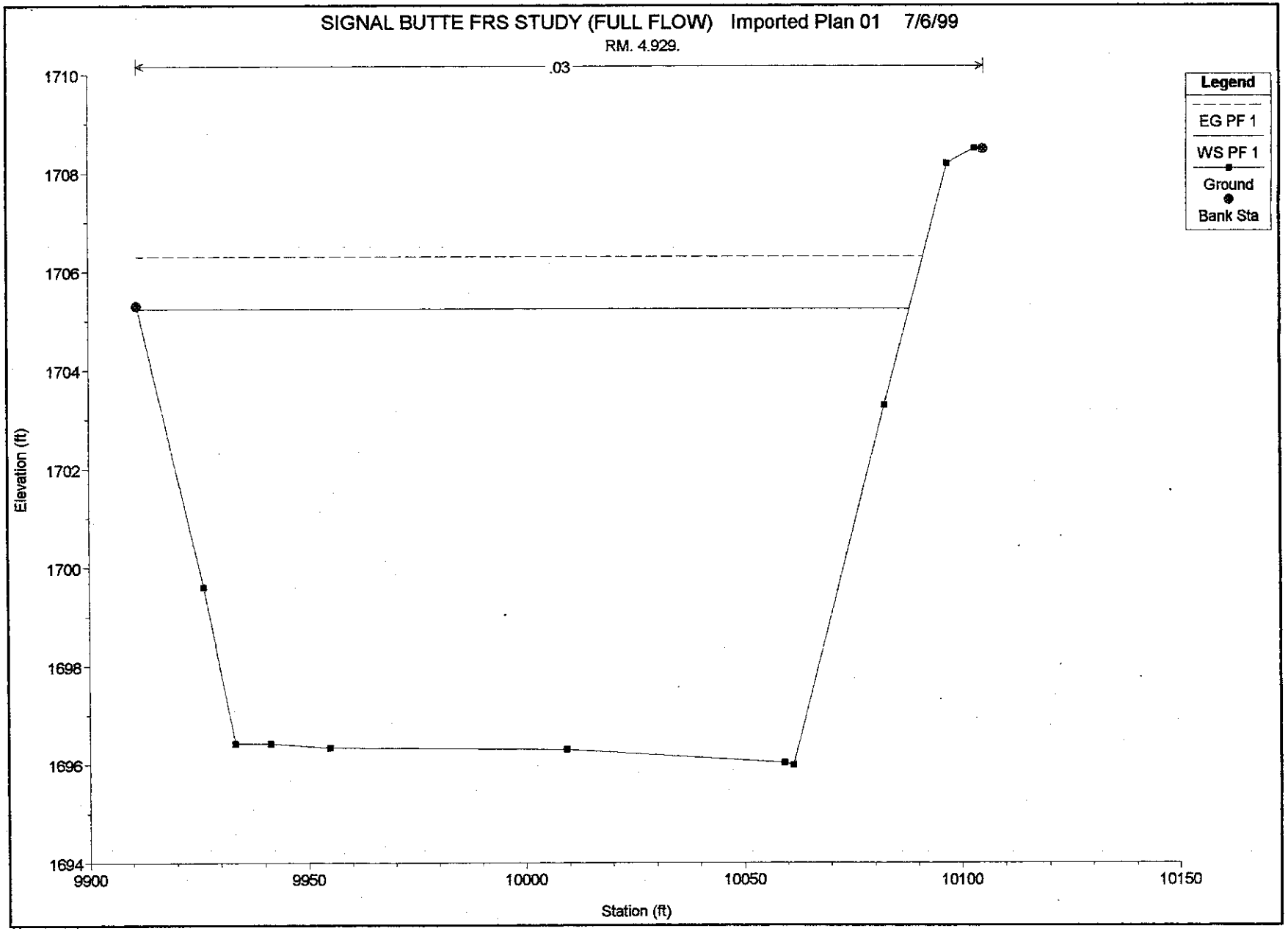

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.697.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1693
1692
1691
1690
1689
1688
1687
1686
1685
8500
9000
9500
10000
10500
11000
Station (ft)

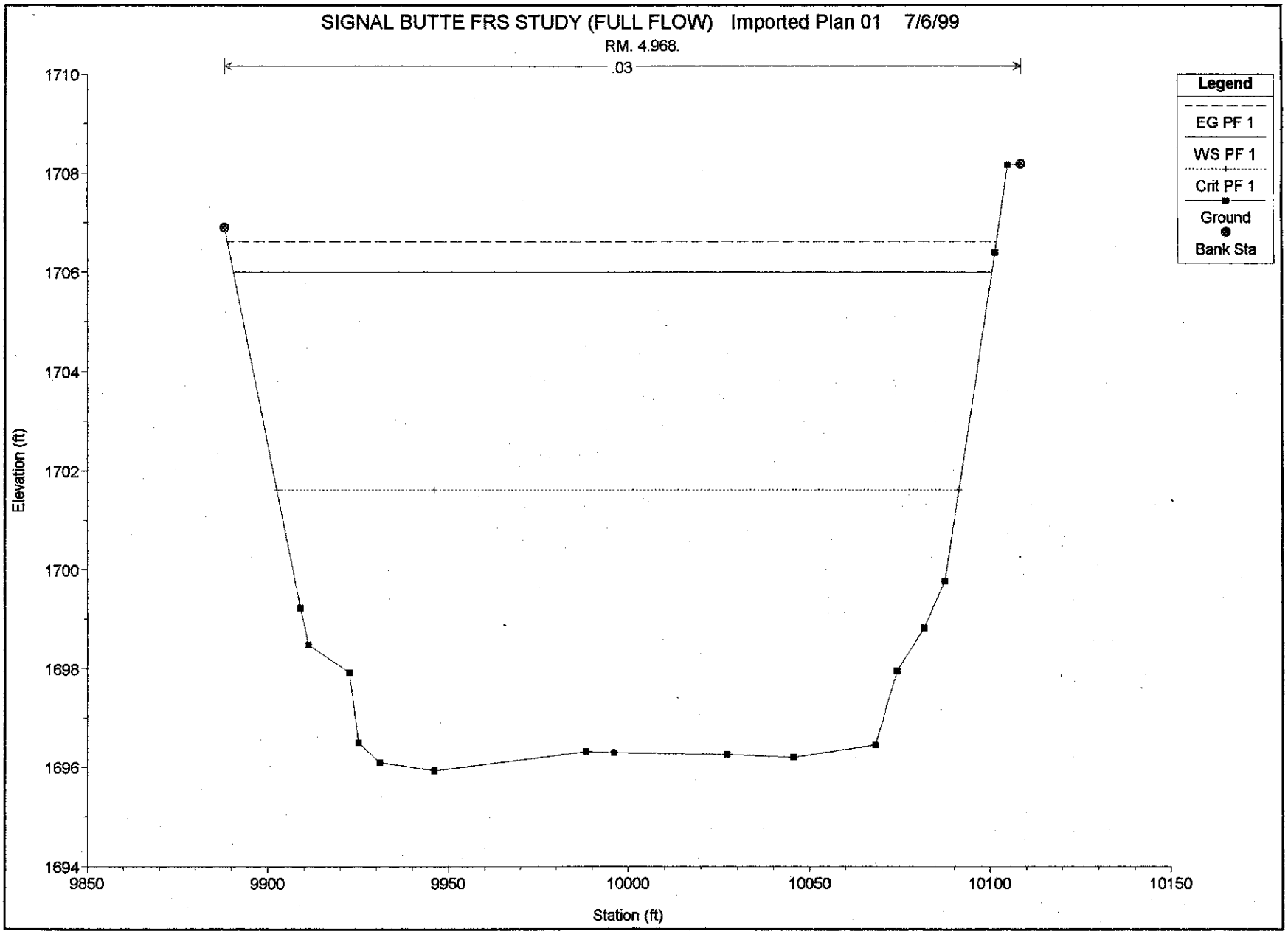

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.776.
.068
.045
.068
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1698
1696
1694
1692
1690
1688
8800
9000
9200
9400
9600
9800
10000
10200
10400
10600
Station (ft)

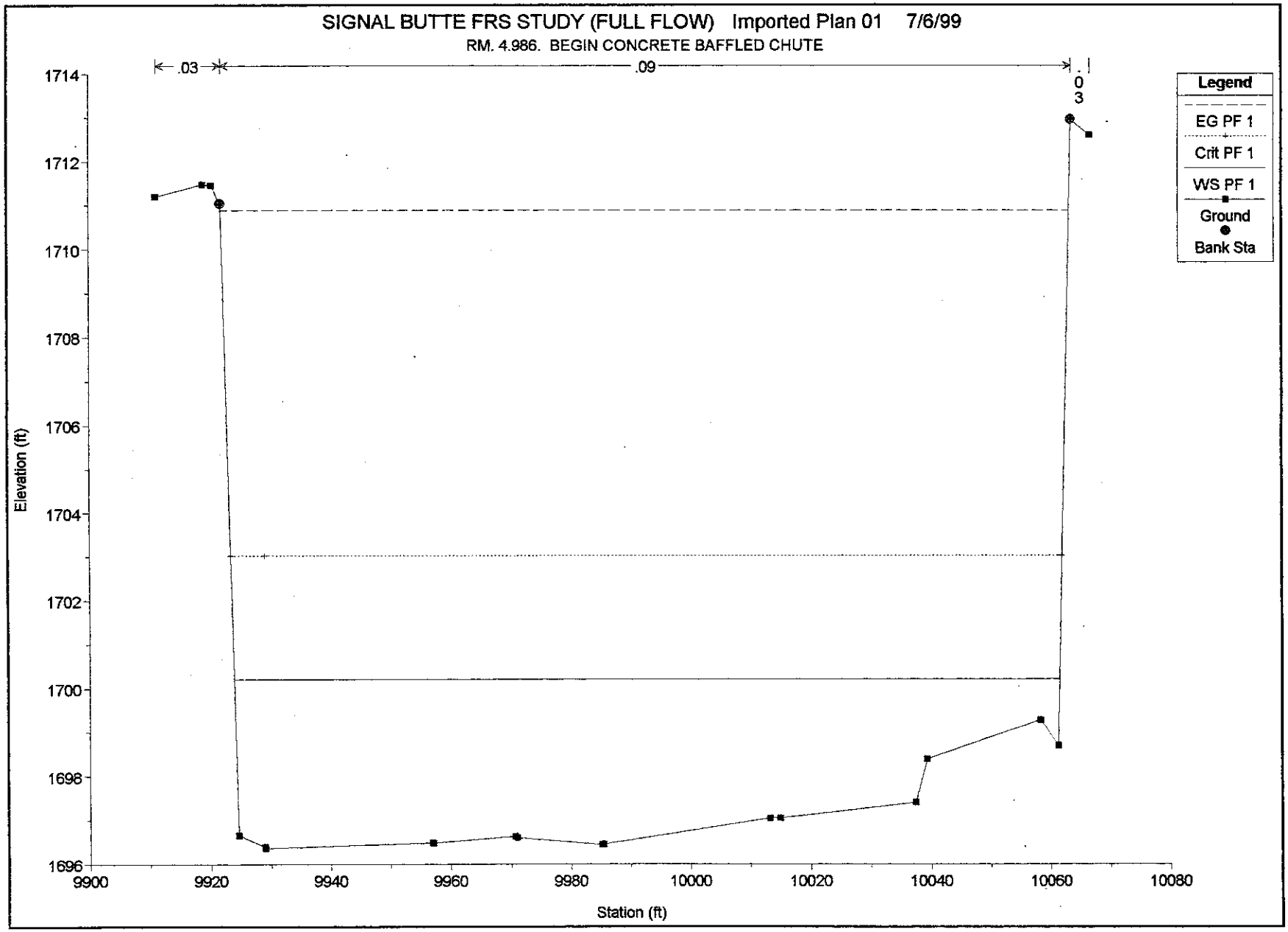

SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.852.
.068
.045
.068
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1704
1702
1700
1698
1696
1694
1692
9000
9200
9400
9600
9800
10000
10200
10400
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.902. BEGIN TRAPEZOIDAL CHANNEL D/S
.068
.045
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.914
.068
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9500
9600
9700
9800
9900
10000
10100
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.929.
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9900
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.968.
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1710
1708
1706
1704
1702
1700
1698
1696
1694
9850
9900
9950
10000
10050
10100
10150
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.986. BEGIN CONCRETE BAFFLED CHUTE
.03
.09
.1
0
3
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1714
1712
1710
1708
1706
1704
1702
1700
1698
1696
9900
9920
9940
9960
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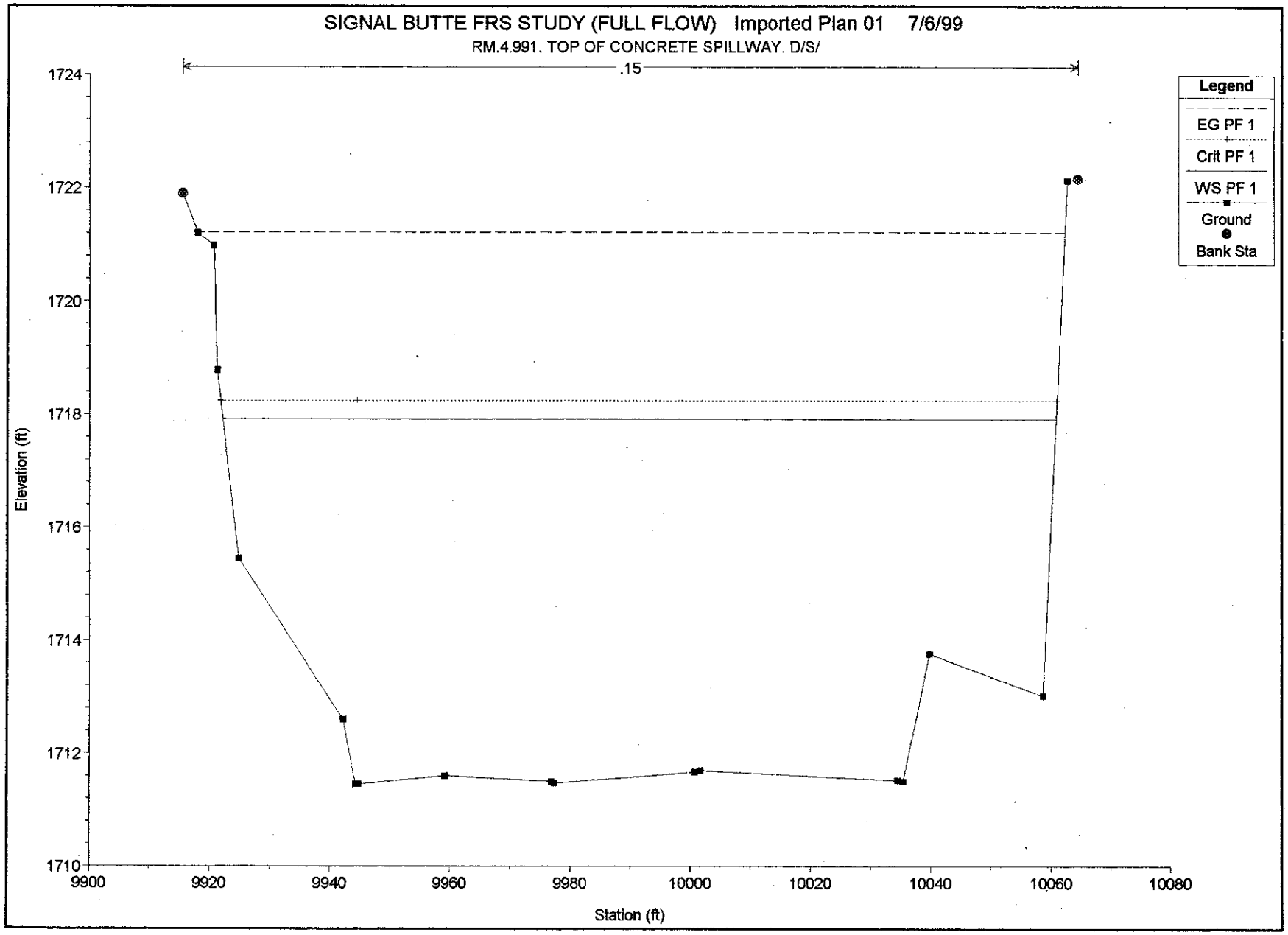
10000
10020
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.4.991. TOP OF CONCRETE SPILLWAY. D/S/
.15
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
1710
9900
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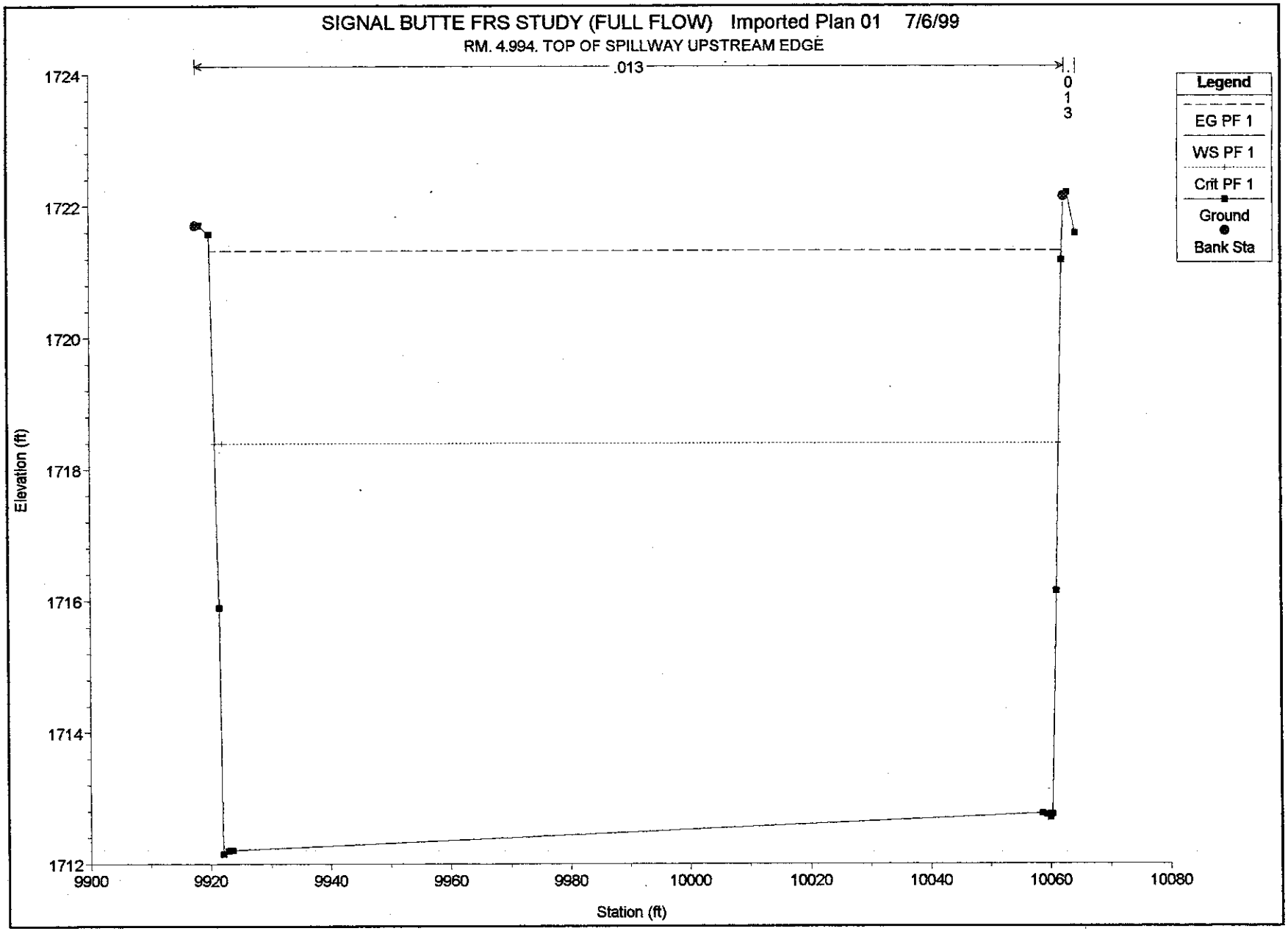
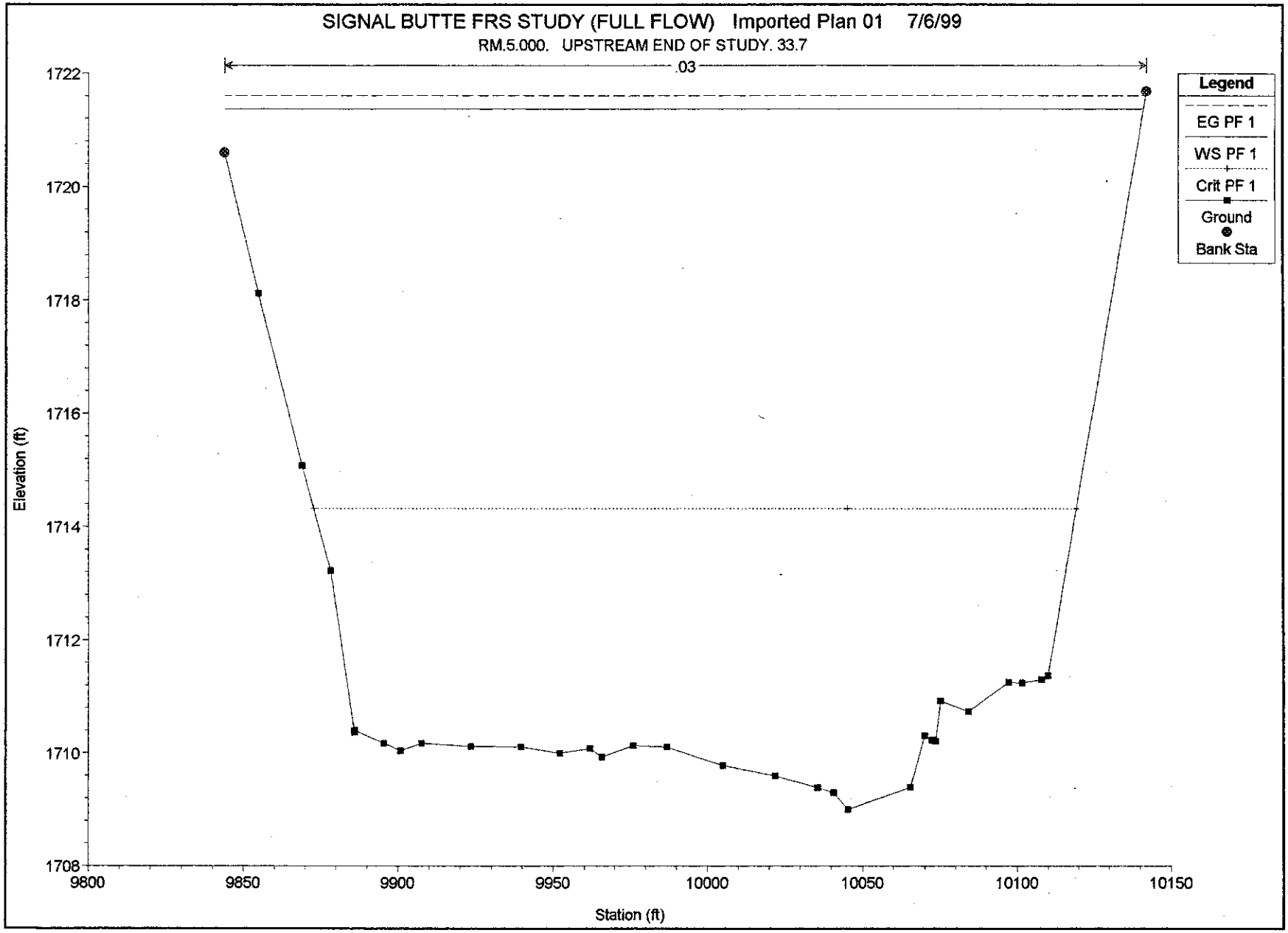
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM. 4.994. TOP OF SPILLWAY UPSTREAM EDGE
.013
.013
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
9900
9920
9940
9960
9980
10000
10020
10040
10060
10080
Station (ft)


SIGNAL BUTTE FRS STUDY (FULL FLOW) Imported Plan 01 7/6/99
RM.5.000. UPSTREAM END OF STUDY. 33.7
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
1708
9800
9850
9900
9950
10000
10050
10100
10150
Station (ft)

Transmittal

AZTEC

Date: November 20, 1999

To: Mr. Greg Schuelke
A-N- West, Inc. Consulting Engineers
7600 North 15th Street, Suite 200
Phoenix, Arizona, 85020

Re: Signal Butte F.R.S. Spillway Delineation Study
F.C.D. # 98-17

From: Al Reece

AZTEC ENGINEERING
4515 N. 16th Street, Suite 202
Phoenix, AZ 85016-5363
TELEPHONE (602) 263-9640
FAX (602) 263-9649

Items Sent:

Memo describing revisions to Survey Report
Revised Survey Report
Hard Copy of spread sheets (3 total)
1 floppy diskette containing the following files:

- Corners.xls (section corner spread sheet)
- Ctrl.xls (aerial panel point spread sheet)
- FPCTLFCD.xls (ERM spread sheet)

Remarks:

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, Arizona 85040-3982
[602] 454-0402 telephone
[602] 454-0403 fax

MEMO

TO: Mr. Greg Shuelke **DATE:** 11/20/99

FROM: Al Reece Job No. 983900

SUBJECT: Signal Butte FRS Revised Survey Report

I spoke with Mark Brewer of the Maricopa County Flood Control District on November 18, 1999 regarding the review comments for this project. The issue of grid coordinates vs. ground coordinates in the Survey Report seemed not to be completely resolved. I mentioned to Mr. Brewer that I thought the County GIS database required grid coordinates, but that the aerial mapping required ground coordinates to be scaled correctly. He confirmed that the County database requires grid coordinates and suggested that we submit only the spread sheets containing grid coordinates with the Survey Report. The ground coordinates shown on pages F-4 and F-7 can be submitted separately for information purposes, but should not be put into the GIS database.

I am including with this correspondence a revised Survey Report to replace the previously submitted report. Pages F-2 and F-3 are identical with those previously submitted. The grid coordinates shown for points 5002 and 5005 are correct. The ground coordinates for those points shown on page F-7 will not be included in this report. Page F-4 will not be included in this report. Page F-5 contains grid coordinates and was revised to change CTLVER_LID values from 8 to 13. Both codes refer to 3rd order surveys, but code 13 is the appropriate one for vertical work. Minor corrections were made to the descriptions to correct spelling. Points Double 2, A365 and B 365 were added. Page F-6 contains grid coordinates and was revised to change CTLVER_LID values from 8 to 13 as above. Also added points Double 2, A 365 and B 365 and inserted space before direction value in CNRNAME. A page for FPCTLFCD.xls was added to the report. The ERM numbering scheme matches the hard copy maps. CLTVER_LID values are 13 as above and grid coordinates are shown. Pages F-7 through F10 will not be included in this report.

F:\112099m1adr.doc

AZTEC ENGINEERING
3747 East Grove Street, Phoenix, AZ 85040-3982
Tel (602) 454-0402 Fax (602) 454-0403

SURVEY REPORT
for
SIGNAL BUTTE F.R.S. SPILLWAY DELINEATION

This report will detail the results of a survey conducted by Aztec Engineering during the month of October, 1998 to establish horizontal and vertical control for the aerial mapping on the above project. The horizontal coordinates are NAD 83 State Plane Coordinates and were established using NGS control point "Double 2" located on the double knolls to the West of the project as a basis. Additional NGS control points "A-365" and "B-365" were also tied to the project as a check. The basis of elevation is NGVD 29 elevation 1569.83 on NGS control point "B-365". Using NGS data, the shift from the NGVD 29 datum to the NAVD 88 datum is +1.98 feet.

Along with setting the aerial control points, Aztec Engineering made ties to Maricopa County Flood Control District control points 5002 and 5005 from the GIS data base for the study area. Also included are elevation measurements on the Signal Butte Flood Control Structure for the Top of Dam and Invert of the Emergency Spillway at Station 205+00. Record coordinates were compared to measured using grid coordinates for the horizontal and the 1.98 foot shift from NGVD 29 for the NAVD 88 vertical, as follows:

POINT I.D.	XNAD83	YNAD83	NAVD88
5002 (Record)	802512.790	888342.450	1709.141
5002 (Measured)	802512.877	888342.460	1708.985
5005 (Record)	802512.880	889642.910	1727.281
5005 (Measured)	802512.942	889642.893	1727.111

Record and measured elevations at the Emergency Spillway at 205+00 are as follows:

Top of Dam El. (from construction plans)	1721.60
Top of Dam El. (NGVD 29 from this survey)	1721.40
Top of Dam El. (NAVD 88 from this survey)	1723.38
Invert of Spillway (from construction plans)	1712.40
Invert of Spillway (NGVD 29 from this survey)	1712.55
Invert of Spillway (NAVD 88 from this survey)	1714.53

At the CAP Canal, Aztec Engineering made ties to two bench marks that are part of a Bureau of Reclamation circuit along the right-of-way line of the canal. Although these bench marks are also on the NGVD 29 Datum and were used for the construction of the canal, we have been informed by CAP Survey personnel that considerable ground subsidence has been detected in the area and the elevations may not be reliable. The monuments are U.S. Bureau of Reclamation brass cap R/W markers that were found beneath approximately three feet of fill dirt. Record and measured data is as follows:

DESCRIPTION	STATION	OFFSET	EL.(Record)	EL.(Measured)
T440+9	440+93.290	125.00' RT.	1565.069	1564.66
C449+4	449+46.267	100.00 RT.	1560.745	1560.25

Topograghic measurements to pipe inverts and gutter elevations at the four corners of bridges along the CAP were collected by holding elevations established by the Aztec Engineering control survey. Coordinates for the CAP topograghy are ground coordinates.

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
25396
ALAN D.
REECE
Date Signed 11-20-99
ARIZONA, U.S.A.

Alan D. Reece

28	7	13	0	0	797239.051	876060.989	1591.30	0	11	SCOR SE	T01N	R07E	23	MCDOT	102	Found MCDOT Brass Cap in Handhole 0.26' below rim at the Intersection of Signal Butte Rd. & Broadway
28	7	13	0	0	802519.196	881352.863	1651.54	0	11	SCOR SE	T01N	R07E	13	MCDOT	103	Found MCDOT Brass Cap in Handhole at the Intersection of Meridian Rd. & University Dr.
28	7	13	0	0	791942.659	881323.947	1595.94	0	11	SCOR SE	T01N	R07E	15	MCDOT	104	Found MCDOT brass Cap in Handhole 0.34' below rim at the intersection of Crismon Rd. & University Dr.
28	7	13	0	0	797234.036	881337.907	1620.83	0	11	SCOR SE	T01N	R07E	14	MCDOT	105	Found MCDOT Brass Cap in Handhole 0.62' below rim at the Intersection of University Dr. & Signal Butte Rd.
28	7	13	0	0	797222.904	886616.067	1675.83	0	11	SCOR NE	T01N	R07E	14		106	Found Brass Cap in Handhole 0.62' below rim at the Intersection of Brown Rd. & Signal Butte Rd.
22	5	19	0	0	780275.033	879028.068	1593.83	0	20	0	0	0	0	NGS	Double 2	ADOT Alum. Cap Stamped Double 2 on twin knolls 6.4 miles West of Apache Junction
22	2	9	0	0	773937.172	890842.812	1552.47	0	27	0	0	0	0	NGS	A 365	U.S.C.&G.S. Brass Cap Stamped A 365 at West end of hill 0.55 miles East of Power Rd. & Jensen Rd.
22	14	9	0	0	774548.764	891006.659	1569.83	0	27	0	0	0	0	NGS	B 365	U.S.C.&G.S. Brass Cap Stamped B 365 at North slope of hill 0.6 miles East of Power Rd. & Mckellips Rd.

F-5

CTLTYP_LID	CTLHOR_LID	CTLVER_LID	XNAD27	YNAD27	XNAD83	YNAD83	NGVD29	NAVD88	CTLMNT_LID	PNTNUM	DESC
6	7	13	0	0	787587.812	878468.975	1532.12	0	17	200	Set PK Nail in parking lot of "Europe at Night" Restaurant
6	7	13	0	0	789296.030	877362.266	1538.56	0	18	201	Found Cotton Picker Spindle 0.35' below surface at the intersection of 96th St. & Balsam St.
6	7	13	0	0	791421.252	873042.327	1523.76	0	3	202	Set 1/2" Rebar in dirt lot South of 99th St. & Pueblo Ave.
6	7	13	0	0	792571.386	874864.110	1545.15	0	3	203	Set 1/2" Rebar in vacant lot 600' West of Crismon Rd. & 1000' South of Broadway Rd.
6	7	13	0	0	794761.246	871238.858	1527.16	0	3	204	Set 1/2" Rebar in retention basin 450' North of Southern Ave. & 200' East of Cheshire St.
6	7	13	0	0	796895.613	875017.453	1573.36	0	17	205	Set PK Nail with shiner in c.l. of 107th St. 275' North of Lake Dr.
6	7	13	0	0	798163.958	876234.937	1587.74	0	17	206	Set PK Nail with shiner at intersection of S St. & E St. in trailer park Northeast of Signal Butte & Broadway
6	7	13	0	0	793646.773	876525.941	1564.49	0	3	207	Set 1/2" Rebar in vacant lot North side of Bramble 4 lots East of 102nd St..
6	7	13	0	0	795499.444	880797.223	1609.18	0	17	208	Set PK Nail with shiner in c.l. 105th Pl. 600' South of University Dr.
6	7	13	0	0	796858.627	882640.639	1630.60	0	3	209	Set 1/2" Rebar 7' South of Quarterline Rd. 385' West of Signal Butte Rd.
6	7	13	0	0	789300.282	881623.622	1579.07	0	17	210	Set PK Nail with shiner in c.l. 96th St. 63' South of Cisco Rd.
6	7	13	0	0	800115.828	880704.282	1630.98	0	3	211	Set 1/2" rebar at North side of Mercury St. 245' East of 112th St.
6	7	13	0	0	801320.081	882874.191	1651.61	0	11	212	Found City of Mesa Brass Cap in Handhole 0.47' below rim at the intersection of Clancy & Decator
6	7	13	0	0	803490.539	886524.276	1698.19	0	3	213	Set 1/2" Rebar 99' South of Lost Dutchman Rd. (Brown Rd.) 850' East of Meridian Rd.
6	7	13	0	0	798866.961	885998.188	1671.59	0	31	214	Set 60d Nail in partially developed lot 1650' East of Signal Butte Rd. 450' South of Brown Rd.
6	7	13	0	0	791184.886	880484.102	1579.72	0	3	215	Set 1/2" Rebar 556' East of 98th St. on c.l. Billings Court extended 30' past the East end of Billings Court
6	7	13	0	0	792357.936	882505.533	1611.23	0	3	216	Set 1/2" Rebar in vacant lot at Southeast corner of Quarterline Rd. & 100th Pl.
6	7	13	0	0	793894.609	884846.595	1648.45	0	31	217	Set 60d Nail with shiner on West side of 103rd St. 850' North of Adobe
6	7	13	0	0	804250.889	888357.754	1723.61	0	3	218	Set 1/2" Rebar on State Trust Land 1600' North of Lost Dutchman Rd. & 1750' East of Meridian Rd.
6	7	13	0	0	800952.532	889984.049	1724.06	0	3	219	Set 1/2" Rebar in Maricopa County Park Land North and West of Lost Dutchman Rd. & Meridian Rd.
6	7	13	0	0	799910.127	888167.777	1688.53	0	3	220	Set 1/2" Rebar North of spillway in Signal Butte Floodwater Retarding Structure Dike.
22	5	13	0	0	780275.033	879028.058	1593.83	0	20	Double 2	ADOT Alum. Cap Stamped Double 2 on twin knolls 6.4 miles West of Apache Junction
22	2	9	0	0	773937.172	890842.812	1552.47	0	27	A 365	U.S.C.&G.S Brass Cap Stamped A 365 at West end of hill 0.55 miles East of Power Rd. & Jensen Rd.
22	14	9	0	0	774548.764	891006.659	1569.83	0	27	B 365	U.S.C.&G.S Brass Cap Stamped B 365 at North slope of hill 0.6 miles East of Power Rd. & Mckellips Rd.

CTLHOR_LID	CTLVER_LID	XNAD27	YNAD27	XNAD83	YNAD83	NGVD29	NAVD88	CTLMNT_LID	RMNUM	DESC
7	13	0	0	786649.871	878732.941	1527.21	0	11	ERM100	Found ADOT Brass Cap in Handhole 0.62' below rim at the intersection of Ellsworth Road and Apache Trail.
7	13	0	0	791944.156	876045.049	1550.70	0	11	ERM101	Found MCDOT Brass Cap in Handhole 0.55' below rim at the intersection of Crismon Rd. & Broadway Rd.
7	13	0	0	797239.951	876060.989	1581.30	0	11	ERM102	Found MCDOT Brass Cap in Handhole 0.25' below rim at the intersection of Signal Butte Rd. & Broadway Rd.
7	13	0	0	802519.196	881352.863	1651.54	0	11	ERM103	Found MCDOT Brass Cap in Handhole at the intersection of Meridian Rd. & University Dr.
7	13	0	0	791942.559	881323.847	1595.34	0	11	ERM104	Found MCDOT Brass Cap in Handhole 0.34' below rim at the intersection of Crismon Rd. & University Dr.
7	13	0	0	797234.036	881337.907	1620.83	0	11	ERM105	Found MCDOT Brass Cap in Handhole 0.62' below rim at the intersection of University Dr. & Signal Butte Rd.
7	13	0	0	797222.904	886616.967	1675.83	0	11	ERM106	Found Brass Cap in Handhole 0.62' below rim at the intersection of Brown Rd. & Signal Butte Rd.
7	13	0	0	801320.081	882874.191	1651.61	0	11	ERM212	Found City of Mesa Brass Cap in Handhole 0.47' below rim at the intersection of Clancy and Decator

10/27/98

ANW 9839

SIGNAL BUTTE

X, Y, Z, TIES TO PIPE
INVARTS ALONG C.A.P.

R.D. pc
S.H. π
G.M. #

CLOY 65°

FB # 105

SIGNAL BUTTE ANW983900

TIES TO CAP. INVERTS FB#105

R.D.
G.M.
S.H.T.

(16

10/27/98

DC FILE: SIGNAL

TC	251	HI 1.532 m	FND - 60 d NAIL, SEE PG. 7
BSC	252	HT 1.607 m	FND - 60 d NAIL, SEE PG. 8

DC# 300 → 303

#300	INV	INVERT TO A 1.524 m.	(5 FT.) DIAM. R.C.P.
301	INV	SAME AS SHOT # 300	
302	INV	SAME AS SHOT # 300	
303	INV	SAME AS SHOT # 300	

TC	250	HI 1.525	FND - 60 d. NAIL, See pg. 7
BSC	251	HT 1.615	FND - 60 d. NAIL, SEE PG. 7

DC# 304 → 326

#304-309	INV.	INV. TO A 1.524 m.	(5 FT.) DIAM. R.C.P.
314-323	INV	INV. TO A 1.829 m.	(6 FT.) DIAM. R.C.P.

F-9

SIGNAL BUTTE ANW983900 R.D. E.M. S.H. T (17

TIES TO C.A.P. INVERTS FB #105 10/27/98

DC FILE: SGNAL

TR 253 HI 1.478 m. FND: 60 d. NAIL, SEE PG. 8

BSR 252 HT 1.640 m. FND- 60d. NAIL, SEE PG. 8

DC #327 → 346

{#335-337, 339-341} INV INV. TO A 1.829 m. (6 FT.) DIAM. R.C.P.

F-10

Central Arizona Project

23636 NORTH 7TH STREET
PHOENIX, ARIZONA 85024
(602) 870-2333

DATE: 10-01-98

RE: Hydrology Summaries Covering the Aqueduct fron University Drive to The Superstition Freeway

TO: Mr. Greg Schuelke
A-N West Engineering
7600 North 15th Street, Suite 200
Phoenix, AZ 85020

OCT 1998
A-N WEST, INC.
PHOENIX, ARIZONA

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☒ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DRAWING NO.	DESCRIPTION
1	344-330-1184	Salt-Gila Aqueduct, Reach 1, Protective Works
1	Data	Hydrology Data

THESE ARE TRANSMITTED as checked below:

☐ Initial Submittal ☐ Resubmittal

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

REMARKS: Per your request through David Gunn

REPLY TO: David Gunn, P.E.
869-2233

SIGNED Rose A Hart

F-11

FORM FPM 500 (R 9/95)

ANW Rcvd 10/5/98

INPUT DATA FOR FLOOD ROUTING
SALT- GILA AQUEDUCT REACH 1

STATION	STRUCT. TYPE	SIZE	INVERT ELEV.	CREST ELEV.	STORAGE CAPACITY DATA ELEV. AC.FT	ELEV. AC.FT.
14+95.07						
	Protected by Spook Hill Flood Retarding Structure. Designed by Soil Conservation Service and Operated by Maricopa County Flood Control District. Emergency spillway located at Station 127+62.3. Principle spillway is on east side of the aqueduct and pumping plant.778					
331+00						
345+30	Pipe OC	3-54"	1565.90	1575.0	No routing considered for this area, due to lack of Right-of-Way available.	
374+00	Flume	40'-10"	1565.08	1571.83		
396+00	Flume	40'-10"	1564.90	1571.65	"	
427+15	Pipe OC	3-72"	1568.32	1577.9	"	
429+20	Pipe OC	3-72"	1568.32	1577.9	"	
456+50	Pipe OC	2-60"	1556.16	1574.0	"	
471+03	Pipe OC	3-72"	1560.68	1573.9	"	
479+00	Pipe OC	5-72"	1562.20	1573.9	"	
504+25	Pipe OC	5-72"	1562.26	1573.6	"	
529+50	Pipe OC	5-72"	1562.59	1576.4	"	
542+50	Pipe OC	5-72"	1562.59	1577.8	"	
552+50	Pipe OC	5-72"	1563.76	1577.7	"	
563+50	Pipe OC	5-72"	1563.76	1577.6	"	
574+50	Pipe OC	3-54"	1566.08	1577.5	"	

INPUT DATA FOR UNIT HYGROGRAPHS
SALT-GILA AQUEDUCT - REACH 1

STATION	AREA Sq.Mi.	GRAPH SCS/PV	CHANNEL Miles	CENTROID Miles	SLOPE ft/mi.	CURVE No.	PRECIPITATION 100-yr	PRECIPITATION 50-yr	PRECIPITATION 3-hr
345+30	0.40	SCS	1.33	0.55	98	85	3.00		2.73
374+00	0.82	SCS	1.42	0.76	84.5	85	3.00		2.73
396+00	0.76	SCS	1.70	0.61	70.6	85	3.00		2.73
427+15 429+20	1.73	SCS	2.84	1.33	49	85	3.00		2.73
456+50	0.19	PV	0.53	0.25	53	85	3.00		2.73
471+03	1.67	PV	3.45	1.89	49.3	85	3.00		2.73
479+00 504+25	2.26	PV	3.98	2.08	56.6	85	3.00		2.73
529+50 542+50	3.10	PV	4.07	1.70	55.3	85	3.00		2.73
552+50 563+50	3.99	PV	5.30	3.07	64.1	85	3.00		2.73
574+50	0.62	PV	2.84	1.29	51	85	3.00		2.73

1

PRECIPITATION FREQUENCY VALUES FOR Salt Gila Reach 1
ZONE NUMBER= 7

LATITUDE 33.50N LONGITUDE 111.45W

POINT VALUES

RETURN PERIOD

DURATION	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.23	.34	.41	.51	.59	.66	.84	5-MIN
10-MIN	.36	.53	.64	.79	.91	1.03	1.30	10-MIN
15-MIN	.46	.67	.81	1.00	1.15	1.30	1.64	15-MIN
30-MIN	.63	.93	1.13	1.39	1.60	1.80	2.28	30-MIN
1-HR	.80	1.18	1.42	1.76	2.02	2.28	2.88	1-HR
2-HR	.90	1.31	1.58	1.96	2.24	2.53	3.18	2-HR
3-HR	.97	1.40	1.69	2.08	2.39	2.69	3.39	3-HR
6-HR	1.10	1.58	1.89	2.33	2.67	3.00	3.77	6-HR
12-HR	1.25	1.79	2.15	2.64	3.02	3.40	4.27	12-HR
24-HR	1.40	2.00	2.40	2.95	3.38	3.80	4.78	24-HR

1

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**************
*            *
* END OF RUN *
*            *
**************
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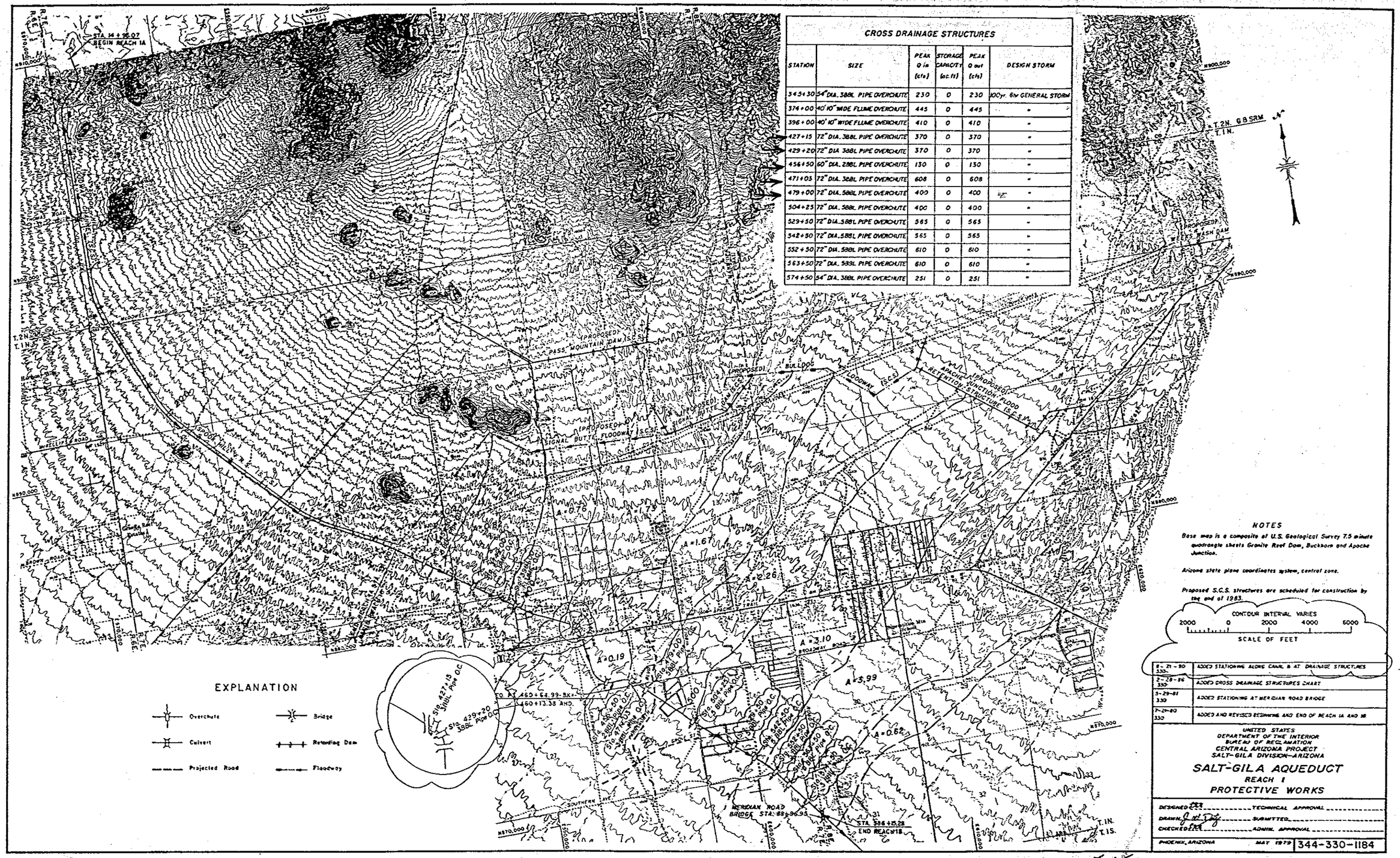


CROSS DRAINAGE STRUCTURES					
STATION	SIZE	PEAK Q in (cfs)	STORAGE CAPACITY (ac.ft)	PEAK Q out (cfs)	DESIGN STORM
345+30	54" DIA. 38BL PIPE OVERCHUTE	230	0	230	100yr. 6hr GENERAL STORM
374+00	40' 10" WIDE FLUME OVERCHUTE	445	0	445	"
396+00	40' 10" WIDE FLUME OVERCHUTE	410	0	410	"
427+15	72" DIA. 38BL PIPE OVERCHUTE	370	0	370	"
429+20	72" DIA 38BL PIPE OVERCHUTE	370	0	370	"
456+50	60" DIA. 28BL PIPE OVERCHUTE	130	0	130	"
471+05	72" DIA. 38BL PIPE OVERCHUTE	608	0	608	"
479+00	72" DIA. 38BL PIPE OVERCHUTE	400	0	400	"
504+25	72" DIA. 38BL PIPE OVERCHUTE	400	0	400	"
529+50	72" DIA. 38BL PIPE OVERCHUTE	565	0	565	"
542+50	72" DIA. 38BL PIPE OVERCHUTE	565	0	565	"
552+50	72" DIA. 38BL PIPE OVERCHUTE	610	0	610	"
563+50	72" DIA. 38BL PIPE OVERCHUTE	610	0	610	"
574+50	54" DIA. 38BL PIPE OVERCHUTE	251	0	251	"

F-16

BUCKHORN-MESA WATERSHED PROTECTION AND FLOOD PREVENTION PROJECT

MARICOPA AND PINAL COUNTIES, ARIZONA

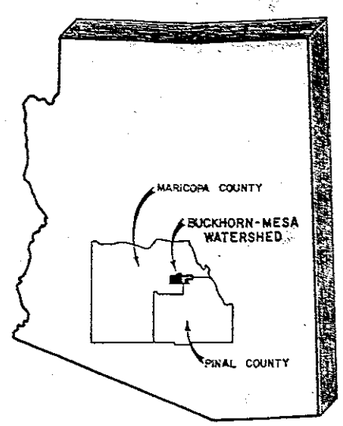
PLANS FOR THE CONSTRUCTION OF

SIGNAL BUTTE FLOODWATER RETARDING STRUCTURE

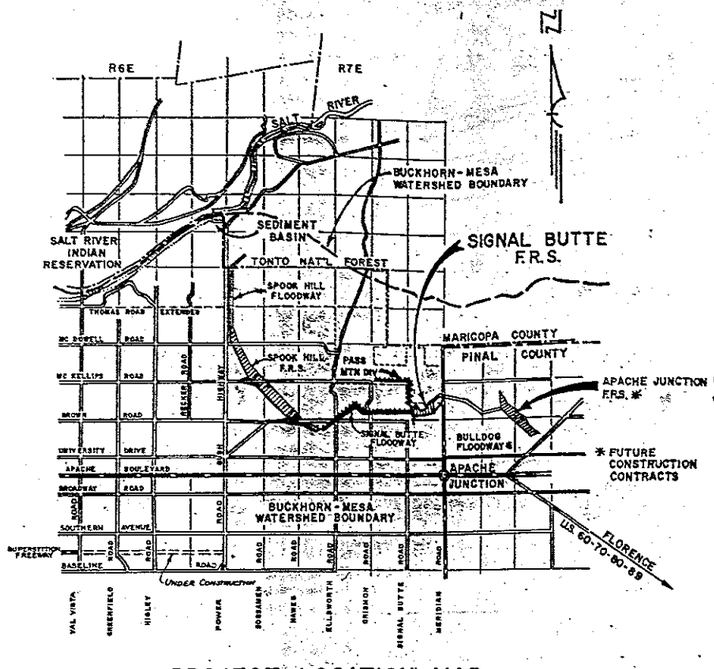
PREPARED FOR THE
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
BOARD OF SUPERVISORS OF PINAL COUNTY
EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT

BY

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE



ARIZONA



PROJECT LOCATION MAP

SCALE IN MILES

GENERAL NOTES

1. Elevations are in feet above mean sea level U.S.G.S. datum.
2. All stationing refers to centerline of construction, unless otherwise shown and is measured horizontal distance.
3. All soil classification symbols shown are based on the unified soil classification system. Field identification was used except where indicated by an asterisk (*). This denotes laboratory classification. Logs and descriptions are abridged. Complete drilling logs, laboratory reports and geology report are available for inspection at the project office.
4. All bearings are referenced to True North.
5. The locations of utilities shown on plan are approximate. It shall be the responsibility of the contractor to field verify locations of all utilities and to coordinate construction with the respective utility companies.
6. Borrow excavation slopes to be no steeper than 4:1.

STRUCTURAL NOTES

1. All exposed concrete edges shall be chamfered one inch or rounded unless specified otherwise.
2. Indicated reinforcing bar spacing is center to center of bars. Bar cover is clear distance between surface of bar and face of concrete and shall be two inches for formed and top surfaces, and three inches for surfaces placed against earth, unless otherwise shown.
3. In sections having a single mat of reinforcing, the steel shall be positioned in the center of the section, unless otherwise shown.
4. All bar splices not shown on the drawings shall be staggered with the bars lapped a minimum of 30 diameters of the smaller bar at the splice.

INDEX OF DRAWINGS

1. INDEX OF DRAWINGS
2. PROJECT PLAN AND PROFILE
3. PLAN & PROFILE-STA. 195+87 TO STA. 211+00
4. PLAN & PROFILE-STA. 211+00 TO STA. 230+00
5. PLAN & PROFILE-STA. 230+00 TO STA. 248+00
6. PLAN & PROFILE-STA. 248+00 TO STA. 266+25±
7. CROSS SECTIONS OF DAM-STA. 212+00 & STA. 227+85
8. CROSS SECTIONS OF DAM-STA. 240+00, STA. 252+00 & STA. 260+00
9. HDPE CURTAIN INSTALLATION
10. PRINCIPAL SPILLWAY PLAN & PROFILE
11. P.S.-INLET STRUCTURE-LAYOUT & STEEL SCHEDULE
12. P.S.-INLET STRUCTURE
13. P.S.-INLET STRUCTURE
14. P.S.-CONDUIT DETAILS
15. P.S.-OUTLET STRUCTURE-LAYOUT
16. P.S.-OUTLET STRUCTURE
17. P.S.-OUTLET STRUCTURE
18. P.S.-OUTLET STRUCTURE
19. P.S.-STEEL SCHEDULE
20. EMERGENCY SPILLWAY-PROFILE & UNIT INDEX
21. E.S.-PLAN
22. E.S.-OUTLET CHANNEL-PROFILE & CROSS SECTION
23. E.S.-HEADWALL
24. E.S.-RETAINING WALL
25. E.S.-UNITS Ⓐ & Ⓑ-UNEXPOSED FACES
26. E.S.-UNITS Ⓐ & Ⓑ-EXPOSED FACES
27. E.S.-UNITS Ⓐ & Ⓑ-SECTIONS A,B,C,D,E & F
28. E.S.-UNITS Ⓑ & Ⓕ
29. E.S.-UNITS Ⓒ & Ⓓ
30. E.S.-UNIT Ⓔ
31. E.S.-UNIT Ⓗ
32. E.S.-UNIT Ⓡ
33. E.S.-STEEL SCHEDULE
34. E.S.-STEEL SCHEDULE
35. GATED OUTLET-PLAN & PROFILE
36. G.O.-INLET & SLIDE GATE ASSEMBLY DETAILS
37. G.O.-INLET STRUCTURE DETAILS
38. G.O.-HDPE ANCHOR COLLAR & CONDUIT DETAILS
39. G.O.-PWD BASIN DETAILS
40. RAMPS & FILTER DIAPHRAGMS
41. MERIDIAN ROAD GATE & PROTECTIVE BARRIERS
42. FENCE DETAILS
43. IDENTIFICATION SIGN

SOIL CONSERVATION SERVICE

FLOOD CONTROL DISTRICT MARICOPA COUNTY

Direction of section — Section or detail
Sheet where section or detail is taken — Sheet where section or detail is shown

CENTRAL FILES
DRAWER 36

EAST MARICOPA NATURAL RESOURCE CONSERVATION DISTRICT
APPROVED
DATE 1-23-85 Jim Mille
Chairman Board of Supervisors

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
APPROVED
DATE 1-23-85 D. Okagamoto
Chief Engineer

REVISIONS
Mar. 85 Sheets 2, 3, 40

INDEX OF DRAWINGS
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA WATERSHED
MARICOPA & PINAL COUNTIES, ARIZONA

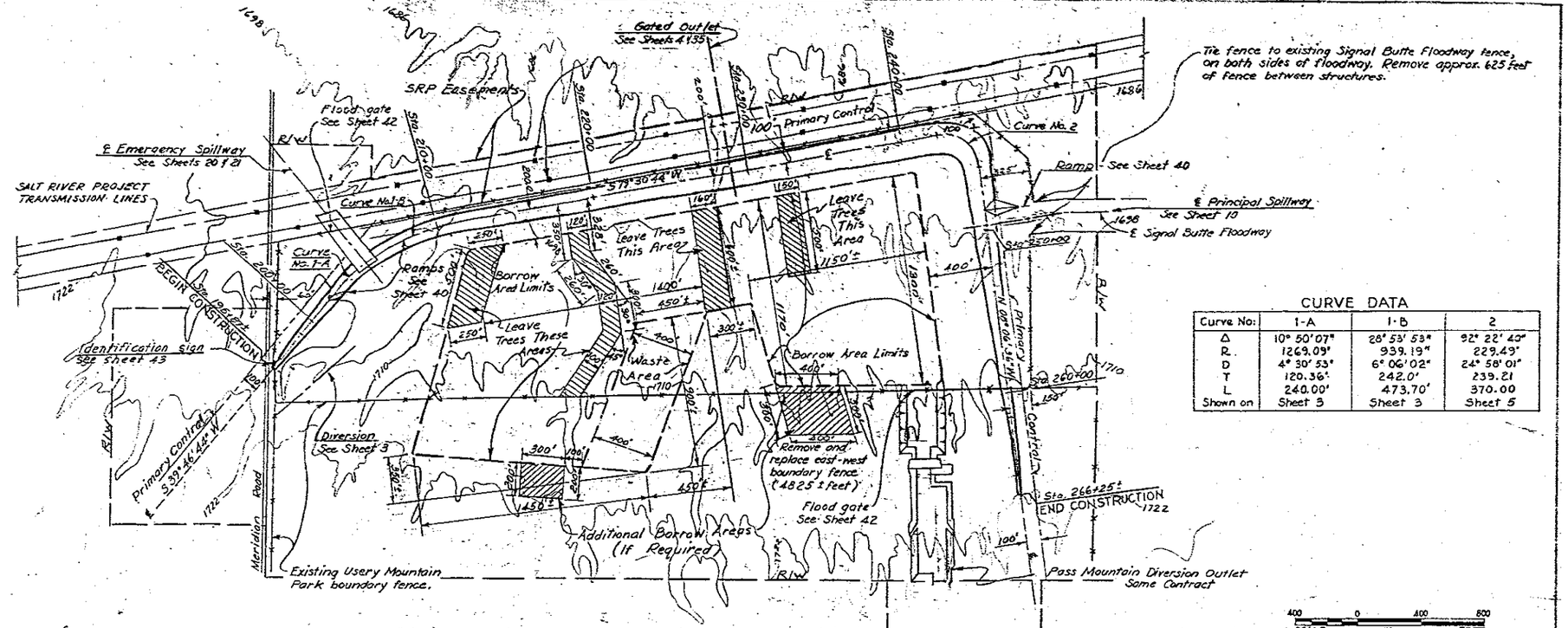
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
Designed	S.C.S.	10-81	Approved by: State Conservation Engineer
Drawn	E.F.S.	10-81	Title: WNTC Head of Eng. Staff
Traced			
Checked	W.E.P.	1-85 / 8-84	Sheet No. 1 of 43 — Drawing No. 83010-AZ-CH

SCS-ENG-313C (REV. 8-78)

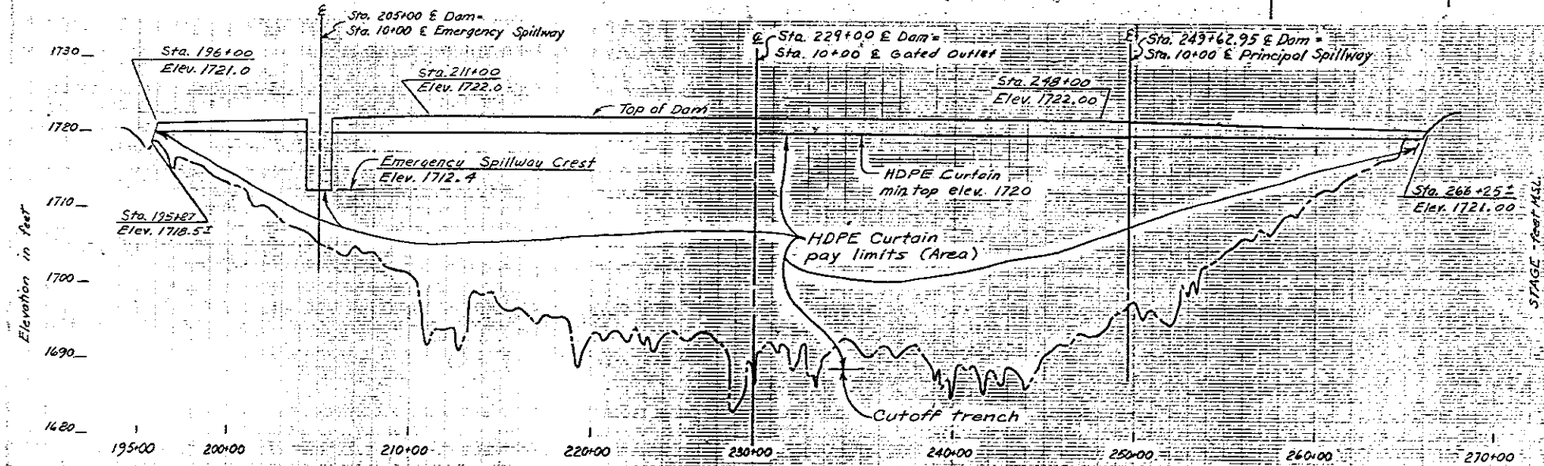
SIGNAL BUTTE FRS
CONSTRUCTION PLANS
83010-AZ-CH 304

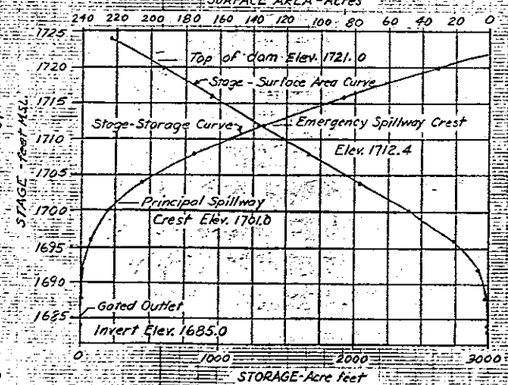
F-16



CURVE DATA

Curve No:	1-A	1-B	2
Δ	10° 50' 07"	28° 53' 53"	92° 22' 40"
R.	1269.09'	939.19"	229.49'
D	4° 30' 53"	6° 06' 02"	24° 58' 01"
T	120.36'	242.0'	239.21
L	240.00'	473.70'	370.00
Shown on	Sheet 3	Sheet 3	Sheet 5





STAGE STORAGE & SURFACE AREA CURVES

SOIL SYMBOLS

GROUP SYMBOLS	TYPICAL NAMES
GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
GM	Silty gravels, gravel-sand-silt mixtures.
GC	Clayey gravels, gravel-sand-clay mixtures.
SW	Well-graded sands, gravelly sands, little or no fines.
SP	Poorly-graded sands, gravelly sands, little or no fines.
SM	Silty sands, sand-silt mixtures.

GROUP SYMBOLS	TYPICAL NAMES
SC	Clayey sands, sand-clay mixtures.
ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity.
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
CALICHE	Soil partially cemented with calcium carbonate. Laboratory samples broke down to SM. Hardness varies.

REVISIONS		
Mar. 85	Revise Curve No. 1-B data	
	Add Primary Control Line	
Oct 85	Borrow Areas Revision	
	Modification No. 1	

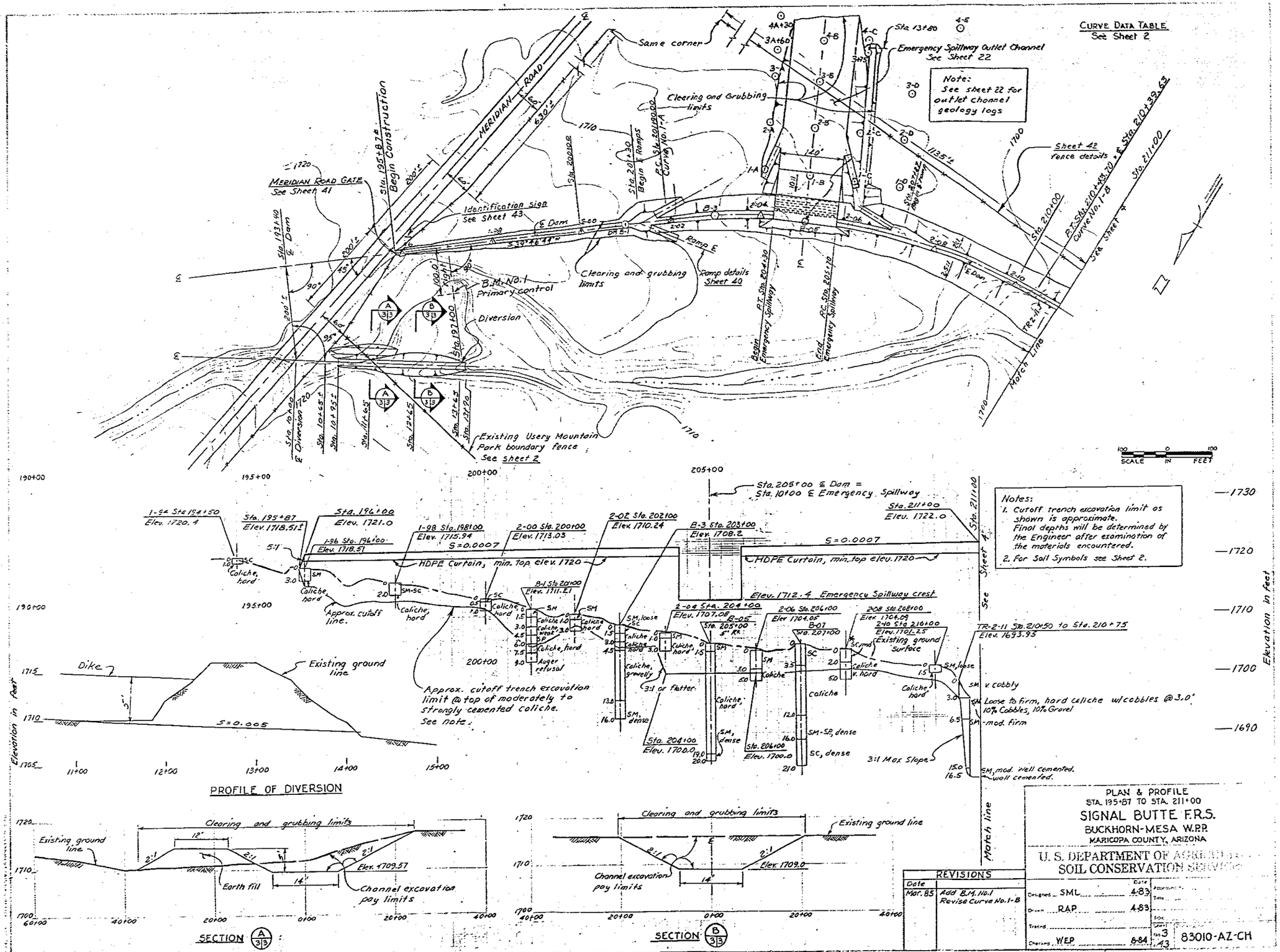
PROJECT PLAN & PROFILE

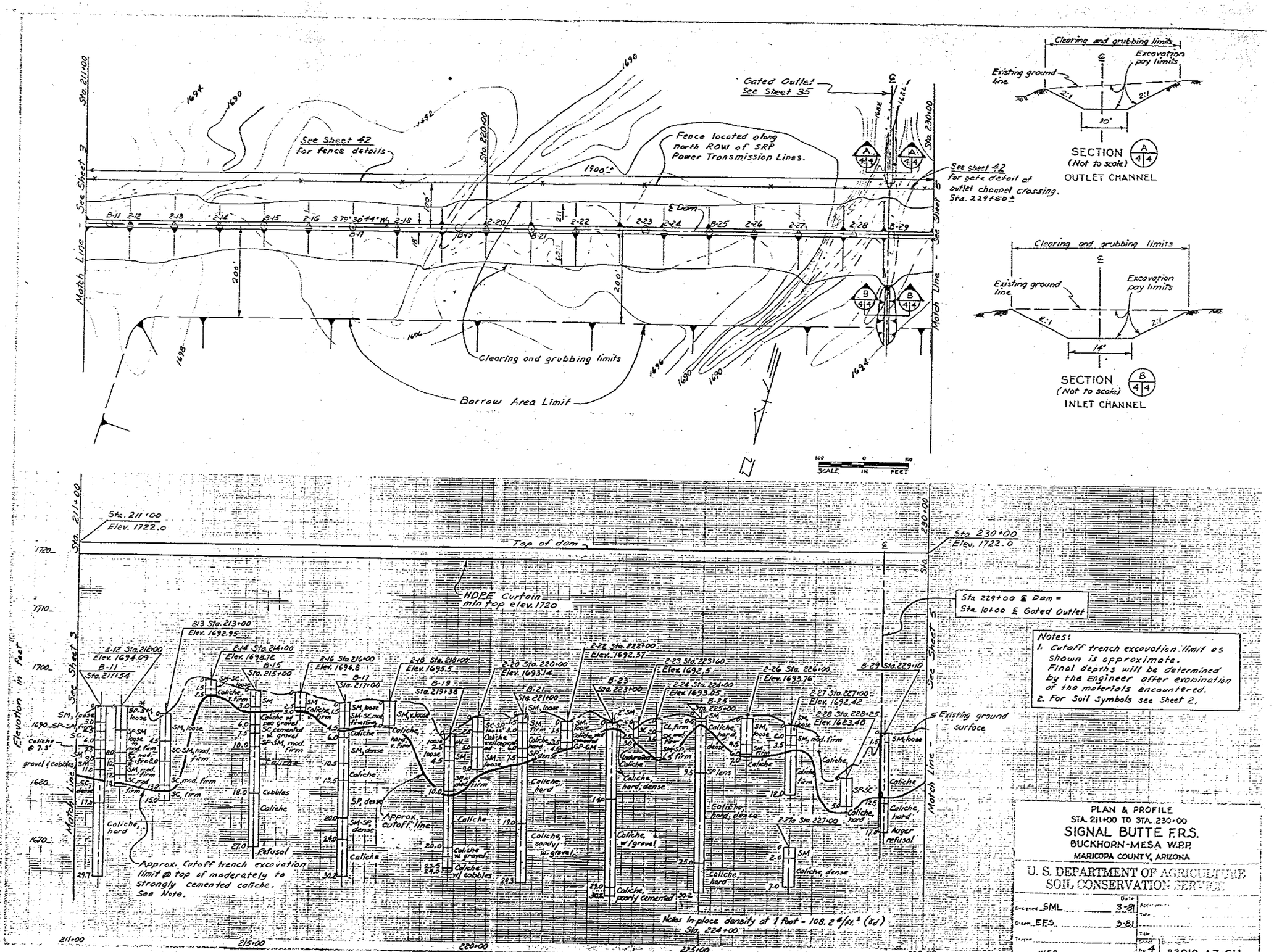
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

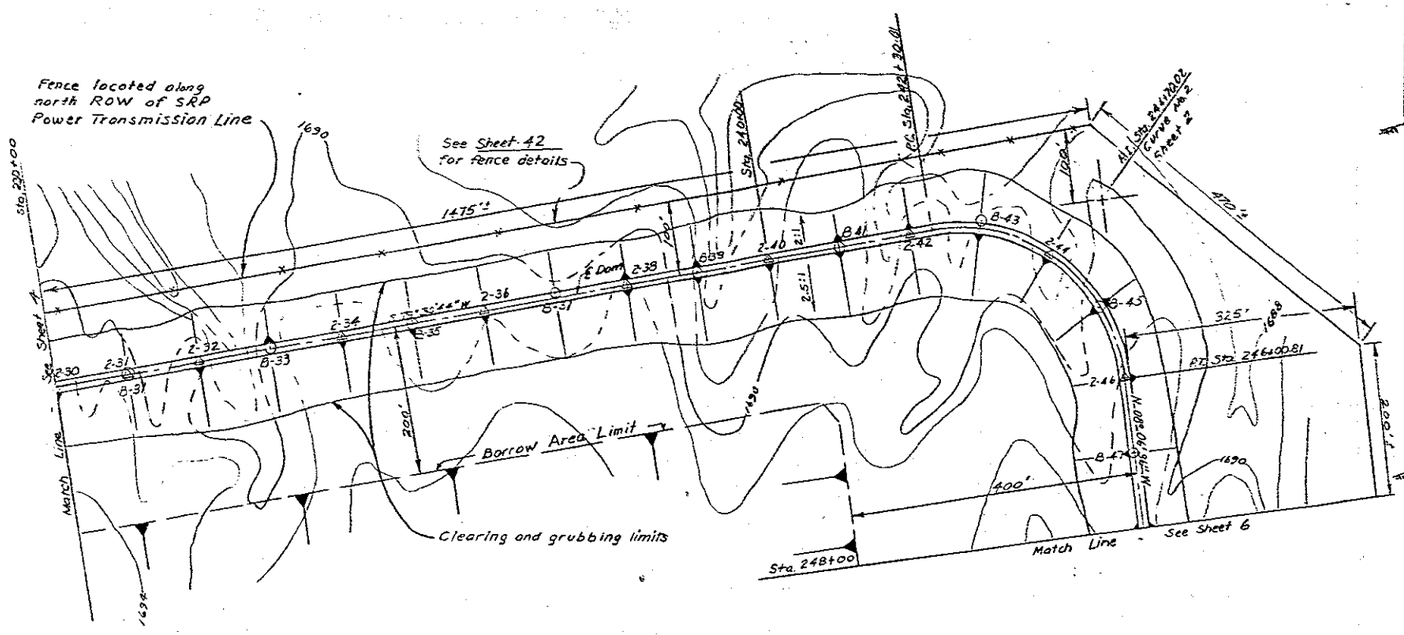
		Date	
Designed	SML	4-84	Approved by
Drawn	RAP	4-84	Title
Traced	E.F.S.	4-84	Title
Checked	WEP	8-84	Sheet No. 2 of 43 — Drawing No. 83010-AZ-CH

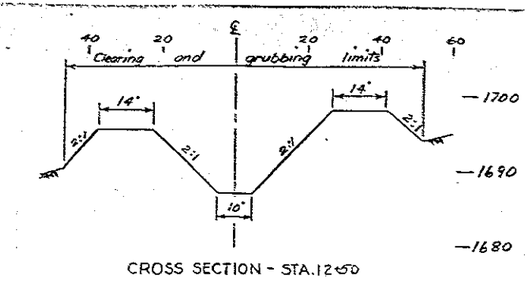
F-17


CURVE DATA TABLE
See Sheet 2
Same corner
Sta. 13+80
Emergency Spillway Outlet Channel
See Sheet 22
Note:
See sheet 22 for outlet channel geology logs
Clearing and Grubbing limits
MERIDIAN ROAD
Sta. 195+87 ℄ Begin Construction
MERIDIAN ROAD GATE
See Sheet 41
Identification sign
See Sheet 43
℄ Dam
Sta. 201+30 Begin ℄ Ramps
P.C. Sta. 201+00 Curve No. 1-A
Ramp ℄
Ramp details
Sheet 40
Clearing and grubbing limits
B.M. No. 1
Primary control
Diversion
Sta. 192+00
Begin Emergency Spillway
End Emergency Spillway
P.T. Sta. 210+43.70 + ℄ Sta. 210+39.63
Curve No. 1-B
Sta. 210+00
Sta. 211+00
Sheet 42
fence details
Existing Usery Mountain Park boundary fence
See sheet 2
Match Line
SCALE IN FEET
Sta. 205+00 ℄ Dam = Sta. 10+00 ℄ Emergency Spillway
Sta. 211+00
Elev. 1722.0
Notes:
1. Cutoff trench excavation limit as shown is approximate. Final depths will be determined by the Engineer after examination of the materials encountered.
2. For Soil Symbols see Sheet 2.
1-94 Sta. 194+50
Elev. 1720.4
Sta. 195+87
Elev. 1718.51
Sta. 196+00
Elev. 1721.0
1-96 Sta. 196+00
Elev. 1718.51
1-98 Sta. 198+00
Elev. 1715.94
2-00 Sta. 200+00
Elev. 1713.03
2-02 Sta. 202+00
Elev. 1710.24
B-3 Sta. 203+00
Elev. 1708.2
S=0.0007
HDPE Curtain, min. top elev. 1720
Elev. 1712.4 Emergency Spillway crest
B-1 Sta. 201+00
Elev. 1711.21
2-04 Sta. 204+00
Elev. 1707.08
2-06 Sta. 206+00
Elev. 1704.05
2-08 Sta. 208+00
Elev. 1704.09
2-10 Sta. 210+00
Elev. 1701.25
Existing ground surface
TR-2-11 Sta. 210+50 to Sta. 210+75
Elev. 1693.93
Approx. cutoff line.
Approx. cutoff trench excavation limit @ top of moderately to strongly cemented coliche. See note.
Coliche, hard
Coliche, gravelly
3:1 or flatter
Coliche
Coliche, v. hard
v. cobbly
Loose to firm, hard coliche w/cobbles @ 3.0'
10% Cobbles, 10% Gravel
mod. firm
3:1 Max Slope
SM, mod. well cemented.
well cemented.
Elevation in feet
Dike
Existing ground line
S=0.005
PROFILE OF DIVERSION
Clearing and grubbing limits
Earth fill
Channel excavation pay limits
Elev. 1709.57
Elev. 1709.0
SECTION A 3/3
SECTION B 3/3
PLAN & PROFILE
STA. 195+87 TO STA. 211+00
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.P.P.
MARICOPA COUNTY, ARIZONA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REVISIONS
Date
Mar. 85
Add B.M. No. 1
Revise Curve No. 1-B
Designed SML 4-83
Drawn RAP 4-83
Traced
Checked WEP 8-84
Sheet 3 of 43
83010-AZ-CH

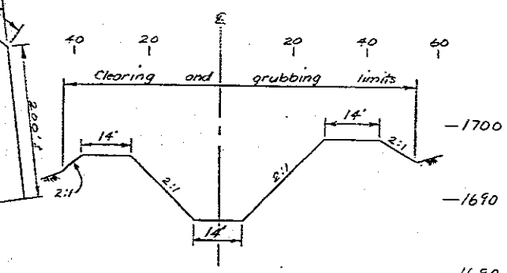

Sta. 211+00
See Sheet 3
Match Line
See Sheet 42 for fence details
Sta. 220+00
Fence located along north ROW of SRP Power Transmission Lines.
Gated Outlet See Sheet 35
Sta. 230+00
See sheet 42 for gate detail at outlet channel crossing. Sta. 229+50±
See Sheet 5
℄ Dam
Clearing and grubbing limits
Borrow Area Limit
SCALE IN FEET
Clearing and grubbing limits
Existing ground line
Excavation pay limits
10'
SECTION A (Not to scale)
OUTLET CHANNEL
14'
SECTION B (Not to scale)
INLET CHANNEL
Sta. 211+00 Elev. 1722.0
Top of dam
Sta. 230+00 Elev. 1722.0
HDPE Curtain min top elev. 1720
Sta 229+00 ℄ Dam = Sta. 10+00 ℄ Gated Outlet
Existing ground surface
Approx. cutoff trench excavation limit @ top of moderately to strongly cemented caliche. See Note.
Approx cutoff line
Elevation in feet
Notes:
1. Cutoff trench excavation limit as shown is approximate. Final depths will be determined by the Engineer after examination of the materials encountered.
2. For Soil Symbols see Sheet 2.
Notes In-place density at 1 foot = 108.2 #/ft.³ (sd)
Sta. 228+00
PLAN & PROFILE
STA. 211+00 TO STA. 230+00
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.R.P.
MARICOPA COUNTY, ARIZONA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed SML 3-81
Drawn EFS 3-81
Checked WEP 8-84
Sheet No. 4 of 43
83010-AZ-CH

F-19





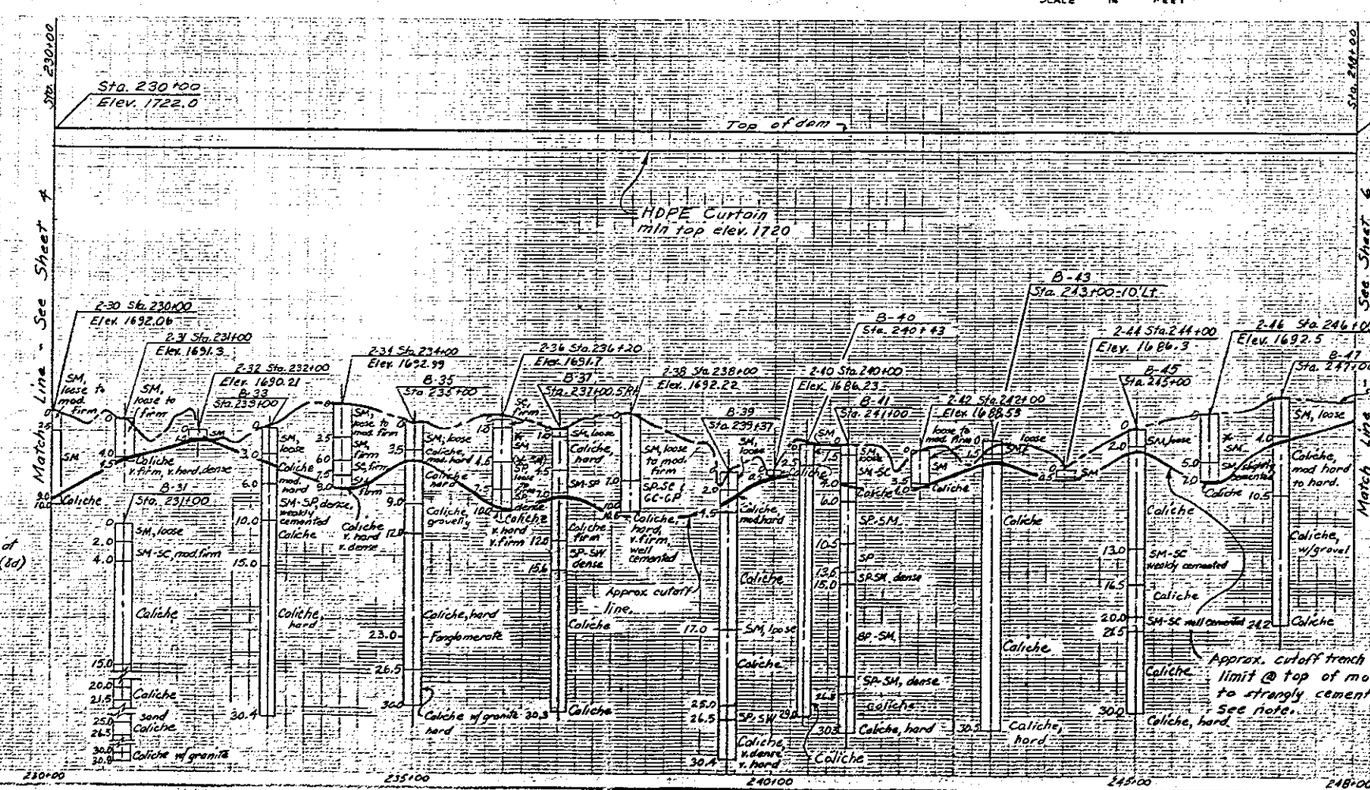
CROSS SECTION - STA. 12+50



CROSS SECTION - STA. 11+10

PRINCIPAL SPILLWAY OUTLET CHANNEL

See Sheets 6, 10 & 40



Notes:
1. Cutoff trench excavation limit as shown is approximate. Final depths will be determined by the Engineer after examination of the materials encountered.
2. For Soil Symbols see Sheet 2.

Note: In-place density of 4 feet is 111.9 #/ft³ (sd) Sta. 230+00

PLAN & PROFILE
STA. 230+00 TO STA. 246+00

SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.P.P.
MARICOPA COUNTY, ARIZONA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SML	9-81	
KKP	9-81	
WEP	8-84	No. 5 / 43 — 83010-AZ-CH

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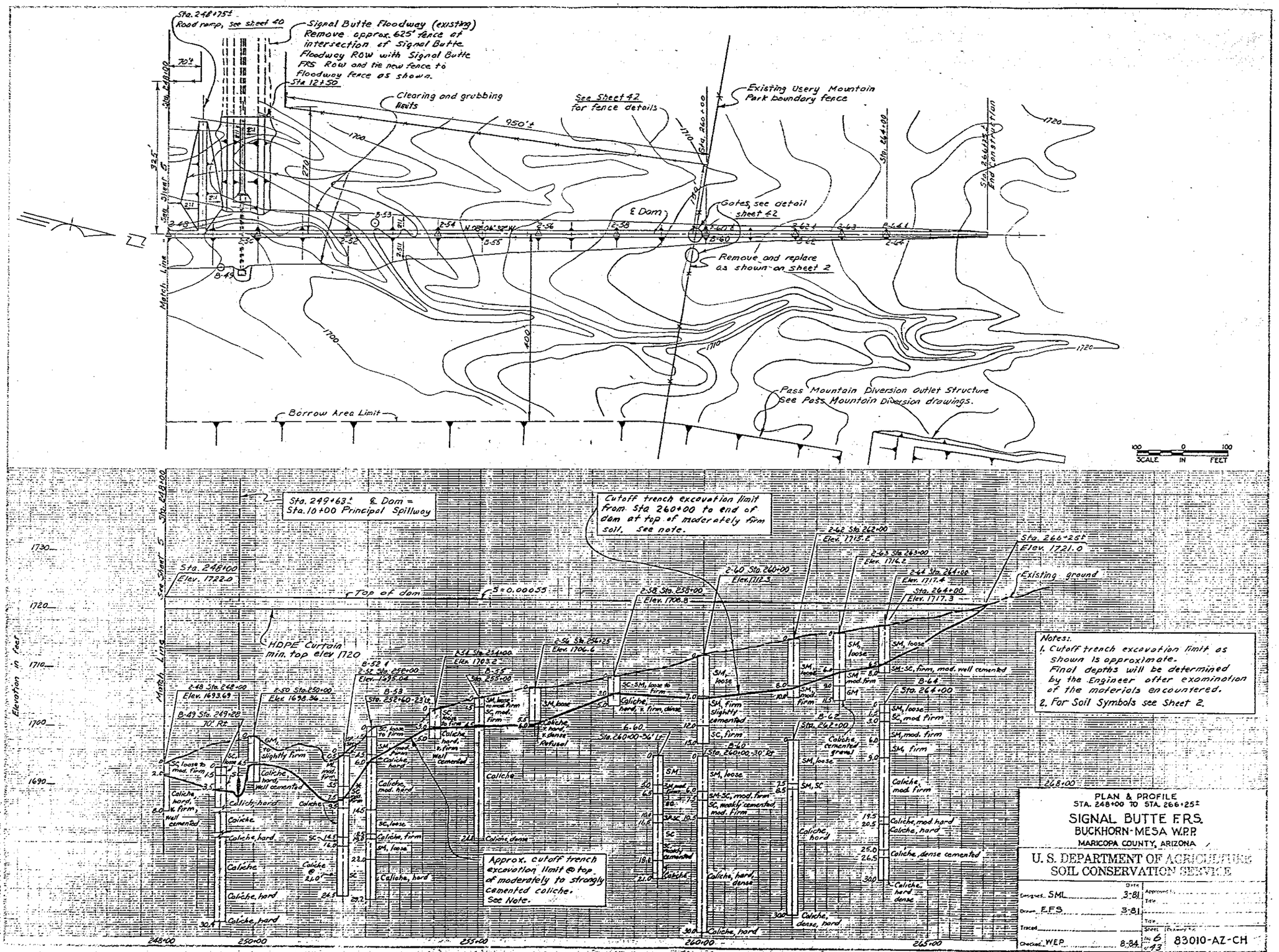
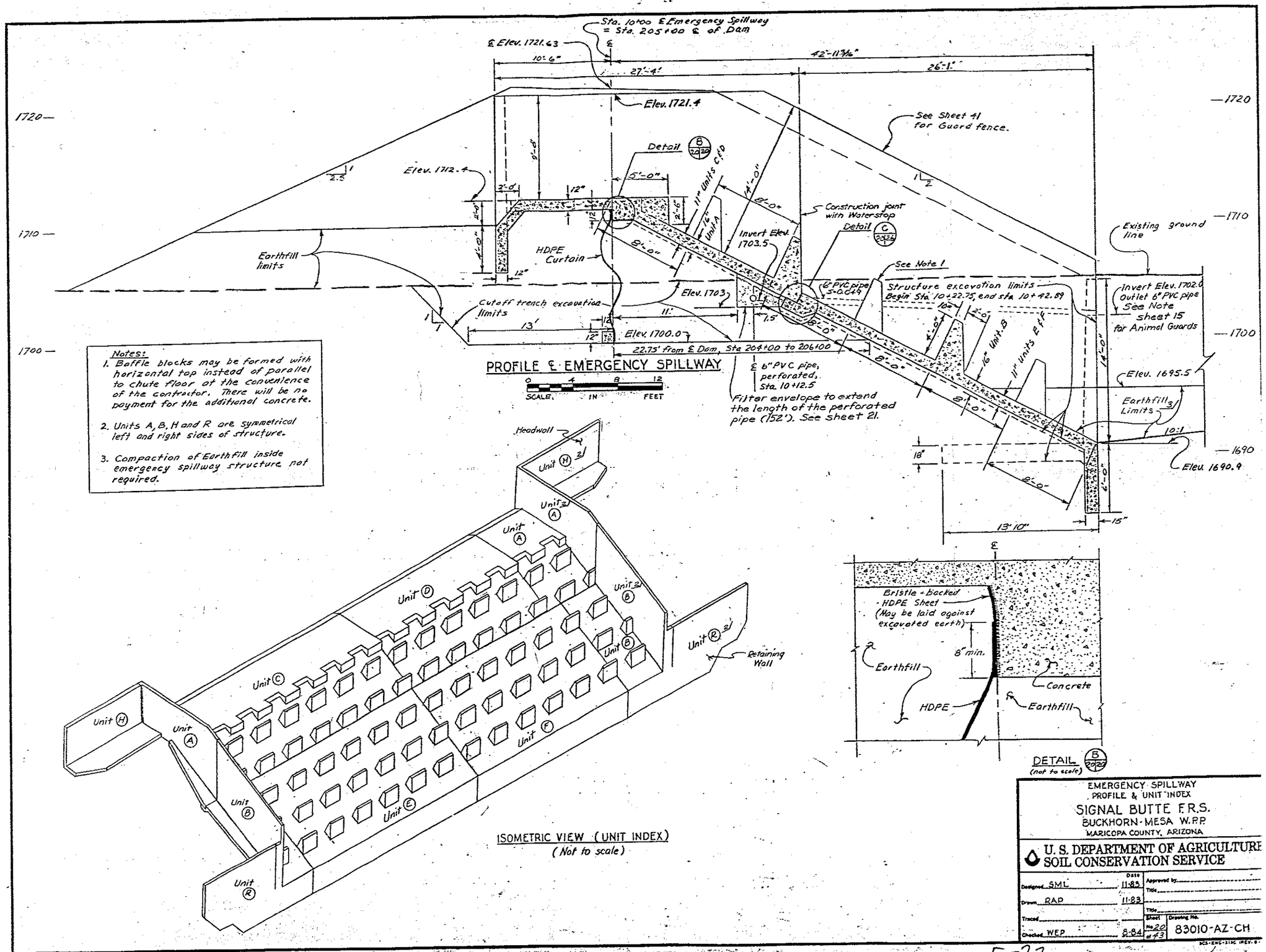

Sta. 248+75± Road ramp, see sheet 40
Signal Butte Floodway (existing) Remove approx. 625' fence at intersection of Signal Butte Floodway ROW with Signal Butte FRS Row and tie new fence to floodway fence as shown. Sta 12+50
Clearing and grubbing limits
See Sheet 42 for fence details
Existing Usery Mountain Park boundary fence
Gates, see detail sheet 42
℄ Dam
Remove and replace as shown on sheet 2
Pass Mountain Diversion Outlet Structure See Pass Mountain Diversion drawings.
Borrow Area Limit
Match Line
SCALE IN FEET
Sta. 249+63± ℄ Dam = Sta. 10+00 Principal Spillway
Cutoff trench excavation limit from Sta 260+00 to end of dam at top of moderately firm soil, see note.
Sta. 248+00 Elev. 1722.0
Top of dam
S=0.00055
HDPE Curtain min. top elev 1720
Approx. cutoff trench excavation limit @ top of moderately to strongly cemented coliche. See Note.
Existing ground
Sta. 266+25± Elev. 1721.0
Notes:
1. Cutoff trench excavation limit as shown is approximate. Final depths will be determined by the Engineer after examination of the materials encountered.
2. For Soil Symbols see Sheet 2.
PLAN & PROFILE
STA. 248+00 TO STA. 266+25±
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.P.P.
MARICOPA COUNTY, ARIZONA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Computed SML 3-81
Drawn E.F.S. 3-81
Checked W.E.P. 8-84
Sheet 6 of 43
83010-AZ-CH


Sta. 10+00 ℄ Emergency Spillway = Sta. 205+00 ℄ of Dam
℄ Elev. 1721.63
10'-6"
27'-4"
42'-11 3/16"
26'-1"
Elev. 1721.4
See Sheet 41 for Guard fence.
Detail B 2/20
Elev. 1712.4
5'-0"
11" Units C & D
14'-0"
8'-0"
Construction joint with Waterstop
Detail C 2/20
Invert Elev. 1703.5
Existing ground line
Earthfill limits
HDPE Curtain
See Note 1
6" PVC pipe S=0.0149
Structure excavation limits Begin Sta. 10+22.75, end sta. 10+42.89
Invert Elev. 1702.0 Outlet 6" PVC pipe See Note sheet 15 for Animal Guards
Elev. 1703
Cutoff trench excavation limits
13'
Elev. 1700.0
22.75' from ℄ Dam, Sta 204+00 to 206+00
℄ 6" PVC pipe, perforated, Sta. 10+12.5
Filter envelope to extend the length of the perforated pipe (152'). See sheet 21.
16" Unit B
11" Units E & F
Elev. 1695.5
Earthfill Limits
Elev. 1690.9
18"
13'-10"
15"
1720
1710
1700
1690
PROFILE ℄ EMERGENCY SPILLWAY
SCALE: 0 4 8 12 IN FEET
Notes:
1. Baffle blocks may be formed with horizontal top instead of parallel to chute floor at the convenience of the contractor. There will be no payment for the additional concrete.
2. Units A, B, H and R are symmetrical left and right sides of structure.
3. Compaction of Earthfill inside emergency spillway structure not required.
Headwall
Unit H
Unit A
Unit D
Unit C
Unit B
Unit E
Unit F
Unit R
Retaining Wall
ISOMETRIC VIEW (UNIT INDEX)
(Not to scale)
Bristle-Backed HDPE Sheet (May be laid against excavated earth)
8" min.
Earthfill
HDPE
Concrete
DETAIL B 2/20
(not to scale)
EMERGENCY SPILLWAY
PROFILE & UNIT INDEX
SIGNAL BUTTE F.R.S.
BUCKHORN-MESA W.P.P.
MARICOPA COUNTY, ARIZONA
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Designed SML 11-83
Drawn RAP 11-83
Checked WEP 8-84
Approved by
Title
Sheet No. 20 of 43
Drawing No. 83010-AZ-CH

F-22

PROJECT: FCD No 98-17 - Signal Butte FRS Spillway Study
A-N West No 7158-05

DESIGNER: GAS

DATE: 3/12/99

HYDROLOGIC AND CHANNEL INFORMATION

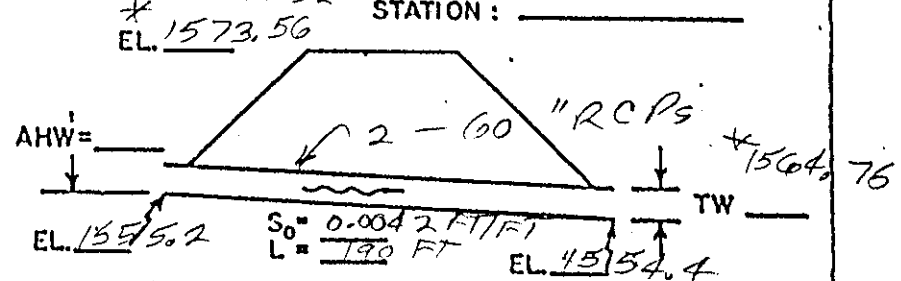
Culvert 1 (HEC-RAS I.D.)
Cross-Section Sta. 73+00 ±
CAP Sta. 456+50
+ Check HEC-RAS Results
For Q = 11,309 cfs Profile

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL HW=H+h_o-LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Headwall with Trash	419 /pipe	2-60"	3.67	18.36	0.9	14.1	5.2	6	10.36	10.36	0.8	23.5	23.6			outlet control
Rack, use Ke = 0.9 &	315 /pipe				0.9	8.8	5.2	6	10.36	10.36	0.8	18.1				outlet control Q = .315 cfs/pipe
Assume Proj. Inlet.																

SUMMARY & RECOMMENDATIONS: HEC-RAS computes 312 CFS/pipe or 624 CFS Total for this condition and indicates outlet control which agrees with above check, reasonably well.

F-24

PROJECT: FCD No 98-17 – Signal Butte FRS Spillway Study
A-N West No. 7158-05

DESIGNER: GAS

DATE: 3/12/99

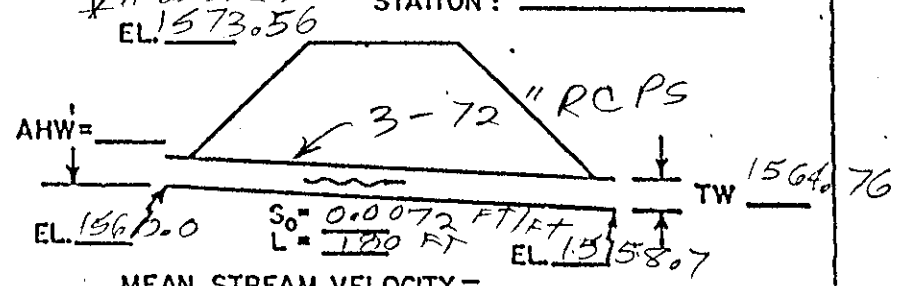
HYDROLOGIC AND CHANNEL INFORMATION

Culvert A 2 (HEC-RAS I.D.)
Cross-Section Sta 58+10 ±
CAP Sta. 471+03
* Check HEC-RAS Results For Q = 11,309 CFS

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q (CFS)	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW = H + h_o - LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Head wall with Trash	490/pipe	3-72"d	2.26	13.56	0.9	9.2	5.5	5.75	6.06	6.06	1.03	13.96	13.96			Outlet control Try Lower Q
Rock. Use Ke = 0.98	475/pipe				0.9	8.8			"	"	"	13.56	13.56			Outlet Control Q = 475
Assume Proj. Inlet																

SUMMARY & RECOMMENDATIONS: HEC-RAS shows outlet control with 448 cfs/pipe or 1345 CFS for the (3) pipes, which is approx. 6 percent lower than above check and checks reasonably well.

F25

PROJECT: FCD No 98-17 — Signal Butte FRS Spillway Study — CAP Culverts
A-N WOS # No. 7158-05

DESIGNER: GAS

DATE: 3/12/99

HYDROLOGIC AND CHANNEL INFORMATION

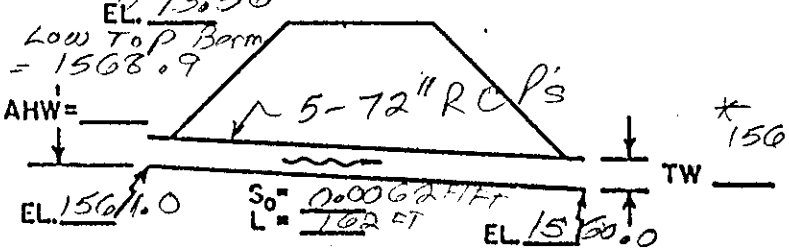
Culvert # 3 (HEC-RAS I.D.)
Cross-Section Sta 49+50±
CAP Sta. = 479+00
* Check HEC-RAS Results For Q = 11,309 CFS (Includes weir Flow)

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q (CFS)	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Headwall with Trash	455 /Pipe	5-72"ϕ	2.09	12.56	0.9	7.8	5.7	5.85	4.76	5.85	1.0	12.65	12.65			Outlet Control
Rock. Use K_e=0.9 ⊘	450 /Pipe				0.9	7.7	"	"	"	"	"	12.55				Outlet Control Q = 450 /Pipe
Assume Projecting Inlet																

SUMMARY & RECOMMENDATIONS: HEC-RAS shows 2105 CFS for the 5-72" Pipes or 421 CFS/Pipe for the above scenario which checks reasonably well at approx. 7% higher for above calcs.

F-26

Tail water Estimate For Below Culvert From Downstream Culvert

PROJECT: FCD No 98-17 Signal Butte FRS Spillway Study
A-N West No 7158-05

DESIGNER: GAS

DATE: 3/12/99

HYDROLOGIC AND CHANNEL INFORMATION

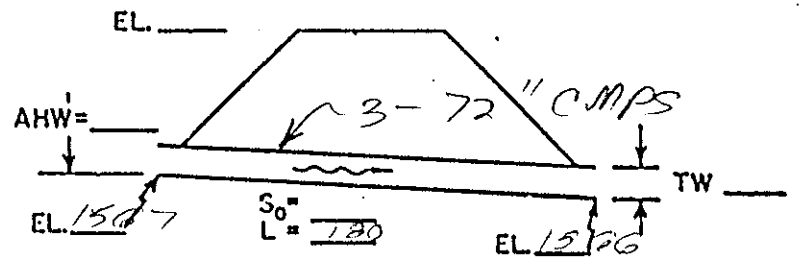
Culvert # 5 (HEC-RAS I.D.)
Cross-Section Sta. 102+30±

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Projecting End.	155	3-72" Pipe	0.92	5.5	0.8	1.6	3.5	4.75	–	1.75	1.0	5.35				Inlet Control HW = 72.92 @ 155 CFS
																This is Tailwater
																To CAP Culvert on Next Sheet.

SUMMARY & RECOMMENDATIONS:

PROJECT: FCD No 98-17 Signal Butte FRS Spillway A-N West No. 7158-05

DESIGNER: GAS

DATE: 3/12/99

HYDROLOGIC AND CHANNEL INFORMATION

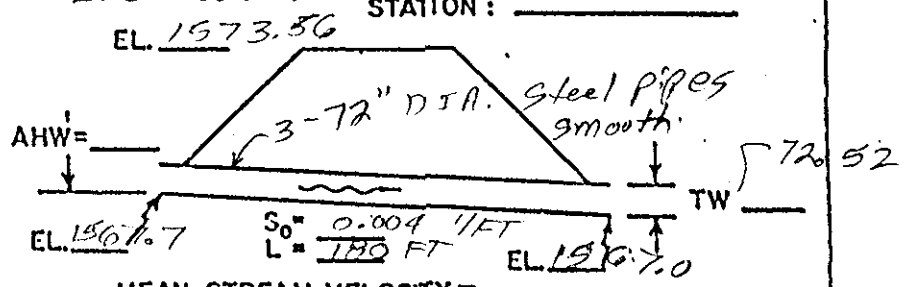
Culvert #5 (HEC-RAS I.D.)
Cross-section Sta 102+30 ± CAP Sta. 427+15
* Check HEC-RAS Results for Q = 11,309 CFS Profile (Includes weir flow)

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Headwall, No Trash	155	72"ϕ	0.85	5.1	0.9	1.0	3.5	4.75	5.52	5.52	0.7	5.82	5.82			Outlet control HW = 73.52 @ 155 CFS Pipe.
Rock. (Noted)																

SUMMARY & RECOMMENDATIONS: Note 1. Immediately Downstream of this set of 3-72" ϕ RCP are (3)-72" CMPs. Projecting Ends X 180 ± LF Long and Inlet I.E. = 1567.0 ± and outlet I.E. 1566.0 ±. These CMP's were used to estimate Tailwater for CAP Canal Culverts.

The HEC-RAS models on the CAP culverts but with n=0.024 and Ke=0.9 to attempt to model the downstream influence of the (3) 72" ϕ CMPs. Per this check, the results compare well.

F-28

PROJECT: FCD #98-17, Signal Butte F.R.S. CAP Sta. 504+25, Just W. of Signal Butte Rd.

DESIGNER: GAS

DATE: 8/16/99

HYDROLOGIC AND CHANNEL INFORMATION

- 5 - 72" Steel I.D. overchute Pipes across C.A.P. Canal

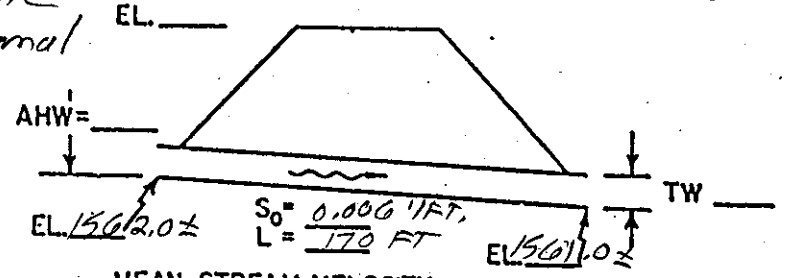
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

Check Cap at HW El = 73.6 →

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Headwall	380/pipe	72"Ø	1.93	11.6	0.5	5.4	5.3	5.65	—	5.65	1	10.1	11.6			Inlet Control Q = 380 CFS/Pipe @ HW = 73.6

SUMMARY & RECOMMENDATIONS: At HW El. = 73.6, (5) Pipe Cap. = 1900 CFS.

F-29

PROJECT: FCD #98-17. Signal Butte F.R.S. CAP Sta. 529+50 and 542+50,

DESIGNER: GAS

DATE: 8/16/99

HYDROLOGIC AND CHANNEL INFORMATION

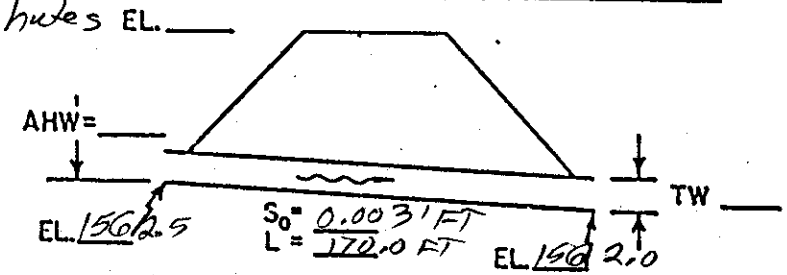
. CAP Sta 529+50: 5 - 72" ϕ overchutes
CAP Sta 542+50: 5 - 72" ϕ Overchutes

Q_1 = _____ TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

By Trial Find HW El. For Above 10 Culverts For Flow OF

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW=H+h_o−LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Total 2600 CFS → Headwall	260	72" ϕ	1.25	7.5	0.5	2.6	4.4	5.2	—	5.2	0.5	7.3	7.5			Inlet Control Hw = 1570.0 @ 260 cfs/Pipe
Total 3750 CFS → Headwall	375	72" ϕ	1.73	11.1	0.5	5.4	5.3	5.65	—	5.65	0.5	10.6	11.1			Inlet Control Hw = 1573.6 @ 375 cfs/pipe

SUMMARY & RECOMMENDATIONS:

F-90

Worksheet
Worksheet for Irregular Channel

By Trial
Find Flow Across Signal Butte Rd Resulting in Energy Grade (Ponded WSEL) Equal To Ponded WSEL = 1573.1 For 2/3 Spillway Flow

Project Description	
Project File	c:\fmw\sigbutt.fm2
Worksheet	SEC.,LOOKING E ALONG C.L. SIGNAL BUTE RD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data ← SECTION ALONG SIGNAL BUTTE ROAD. CENTERLINE UPSTREAM OF CAP CANAL, LOOKING EAST (DOWNSTREAM).

Channel Slope 0.020000 ft/ft

Elevation range: 1571.30 ft to 1574.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1574.00	0.00	1250.00	0.015
130.00	1573.10			
300.00	1572.00			
670.00	1571.30			
1000.00	1572.00			
1230.00	1572.50			
1250.00	1574.00			

Discharge 2600.00 ft³/s ← DISCHARGE ACROSS SIGNAL BUTTE ROAD AT CAP CANAL

Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1572.11	ft
Flow Area	327.76	ft²
Wetted Perimeter	769.24	ft
Top Width	769.23	ft
Depth	0.81	ft
Critical Water Elev.	1572.41	ft
Critical Slope	0.003858	ft/ft
Velocity	7.93	ft/s
Velocity Head	0.98	ft
Specific Energy	1573.09	ft ← EQUALS PONDED WSEL FOR 2/3 SPILLWAY FLOW
Froude Number	2.14	
Full Flow Capacity	50770.78	ft³/s

Flow is supercritical.

Worksheet
Worksheet for Irregular Channel

Project Description	
Project File	c:\fmw\sigbutt.fm2
Worksheet	SEC.,LOOKING E ALONG C.L. SIGNAL BUTE RD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.020000 ft/ft

Elevation range: 1571.30 ft to 1574.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1574.00	0.00	1250.00	0.015
130.00	1573.10			
300.00	1572.00			
670.00	1571.30			
1000.00	1572.00			
1230.00	1572.50			
1250.00	1574.00			

Discharge 3750.00 ft³/s ← DISCHARGE ACROSS SIGNAL BUTTE ROAD AT CAP CANAL EQUAL TO APPROX. CAP OF 10 - 72" Pipes TO EOST.

Results

Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1572.23	ft
Flow Area	423.38	ft²
Wetted Perimeter	842.17	ft
Top Width	842.16	ft
Depth	0.93	ft
Critical Water Elev.	1572.59	ft
Critical Slope	0.003612	ft/ft
Velocity	8.86	ft/s
Velocity Head	1.22	ft
Specific Energy	1573.45	ft
Froude Number	2.20	
Full Flow Capacity	50770.78	ft³/s

Flow is supercritical.

← Ponded WSEL Approx. Equals The Full Spillway Ponded WSEL = 1573.6.