RED MOUNTAIN FREEWAY (202L)

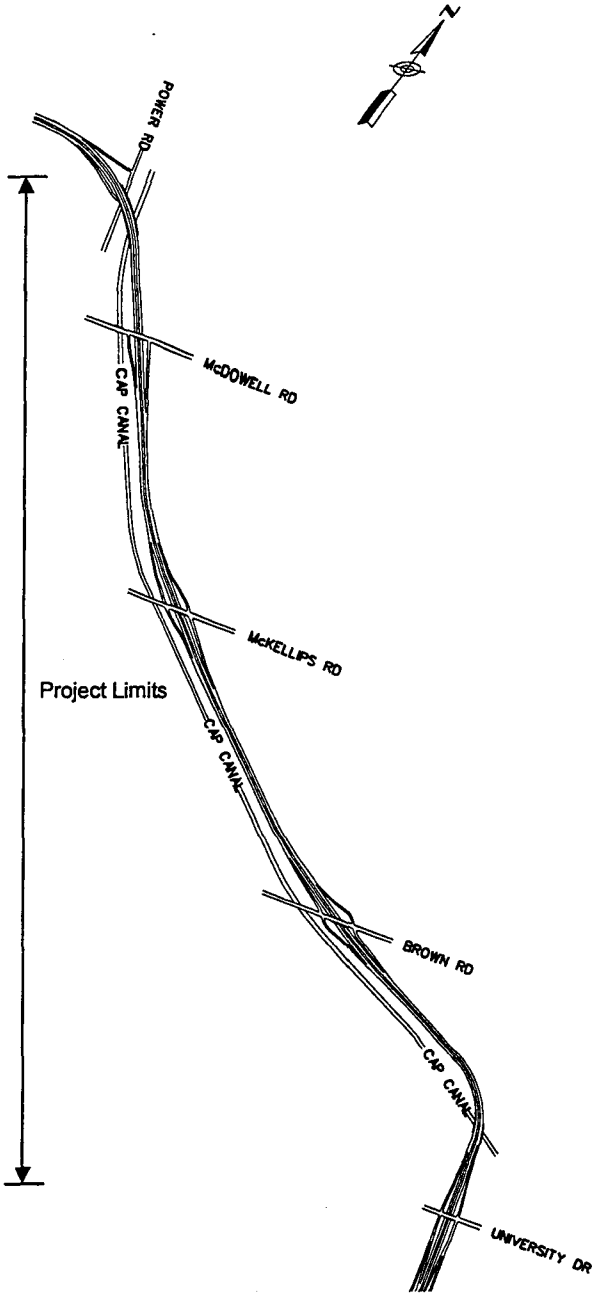
POWER ROAD TO UNIVERSITY DRIVE

SPOOK HILL FLOODWATER RETARDING STRUCTURE

TECHNICAL REPORT NO. 3

EXISTING CONDITION HYDROLOGY AND HYDRAULICS

50-YEAR AND 100-YEAR FLOODS



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August 2002

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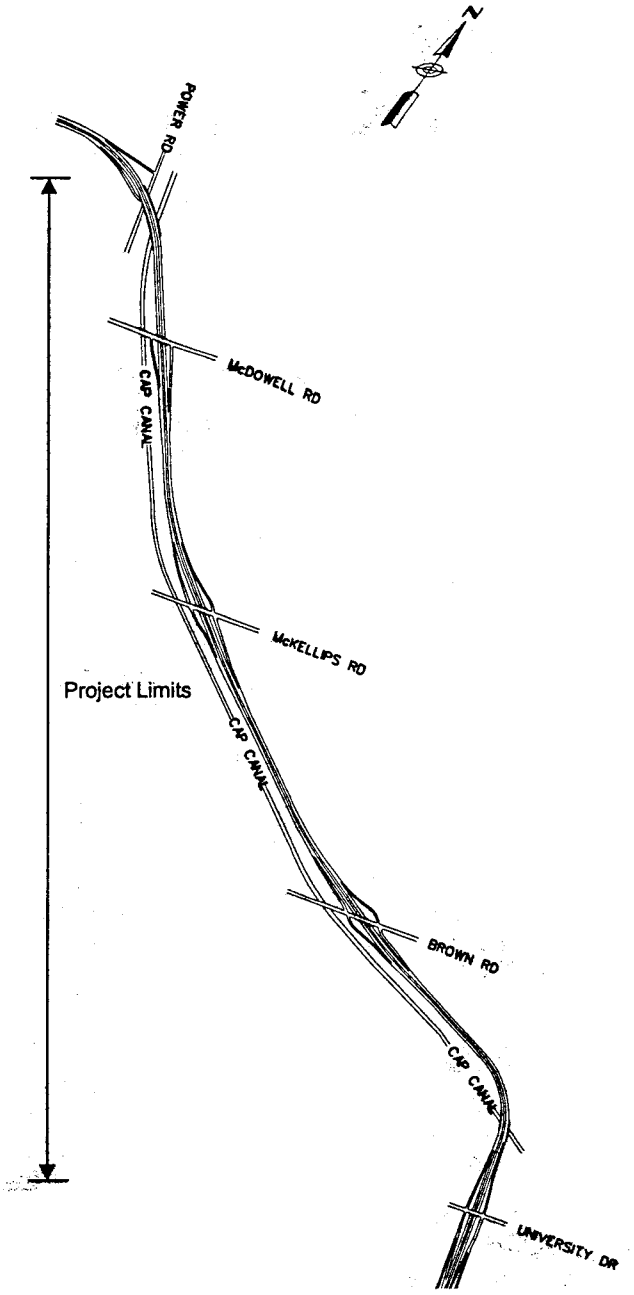

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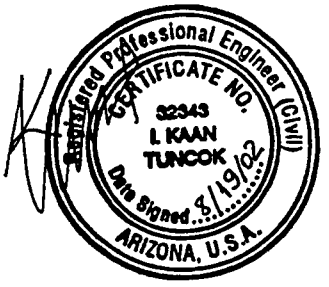

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1.0 INTRODUCTION

1.1 Project Background

The Red Mountain Freeway (202L) is a major element of the Maricopa Association of Governments (MAG) adopted Regional Freeway System in the East Valley of Maricopa County. This freeway corridor is shown in Figure 1.

The 202L freeway in the project area is planned as a six-lane facility consisting of three general purpose lanes in each direction of travel separated with a 46-foot open median. High occupancy vehicle (HOV) lanes will be added in the future within the median when traffic volumes warrant this improvement. Auxiliary lanes are planned between successive local service interchange entrance and exit ramps.

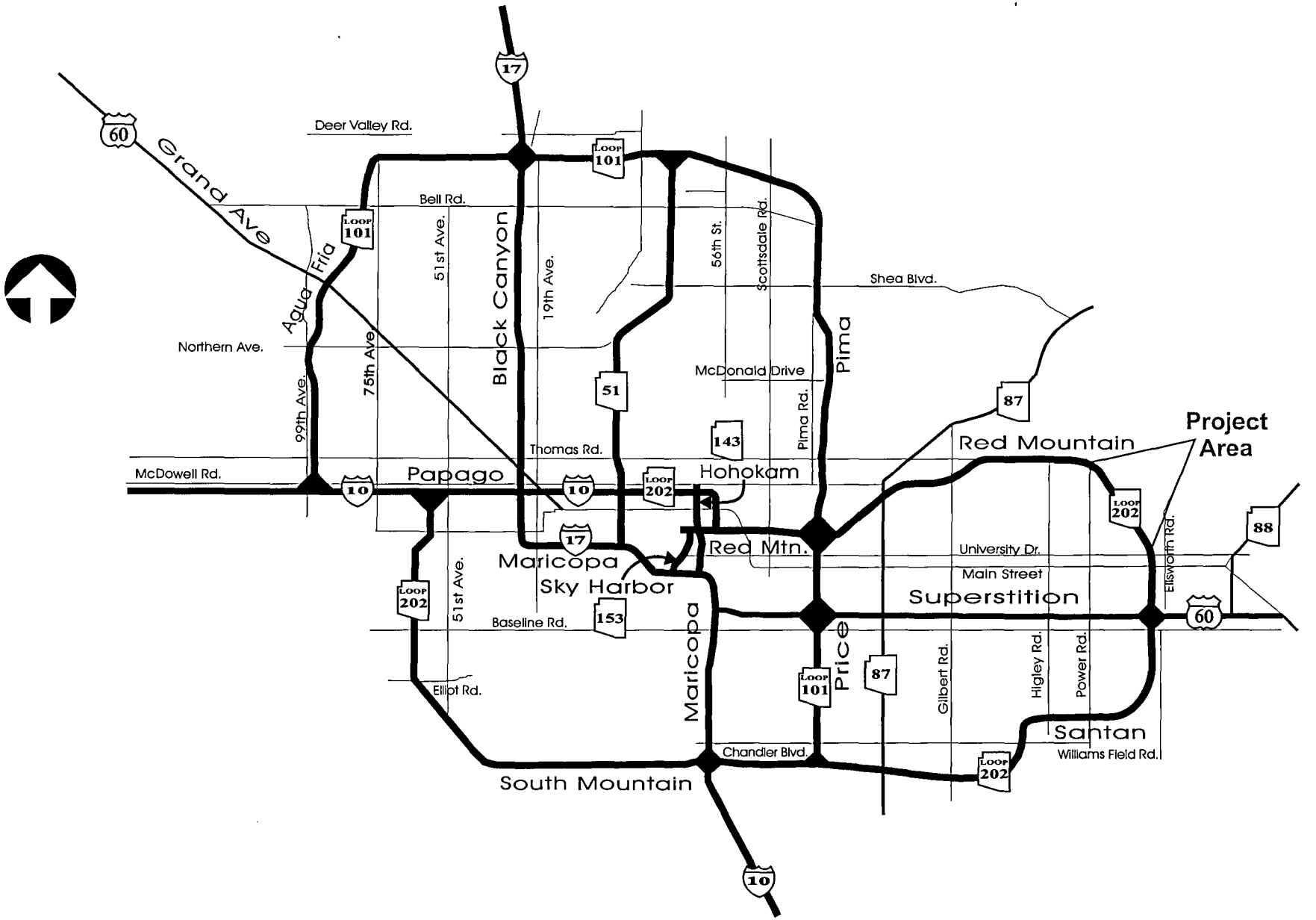
A half diamond traffic interchange is planned for local street access at McDowell Road (south side). Full diamond interchanges are planned at McKellips Road, Brown Road and University Drive. Each local arterial street will cross over the freeway at the interchange location.

Between Power Road and University Drive, the freeway is located immediately adjacent to the upstream side of the Spook Hill Floodwater Retarding Structure (FRS), within the existing flood pool reservoir. A Project Vicinity map is provided as Figure 2.

The freeway profile is elevated over Power Road, the Central Arizona Project (CAP) Canal, the Spook Hill FRS, and the Spook Hill FRS emergency spillway. The freeway profile for the original freeway concept then transitions to an elevation slightly above the 50-year water surface elevation within the FRS. Approximately 3,000 feet southeast of Brown Road, the freeway again passes over the Spook Hill FRS and the CAP Canal. The feasibility of providing a freeway design above the 100-year water surface elevation within the FRS will be investigated with this project.

The conceptual freeway section along the Spook Hill FRS is shown in Figure 3. In addition to the freeway embankment, an earthen berm is planned along the east side of the freeway to provide visual screening and noise mitigation for the adjacent existing and planned recreational and residential developments.

The freeway embankment volume will be offset by an equivalent volume of excavation located within the current flood retention area immediately upstream of the freeway, thereby maintaining the current volume of floodwater storage. The existing Spook Hill Floodway conveyance capacity will also be maintained in accordance with the original design intent.



RED MOUNTAIN FREEWAY (202L)
POWER ROAD TO UNIVERSITY DRIVE

FIGURE 1

DESIGNED BY	IKT	04/02
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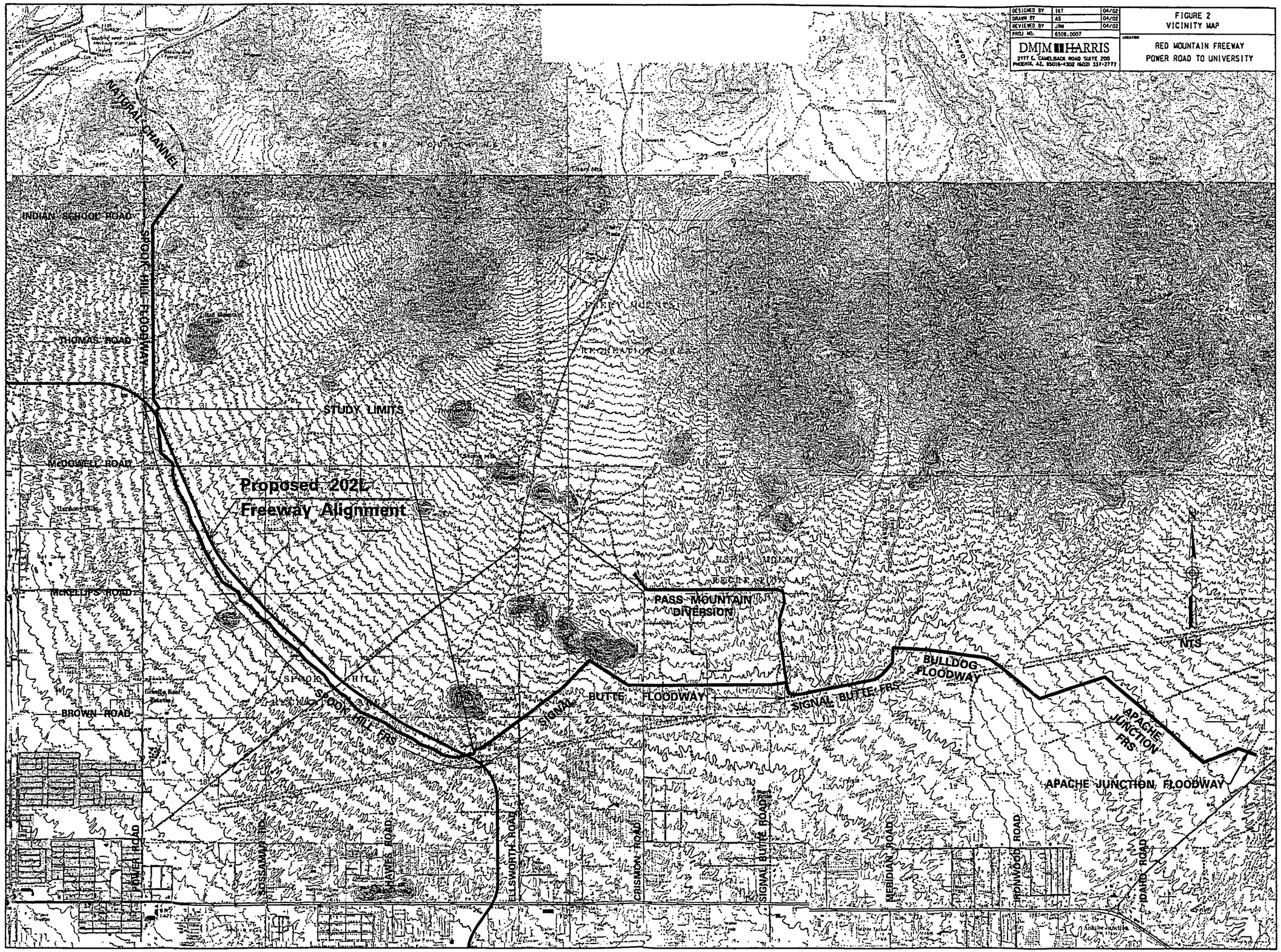
FIGURE 2
VICINITY MAP

LOCATION
RED MOUNTAIN FREEWAY
POWER ROAD TO UNIVERSITY



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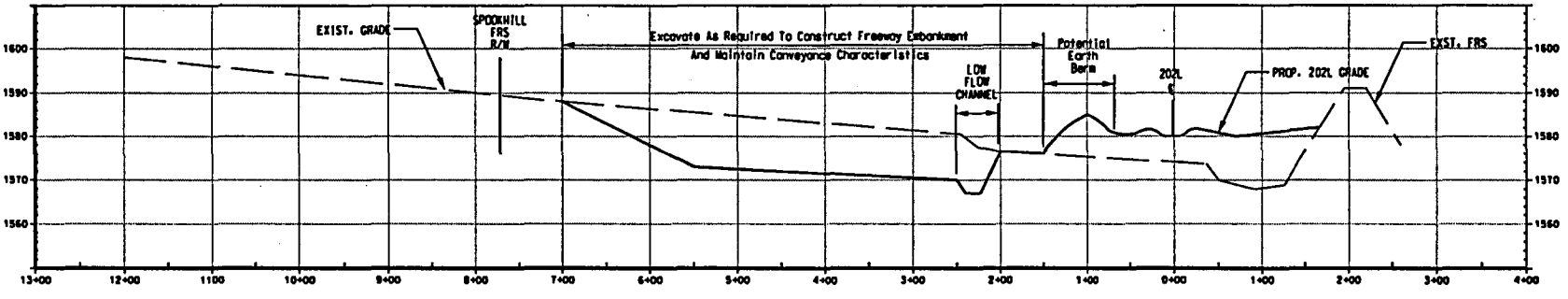

PROPOSED FREEWAY SECTION ADJACENT TO SPOOKHILL FRS

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FIGURE 3
TYPICAL CROSS SECTION

LOCATION
RED MOUNTAIN FREEWAY (202L)

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The freeway design concept will require the relocation of portions of the Spook Hill FRS embankment at McDowell, McKellips and Brown Roads. Therefore, coordination will be required with the Flood Control District of Maricopa County (FCDMC), the Arizona Department of Water Resources (ADWR), the Natural Resource Conservation Service (NRCS), the Central Arizona Project (CAP) and the City of Mesa.

1.2 Previous Freeway Technical and Environmental Studies

The Red Mountain Freeway corridor was adopted into the MAG Regional Freeway System in 1985, and was then included in the State Highway System by approval of the State Transportation Board. In 1988, the Arizona Department of Transportation (ADOT) prepared a Design Concept Report for the segment of the Red Mountain Freeway between Lindsay Road and Baseline Road, which recommended the 202L freeway alignment location immediately upstream of the Spook Hill FRS between Power Road and University Drive. A State-Level Environmental Assessment (EA) was also prepared for this freeway segment. ADOT and the City of Mesa approved these early design and environmental studies in 1989.

The decisions resulting from the previous corridor studies were reviewed during the completion of the Red Mountain Freeway Final Environmental Impact Statement (FEIS), completed in 1999. The FEIS was prepared for the segment of the Red Mountain Freeway between SR87 (Country Club Drive) and Baseline Road, one-half mile south of US60. Some of the FEIS mitigation measures, relative to the FRS, were included in a technical report previously prepared by DMJM+HARRIS, Technical Report No. 1, Existing Condition Hydrology (Final).

1.3 Study Purpose

This report is the third in a series of Technical Reports that will be developed by ADOT to support the design of the Red Mountain Freeway segment between Power Road and University Drive. These Technical Reports will be developed to document the existing hydrologic and hydraulic conditions, and to address proposed modifications of the Spook Hill FRS in accordance with *ADWR Rules and Regulations Pertaining to Dam Safety Procedures* (12 AAC 15).

ADWR rules apply to projects that reconstruct, repair, alter, enlarge, breach, or remove an existing dam or reservoir. As defined in the Arizona Administrative Code (AAC), "alteration or repair of an existing dam or appurtenant structure" means to change the originally approved construction drawings and specifications or current condition without changing the height or storage capacity of the dam or reservoir, except for ordinary repairs and general maintenance as prescribed in R12-15-1217. Since the FEIS approved freeway concept requires the relocation of the Spook Hill FRS dam embankment at McDowell, McKellips and Brown Roads to accommodate freeway traffic interchanges, the freeway project will require approvals from ADWR, the FCDMC (owner of the structure) and other governmental agencies.

The two previous Technical Reports defined the existing hydrologic and hydraulic conditions for the Probable Maximum Flood (PMF). The specific purpose of this Technical Report No. 3 is to define the existing hydrologic and hydraulic conditions for the Spook Hill FRS associated with the 50-year and 100-year flood events. Once the existing hydrologic and hydraulic conditions are established, the Red Mountain Freeway hydrologic and hydraulic impacts can be quantified and mitigation measures defined.

1.4 Previous Hydrologic and Hydraulic Studies

The Spook Hill FRS is located in the north central part of the Buckhorn-Mesa watershed in Maricopa County, about 10 miles northeast of downtown Mesa, Arizona. It was designed in 1977 as one element of the Buckhorn-Mesa Public Law 566 Small Watershed Project that was developed by the Soil Conservation Service (SCS). The SCS has recently been renamed the Natural Resource Conservation Service (NRCS).

As shown in Figure 2, the Buckhorn-Mesa project facilities include three floodwater-retarding structures, four floodways, and one diversion structure that were designed to detain a 100-year flood event. The project features include:

- **Apache Junction Dam and Floodway**; includes 1.6 miles of earthen dam and a 1500-foot floodway that diverts floodwater from a wash above the dam into the reservoir area. The structure drains six square miles north of the Town of Apache Junction.
- **Bulldog Floodway**; is 1.7 miles in length and transports stormwater impounded behind the Apache Junction Dam and the contributing watershed into the reservoir behind the Signal Butte Dam.
- **Pass Mountain Diversion and Outlet**; consists of a 1.2 mile long earth embankment and a 2,800-foot long outlet channel that drains floodwaters from a four square mile area to the Signal Butte Dam.
- **Signal Butte Dam and Floodway**; consists of a 1.3 mile long earthen dam and a 2.7 mile long floodway that conveys floodwaters discharged from the Signal Butte Dam and the contributing watershed to the Spook Hill Dam. The structure drains 16 square miles above the Apache Trail near the Maricopa County - Pinal County boarder.
- **Spook Hill Dam and Floodway**; consists of a 4.1 mile long earthen dam parallel to the Central Arizona Project (CAP) Canal. The principal spillway discharges to the north into a 2.0 mile long floodway which outlets to a natural wash. These controlled flows then continue north through the wash, cross under the Bush Highway, and discharge into a sediment basin at the Salt River immediately upstream of the Granite Reef Diversion Dam.

Evaluation of Preliminary Design Report
The primary purpose of the Evaluation of Preliminary FRS Design Report (1975) was to review the preliminary design hydrology for the Spook Hill FRS. The computations for determining the required floodwater retarding capacity, principal spillway size, and the emergency spillway crest were found to be satisfactory.

Final Design Report
This report was finalized by the SCS in 1976. It documents the basis of the hydrologic, hydraulic, structural, foundation and embankment designs for the Spook Hill FRS.

1.5 Current Studies

Spook Hill Area Drainage Master Plan Update
Wood/Patel & Associates, Inc. (WPA) is currently under contract with the Flood Control District of Maricopa County to update the existing Spook Hill Area Drainage Master Plan (ADMP) originally performed in July 1987. The ADMP will quantify the extent of flooding problems, incorporate existing drainage structures into the hydrologic model, and develop alternative solutions to flooding problems for the contributing watershed. The limits of this on-going study are depicted in Plate 1 (Map Pocket).

The ADMP has two major objectives. The first major objective is to develop a plan to control runoff to prevent flood damage within the watershed. The second major objective is to mitigate the potential increase in runoff due to development in order to preserve the ability of the Buckhorn-Mesa Project to provide the desired protection to lands downstream from future 100-year flood events.

FCDMC Structures Assessment Program
The FCDMC has initiated a Structures Assessment Program to minimize risk and liability associated with the District's flood control dams. The Structures Assessment Program will be conducted in three phases. Phase I will primarily involve:

- Collection of data and inspection of dams,
- Development of dam safety recommendations and priorities,
- Preliminary alternative analysis studies to modify existing projects to address urbanization related issues, and,
- Evaluation of newly enacted ADWR rule changes and District policy issues.

Phase II will primarily involve:

- Detailed investigations and analyses as identified by need and priority in Phase I,
- Project planning and authorization activities to correct identified distress issues,

- Implementing changes to the overall dam safety program and policies, and,
- Conceptual design studies and alternative analyses for modification of projects to address urbanization and distress issues.

Phase III will primarily involve:

- Implementing projects to correct any identified dam safety concerns,
- Implementing approved projects and land acquisitions to address urbanization issues, and,
- Continue the long-term dam safety program.

Kimley-Horn and Associates, Inc. (KHA) completed the Phase I Structures Assessment for the Spook Hill FRS, Signal Butte FRS, and Apache Junction FRS in April 2001. The Phase I Structures Assessment for the Spook Hill FRS included a technical review of available studies and a field examination which developed a list of recommended corrective actions. A summary of further actions/investigations recommended in the Phase I assessment for the Spook Hill FRS is as follows:

- Monitor longitudinal cracks on the crest of the dam,
- Repair erosion that has occurred on the slopes of the embankment,
- Perform a risk assessment based on breach failure by piping, or piping along a transverse crack,
- Evaluate the need for a transition filter along the longitudinal centerline of the embankment,
- Perform slope stability analyses of the embankment under various loading conditions,
- Perform hydrologic/hydraulic and watershed sediment yield analyses to confirm that the dam provides greater than 100-year flood protection,
- Perform an Incremental Damage Assessment (IDA) assuming failure of the structure versus no structure,
- Prepare a utility database for the structure identifying measures used to control piping and seepage.

The overall conclusion of the field examination is that the Spook Hill FRS and appurtenant structures are in satisfactory operational condition.

2.0 ORIGINAL HYDROLOGIC AND HYDRAULIC METHODOLOGY

The SCS hydrologic and hydraulic design of the three major structural elements: dam embankment, spillways and crossroads was performed using methods defined in the National Engineering Handbook No. 4, Hydrology [NEH-4, (1972)]. Details of the hydrologic and hydraulic methods are documented in the Evaluation of Preliminary Design and Final Design Reports. Supporting documentation from these original design reports are provided in the DMJM+HARRIS Technical Reports No. 1 and 2. The SCS developed design hydrographs including the principal spillway, emergency spillway and freeboard hydrographs. The purpose of these design hydrographs is defined below in Table 1.

Table 1 - FRS Design Hydrographs

FRS Structure Element	Design Hydrograph	Design Feature	Design Storm
Dam Embankment	Freeboard	Crest Elevation	PMF[1]
Emergency Spillway	Principal Spillway	Crest Elevation	100-year
Emergency Spillway	Freeboard	Spillway Dimensions	PMF
Emergency Spillway	Emergency Spillway	Outlet Channel	N.A.[2]
Principal Spillway	Principal Spillway	Crest Elevation	100-year[3]
Crossroads	Principal Spillway	Cross-Culvert Size	10-year

[1] Probable Maximum Flood (PMF)
[2] Not applicable to design storm frequency
[3] Supporting documentation could not be located

The details of the hydraulic design for the crossroads and top of dam elevation were documented in the SCS Final Design Report. Pertinent excerpts of this report were documented in Technical Report No. 2.

The crossroads at Brown Road, McKellips Road, and McDowell Road were designed using the Storage-Indication method documented in NEH-4. This analysis defined a minimum crossroad elevation of 1,578.7 feet, 1578.8 feet, and 1,579.0 feet at Brown, McKellips, and McDowell Roads, respectively. These elevations are based on the NGVD 29 datum.

The top of dam elevation was computed using the Freeboard Hydrograph methodology defined in NEH-4. This process resulted in a top of dam elevation of 1,591 feet (NGVD 29).

It should be noted that the design intent of the Spook Hill FRS is to safely impound and discharge the 100-year flood event through the principal spillway without experiencing any discharges from the emergency spillway.

3.0 FRS STRUCTURE DESIGN ELEVATIONS

Using the results of the hydrograph methodologies outlined in the previous section, the SCS defined the Spook Hill FRS structure control elevations. A summary of these critical elevations is provided below in Table 2.

Table 2 - Critical Structure Elevations

Structure	NGVD 29 Elevation (ft)	NAVD 88 Elevation (ft)
Dam Crest[1]	1,591.00	1,592.86
Principal Spillway Intake	1,577.50	1,579.36
Emergency Spillway Crest	1,582.00	1,583.86

[1] Minimum dam crest elevation along the Spook Hill FRS.

A conversion factor of +1.86 feet was developed for the Area Drainage Master Plan (ADMP) Update to convert NGVD 29 elevations to the North American Vertical Datum of 1988 (NAVD 88).

The SCS as-built plans, presented in Technical Report No. 2, indicate the use of 9-foot diameter corrugated metal pipes (CMP's) at the crossroads. The invert elevations of the CMP's at the crossroads are summarized in Table 3.

Table 3 – Culvert Invert Elevations

Structure	NGVD 29 Elevation (ft)	NAVD 88 Elevation (ft)
Brown Road Culvert	1,569.38	1,571.24
McKellips Road Culvert	1,567.74	1,569.60
McDowell Road Culvert	1,566.52	1,568.38

4.0 EXISTING CONDITION HYDROLOGIC ANALYSIS

The Spook Hill FRS existing condition hydrologic analyses for the 50-year and 100-year flood events presented in this section were developed using methodologies documented in the Drainage Design Manual (DDM) for Maricopa County, Volume I, Hydrology (1995). The U.S. Army Corp of Engineers (USCOE) Hydrologic Engineering Center (HEC) HEC-1 computer program (version 4.1, 1998) was used for the hydrologic analysis.

The hydrologic model developed by WPA for the ADMP Update for the 100-year, 24-hour storm was reviewed and approved by the FCDMC and was used as the basis of the models presented in this section. The WPA subbasin delineation and routing schematic is provided as Plate 1.

The Drainage Design Management System (DDMS) computer program developed by the FCDMC was used to facilitate data management and computational procedures required for developing the physical parameters associated with the 50-year flood event.

4.1 Summary of Hydrologic Methodology

Rainfall Parameters

The precipitation and storm distributions are based on the FCDMC DDM. The site specific precipitation depths developed for the ADMP Update were used for both storm frequencies.

Rainfall Loss Parameters

Rainfall infiltration losses were computed using Green and Ampt methodology presented in the FCDMC DDM.

Rainfall Excess to Runoff Transformation

Precipitation excess was transformed to direct runoff using the Clark unit hydrograph methodology. Three parameters, the time of concentration (Tc), storage coefficient (R), and a time area relation were computed using the procedures defined in the FCDMC DDM.

Channel Routing

Normal depth routing, a hydrologic routing method, was used to route the flood hydrographs. The number of time steps (NSTPS), an input parameter in the normal depth routing process, was modified to reflect the hydrograph attenuation for the 50-year storm event.

Reservoir Routing

Level-pool reservoir routing was used to define the outflow hydrograph through the emergency and principal spillways. The two components of this methodology, the stage-storage and stage-discharge functions were developed as follows:

Stage-Storage Function

As defined in the SCS as-builts, 4,070 acre-feet can be stored within the Spook Hill reservoir at an elevation of 1,591.0 feet (top of dam elevation, NGVD 29). The SCS developed this stage-storage function using maps that were available during the development of the Final Design Report. The as-built plans were presented in Technical Report No. 2.

In order to increase the accuracy of the stage-storage function, WPA used a recent 2-foot contour interval map of the Spook Hill dam and reservoir. A comparison of this function to the one developed by the SCS was provided in Technical Report No. 1.

Stage-Discharge Function

The stage-discharge relationship developed by WPA was replaced by the relationship developed by DMJM+HARRIS. This relationship, presented in Technical Report No. 1, defines a more detailed estimate of the stage-discharge values at the emergency and principal spillways. A comparison between the SCS as-built emergency spillway rating curve and the rating curve developed by DMJM+HARRIS was also presented in Technical Report No. 1.

4.2 Hydrologic Model Results

DMJM+HARRIS evaluated both the 6-hour and 24-hour duration storms for the 50-year flood event. Upon completion of the analyses, it was determined that the 6-hour duration storm resulted in greater peak discharges and resulting water-surface elevations. As a result of these analyses, only the results of the 6-hour duration storm are presented in this section.

Signal Butte Inflow Hydrograph

The Signal Butte Floodway hydrograph is required to model the contribution of the upper segments of the Buckhorn-Mesa watershed, in terms of the peak discharge and volume, into the Spook Hill FRS. The concentration point at the downstream end of the Signal Butte Floodway (C320 as shown in Plate 1) was used to define the inflow hydrograph. The resulting peak inflow for the 50-year, 6-hour storm was 1,899 cfs at the inlet to the Spook Hill FRS. The resulting peak inflow was 2,546 cfs for the 100-year, 24-hour storm at the inlet to the Spook Hill FRS.

The 50-year, 6-hour flood discharges along the Spook Hill FRS are summarized in Table 4.

Table 4 – 50-Year, 6-hour Flood Event Hydrologic Summary

Concentration Point	Peak Discharge (cfs)	Peak Volume (ac-ft)
340C	833	46
360C	1,031	85
380C	876	68
400C	751	44
C420	745	56
R415	1318	111
C455	184	15

The 100-year, 24-hour flood discharges along the Spook Hill FRS are summarized in Table 5.

Table 5 – 100-Year, 24-hour Flood Event Hydrologic Summary

Concentration Point	Peak Discharge (cfs)	Peak Volume (ac-ft)
340C	1,303	85
360C	1,286	116
380C	1,313	91
400C	712	50
C420	805	66
R415	1527	134
C455	169	51

5.0 EXISTING CONDITION HYDRAULIC ANALYSIS

The existing condition hydraulic analysis for the Spook Hill Floodwater Retarding Structure is presented for the 50-year, 6-hour and 100-year, 24-hour flood events. The structural facilities incorporated into the hydraulic model include the Spook Hill FRS, the principal and emergency spillways and the arterial street crossroads at Brown, McKellips and McDowell Roads.

5.1 Hydraulic Model Development

The existing condition hydraulic models were developed using the most recent version of HEC-RAS (Version 3.0.1). As described in Technical Report No. 2, the UNET computational engine, a one-dimensional unsteady flow hydraulic computer model, was used to define the existing hydraulic conditions for the Spook Hill FRS. The downstream and upstream limits of the hydraulic model are the principal/emergency spillway and the Signal Butte Floodway outlet, respectively. The parameters associated with the hydraulic model development are presented in the following paragraphs and documented in Appendix C.

Boundary Conditions

Upstream and Downstream Boundary Conditions

The numerical solutions of the Saint-Venant equations require the definition of the hydraulic conditions at the most upstream and downstream locations of the study reach. These are known as the upstream and downstream boundary conditions.

The Signal Butte inflow hydrograph and the combined Spook Hill emergency/principal spillway stage-discharge-rating curve, associated with the 50-and 100-year flood events presented in Appendix C, are the basis of the upstream and downstream boundary conditions.

Internal Boundary Conditions

The crossroads at Brown Road, McKellips Road and McDowell Road and the inflow hydrographs for the subbasins along the Spook Hill FRS were modeled using the available options in HEC-RAS as follows:

- The crossroads were modeled using the culvert option in HEC-RAS. A discharge coefficient, C, of 2.67 was used in the broad-crested weir equation (i.e., $Q = CLH^{1.5}$) for flow over the roadway.
- The inflow hydrographs were modeled using the uniform lateral inflow option in HEC-RAS. This option allows the user to define an inflow hydrograph and distribute it uniformly along the river reach between specified cross-sections.

The design inflow hydrographs are used as the uniform lateral inflow hydrographs in the HEC-RAS model and are documented in Appendices A and C, respectively.

- The lateral inflow hydrograph option in HEC-RAS is used to define an inflow hydrograph at a specific point. This option was used to model the inflow hydrograph from an existing channel on the north side of McDowell Road, parallel to the roadway embankment (concentration point R415).

Initial Flow Conditions

The basic requirement of HEC-RAS is a non-zero flow condition at the beginning of the simulation. Therefore, the inflow hydrograph at the upstream boundary was modified, replacing the zero flow value along the rising limb of the inflow hydrograph, with a nonzero value (i.e., 1 cfs). The uniform lateral inflow hydrographs were not modified.

Geometric Data

Plate 2 (Map Pocket) illustrates the hydraulic cross-section locations for the Spook Hill FRS. The project digital terrain models (dtm) and associated 1-foot contour interval topographic mapping developed by Kenney Aerial Mapping, Inc. (2001) and HJW Geospatial, Inc. (2001) were used to develop the cross-section geometric data.

As shown in Plate 2, cross-sections are provided at approximately 400-foot intervals along the Spook Hill FRS. Special consideration was given to provide sections at the immediate upstream and downstream ends of the crossroads at Brown, McKellips and McDowell Roads.

The skewed cross-sections at the crossroads were modified by adjusting the cross-section dimensions to define an equivalent section perpendicular to the flow direction for large magnitude flood events. These sections were modified as follows:

- For the sections at the downstream and upstream sides of the crossroads, the skew angle option available in HEC-RAS was used to automatically adjust the section dimensions.
- For the roadway profile information, the adjusted sections were input into the culvert routine in the HEC-RAS program.

The skew angles used at Brown Road, McKellips Road and McDowell Road are 50°, 36°, and 20°, respectively.

Expansion/Contraction Coefficients

In general, contraction and expansion coefficients along the study reach were defined as 0.1 and 0.3, respectively. In the vicinity of the crossroads, contraction and expansion coefficients were defined as 0.3 and 0.5, respectively, for the culverts.

Manning's Roughness Coefficient

The following guidelines were used to identify the representative roughness values for the FRS:

- Aerial photo dated January 13, 2000,
- Open Channel Hydraulics (Chow, 1959),
- USGS 7.5 Minute Series topographic map,
- USGS Water-Supply Paper 2339 (1989), and
- Flood Control District of Maricopa County Hydraulics Manual.

Field observations and engineering judgement were used to establish the Manning's n values for the existing condition hydraulics model. Typically, a Manning's n value of 0.035 was used along the Spook Hill FRS.

5.2 Results

The existing condition hydraulic models of the Spook Hill FRS, for the 50-year and 100-year flood events, are recommended to be the basis of the proposed condition hydraulic analyses for the design of the Red Mountain Freeway. The results of the hydraulic analysis for the 50-year and 100-year flood events are summarized in tables presented in this section based on the project datum (NAVD 88).

The HEC-RAS output files documented in Appendix B represent the peak discharge and water-surface elevation at discrete sections along the Spook Hill FRS. The associated stage (water-surface elevation) and flow hydrographs are documented as well.

As shown in Appendix C, the hydraulic conditions and the relative magnitude of the uniform lateral inflow hydrograph north of McDowell and McKellips Roads result in a negative flow during the rising limb of the flow hydrograph, implying a reversal in the direction of flow towards the culvert inlet. After the flood wave passes, the direction of flow reverses direction to flowing from the culvert inlet to the outlet.

A summary of the calculated hydraulic variables for the 50-year and 100-year flood events are provided in Tables 6 and 7, respectively. These results do not account for the impact of the original design sediment elevation within the flood pool.

Table 6 – 50-Year Hydraulic Summary

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
0.000	686	1568.99	1581.59	12.60	Principal Spillway
0.016	681	1568.89	1581.60	12.71	
0.019	680	1568.71	1581.60	12.89	Emergency Spillway
0.063	666	1569.37	1581.61	12.24	Emergency Spillway
0.068	665	1569.32	1581.61	12.29	
0.109	653	1569.32	1581.62	12.30	
0.185	633	1569.58	1581.63	12.05	
0.261	615	1569.20	1581.63	12.43	
0.336	595	1569.34	1581.63	12.29	
0.425	---[3]	1568.88	1581.61	12.73	McDowell Road
0.465	312	1569.15	1581.59	12.44	
0.533	312	1569.13	1581.65	12.52	
0.604	312	1569.28	1581.65	12.37	
0.680	311	1569.80	1581.65	11.85	
0.756	311	1570.22	1581.66	11.44	
0.831	310	1569.31	1581.66	12.35	
0.906	310	1569.66	1581.66	12.00	
0.983	310	1569.94	1581.66	11.72	
1.058	309	1570.83	1581.66	10.83	
1.135	309	1570.23	1581.66	11.43	
1.164	309	1570.04	1581.66	11.62	
1.210	309	1570.03	1581.66	11.63	
1.283	308	1569.85	1581.66	11.81	
1.358	308	1570.00	1581.66	11.66	
1.433	308	1569.98	1581.66	11.68	
1.509	308	1570.57	1581.66	11.09	
1.607	353	1570.24	1581.69	11.45	McKellips Road
1.656	386	1570.09	1582.59	12.50	
1.756	388	1570.56	1582.59	12.03	
1.826	379	1570.90	1582.59	11.69	
1.874	380	1570.85	1582.59	11.74	
1.901	380	1570.66	1582.59	11.93	
1.977	378	1570.52	1582.59	12.07	
2.053	378	1570.79	1582.59	11.80	
2.129	359	1570.63	1582.59	11.96	
2.205	357	1570.47	1582.59	12.12	
2.281	355	1569.87	1582.59	12.72	
2.328	354	1570.67	1582.59	11.92	
2.357	352	1570.91	1582.59	11.68	
2.433	346	1570.78	1582.59	11.81	
2.509	340	1571.29	1582.59	11.30	
2.585	332	1570.54	1582.59	12.05	

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
2.662	327	1571.72	1582.59	10.87	
2.736	321	1570.94	1582.59	11.65	
2.815	320	1571.07	1582.59	11.52	
2.871	319	1571.33	1582.59	11.26	
2.891	317	1571.26	1582.59	11.33	
2.966	315	1571.96	1582.59	10.63	
3.096	363	1571.78	1582.67	10.89	Brown Road
3.138	662	1572.36	1584.39	12.03	
3.285	630	1573.04	1584.39	11.35	
3.349	614	1573.32	1584.40	11.08	
3.424	597	1573.19	1584.40	11.21	
3.500	586	1572.48	1584.40	11.92	
3.545	580	1572.75	1584.40	11.65	
3.645	583	1572.16	1584.40	12.24	
3.749	586	1575.57	1584.40	8.83	
3.824	580	1576.54	1584.40	7.86	
3.852	580	1576.18	1584.41	8.23	

[1]Discharge corresponding to the maximum computed water-surface elevation for the 50-year storm.
[2]Maximum water-surface elevation computed using the UNET model for the 50-year storm.
[3]Flow reversal during the rising limb of the flow hydrograph (see Appendix C).

Table 7 – 100-Year Hydraulic Summary

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
0.000	713	1568.99	1581.72	12.73	Principal Spillway
0.016	712	1568.89	1581.73	12.84	
0.019	712	1568.71	1581.73	13.02	Emergency Spillway
0.063	710	1569.37	1581.74	12.37	Emergency Spillway
0.068	709	1569.32	1581.74	12.42	
0.109	708	1569.32	1581.75	12.43	
0.185	707	1569.58	1581.76	12.18	
0.261	707	1569.20	1581.77	12.57	
0.336	709	1569.34	1581.77	12.43	
0.425	---[3]	1568.88	1581.74	12.86	McDowell Road
0.465	371	1569.15	1582.05	12.90	
0.533	371	1569.13	1582.13	13.00	
0.604	370	1569.28	1582.13	12.85	
0.680	370	1569.80	1582.13	12.33	
0.756	369	1570.22	1582.13	11.91	
0.831	369	1569.31	1582.14	12.83	
0.906	369	1569.66	1582.14	12.48	
0.983	368	1569.94	1582.14	12.20	
1.058	369	1570.83	1582.14	11.31	
1.135	370	1570.23	1582.14	11.91	
1.164	367	1570.04	1582.14	12.10	
1.210	370	1570.03	1582.14	12.11	
1.283	371	1569.85	1582.14	12.29	
1.358	372	1570.00	1582.14	12.14	
1.433	373	1569.98	1582.14	12.16	
1.509	374	1570.57	1582.14	11.57	
1.607	375	1570.24	1582.18	11.94	McKellips Road
1.656	494	1570.09	1582.97	12.88	
1.756	496	1570.56	1582.97	12.41	
1.826	497	1570.90	1582.97	12.07	
1.874	498	1570.85	1582.97	12.12	
1.901	483	1570.66	1582.97	12.31	
1.977	480	1570.52	1582.97	12.45	
2.053	475	1570.79	1582.97	12.18	
2.129	472	1570.63	1582.97	12.34	
2.205	484	1570.47	1582.97	12.50	
2.281	477	1569.87	1582.97	13.10	
2.328	475	1570.67	1582.97	12.30	
2.357	474	1570.91	1582.97	12.06	
2.433	467	1570.78	1582.97	12.19	
2.509	460	1571.29	1582.97	11.68	
2.585	459	1570.54	1582.97	12.43	

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
2.662	451	1571.72	1582.97	11.25	
2.736	442	1570.94	1582.97	12.03	
2.815	441	1571.07	1582.97	11.90	
2.871	438	1571.33	1582.97	11.64	
2.891	437	1571.26	1582.97	11.71	
2.966	435	1571.96	1582.97	11.01	
3.096	430	1571.78	1583.01	11.23	Brown Road
3.138	866	1572.36	1585.07	12.71	
3.285	835	1573.04	1585.08	12.04	
3.349	816	1573.32	1585.08	11.76	
3.424	789	1573.19	1585.08	11.89	
3.500	777	1572.48	1585.09	12.61	
3.545	770	1572.75	1585.09	12.34	
3.645	775	1572.16	1585.09	12.93	
3.749	776	1575.57	1585.08	9.51	
3.824	773	1576.54	1585.09	8.55	
3.852	778	1576.18	1585.09	8.91	

[1]Discharge corresponding to the maximum computed water-surface elevation for the 100-year storm.
[2]Maximum water-surface elevation computed using the UNET model for the 100-year storm.
[3]Flow reversal during the rising limb of the flow hydrograph (see Appendix C).

5.3 Sediment Elevation Considerations

The stage-storage function developed for the Spook Hill Area Drainage Master Plan Update defines a sediment volume of 271 acre-feet based on the elevation of the principal spillway outlet. This volume was computed using recent FCDMC 2-foot contour interval topographic mapping and corresponds to an elevation of 1,577.2 feet (NAVD 88).

A second HEC-RAS geometric data set was developed to represent the design sediment pool impact on the Spook Hill FRS hydraulic analyses. The HEC-RAS output files for these analyses are also provided in Appendix B to document the estimated peak discharge and water-surface elevation at discrete sections along the Spook Hill FRS. The associated stage (water-surface elevation) and flow hydrographs are also provided in Appendix B.

The soffit elevations for the cross culverts at Brown Road, McKellips Road and McDowell Road are 1,580.24 ft, 1,578.60 ft, and 1,577.38 ft, respectively (NAVD 88). The estimated sediment elevation of 1,577.2 feet effectively blocks the crossroad culverts. It should be noted that it is unlikely that the FCDMC would allow this sediment accumulation to occur without intervening maintenance.

Table 8 – 50-Year Hydraulic Summary Including Sediment

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
0.000	725	1577.2	1581.78	4.58	Principal Spillway
0.016	720	1577.2	1581.84	4.64	
0.019	719	1577.2	1581.85	4.65	Emergency Spillway
0.063	707	1577.2	1581.88	4.68	Emergency Spillway
0.068	706	1577.2	1581.89	4.69	
0.109	693	1577.2	1581.92	4.72	
0.185	674	1577.2	1581.94	4.74	
0.261	658	1577.2	1581.96	4.76	
0.336	645	1577.2	1581.96	4.76	
0.425		1577.2	1581.79	4.59	McDowell Road
0.465	181	1577.2	1581.40	4.20	
0.533	181	1577.2	1581.78	4.58	
0.604	181	1577.2	1581.78	4.58	
0.680	180	1577.2	1581.78	4.58	
0.756	180	1577.2	1581.78	4.58	
0.831	180	1577.2	1581.79	4.59	
0.906	180	1577.2	1581.79	4.59	
0.983	180	1577.2	1581.79	4.59	
1.058	179	1577.2	1581.79	4.59	
1.135	179	1577.2	1581.79	4.59	
1.164	179	1577.2	1581.79	4.59	
1.210	179	1577.2	1581.79	4.59	
1.283	179	1577.2	1581.79	4.59	
1.358	178	1577.2	1581.79	4.59	
1.433	178	1577.2	1581.79	4.59	
1.509	178	1577.2	1581.79	4.59	
1.607	203	1577.2	1582.11	4.91	McKellips Road
1.656	232	1577.2	1582.70	5.50	
1.756	232	1577.2	1582.70	5.50	
1.826	232	1577.2	1582.70	5.50	
1.874	232	1577.2	1582.70	5.50	
1.901	231	1577.2	1582.70	5.50	
1.977	229	1577.2	1582.70	5.50	
2.053	227	1577.2	1582.70	5.50	
2.129	226	1577.2	1582.70	5.50	
2.205	225	1577.2	1582.70	5.50	
2.281	222	1577.2	1582.70	5.50	
2.328	221	1577.2	1582.70	5.50	
2.357	222	1577.2	1582.70	5.50	
2.433	218	1577.2	1582.70	5.50	
2.509	217	1577.2	1582.70	5.50	
2.585	215	1577.2	1582.70	5.50	

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
2.662	213	1577.2	1582.70	5.50	
2.736	211	1577.2	1582.70	5.50	
2.815	209	1577.2	1582.70	5.50	
2.871	206	1577.2	1582.70	5.50	
2.891	207	1577.2	1582.70	5.50	
2.966	204	1577.2	1582.70	5.50	
3.096	698	1577.2	1582.90	5.70	Brown Road
3.138	710	1577.2	1584.85	7.65	
3.285	684	1577.2	1584.85	7.65	
3.349	669	1577.2	1584.85	7.65	
3.424	629	1577.2	1584.85	7.65	
3.500	618	1577.2	1584.86	7.66	
3.545	612	1577.2	1584.86	7.66	
3.645	614	1577.2	1584.86	7.66	
3.749	616	1577.2	1584.86	7.66	
3.824	618	1577.2	1584.86	7.66	
3.852	621	1577.2	1584.87	7.67	

[1]Discharge corresponding to the maximum computed water-surface elevation for the 50-year storm.
[2]Maximum water-surface elevation computed using the UNET model for the 50-year storm.
[3]Flow reversal during the rising limb of the flow hydrograph (see Appendix C).

Table 9 – 100-Year Hydraulic Summary Including Sediment

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
0.000	751	1577.2	1581.91	4.71	Principal Spillway
0.016	753	1577.2	1581.97	4.77	
0.019	753	1577.2	1581.97	4.77	Emergency Spillway
0.063	765	1577.2	1582.00	4.80	Emergency Spillway
0.068	767	1577.2	1582.01	4.81	
0.109	773	1577.2	1582.04	4.84	
0.185	791	1577.2	1582.06	4.86	
0.261	767	1577.2	1582.07	4.87	
0.336	768	1577.2	1582.08	4.88	
0.425	---[3]	1577.2	1582.09	4.89	McDowell Road
0.465	231	1577.2	1582.45	5.25	
0.533	238	1577.2	1582.46	5.26	
0.604	151	1577.2	1582.46	5.26	
0.680	148	1577.2	1582.47	5.27	
0.756	151	1577.2	1582.47	5.27	
0.831	154	1577.2	1582.47	5.27	
0.906	159	1577.2	1582.47	5.27	
0.983	167	1577.2	1582.46	5.26	
1.058	171	1577.2	1582.46	5.26	
1.135	177	1577.2	1582.46	5.26	
1.164	181	1577.2	1582.46	5.26	
1.210	185	1577.2	1582.46	5.26	
1.283	189	1577.2	1582.46	5.26	
1.358	220	1577.2	1582.46	5.26	
1.433	202	1577.2	1582.46	5.26	
1.509	200	1577.2	1582.46	5.26	
1.607	234	1577.2	1582.50	5.30	McKellips Road
1.656	315	1577.2	1583.15	5.95	
1.756	317	1577.2	1583.15	5.95	
1.826	318	1577.2	1583.15	5.95	
1.874	317	1577.2	1583.15	5.95	
1.901	316	1577.2	1583.15	5.95	
1.977	314	1577.2	1583.15	5.95	
2.053	312	1577.2	1583.15	5.95	
2.129	310	1577.2	1583.15	5.95	
2.205	309	1577.2	1583.15	5.95	
2.281	306	1577.2	1583.15	5.95	
2.328	305	1577.2	1583.15	5.95	
2.357	305	1577.2	1583.15	5.95	
2.433	301	1577.2	1583.15	5.95	
2.509	295	1577.2	1583.15	5.95	
2.585	291	1577.2	1583.15	5.95	

Station (miles)	Discharge[1] (cfs)	Minimum Channel Elevation (ft)	Maximum Water-Surface Elevation[2] (ft)	Maximum Depth (ft)	Comments
2.662	288	1577.2	1583.15	5.95	
2.736	284	1577.2	1583.15	5.95	
2.815	280	1577.2	1583.15	5.95	
2.871	279	1577.2	1583.15	5.95	
2.891	278	1577.2	1583.15	5.95	
2.966	269	1577.2	1583.15	5.95	
3.096	274	1577.2	1583.18	5.98	Brown Road
3.138	1113	1577.2	1585.22	8.02	
3.285	1085	1577.2	1585.23	8.03	
3.349	1078	1577.2	1585.24	8.04	
3.424	1093	1577.2	1585.24	8.04	
3.500	1095	1577.2	1585.24	8.04	
3.545	953	1577.2	1585.24	8.04	
3.645	950	1577.2	1585.24	8.04	
3.749	1141	1577.2	1585.24	8.04	
3.824	1148	1577.2	1585.25	8.05	
3.852	1149	1577.2	1585.27	8.07	

[1]Discharge corresponding to the maximum computed water-surface elevation for the 100-year storm.
[2]Maximum water-surface elevation computed using the UNET model for the 100-year storm.
[3]Flow reversal during the rising limb of the flow hydrograph (see Appendix C).

When comparing Tables 6 through 9, the impact of the design sediment pool on the maximum water-surface elevation is 0.5 feet and 0.4 feet for the 50-year and 100-year design floods, respectively. It can also be noted that that incorporating the design sediment pool into the reservoir reduces the peak flow attenuation along the length of the FRS, which is expected since there is less storage volume available.

The HEC-RAS UNET software can generate variable rating curves at each of the cross-sections in the hydraulic model. The rating curves presented in Appendix B give the impression of numerical instability. However, a more detailed review of the rating curves illustrates the dynamic nature of the system, especially in the vicinity of the crossroads where the culverts impact the reservoir hydraulics.

During the rising limb of the inflow hydrograph, the culvert tailwater can increase faster than the headwater resulting in a decrease in conveyance through the culvert; or in the case of the McDowell or McKellips Road culverts, reverse the direction of flow. As the inflow hydrograph continues to increase and the flood wave progresses through the system, the headwater elevation increases and the peak discharge increases through the culvert system.

6.0 SUMMARY

The methodologies used in the development of the hydrologic models are based on the FCDMC "Drainage Design Manual (DDM) for Maricopa County, Volume I, Hydrology" (1995). The 100-year, 24-hour hydrologic model used in this study was developed for the FCDMC to update the existing Spook Hill ADMP. This model was used as the basis of the 50-year hydrologic model presented in this report. The FCDMC DDMS computer program was used to update the hydrologic parameters of the 50-year storm. As indicated in Section 4 the 50-year, 6-hour storm results in higher peak flows and water-surface elevations than the 24-hour storm.

The results of the hydraulic analysis indicate that the difference in water-surface elevation between the 50-year and 100-year storms is on the order of 0.5 foot. In some locations the difference can be as little as 0.1 foot to as much as 1.0 foot upstream of McDowell Road. The design sediment pool can also impact the maximum water-surface elevation on the order of 0.5 foot which is likely within the accuracy of the hydraulic analysis.

The maximum 100-year water-surface elevation for the Spook Hill FRS at the principal spillway is summarized below in Table 10 (NAVD 88) for the original SCS design, hydrologic routing (HEC-1) and hydraulic routing (HEC-RAS) presented in this report.

Table 10 – Principal Spillway Maximum 100-Year Water Surface Elevation Comparison

Methodology	Maximum Water-Surface Elevation (ft)
SCS Principal Spillway Hydrograph	1,583.9
Hydrologic Routing (HEC-1)	1,579.1
Hydraulic Routing (HEC-RAS)	1,581.9

It should be noted that the maximum water-surface elevations presented in Table 10 do not compare similar hydrologic and hydraulic methodologies. This comparison should only be used as an order of magnitude check for the analyses presented. Additionally, the hydraulic routing methodology predicts a backwater impact of approximately 3.4 feet at the upstream end of the FRS.

It is recommended that the hydraulic analyses presented with this report be used to define the existing conditions for the 50-year and 100-year design flood events for the Spook Hill FRS.

7.0 REFERENCES

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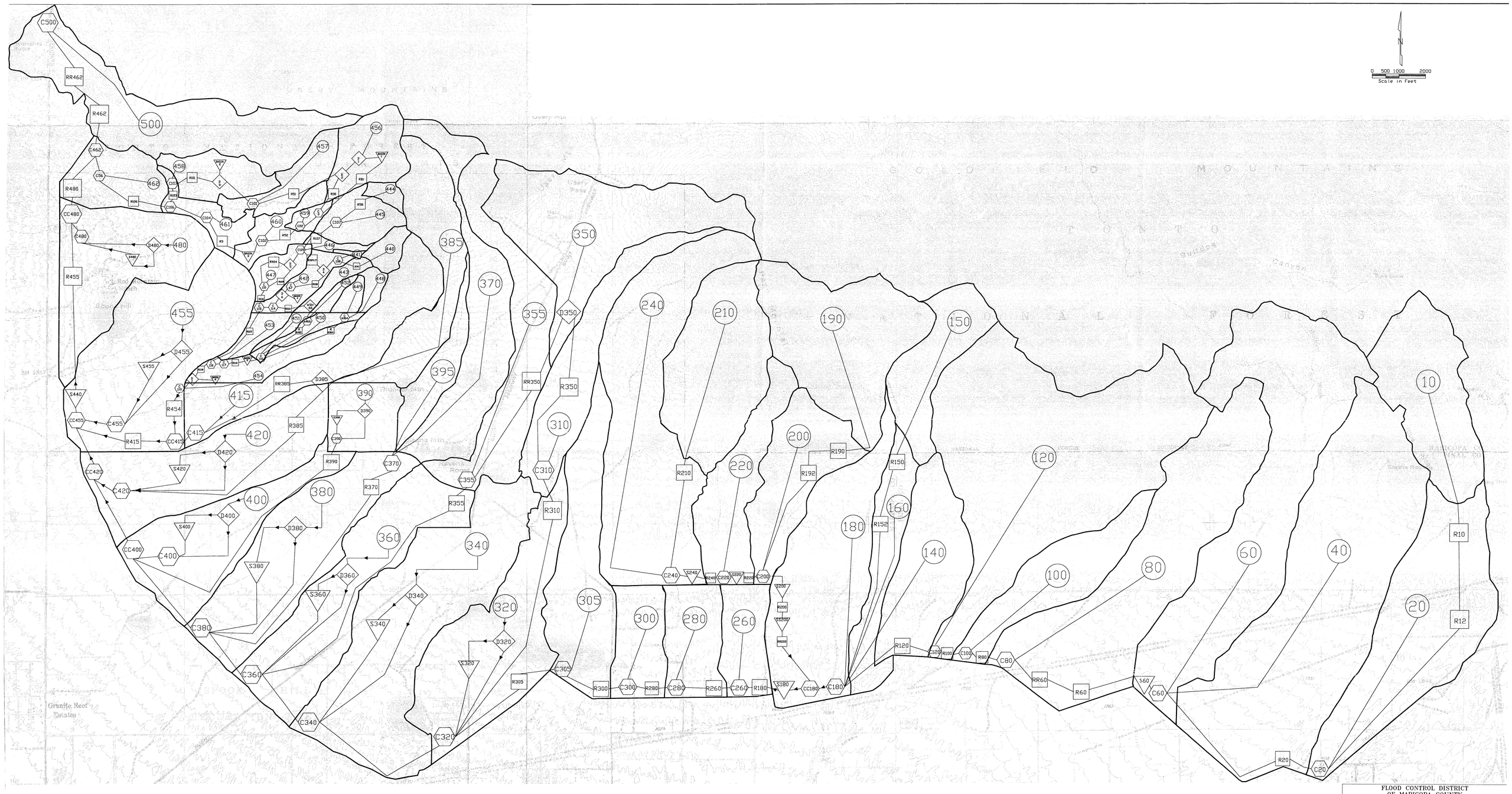
PLATE 1

SUBBASIN BOUNDARY MAP



SOSSAMAN ROAD

HAWES ROAD

ELLSWORTH ROAD

CRISMON ROAD

SIGNAL BUTTE RD

MERIDIAN ROAD

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

EXISTING CONDITION BASE MODEL

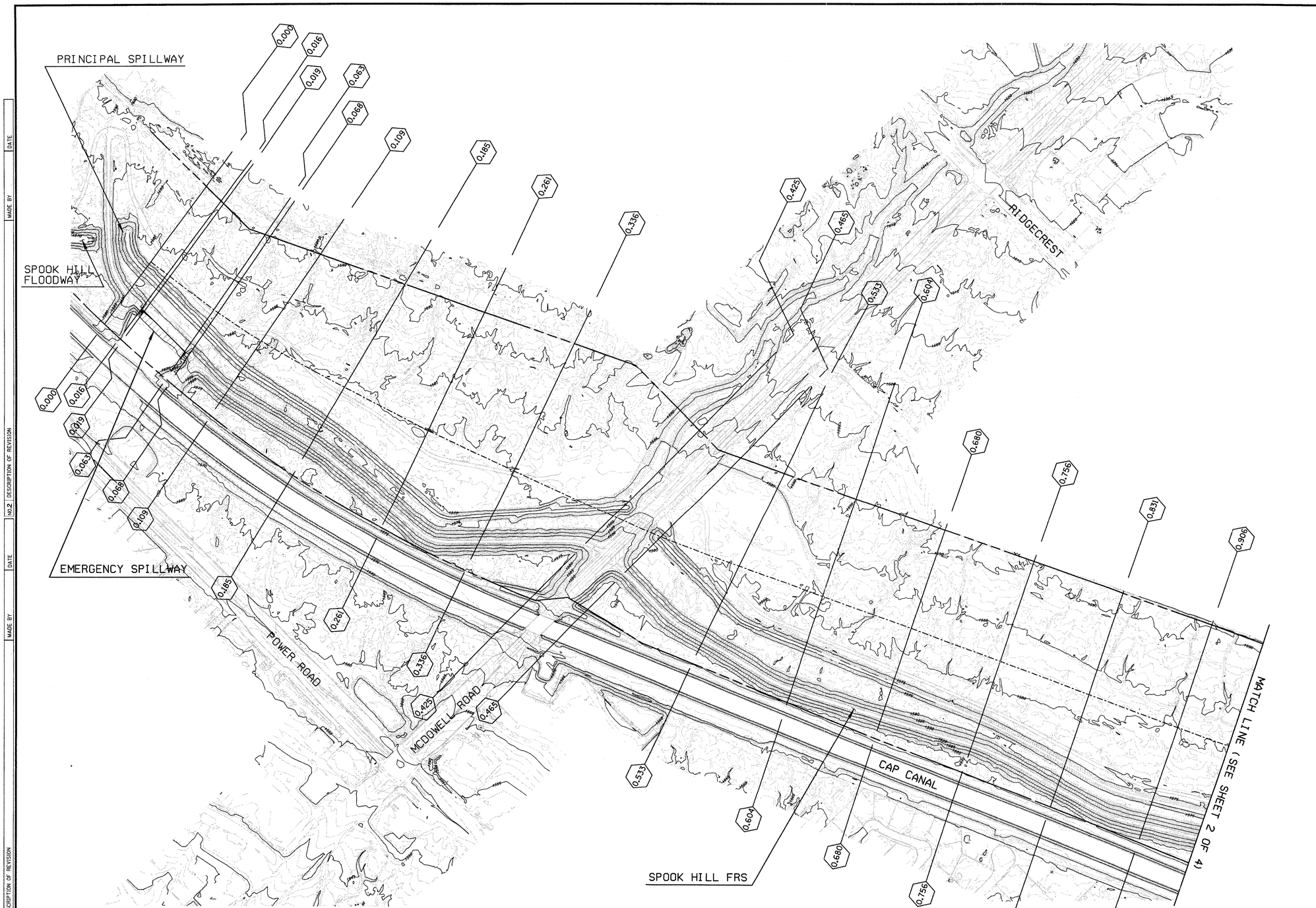
	BY	DATE
DESIGNED	R. HINER	06/00
DRAWN	S. CAMPBELL	06/00
CHECKED	A. PATEL	06/00

WOOD, PATEL & ASSOCIATES, INC.
2051 WEST NORTHERN, SUITE 100
PHOENIX, ARIZONA (602) 335-8500

DRAWING NO. EC24BASE.DWG SHEET OF

PLATE 2

HEC-RAS CROSS-SECTION LOCATION MAPS



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

LEGEND

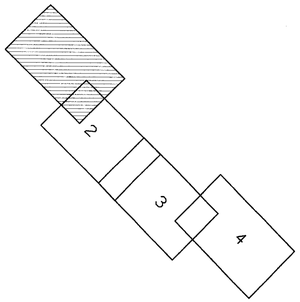
HYDRAULIC BASE LINE

CROSS SECTION LOCATION (0.283) (0.283)

FCDMC RIGHT OF WAY

NOTES

INDEX MAP



N

200 0 200 400'

SCALE: 1"=200'

CONTOUR INTERVAL = 1 FOOT

NO.	DESCRIPTION OF REVISION	DATE	MADE BY

		DATE
DESIGN	IKT	05/02
DRAWN	CPG	05/02
CHECKED	JRM	05/02

DMJM HARRIS
2777 E. CAMELBACK ROAD SUITE 200
PHOENIX, AZ. 85016-4302 (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SPOOK HILL FRS
HEC-RAS CROSS-SECTION
LOCATION MAP

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
202L			RED MOUNTAIN FREEWAY

TRACS NO. H 5782 01C

DWG. NO. - .

1 OF 4

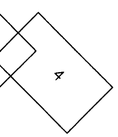
05/15/02 j:\Rm06\Prod\drn\s6dex01.dgn

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 1' CONTOUR INTERVALS.

GROUND CONTROL SURVEY DATA PROVIDED BY
PROJECT ENGINEERING CONSULTANTS, INC. AND WOOD, PATEL & ASSOCIATES, INC.

TOTAL SHEETS	AS BUILT

0.283 — 0.283



200 400'

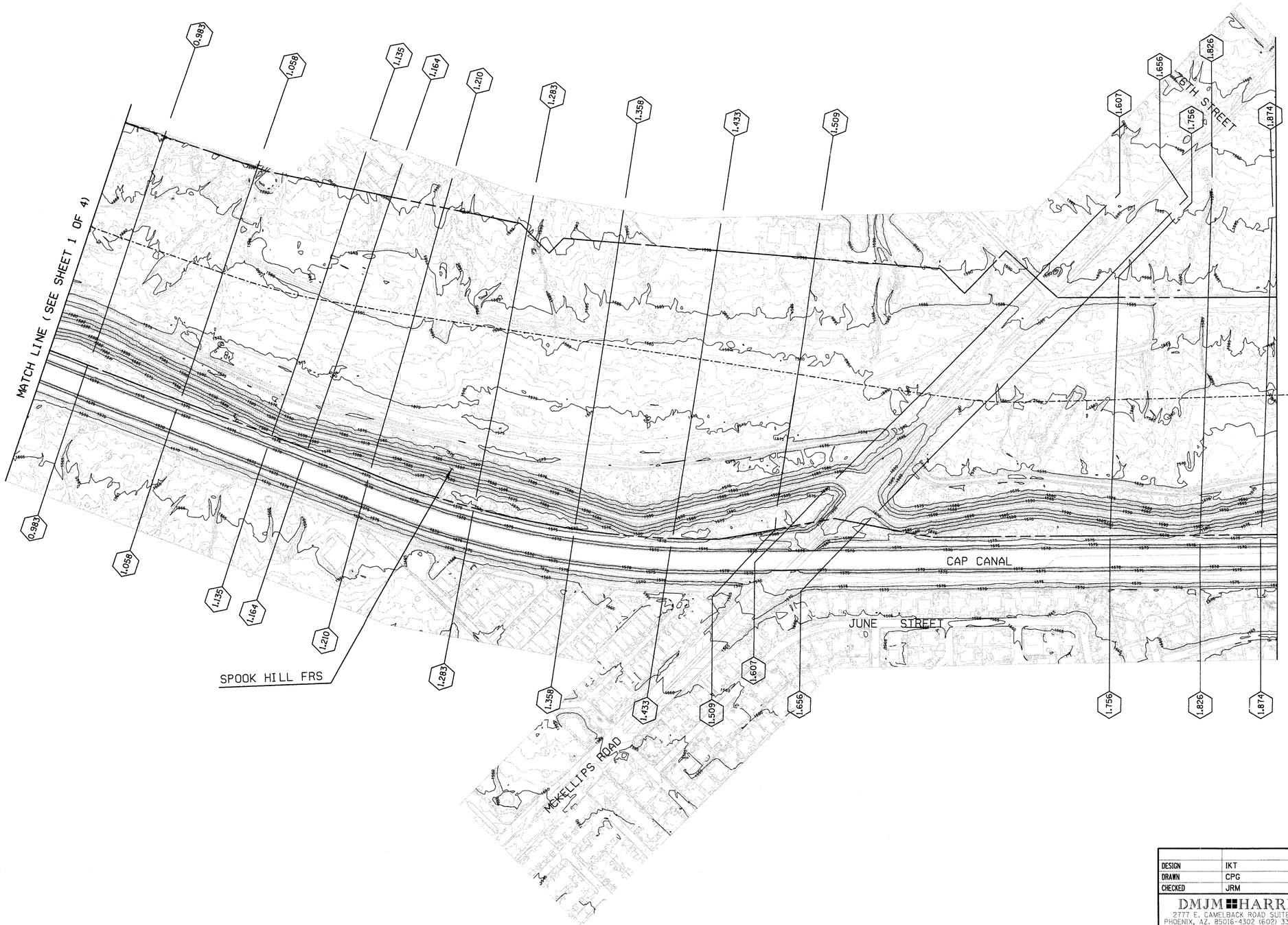
= 1 FOOT

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

DWG. NO. - .

2 OF 4

NO.	DESCRIPTION OF REVISION	DATE	MADE BY
NO.1			
NO.2			



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.
9	ARIZ.		

LEGEND

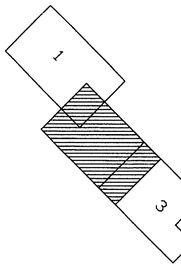
HYDRAULIC BASE LINE

CROSS SECTION LOCATION

FCDMC RIGHT OF WAY

NOTES

INDEX M



200 0

SCALE: 1"=2

CONTOUR INTERVAL

		DATE
DESIGN	IKT	05/02
DRAWN	CPG	05/02
CHECKED	JRM	05/02

DMJM HARRIS
2777 E. CAMELBACK ROAD SUITE 200
PHOENIX, AZ. 85016-4302 (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATIO
INTERMODAL TRANSPORTATION DIVISION

SPOOK HILL FRS
HEC-RAS CROSS-SECTION
LOCATION MAP

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
202L			RED MOUNTAIN FREEWAY

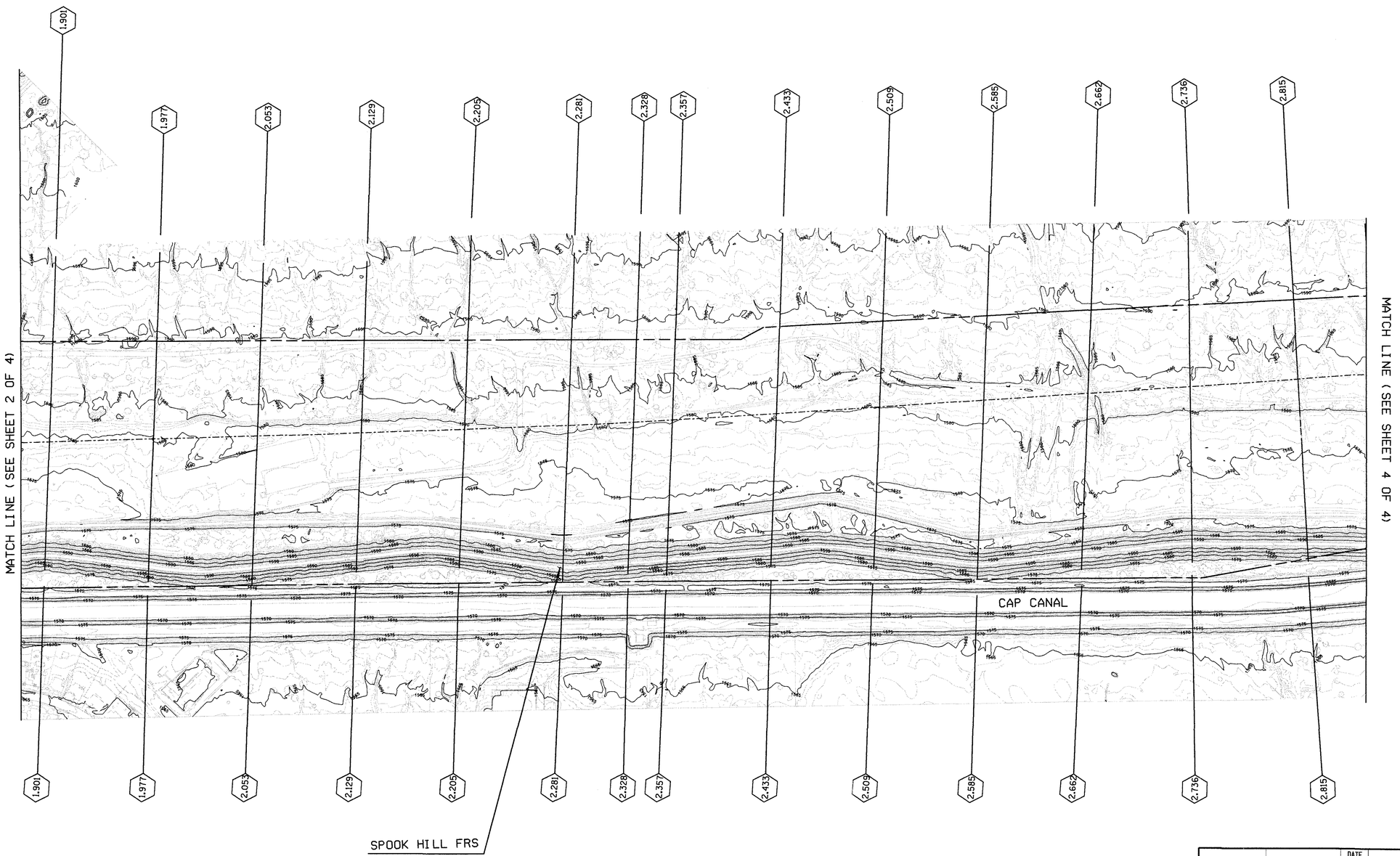
TRACS NO. H 5782 01C

05/15/02 J:\Rm06\Prod\drn\s6dex02.dgn

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 1' CONTOUR INTERVALS.

GROUND CONTROL SURVEY DATA PROVIDED BY
PROJECT ENGINEERING CONSULTANTS, INC. AND WOOD, PATEL & ASSOCIATES, INC.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				



LEGEND

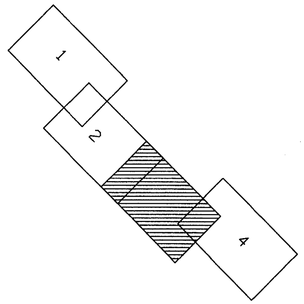
HYDRAULIC BASE LINE

CROSS SECTION LOCATION 0.283 — 0.283

FCDMC RIGHT OF WAY

NOTES

INDEX MAP



N

200 0 200 400'

SCALE: 1"=200'

CONTOUR INTERVAL = 1 FOOT

		DATE
DESIGN	IKT	05/02
DRAWN	CPG	05/02
CHECKED	JRM	05/02

DMJM HARRIS
2777 E. CAMELBACK ROAD SUITE 200
PHOENIX, AZ. 85016-4302 (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SPOOK HILL FRS
HEC-RAS CROSS-SECTION
LOCATION MAP

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

ROUTE	MILEPOST	STRUCTURE NO.	LOCATION
202L			RED MOUNTAIN FREEWAY

TRACS NO. H 5782 01C

DWG. NO. - .

3 OF 4

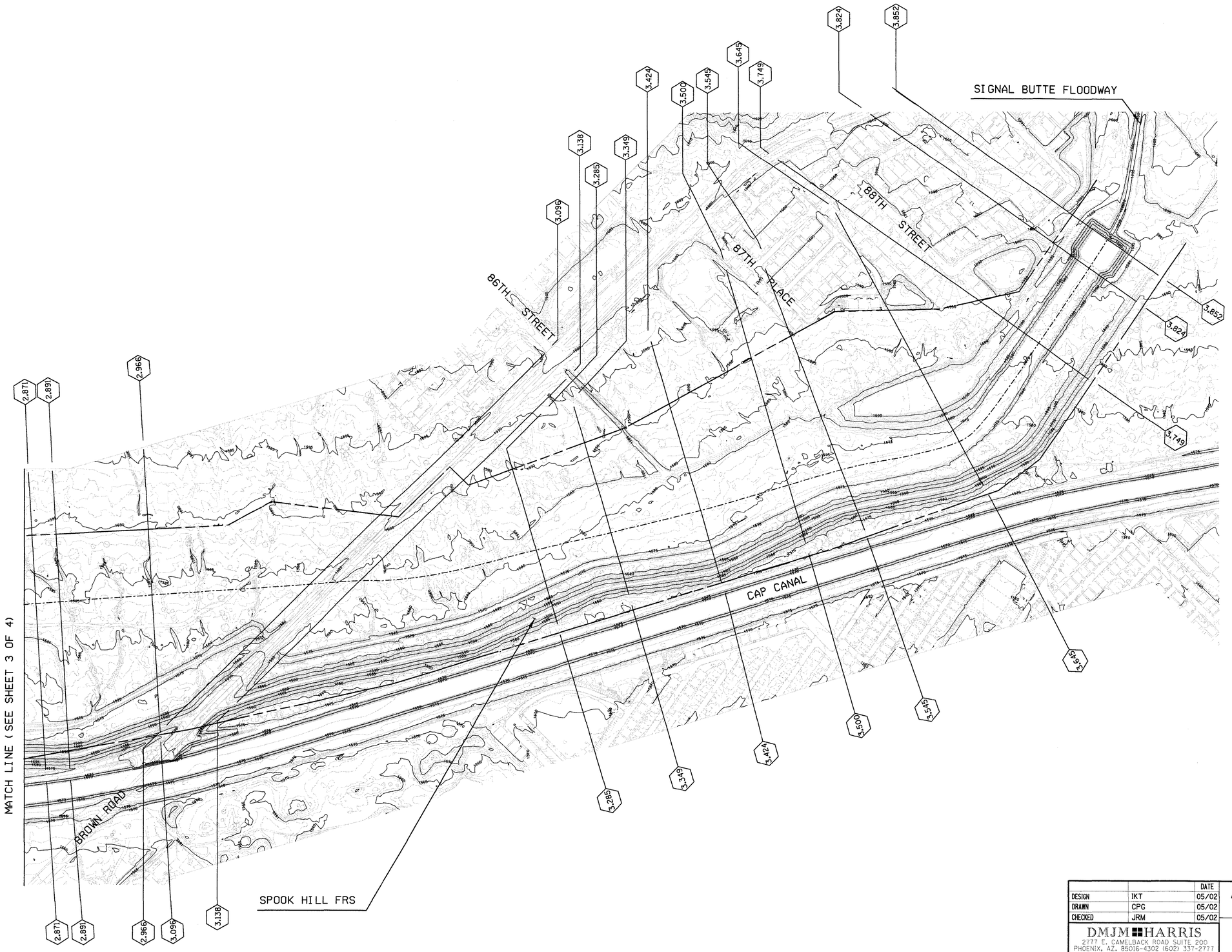
NO.	DESCRIPTION OF REVISION	MADE BY	DATE

05/15/02 J:\Rm06\Prod\drn\s6dex03.dgn

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 1' CONTOUR INTERVALS.

GROUND CONTROL SURVEY DATA PROVIDED BY
PROJECT ENGINEERING CONSULTANTS. INC. AND WOOD. PATEL & ASSOCIATES. INC.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				



LEGEND

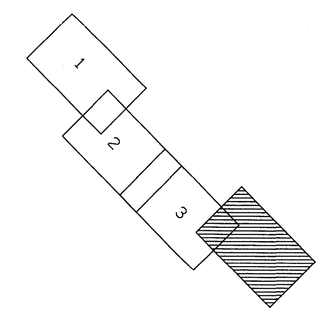
HYDRAULIC BASE LINE

CROSS SECTION LOCATION 0.283 — 0.283

FCDMC RIGHT OF WAY

NOTES

INDEX MAP



200 0 200 400'

SCALE: 1"=200'

CONTOUR INTERVAL = 1 FOOT

		DATE
DESIGN	IKT	05/02
DRAWN	CPG	05/02
CHECKED	JRM	05/02

DMJM HARRIS
2777 E. CAMELBACK ROAD SUITE 200
PHOENIX, AZ. 85016-4302 (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

SPOOK HILL FRS
HEC-RAS CROSS-SECTION
LOCATION MAP

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

202L			LOCATION RED MOUNTAIN FREEWAY
ROUTE	MILEPOST	STRUCTURE NO.	

TRACS NO. H 5782 01C

DWG. NO. - .

4 OF 4

NO.	DESCRIPTION OF REVISION	MADE BY	DATE

05/15/02 J:\Rm06\Prod\drn\s6dex04.dgn

THIS MAP WAS PREPARED BY PHOTOGRAMMETRIC METHODS TO NATIONAL MAP ACCURACY STANDARDS FOR 1"= 200' HORIZONTAL SCALE AND 1' CONTOUR INTERVALS.

GROUND CONTROL SURVEY DATA PROVIDED BY
PROJECT ENGINEERING CONSULTANTS, INC. AND WOOD, PATEL & ASSOCIATES, INC.

APPENDIX A

HEC-1 OUTPUT

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
* RUN DATE   15MAY02  TIME  07:48:20   *
*                                      *
****************************************
```

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

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

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

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

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

  1           ID   Hydrologic model revised by DMJM+HARRIS
  2           ID   Existing Condition Base Model(50-year, 6-hour storm)
  3           ID   File Name: DHEL6.DAT
  4           ID
  5           ID   The Existing Condition Base Model with Spook Hill FRS Storage Routing
  6           ID   (File Name: EC24BASE.DAT) developed by WPA as part of the ADMP update
  7           ID   is the origin of this model.
  8           ID
  9           ID   The following concentration points were added to define the uniform
 10           ID   lateral inflow hydrographs along the Spook Hill FRS:
 11           ID        340C, 360C, 380C, 400C
 12           ID   These hydrograph combination labels were used for consistency with
 13           ID   the routing exhibit provided for the model.
 14           ID
 15           ID   The DDMS software was used to revise the precipitation and Clark Unit
 16           ID   hydrograph variables for the frequency and duration of the storm event.
 17           ID
 18           ID   The hydrologic routing variable, NSTPS, was modified based on:
 19           ID                     NSTPS = (Travel Time)*60/NMIN
 20           ID
 21           ID   A CONSERVATIVE ESTIMATE WAS USED FOR THE LOCATION OF THE CENTROID FOR
 22           ID   PRECIPITATION VALUES
 23           ID   CHANNEL ROUTING INFORMATION FOR MCFCD FLOODWAYS WERE OBTAINED
 24           ID   FROM MCFCD SPOOK HILL, SIGNAL BUTTE AND BULLDOG FLOODWAY PLANS
 25           ID
 26           ID
 27           ID   UPDATE TO EXISTING CONDITION 24-HR 100-YR MODEL RUN BASED ON RE-ALIGNMENT
 28           ID   OF SUB-BASIN BOUNDARIES FOR SUB-BASINS 385 (REDUCED) & 415 (ENLARGED)
 29           ID   UPDATE BASED ON INFORMATION FROM 2' CONTOUR MAPPING.
 30           ID
 31           ID   ANALYSIS PERFORMED BY WOOD/PATEL; MW;        07/27/00  FILE: S24CE30Z.DAT
 32           ID
 33           ID   DDM MCUHP1 SPOOK HILL AMDP - EXISTING CONDITIONS MODEL - 100YR, 24HR STORM
              *       Original File Name: S24CE30.DAT
              *       Modified File Name: S24CE30Z.DAT
              *       Changes: 1) No. of Hydrograph Ordinates Increased to 2000
              *                2) SE, SV and SQ Cards for the Three (3) FRSs Updated
              *                3) Sediment Volumes Subtracted from Storage Volumes
              *                4) Old Elevation Datum Adjusted to NAVD 1988
              *       Wood/Patel, July 19, 2000.  SZ.
              *
              *  As of 12/06/00 the following has been added to update the base hec1 file
              *  S24CE30z. This file is used   to begin update process towards resulting 100yr
              *  existing condition 24-hour hec run which upon its completion will be  file
              *  from which all subsequent (future) runs will be derived.
              *
              *  This new file will be named (labeled):    EC24base.dat
              *              E  =  Existing condition model
              *              C  =  100-year return period
              *              24 =  Storm Duration
              *
              *  MAJOR ASSUMPTIONS / CRITERIA / CHANGES FROM PREVIOUS MODELS: 2/14/1
              *
              *       1. Refinement of areas for sub-basins 200, 210, 220, 240, 260, 280, 300,
              *          305, 320, 340, 355, 360, 370, 380, 395 and 415 using CAD as follows:
              *               Area of 200 changes to  .530 sq. miles
```

```
*            Area of 210 changes to  .792 sq. miles
*            Area of 220 changes to  .473 sq. miles
*            Area of 240 changes to 1.408 sq. miles
*            Area of 260 changes to  .262 sq. miles
*            Area of 280 changes to  .319 sq. miles
*            Area of 300 changes to  .289 sq. miles
*            Area of 305 changes to  .702 sq. miles
*            Area of 320 changes to  .950 sq. miles
*            Area of 340 changes to 1.440 sq. miles
*            Area of 355 changes to  .676 sq. miles
*            Area of 360 changes to  .880 sq. miles
*            Area of 370 changes to  .672 sq. miles
*            Area of 380 changes to  .898 sq. miles
*            Area of 395 changes to  .199 sq. miles
*            Area of 415 changes to  .609 sq. miles
*
*      2. The numbering system used when a sub-basin is further divide
*         is changed to a number letter combination from a number only system.
*         Now when a sub-basin is divided further, the original number  will
*         remain and a letter a,b,c will be attached depending on the
*         number of pieces that the sub-basin is divided into. This applies
*         only to future condition models.
*
*      3. The slope of R455 is incorrect and will change from .002 ft/ft
*         to .0002 ft/ft.
*
*      4. Changes to sub-basin areas will result in changes to soil type
*         percentages.  All changes to areas and soil make-up have been
*         obtained using CAD instead of hand planimeter.
*
*      5. Signal Butte Floodway reach lengths have been updated using
*         the as built plans dated March of 1983.  Hec routings affected by
*         this are as follows:
*              R180 increased 100' from 1500' to 1600'
*              R260 remained unchanged.
*              R280 decreased 400' from 2500' to 2100'
*              R300 increased 300' from 2200' to 2500'
*              RR300 is relabeled R305
*              R305 decreased 50' from 6050' to 6000'
*
*      6. "N - Steps" balanced using normal depth channel calcs and limiting
*         divergence from the resulting value by no more than 30%
*         higher or lower.
*
*
*
*
*DIAGRAM
```

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

  34          IT       2                   2000
  35          IO       5
  36          IN      15
  37          JD    2.82    0.01
  38          PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  39          PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  40          PC    .962    .972    .983    .991   1.000
  41          JD    2.80    0.50
  42          JD    2.76    2.80
  43          PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
  44          PC    .087    .100    .120    .163    .252    .451    .694    .837    .900    .938
  45          PC    .950    .963    .975    .988   1.000
  46          JD    2.60    16.0
  47          PC    .000    .015    .020    .030    .048    .063    .076    .090    .105    .119
  48          PC    .135    .152    .175    .222    .304    .472    .670    .796    .868    .912
  49          PC    .946    .960    .973    .987   1.000
  50          JD    2.28    90.0
  51          PC    .000    .021    .035    .051    .071    .087    .105    .125    .143    .160
  52          PC    .179    .201    .232    .281    .364    .500    .658    .773    .841    .888
  53          PC    .927    .945    .964    .982   1.000
  54          JD    1.61   500.0
  55          PC    .000    .024    .043    .059    .078    .098    .119    .141    .162    .186
  56          PC    .212    .239    .271    .321    .408    .515    .627    .735    .814    .864
  57          PC    .907    .930    .954    .977   1.000
              * DDM   ***** Updated *****

  58          KK      10
  59          KM   SUB-BASIN 10
  60          KM   6-HOUR RAINFALL, PATTERN NO. 1.20 WAS USED TO FIND TC & R FOR THIS BASIN
  61          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
  62          KM     L = 2.00  Kb = .044  Adj. Slope =  165.0
  63          BA    .702
  64          LG    .350    .320   7.600    .090  15.000
  65          UC    .429    .308
  66          UA       0       3       5       8      12      20      43      75      90      96
  67          UA     100
              * DDM   ***** Preserved *****

  68          KK     R10
  69          KM   ROUTING OF FLOW FROM SUB-BASIN 10 TO R12
  70          RS       4    FLOW      -1
  71          RC    .045     .03    .045    8700    .021
  72          RX       0       1       2      17      27      42      43      44
  73          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

  74          KK     R12
  75          KM   ROUTING OF FLOW FROM R12 TO SUB-BASIN 20
  76          RS       6    FLOW      -1
  77          RC    .045     .03    .045    4500     .01
  78          RX       0       1      45    52.5    72.5      80     124     125
  79          RY       4     2.5     2.5       0       0     2.5     2.5       4
              * DDM   ***** Updated *****
```

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

  80          KK      20
  81          KM   SUB-BASIN 20
  82          KM   6-HOUR RAINFALL, PATTERN NO. 1.47 WAS USED TO FIND TC & R FOR THIS BASIN
  83          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .986
  84          KM     L = 2.50  Kb = .041  Adj. Slope =   88.0
  85          BA   1.120
  86          LG    .350    .390   5.800    .190   1.000
  87          UC    .725    .505
  88          UA       0       3       5       8      12      20      43      75      90      96
  89          UA     100
              * DDM   ***** Preserved *****

  90          KK     C20
  91          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 10 AND 20
  92          HC       2
              * DDM   ***** Preserved *****

  93          KK     R20
  94          KM        ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
  95          RS       1    FLOW      -1
  96          RC    .016    .016    .016     990    .004
  97          RX       0       5       7    14.5    34.5      42      44      50
  98          RY       4       2       2       0       0       2       2       4
              * DDM   ***** Updated *****

  99          KK      40
 100          KM   SUB-BASIN 40
 101          KM   6-HOUR RAINFALL, PATTERN NO. 1.87 WAS USED TO FIND TC & R FOR THIS BASIN
 102          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .979
 103          KM     L = 3.08  Kb = .036  Adj. Slope =  189.0
 104          BA   2.233
 105          LG    .340    .340   4.900    .280   5.000
 106          UC    .613    .334
 107          UA       0       3       5       8      12      20      43      75      90      96
 108          UA     100
              * DDM   ***** Updated *****

 109          KK      60
 110          KM   SUB-BASIN 60
 111          KM   6-HOUR RAINFALL, PATTERN NO. 1.73 WAS USED TO FIND TC & R FOR THIS BASIN
 112          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
 113          KM     L = 4.19  Kb = .038  Adj. Slope =  209.6
 114          BA   1.746
 115          LG    .330    .350   5.800    .190   9.000
 116          UC    .675    .548
 117          UA       0       3       5       8      12      20      43      75      90      96
 118          UA     100
              * DDM   ***** Preserved *****
```

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

 119          KK     C60
 120          KM     C60GRAPH COMBINATION FOR APACHE JUNCTION FRS
              *      1       2
 121          HC       3
              * DDM   ***** Preserved *****

 122          KK     S60
 123          KM   APACHE JUNCTION FRS AS-BUILT PLANS 12/19/88
 124          KM   OUTLET PIPE=30"RCP; L=136.6'; INLET INV.=1783.5; OUTLET INV.=1783
 125          KM   EMERGENCY SPILLWAY ELEV.=1799.77'; PRINCIPLE SPILLWAY ELEV.=1793.5'
 126          KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 100 ACRE-FEET
              *  ESE = 1801.92 ft; PSE = 1795.65 ft; Sediment Vol. = 237 Ac-Ft.
 127          RS       1    STOR       0
 128          SV       0       0      77     242     371     439     563     687    2163
 129          SQ       0      12     103     114     120     362    1462    3101   30000
 130          SE    95.0    96.0    98.0   100.0   101.6   101.9   103.0   104.0   112.9
              * DDM   ***** Preserved *****

 131          KK     R60
 132          KM        ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
 133          RS       3    FLOW      -1
 134          RC    .016    .016    .016    2850    .012
 135          RX       0       1       2     2.1     5.6     5.7       6       7
 136          RY     3.5     3.5     3.5       0       0     3.5     3.5     3.5
              * DDM   ***** Preserved *****

 137          KK    RR60
 138          KM   ROUTE FLOW FROM BULLDOG FLOODWAY TO SUB-BASIN 80
 139          RS       3    FLOW      -1
 140          RC    .016    .016    .016    3500    .005
 141          RX       0       1       2     2.1     7.1     7.2       8       9
 142          RY     3.5     3.5     3.5       0       0     3.5     3.5     3.5
              * DDM   ***** Updated *****

 143          KK      80
 144          KM   SUB-BASIN 80
 145          KM   6-HOUR RAINFALL, PATTERN NO. 1.63 WAS USED TO FIND TC & R FOR THIS BASIN
 146          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .984
 147          KM     L = 2.69  Kb = .039  Adj. Slope =  229.8
 148          BA   1.475
 149          LG    .330    .330   5.600    .210   4.000
 150          UC    .500    .303
 151          UA       0       3       5       8      12      20      43      75      90      96
 152          UA     100
              * DDM   ***** Preserved *****

 153          KK     C80
 154          KM   HYDROGRAPH COMBINATION FOR FLOW FROM APACHE JUNCTION FRS & SUB-BASIN 80
 155          HC       2   1.475
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 156          KK     R80
 157          KM   ROUTE FLOW FROM SUB-BASIN 80 TO SUB-BASIN 100
 158          RS       1    FLOW      -1
 159          RC    .025    .016    .025    1200    .003
 160          RX       0       2       6     6.1    41.1    41.2    56.2    58.2
 161          RY     5.5     4.5     4.5       0       0     4.5     4.5     5.5
              * DDM   ***** Updated *****

 162          KK     100
 163          KM   SUB-BASIN 100
 164          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 165          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 166          KM     L = 1.94  Kb = .046  Adj. Slope =  108.0
 167          BA    .484
 168          LG    .320    .290   5.100    .260   3.000
 169          UC    .546    .486
 170          UA       0       5      16      30      65      77      84      90      94      97
 171          UA     100
              * DDM   ***** Preserved *****

 172          KK    C100
 173          KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 80 & 100
 174          HC       2
              * DDM   ***** Preserved *****

 175          KK    R100
 176          KM   ROUTE FLOW FROM SUB-BASIN 100 TO SUB-BASIN 120
 177          RS       2    FLOW      -1
 178          RC    .016    .016    .016     940    .005
 179          RX       0       1       2     2.1    52.1    52.2      53      54
 180          RY     4.5     4.5     4.5       0       0     4.5     4.5     4.5
              * DDM   ***** Updated *****

 181          KK     120
 182          KM   SUB-BASIN 120
 183          KM   6-HOUR RAINFALL, PATTERN NO. 1.86 WAS USED TO FIND TC & R FOR THIS BASIN
 184          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .979
 185          KM     L = 3.07  Kb = .037  Adj. Slope =  239.0
 186          BA   2.202
 187          LG    .330    .280   6.800    .130  11.000
 188          UC    .504    .271
 189          UA       0       3       5       8      12      20      43      75      90      96
 190          UA     100
              * DDM   ***** Preserved *****

 191          KK    C120
 192          KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 100 & 120
 193          HC       2
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 194          KK    R120
 195          KM   ROUTE FLOW FROM SUB-BASIN 120 TO SIGNAL BUTTE FRS
 196          RS       2    FLOW      -1
 197          RC    .025    .016    .025    2100    .005
 198          RX       0       6      10    10.1    60.1    60.2    74.2    80.2
 199          RY       8       5       5       0       0       5       5       8
              * DDM   ***** Updated *****

 200          KK     140
 201          KM   SUB-BASIN 140
 202          KM   6-HOUR RAINFALL, PATTERN NO. 1.10 WAS USED TO FIND TC & R FOR THIS BASIN
 203          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .992
 204          KM     L = 1.61  Kb = .044  Adj. Slope =  149.0
 205          BA    .598
 206          LG    .310    .280   4.200    .440   5.000
 207          UC    .429    .284
 208          UA       0       5      16      30      65      77      84      90      94      97
 209          UA     100
              * DDM   ***** Updated *****

 210          KK     150
 211          KM   SUB-BASIN 150
 212          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 213          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 214          KM     L = 1.50  Kb = .047  Adj. Slope =  314.6
 215          BA    .408
 216          LG    .350    .360   5.100    .260   7.000
 217          UC    .283    .210
 218          UA       0       3       5       8      12      20      43      75      90      96
 219          UA     100
              * DDM   ***** Preserved *****

 220          KK    R150
 221          KM   ROUTING OF FLOW FROM SUB-BASIN 150 TO R152
 222          RS       1    FLOW      -1
 223          RC    .045     .04    .045    3100    .032
 224          RX       0       1       2      23      33      54      55      56
 225          RY       7       7       7       0       0       7       7       7
              * DDM   ***** Preserved *****

 226          KK    R152
 227          KM   ROUTING OF FLOW FROM R152 TO SUB-BASIN 160
 228          RS       4    FLOW      -1
 229          RC    .045     .03    .045    5900    .019
 230          RX       0       1       2       8      33      39      40      41
 231          RY       2       2       2       0       0       2       2       2
              * DDM   ***** Updated *****

 232          KK     160
 233          KM   SUB-BASIN 160
 234          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 235          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 236          KM     L = 2.10  Kb = .047  Adj. Slope =  129.0
 237          BA    .369
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 238          LG    .340    .330   4.150    .440   1.000
 239          UC    .608    .681
 240          UA       0       3       5       8      12      20      43      75      90      96
 241          UA     100
              * DDM   ***** Updated *****

 242          KK     180
 243          KM   SUB-BASIN 180
 244          KM   6-HOUR RAINFALL, PATTERN NO. 1.40 WAS USED TO FIND TC & R FOR THIS BASIN
 245          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
 246          KM     L = 2.42  Kb = .041  Adj. Slope =  140.0
 247          BA   1.000
 248          LG    .350    .350   4.150    .430    .000
 249          UC    .658    .472
 250          UA       0       3       5       8      12      20      43      75      90      96
 251          UA     100
              * DDM   ***** Preserved *****

 252          KK    C180
 253          KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
 254          HC       5
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 255          KK     210
 256          KM   SUB-BASIN 210
 257          KM   6-HOUR RAINFALL, PATTERN NO. 1.27 WAS USED TO FIND TC & R FOR THIS BASIN
 258          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
 259          KM     L = 1.84  Kb = .043  Adj. Slope =  315.0
 260          BA    .792
 261          LG    .350    .360   6.800    .130   4.000
 262          UC    .321    .195
 263          UA       0       3       5       8      12      20      43      75      90      96
 264          UA     100
              * DDM   ***** Preserved *****

 265          KK    R210
 266          KM   ROUTING OF FLOW FROM SUB-BASIN 210 TO SUB-BASIN 220
 267          RS       3    FLOW      -1
 268          RC    .045     .03    .045    5100    .022
 269          RX       0       1       2      14      34      46      47      48
 270          RY       4       4       4       0       0       4       4       4
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 271          KK     240
 272          KM   SUB-BASIN 240
 273          KM   6-HOUR RAINFALL, PATTERN NO. 1.60 WAS USED TO FIND TC & R FOR THIS BASIN
 274          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .984
 275          KM     L = 3.50  Kb = .039  Adj. Slope =  298.6
 276          BA   1.408
 277          LG    .350    .370   5.300    .230   2.000
 278          UC    .546    .424
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 279          UA       0       3       5       8      12      20      43      75      90      96
 280          UA     100
              * DDM   ***** Preserved *****

 281          KK    C240
 282          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 283          HC       2
              * DDM   ***** Preserved *****

 284          KK    S240
 285          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 286          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 287          RS       1    STOR       0
 288          SA    1.38    14.2    36.5
 289          SE     1.7       5      11
 290          SS       5      42       3     1.5
              * DDM   ***** Preserved *****

 291          KK    R240
 292          KM   ROUTE FLOW FROM SUB-BASIN 240 TO SUB-BASIN 220
 293          KM   PASS MOUNTAIN DIVERSION
 294          RS       2    FLOW      -1
 295          RC    .035    .025    .035    1800    .005
 296          RX       0      15      30      39      69      81      96     111
 297          RY     3.6     3.3       3       0       0       3       3       4
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 298          KK     220
 299          KM   SUB-BASIN 220
 300          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 301          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 302          KM     L = 1.92  Kb = .046  Adj. Slope =  315.0
 303          BA    .473
 304          LG    .350    .350   7.000    .120   5.000
 305          UC    .321    .270
 306          UA       0       3       5       8      12      20      43      75      90      96
 307          UA     100
              * DDM   ***** Preserved *****

 308          KK    C220
 309          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 310          HC       2
              * DDM   ***** Preserved *****

 311          KK    S220
 312          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 313          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 314          RS       1    STOR       0
 315          SA     .78     4.1    13.7
 316          SE       1       3      10
 317          SS       3      65       3     1.5
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 318          KK    R220
 319          KM   ROUTE FLOW FROM SUB-BASIN 220 TO SUB-BASIN 200
 320          KM   PASS MOUNTAIN DIVERSION
 321          RS       1    FLOW      -1
 322          RC    .035    .025    .035    1250    .005
 323          RX       0      50     100     109     139     148     178     184
 324          RY       5       4       3       0       0       3       3       5
              * DDM   ***** Updated *****

 325          KK     190
 326          KM   SUB-BASIN 190
 327          KM   6-HOUR RAINFALL, PATTERN NO. 1.35 WAS USED TO FIND TC & R FOR THIS BASIN
 328          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
 329          KM     L = 1.91  Kb = .042  Adj. Slope =  315.0
 330          BA    .918
 331          LG    .350    .390   5.800    .190   8.000
 332          UC    .342    .198
 333          UA       0       3       5       8      12      20      43      75      90      96
 334          UA     100
              * DDM   ***** Preserved *****

 335          KK    R190
 336          KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 337          RS       3    FLOW      -1
 338          RC    .045     .03    .045    4740     .03
 339          RX       0       1       2      17      37      52      53      54
 340          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 341          KK    R192
 342          KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 343          RS       2    FLOW      -1
 344          RC    .045    .035    .045    2200    .018
 345          RX       0       1      50      59      79      88     137     138
 346          RY     4.5       3       3       0       0       3       3     4.5
              * DDM   ***** Updated *****

 347          KK     200
 348          KM   SUB-BASIN 200
 349          KM   6-HOUR RAINFALL, PATTERN NO. 1.03 WAS USED TO FIND TC & R FOR THIS BASIN
 350          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
 351          KM     L = 1.58  Kb = .045  Adj. Slope =  305.6
 352          BA    .530
 353          LG    .350    .390   5.700    .200  10.000
 354          UC    .287    .192
 355          UA       0       3       5       8      12      20      43      75      90      96
 356          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 357          KK    C200
 358          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 220 & 200
 359          HC       3
              * DDM   ***** Preserved *****

 360          KK    S200
 361          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 362          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 363          RS       1    STOR       0
 364          SA    2.56     3.1     9.4
 365          SE       0       3      10
 366          SS       3     112       3     1.5
              * DDM   ***** Preserved *****

 367          KK    R200
 368          KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS through storage
 369          RS       1    FLOW      -1
 370          RC    .035    .025    .035     650    .005
 371          RX       0       1       2      17     117     132     133     134
 372          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 373          KK   SS200
 374          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 375          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 376          RS       1    STOR       0
 377          SA       8     9.2     9.2
 378          SE       0       7      10
 379          SS       7     251       3     1.5
              * DDM   ***** Preserved *****

 380          KK   RR200
 381          KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS
 382          RS       7    FLOW      -1
 383          RC    .035    .025    .035    3150    .005
 384          RX       0       1       2      17     117     132     133     134
 385          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 386          KK   CC180
 387          KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
              *      1       2
 388          HC       2
              * DDM   ***** Preserved *****

 389          KK    S180
 390          KM   SIGNAL BUTTE FRS DATED 1/28/85
 391          KM   OUTLET PIPE=36"RCP; L= 147';  INLET INV.=1690; OUTLET INV.=1687
 392          KM   EMERGENCY SPILLWAY ELEV.=1712.4; PRINCIPLE SPILLWAY ELEV.=1701
 393          KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 250 ACRE-FEET
              *  ESE = 1714.63 ft; PSE = 1703.23 ft; Sediment Vol. = 247 Ac-Ft.
 394          RS       1    STOR       0
 395          SV       0      92     226     462     742    1197    1418    1776    1941    3114
 396          SQ       0      10    10.5      98     133     149     155    1484    2567    6000
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 397          SE      99     101   103.0     106     109   113.0   114.6     117     118     120
              * DDM   ***** Preserved *****

 398          KK    R180
 399          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 400          KM   Routing length increased 100' from 1500' to 1600'    12/12/00
 401          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 402          KM   ROUTE FLOW FROM SIGNAL BUTTE FRS TO SUB-BASIN 260
 403          RS       2    FLOW      -1
 404          RC    .035    .025    .035    1600    .003
 405          RX       0       1       2    22.6    38.6    59.2      60      61
 406          RY     9.3     9.3     9.3       0       0     9.3     9.3     9.3
              * DDM   ***** Updated *****

 407          KK     260
 408          KM   SUB-BASIN 260
 409          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 410          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 411          KM     L =  .81  Kb = .049  Adj. Slope =   68.0
 412          BA    .262
 413          LG    .300    .190   6.600    .170  15.000
 414          UC    .350    .209
 415          UA       0       5      16      30      65      77      84      90      94      97
 416          UA     100
              * DDM   ***** Preserved *****

 417          KK    C260
 418          KM   HYDROGRAPH COMBINATION FOR OUTFLOW OF SIGNAL BUTTE FRS & SUB-BASIN 260
 419          HC       2    .262
              * DDM   ***** Preserved *****

 420          KK    R260
 421          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 422          KM   Routing length unchanged     12/12/00
 423          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 424          KM   ROUTE FLOW FROM SUB-BASIN 260 TO SUB-BASIN 280
 425          RS       4    FLOW      -1
 426          RC    .035    .025    .035    2300    .003
 427          RX       0       1       2    23.4    43.4    64.8      65      66
 428          RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              * DDM   ***** Updated *****

 429          KK     280
 430          KM   SUB-BASIN 280
 431          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 432          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 433          KM     L =  .77  Kb = .048  Adj. Slope =   84.0
 434          BA    .319
 435          LG    .300    .250   5.300    .290  15.000
 436          UC    .317    .161
 437          UA       0       5      16      30      65      77      84      90      94      97
 438          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 439          KK    C280
 440          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 260 & SUB-BASIN 280
 441          HC       2
              * DDM   ***** Preserved *****

 442          KK    R280
 443          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 444          KM   Routing length decreased 400' from 2500' to 2100'    12/12/00
 445          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 446          KM   ROUTE FLOW FROM SUB-BASIN 280 TO SUB-BASIN 300
 447          RS       3    FLOW      -1
 448          RC    .035    .025    .035    2100    .003
 449          RX       0       1       2    23.4    43.4    64.8      65      66
 450          RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 451          KK     300
 452          KM   SUB-BASIN 300
 453          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 454          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 455          KM     L =  .78  Kb = .049  Adj. Slope =  103.0
 456          BA    .289
 457          LG    .320    .290   4.200    .480  11.000
 458          UC    .313    .169
 459          UA       0       5      16      30      65      77      84      90      94      97
 460          UA     100
              * DDM   ***** Preserved *****

 461          KK    C300
 462          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 280 & 300
 463          HC       2
              * DDM   ***** Preserved *****

 464          KK    R300
 465          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 466          KM   Routing length increased 300' from 2200' to 2500'    12/12/00
 467          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 468          KM   ROUTE FLOW FROM SUB-BASIN 300 TO START OF FLOODWAY CONCRETE CHANNEL
 469          RS       2    FLOW      -1
 470          RC    .035    .025    .035    2500    .003
 471          RX       0       1       2    23.4    55.4    76.8      77      78
 472          RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 473          KK     305
 474          KM   SUB-BASIN 305
 475          KM   6-HOUR RAINFALL, PATTERN NO. 1.20 WAS USED TO FIND TC & R FOR THIS BASIN
 476          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
 477          KM     L = 2.50  Kb = .044  Adj. Slope =  116.0
 478          BA    .702
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 479          LG    .340    .340   4.550    .350   6.000
 480          UC    .688    .622
 481          UA       0       5      16      30      65      77      84      90      94      97
 482          UA     100
              * DDM   ***** Preserved *****

 483          KK    C305
 484          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 300 AND 305
 485          HC       2
              * DDM   ***** Preserved *****

 486          KK    R305
 487          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 488          KM   Routing length decreased 50' from 6050' to 6000'     12/12/00
 489          KM   CHANNEL GEOMETRY FOR SPOOK HILL FRS OBTAINED FROM AS-BUILTS PLANS.
 490          KM   CONTINUE TO ROUTE FLOW WITHIN CONCRETE CHANNEL TO SPOOK HILL FRS
 491          RS       3    FLOW      -1
 492          RC    .016    .016    .016    6000   .0146
 493          RX       0       1       2     2.1    16.1    16.2      17      18
 494          RY     7.5     7.5     7.5       0       0     7.5     7.5     7.5
              *      1       2
              * DDM   ***** Updated *****

 495          KK     350
 496          KM   SUB-BASIN 350
 497          KM   6-HOUR RAINFALL, PATTERN NO. 1.38 WAS USED TO FIND TC & R FOR THIS BASIN
 498          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
 499          KM     L = 2.22  Kb = .042  Adj. Slope =  315.0
 500          BA    .970
 501          LG    .350    .350   4.550    .340   4.000
 502          UC    .404    .261
 503          UA       0       3       5       8      12      20      43      75      90      96
 504          UA     100
              * DDM   ***** Preserved *****

 505          KK    D350
 506          KM   DIVERT FLOW FROM SUB-BASIN 350. FOR MODELING PURPOSES THE SPLIT FLOW WILL
 507          KM   BE ROUTED BETWEEN SUB-BASINS 355 & 310. THE MAIN FLOW WILL ROUTED TO 310
 508          DT   SF350
 509          DI       0    5000
 510          DQ       0    2500
              * DDM   ***** Preserved *****

 511          KK    R350
 512          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING
 513          KM   ROUTING OF MAIN FLOW FROM DIVERSION OF SUB-BASIN 350 TO SUB-BASIN 310
 514          RS       6    FLOW      -1
 515          RC    .045    .035    .045    5150    .025
 516          RX       0       1      40      46      56      62     102     103
 517          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 518          KK     310
 519          KM   SUB-BASIN 310
 520          KM   6-HOUR RAINFALL, PATTERN NO. 1.06 WAS USED TO FIND TC & R FOR THIS BASIN
 521          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
 522          KM     L = 2.70  Kb = .045  Adj. Slope =  283.5
 523          BA    .555
 524          LG    .350    .350   3.910    .480    .000
 525          UC    .508    .541
 526          UA       0       3       5       8      12      20      43      75      90      96
 527          UA     100
              * DDM   ***** Preserved *****

 528          KK    C310
 529          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 350 & 310
 530          HC       2    1.04
              * DDM   ***** Preserved *****

 531          KK    R310
 532          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 533          KM   ROUTING OF FLOW FROM SUB-BASIN 310 TO 320
 534          RS      11    FLOW      -1
 535          RC    .045    .035    .045   10050    .022
 536          RX       0       1      40      46      56      62     102     103
 537          RY       3       2       2       0       0       2       2       3
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 538          KK     320
 539          KM   SUB-BASIN 320
 540          KM   6-HOUR RAINFALL, PATTERN NO. 1.37 WAS USED TO FIND TC & R FOR THIS BASIN
 541          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
 542          KM     L = 2.20  Kb = .042  Adj. Slope =  132.0
 543          BA    .950
 544          LG    .310    .300   4.600    .350  14.000
 545          UC    .558    .375
 546          UA       0       5      16      30      65      77      84      90      94      97
 547          UA     100
              * DDM   ***** Preserved *****

 548          KK    D320
 549          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 550          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
 551          KM   SIERRA HEIGHTS       FALCON RIDGE    & MARBLE CREEK
 552          KM        MAXIMUM VOLUME DIVERSION = 12.27acre-feet
              *      1
 553          DT   BS320   12.27
 554          DI       0   10000
 555          DQ       0   10000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

556           KK   RT320
557           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
558           DR   BS320
              * DDM   ***** Preserved *****

559           KK    S320
560           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
561           KM   12.27 ACRE-FEETx43560/36x3600=4.1cfs
              *      1
562           RS       1    STOR       0
563           SV       0     .01    12.3
564           SQ       0     3.0     4.2
              * DDM   ***** Preserved *****

565           KK    C320
566           KM   HYDROGRAPH COMBINATION FOR INFLOW HYDROGRAPH
              * KO     1
567           HC       4
              * DDM   ***** Updated *****

568           KK    340
569           KM   SUB-BASIN 340
570           KM   6-HOUR RAINFALL, PATTERN NO. 1.61 WAS USED TO FIND TC & R FOR THIS BASIN
571           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .984
572           KM     L = 2.40  Kb = .042  Adj. Slope =  160.0
573           BA   1.440
574           LG    .280    .280   4.150    .520  21.000
575           UC    .596    .341
576           UA       0       5      16      30      65      77      84      90      94      97
577           UA     100
              * DDM   ***** Preserved *****

578           KK    D340
579           KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
580           KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
581           KM   GRANDVIEW ESTATES    BOULDER MOUNTAIN & 33% OF MESA HIGHLANDS
582           KM        MAXIMUM VOLUME DIVERSION = 56.0 acre-feet
              *      1
583           DT   BS340      56
584           DI       0   10000
585           DQ       0   10000
              * DDM   ***** Preserved *****

586           KK   RT340
587           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
588           DR   BS340
              * DDM   ***** Preserved *****

589           KK    S340
590           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
591           KM    56.0 ACRE-FEETx43560/36x3600=18.8cfs
              *      1
592           RS       1    STOR       0
593           SV       0     .01      56
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 594          SQ       0     3.0    18.9
              * ***********************************************************************
              * MODIFIED BY DMJM+HARRIS

 595          KK    340C
 596          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO      1
 597          HC       2

 598          KK    C340
 599          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 600          HC       2
              * ***********************************************************************
              * DDM   ***** Preserved *****

 601          KK   RT350
 602          KM   RETRIEVE SPLIT FLOW FROM DIVERSION OF SUB-BASIN 350
 603          DR   SF350
              * DDM   ***** Preserved *****

 604          KK   RR350
 605          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 606          KM   ROUTING OF FLOW FROM SPLIT OF SUB-BASIN 350 TO 355
 607          RS       8    FLOW      -1
 608          RC    .045    .035    .045    6050    .025
 609          RX       0       1      40      46      56      62     102     103
 610          RY       3       2       2       0       0       2       2       3
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 611          KK     355
 612          KM   SUB-BASIN 355
 613          KM   6-HOUR RAINFALL, PATTERN NO. 1.17 WAS USED TO FIND TC & R FOR THIS BASIN
 614          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
 615          KM     L = 3.00  Kb = .044  Adj. Slope =  284.0
 616          BA    .676
 617          LG    .340    .340   4.450    .370   4.000
 618          UC    .521    .540
 619          UA       0       3       5       8      12      20      43      75      90      96
 620          UA     100
              * DDM   ***** Preserved *****

 621          KK    C355
 622          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 355 AND THE SPLIT FLOW FROM SUB-BASIN 350
 623          HC       2   1.161
              * DDM   ***** Preserved *****

 624          KK    R355
 625          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 626          KM   ROUTING OF FLOW FROM SUB-BASIN 355 TO SUB-BASIN 360
 627          RS       9    FLOW      -1
 628          RC    .045    .035    .045   10100    .026
 629          RX       0       1      40      46      56      62     102     103
 630          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 631          KK     360
 632          KM   SUB-BASIN 360
 633          KM   6-HOUR RAINFALL, PATTERN NO. 1.33 WAS USED TO FIND TC & R FOR THIS BASIN
 634          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .989
 635          KM     L = 2.10  Kb = .047  Adj. Slope =  124.0
 636          BA    .880
 637          LG    .260    .270   4.100    .560  20.000
 638          UC    .625    .428
 639          UA       0       5      16      30      65      77      84      90      94      97
 640          UA     100
              * DDM   ***** Preserved *****

 641          KK    D360
 642          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 643          KM   DETENTION/RETENTION BASINS LOCATED WITHIN 33% OF MESA HIGHLANDS
 644          KM        MAXIMUM VOLUME DIVERSION = 28.6 acre-feet
              *      1
 645          DT   BS360    28.6
 646          DI       0   10000
 647          DQ       0   10000
              * DDM   ***** Preserved *****

 648          KK   RT360
 649          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 650          DR   BS360
              * DDM   ***** Preserved *****

 651          KK    S360
 652          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 653          KM    28.6 ACRE-FEETx43560/36x3600=9.6cfs
 654          RS       1    STOR       0
 655          SV       0     .01    28.6
 656          SQ       0     3.0     9.6
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

 657          KK    360C
 658          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 659          HC       3

 660          KK    C360
 661          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 662          HC       2
              * ******************************************************************************
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 663          KK     370
 664          KM   SUB-BASIN 370
 665          KM   6-HOUR RAINFALL, PATTERN NO. 1.17 WAS USED TO FIND TC & R FOR THIS BASIN
 666          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
 667          KM     L = 1.90  Kb = .044  Adj. Slope =  203.5
 668          BA    .672
 669          LG    .340    .320   4.650    .330   8.000
 670          UC    .417    .293
 671          UA       0       3       5       8      12      20      43      75      90      96
 672          UA     100
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 673          KK     395
 674          KM   SUB-BASIN 395
 675          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 676          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 677          KM     L = 1.30  Kb = .051  Adj. Slope =  219.2
 678          BA    .199
 679          LG    .330    .320   4.900    .300  10.000
 680          UC    .321    .324
 681          UA       0       3       5       8      12      20      43      75      90      96
 682          UA     100
              * DDM   ***** Preserved *****

 683          KK    C370
 684          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 685          HC       2
              * DDM   ***** Preserved *****

 686          KK    R370
 687          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 688          KM   ROUTING OF FLOW FROM SUB-BASINS 370 AND 395 TO SUB-BASIN 380.
 689          RS      11    FLOW      -1
 690          RC    .045    .035    .045   10250    .023
 691          RX       0       1      40      46      56      62     102     103
 692          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 693          KK     380
 694          KM   SUB-BASIN 380
 695          KM   6-HOUR RAINFALL, PATTERN NO. 1.34 WAS USED TO FIND TC & R FOR THIS BASIN
 696          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
 697          KM     L = 2.20  Kb = .049  Adj. Slope =  114.0
 698          BA    .898
 699          LG    .300    .310   4.150    .500   7.000
 700          UC    .750    .537
 701          UA       0       5      16      30      65      77      84      90      94      97
 702          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 703          KK    D380
 704          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 705          KM   DETENTION/RETENTION BASINS LOCATED WITHIN 33% OF MESA HIGHLANDS
 706          KM        MAXIMUM VOLUME DIVERSION = 28.6 acre-feet
              *      1
 707          DT   BS380    28.6
 708          DI       0   10000
 709          DQ       0   10000
              * DDM   ***** Preserved *****

 710          KK   RT380
 711          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 712          DR   BS380
              * DDM   ***** Preserved *****

 713          KK    S380
 714          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 715          KM    28.6 ACRE-FEETx43560/36x3600=9.6cfs
 716          RS       1    STOR       0
 717          SV       0     .01    28.6
 718          SQ       0     3.0     9.6
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

 719          KK    380C
 720          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 721          HC       3

 722          KK    C380
 723          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 724          HC       2
              * ******************************************************************************
              * DDM   ***** Updated *****

 725          KK     390
 726          KM   SUB-BASIN 390
 727          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 728          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 729          KM     L =  .70  Kb = .050  Adj. Slope =  299.4
 730          BA    .244
 731          LG    .300    .250   4.700    .380  18.000
 732          UC    .196    .102
 733          UA       0       5      16      30      65      77      84      90      94      97
 734          UA     100
              * DDM   ***** Preserved *****

 735          KK    D390
 736          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 737          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THUNDER MOUNTAIN ESTATES
 738          KM        MAXIMUM VOLUME DIVERSION  = 3.5 acre-feet
              *      1
 739          DT   BS390     3.5
 740          DI       0   10000
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 741          DQ       0   10000
              * DDM   ***** Preserved *****

 742          KK   RT390
 743          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 744          DR   BS390
              * DDM   ***** Preserved *****

 745          KK    S390
 746          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 747          KM     3.5 ACRE-FEETx43560/36x3600=1.2cfs
 748          RS       1    STOR       0
 749          SV       0     .01     3.5
 750          SQ       0     0.2     1.2
              * DDM   ***** Preserved *****

 751          KK    C390
 752          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 753          HC       2
              * DDM   ***** Preserved *****

 754          KK    R390
 755          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 756          KM   FROM SUB-BASIN 390 TO SUB-BASIN 400
 757          RS      14    FLOW      -1
 758          RC    .045    .045    .045    8800    .020
 759          RX       0       1      40      46      56      62     102     103
 760          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 761          KK     400
 762          KM   SUB-BASIN 400
 763          KM   6-HOUR RAINFALL, PATTERN NO. 1.12 WAS USED TO FIND TC & R FOR THIS BASIN
 764          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .992
 765          KM     L = 1.64  Kb = .046  Adj. Slope =  110.0
 766          BA    .616
 767          LG    .320    .300   4.150    .490   6.000
 768          UC    .542    .367
 769          UA       0       5      16      30      65      77      84      90      94      97
 770          UA     100
              * DDM   ***** Preserved *****

 771          KK    D400
 772          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 773          KM   DETENTION/RETENTION BASIN LOCATED WITHIN SAGUARO VISTA SUBDIVISION
 774          KM        MAXIMUM VOLUME DIVERSION = 5.6 ACRE-FEET
              *      1
 775          DT   BS400     5.6
 776          DI       0   10000
 777          DQ       0   10000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 778          KK   RT400
 779          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 780          DR   BS400
              * DDM   ***** Preserved *****

 781          KK    S400
 782          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 783          KM     5.6 ACRE-FEETx43560/36x3600 = 2 cfs
 784          RS       1    STOR       0
 785          SV       0     .01     5.6
 786          SQ       0       1       2
              * DDM   ***** Preserved *****

 787          KK    C400
 788          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 789          HC       2
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

 790          KK    400C
 791          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO      1
 792          HC       2

 793          KK   CC400
 794          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 795          HC       2
              * ******************************************************************************
              * DDM   ***** Updated *****

 796          KK     385
 797          KM   SUB-BASIN 385
 798          KM   6-HOUR RAINFALL, PATTERN NO. 1.03 WAS USED TO FIND TC & R FOR THIS BASIN
 799          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
 800          KM     L = 2.30  Kb = .045  Adj. Slope =  303.0
 801          BA    .527
 802          LG    .340    .360   5.600    .220  13.000
 803          UC    .375    .349
 804          UA       0       3       5       8      12      20      43      75      90      96
 805          UA     100
              * DDM   ***** Preserved *****

 806          KK    D385
 807          KM   DIVERT FLOW INTO SUB-BASINS 415 & 420
 808          DT   SF385
 809          DI       0    5000
 810          DQ       0    3000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 811          KK    R385
 812          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 813          KM   ROUTING OF FLOW DIVERSION FROM SUB-BASIN 385 INTO SUB-BASIN 420
 814          RS      17    FLOW      -1
 815          RC    .045     .04    .045   10250    .022
 816          RX       0       1      40      46      56      62     102     103
 817          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 818          KK     420
 819          KM   SUB-BASIN 420
 820          KM   6-HOUR RAINFALL, PATTERN NO. 1.31 WAS USED TO FIND TC & R FOR THIS BASIN
 821          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .989
 822          KM     L = 1.91  Kb = .042  Adj. Slope =  120.0
 823          BA    .849
 824          LG    .310    .270   3.880    .580  12.000
 825          UC    .567    .363
 826          UA       0       5      16      30      65      77      84      90      94      97
 827          UA     100
              * DDM   ***** Preserved *****

 828          KK    D420
 829          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 830          KM   DETENTION/RETENTION BASINS LOCATED WITHIN GRAY FOX SUBDIVISION
 831          KM        MAXIMUM VOLUME DIVERSION = 8.65 acre-feet
              *      1
 832          DT   BS420    8.65
 833          DI       0   10000
 834          DQ       0   10000
              * DDM   ***** Preserved *****

 835          KK   RT420
 836          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 837          DR   BS420
              * DDM   ***** Preserved *****

 838          KK    S420
 839          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 840          KM    8.65 ACRE-FEETx43560/36x3600=2.9cfs
 841          RS       1    STOR       0
 842          SV       0     .01    8.65
 843          SQ       0     1.0     2.9
              * DDM   ***** Preserved *****

 844          KK   C420
 845          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 846          HC       3  1.0598
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

847           KK   CC420
848           KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
849           HC       2
              * DDM   ***** Updated *****

850           KK     440
851           KM   SUB-BASIN 440
852           KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
853           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
854           KM     L =  .40  Kb = .039  Adj. Slope =  315.0
855           BA    .080
856           LG    .190    .380   6.400    .140  13.000
857           UC    .125    .075
858           UA       0       3       5       8      12      20      43      75      90      96
859           UA     100
              * DDM   ***** Preserved *****

860           KK     R70
861           KM   ROUTE FLOW FROM SUB-BASIN 440 TO C108
862           RS       2    FLOW      -1
863           RC     .05    .035     .05    2250     .08
864           RX    1000    1025    1050    1070    1075    1095    1120    1145
865           RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

866           KK     441
867           KM   SUB-BASIN 441
868           KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
869           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
870           KM     L =  .28  Kb = .069  Adj. Slope =  315.0
871           BA    .010
872           LG    .300    .250   5.600    .220   5.000
873           UC    .142    .211
874           UA       0       5      16      30      65      77      84      90      94      97
875           UA     100
              * DDM   ***** Preserved *****

876           KK    C108
877           KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 440 & 441
878           HC       2
              * DDM   ***** Preserved *****

879           KK      D4
880           KM        SPLIT FLOW WITH TWO 42 INCH PIPES TO WEST AND SOUTH
              *      1
881           DT   SPLIT
882           DI       0      14      40      82     120     154     180
883           DQ       0       7      20      41      60      77      90
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

884           KK    R108
885           KM        ROUTE FLOW FROM SUB-BASIN C108 TO C67
886           RS       1    FLOW      -1
887           RC     .05    .035     .05    3200      .1
888           RX    1000    1025    1050    1070    1075    1095    1120    1145
889           RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

890           KK     442
891           KM   SUB-BASIN 442
892           KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
893           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
894           KM     L =  .83  Kb = .055  Adj. Slope =  274.2
895           BA    .100
896           LG    .300    .270   3.290    .770   5.000
897           UC    .246    .250
898           UA       0       5      16      30      65      77      84      90      94      97
899           UA     100
              * DDM   ***** Preserved *****

900           KK     C67
901           KM   COMBINE FLOW FROM SUB-BASIN 442 & DIV4
902           HC       2
              * DDM   ***** Preserved *****

903           KK      D6
904           KM        OFFLINE BASIN WITH 25 FOOT WEIR SET AT 2.5 FEET ABOVE BOTTOM OF CHANNEL
905           KM        FLOW CONTINUES BEYOND BASIN THROUGH 2-30" PIPES
              *      1
906           DT  BASIN4     3.3
907           DI       0      10      32      44    79.9   132.5     198   272.9   356.8
908           DQ       0       0       0       0    23.9    67.5     124   190.9   266.8
              * DDM   ***** Preserved *****

909           KK    RTD6
910           KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
911           DR  BASIN4
              * DDM   ***** Preserved *****

912           KK     SD6
913           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
914           KM     3.3 ACRE-FEETx43560/36x3600=1.1cfs
              *      1
915           RS       1    STOR       0
916           SV       0     .01     3.3
917           SQ       0     0.2     1.1
              * DDM   ***** Preserved *****

918           KK     CD6
919           KM   HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
920           HC       2
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

921           KK     443
922           KM   SUB-BASIN 443
923           KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
924           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
925           KM     L =  .71  Kb = .050  Adj. Slope =  315.0
926           BA    .080
927           LG    .250    .190   8.000    .080  10.000
928           UC    .188    .185
929           UA       0       5      16      30      65      77      84      90      94      97
930           UA     100
              * DDM   ***** Preserved *****

931           KK     D66
932           KM        DIVERT FLOW INTO 3 NATURAL WASHES WITH ONE 24" PIPE IN EACH WASH.
933           KM        EACH PIPE CAPACITY BASED ON 4 FEET OF HEAD
934           DT   WSH66
935           DI       0      78     100     200
936           DQ       0      78      78      78
              * DDM   ***** Preserved *****

937           KK    R113
938           KM        ROUTE FLOW FROM C113 TO C114
939           RS       2    FLOW      -1
940           RC    .019    .019    .019    1300    .029
941           RX    1000    1004    1008    1012    1018    1022    1026    1030
942           RY      17   15.33   12.67      10      10   12.67   15.33      17
              * DDM   ***** Preserved *****

943           KK    C114
944           KM        COMBINE HYDROGRAPHS FROM SUB-BASIN 67 AND C113
945           HC       2
              * DDM   ***** Updated *****

946           KK     444
947           KM   SUB-BASIN 444
948           KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
949           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
950           KM     L =  .33  Kb = .034  Adj. Slope =  315.0
951           BA    .040
952           LG    .130    .350   4.450    .320   1.000
953           UC    .108    .081
954           UA       0       3       5       8      12      20      43      75      90      96
955           UA     100
              * DDM   ***** Preserved *****

956           KK     R58
957           KM   ROUTE FLOW FROM SUB-BASIN 444 TO C107
958           RS       2    FLOW      -1
959           RC     .05    .035     .05    2370   .0516
960           RX    1000    1010    1020    1050    1055    1085    1095    1105
961           RY      19      18      17      10      10      17      18      19
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 962          KK     445
 963          KM   SUB-BASIN 445
 964          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 965          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 966          KM     L =  .82  Kb = .036  Adj. Slope =  315.0
 967          BA    .190
 968          LG    .170    .320   3.470    .590   3.000
 969          UC    .183    .124
 970          UA       0       5      16      30      65      77      84      90      94      97
 971          UA     100
              * DDM   ***** Preserved *****

 972          KK    C107
 973          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 444 & 445
 974          HC       2
              * DDM   ***** Preserved *****

 975          KK    R107
 976          KM        ROUTE FLOW FROM C107 TO C109
 977          RS       2    FLOW      -1
 978          RC     .05    .035     .05     700   .0516
 979          RX    1000    1010    1020    1050    1055    1085    1095    1105
 980          RY      19      18      17      10      10      17      18      19
              * DDM   ***** Preserved *****

 981          KK    RTB2
 982          KM        RETRIEVE DIVERTED FLOW FROM BASIN 1
              *      1
 983          DR   SPLIT
              * DDM   ***** Preserved *****

 984          KK  RSPLIT
 985          KM        ROUTE FLOW FROM SPLIT TO C109
 986          RS       1    FLOW      -1
 987          RC     .05    .035     .05     800     .05
 988          RX    1000    1025    1050    1070    1075    1095    1120    1145
 989          RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

 990          KK     446
 991          KM   SUB-BASIN 446
 992          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
 993          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 994          KM     L =  .46  Kb = .061  Adj. Slope =  303.9
 995          BA    .040
 996          LG    .270    .250   4.500    .400  19.000
 997          UC    .175    .180
 998          UA       0       5      16      30      65      77      84      90      94      97
 999          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1000          KK    C109
1001          KM        COMBINE HYDROGRAPHS FROM COMBINES C107 AND C108
1002          HC       3
              * DDM   ***** Preserved *****

1003          KK      D5
1004          KM        DIVERT FLOW INTO WASHES TOWARDS WEST
1005          KM        DIVERSION THROUGH 36" PIPE WITH 3 FEET OF HEAD
              *      1
1006          DT  WSH404
1007          DI       0    40.7    71.2   121.6     190     276   379.4   500.6
1008          DQ       0      35      35      35      35      35      35      35
              * DDM   ***** Preserved *****

1009          KK    R109
1010          KM        ROUTE FLOW FROM C109 TO C110
1011          RS       1    FLOW      -1
1012          RC    .019    .019    .019    3080     .05
1013          RX    1000    1005    1010    1015    1025    1030    1035    1040
1014          RY   13.75    12.5   11.25      10      10   11.25    12.5   13.75
              * DDM   ***** Updated *****

1015          KK     447
1016          KM   SUB-BASIN 447
1017          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1018          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1019          KM     L =  .49  Kb = .056  Adj. Slope =  221.0
1020          BA    .090
1021          LG    .250    .270   3.350    .870  30.000
1022          UC    .196    .135
1023          UA       0       5      16      30      65      77      84      90      94      97
1024          UA     100
              * DDM   ***** Preserved *****

1025          KK   RT404
1026          KM        RETRIEVE DIVERTED FLOW FOR WASH 109
1027          DR  WSH404
              * DDM   ***** Preserved *****

1028          KK    R404
1029          KM        ROUTE FLOW FROM C110 TO C110
1030          RS       7    FLOW      -1
1031          RC    .019    .019    .019    3540     .03
1032          RX    1000    1012    1016    1020    1025    1029    1033    1045
1033          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1034          KK    C110
1035          KM   COMBINE HYDROGRAPHS FROM SUB-BASIN 447 AND R404
1036          HC       3
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1037          KK    R110
1038          KM        ROUTE FLOW FROM C110 TO C115
1039          RS       1    FLOW      -1
1040          RC    .019    .019    .019     580   .0291
1041          RX    1000    1012    1016    1020    1035    1039    1043    1055
1042          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1043          KK    C115
1044          KM        COMBINE HYDROGRAPHS FROM C114 AND C110
1045          HC       2
              * DDM   ***** Preserved *****

1046          KK    R115
              * ******OUTFLOW FROM THIS ROUTING IS GREATER THAN INFLOW TO THE
              * ******ROUTING BY 2cfs.  THIS IS NOTED BUT LEFT UNCHANGED WITHIN THE MODEL
1047          KM        ROUTE FLOW FROM C115 TO Sub 453
1048          RS       1    FLOW      -1
1049          RC    .019    .019    .019    2125    .029
1050          RX    1000    1012    1016    1020    1035    1039    1043    1055
1051          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Updated *****

1052          KK     448
1053          KM   SUB-BASIN 448
1054          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1055          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1056          KM     L =  .36  Kb = .042  Adj. Slope =  315.0
1057          BA    .045
1058          LG    .170    .310   4.200    .390  11.000
1059          UC    .125    .095
1060          UA       0       5      16      30      65      77      84      90      94      97
1061          UA     100
              * DDM   ***** Updated *****

1062          KK     449
1063          KM   SUB-BASIN 449
1064          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1065          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1066          KM     L =  .40  Kb = .054  Adj. Slope =  315.0
1067          BA    .050
1068          LG    .260    .280   3.500    .640   6.000
1069          UC    .158    .127
1070          UA       0       5      16      30      65      77      84      90      94      97
1071          UA     100
              * DDM   ***** Preserved *****

1072          KK   C6364
1073          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 448 & 449
1074          HC       2
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1075          KK   R6364
1076          KM   ROUTE FLOW FROM C116 AND SUB-BASINS 448 AND 449
1077          RS       5    FLOW      -1
1078          RC     .05    .035     .05    4375   .0333
1079          RX    1000    1027    1053    1080    1090    1117    1143    1170
1080          RY      15   13.33   11.67      10      10   11.67   13.33      15
              * DDM   ***** Updated *****

1081          KK     450
1082          KM   SUB-BASIN 450
1083          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1084          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1085          KM     L =  .85  Kb = .057  Adj. Slope =  210.5
1086          BA    .070
1087          LG    .340    .350   3.630    .570   4.000
1088          UC    .279    .359
1089          UA       0       3       5       8      12      20      43      75      90      96
1090          UA     100
              * DDM   ***** Updated *****

1091          KK     451
1092          KM   SUB-BASIN 451
1093          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1094          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1095          KM     L =  .57  Kb = .063  Adj. Slope =  175.0
1096          BA    .025
1097          LG    .340    .340   3.290    .750   3.000
1098          UC    .258    .430
1099          UA       0       3       5       8      12      20      43      75      90      96
1100          UA     100
              * DDM   ***** Preserved *****

1101          KK    C451
1102          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451
1103          HC       2
              * DDM   ***** Preserved *****

1104          KK    RT66
1105          KM       RETRIEVE DIVERTED FLOW FROM SUB-BASIN 66
1106          DR   WSH66
              * DDM   ***** Updated *****

1107          KK     452
1108          KM   SUB-BASIN 452
1109          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1110          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1111          KM     L =  .43  Kb = .055  Adj. Slope =  315.0
1112          BA    .040
1113          LG    .260    .280   3.700    .550   9.000
1114          UC    .162    .157
1115          UA       0       5      16      30      65      77      84      90      94      97
1116          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


1117          KK   C6465
1118          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 443 AND 452
1119          HC       2
              * DDM   ***** Preserved *****

1120          KK   R6566
1121          KM        ROUTE FLOW FROM DIVERSIONS 65 AND 66 TO C116
1122          RS       3    FLOW      -1
1123          RC     .05    .035     .05    2435   .0282
1124          RX    1000    1045    1090    1150    1160    1220    1265    1310
1125          RY      25      23      20      10      10      20      23      25
              * DDM   ***** Preserved *****

1126          KK    C116
1127          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451 AND R6364 & R6465
1128          HC       3
              * DDM   ***** Preserved *****

1129          KK  BASIN5
1130          KM        RESERVOIR WITHIN PARCEL 31      2-48 INCH PIPES AT OUTFALL
1131          KM        BASIN 5 FEET DEEP
1132          RS       1    ELEV       0
1133          SV       0     4.5     9.9
1134          SQ       0      69     190
1135          SE       0     2.5       5
              * DDM   ***** Preserved *****

1136          KK    R116
1137          KM   ROUTE FLOW FROM C116 TO C117
1138          RS       4    FLOW      -1
1139          RC     .05    .035     .05    1300   .0333
1140          RX    1000    1100    1200    1300    1320    1420    1520    1620
1141          RY      13      12      11      10      10      11      12      13
              * DDM   ***** Updated *****

1142          KK     453
1143          KM   SUB-BASIN 453
1144          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1145          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1146          KM     L =  .58  Kb = .058  Adj. Slope =  138.0
1147          BA    .060
1148          LG    .290    .300   3.290    .820  18.000
1149          UC    .262    .270
1150          UA       0       5      16      30      65      77      84      90      94      97
1151          UA     100
              * DDM   ***** Preserved *****

1152          KK    C117
1153          KM   COMBINE HYDROGRAPHS FROM SUB-BASIN 453 AND R116
1154          HC       2
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1155          KK    C118
1156          KM   COMBINE HYDROGRAPHS FROM R115 AND C117
1157          HC       2
              * DDM   ***** Preserved *****

1158          KK    R118
1159          KM        ROUTE FLOW FROM C118 TO  DIV7
1160          RS       1    FLOW      -1
1161          RC    .019    .019    .019    1500    .024
1162          RX    1000    1012    1016    1020    1035    1039    1043    1055
1163          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1164          KK      D7
1165          KM        OFFLINE BASIN AT NORTH MOUNTAIN RIDGE   FLOWS ENTER BASIN OVER
1166          KM        30' WEIR SET AT 5.3' ABOVE THE CHANNEL BOTTOM
              *      1
1167          DT  BASIN6     3.6
1168          DI       0     363     487     563     645     844
1169          DQ       0       3      47      83     125     244
              * DDM   ***** Preserved *****

1170          KK    RTD7
1171          KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
1172          DR  BASIN6
              * DDM   ***** Preserved *****

1173          KK     SD7
1174          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1175          KM     3.6 ACRE-FEETx43560/36x3600=1.2cfs
1176          RS       1    STOR       0
1177          SV       0     .01     3.6
1178          SQ       0     0.2     1.2
              * DDM   ***** Preserved *****

1179          KK     CD7
1180          KM   HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
1181          HC       2
              * DDM   ***** Updated *****

1182          KK     454
1183          KM   SUB-BASIN 454
1184          KM   6-HOUR RAINFALL, PATTERN NO. 1.00 WAS USED TO FIND TC & R FOR THIS BASIN
1185          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
1186          KM     L = 1.23  Kb = .051  Adj. Slope =  163.0
1187          BA    .180
1188          LG    .300    .310   3.780    .560  14.000
1189          UC    .367    .381
1190          UA       0       5      16      30      65      77      84      90      94      97
1191          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1192          KK    C119
1193          KM        COMBINE HYDROGRAPHS FROM SUB-BASIN 454 AND C119
              *      1       2
1194          HC       2
              * DDM   ***** Preserved *****

1195          KK    R454
1196          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1197          KM   ROUTE FLOW FROM C119 TO 415C
1198          RS       4    FLOW      -1
1199          RC    .045    .035    .045    2200    .009
1200          RX       0      .5       1      33      42      67    67.5      68
1201          RY       5       4       4       0       0       6       6       6
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

1202          KK     415
1203          KM   SUB-BASIN 415
1204          KM   6-HOUR RAINFALL, PATTERN NO. 1.11 WAS USED TO FIND TC & R FOR THIS BASIN
1205          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .992
1206          KM     L = 2.58  Kb = .044  Adj. Slope =  298.5
1207          BA    .609
1208          LG    .320    .290   4.500    .400  15.000
1209          UC    .429    .410
1210          UA       0       5      16      30      65      77      84      90      94      97
1211          UA     100
              * DDM   ***** Preserved *****

1212          KK   RT385
1213          KM   RETRIEVE FLOW FROM DIVERSION OF SUB-BASIN 385 INTO SUB-BASIN 415
1214          DR   SF385
              * DDM   ***** Preserved *****

1215          KK   RR385
1216          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1217          KM   ROUTING OF SPLIT FLOW FROM SUB-BASIN 385 TO SUB-BASIN 415
1218          RS       9    FLOW      -1
1219          RC    .045     .04    .045    5878    .024
1220          RX       0       1      40      46      56      62     102     103
1221          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Preserved *****

1222          KK   C415
1223          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 415 & SPLIT FLOW FROM 385
1224          HC       2  0.9252
              * DDM   ***** Preserved *****

1225          KK   CC415
1226          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 415, R454 & SPLIT FLOW FROM 385
1227          HC       2
              * DDM   ***** Preserved *****
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1228          KK   R415
1229          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1230          KM   ROUTING OF FLOW FROM 415C TO 455C
1231          KM   HYDROGRAPH COMBINATION FOR LATERAL INFLOW HYDROGRAPH
              * KO     1
1232          RS       3    FLOW      -1
1233          RC    .045     .03    .045    4100    .024
1234          RX       0      .5       1       8      16      23    23.5      24
1235          RY       8       8       8       0       0       8       8       8
              * ******************************************************************************
              * DDM   ***** Updated *****

1236          KK     455
1237          KM   SUB-BASIN 455
1238          KM   6-HOUR RAINFALL, PATTERN NO. 1.46 WAS USED TO FIND TC & R FOR THIS BASIN
1239          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .986
1240          KM     L = 1.70  Kb = .041  Adj. Slope =  146.0
1241          BA   1.111
1242          LG    .270    .280   3.700    .640  24.000
1243          UC    .471    .231
1244          UA       0       5      16      30      65      77      84      90      94      97
1245          UA     100
              * DDM   ***** Preserved *****

1246          KK    D455
1247          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
1248          KM   DETENTION/RETENTION BASINS LOCATED WITHIN LAS SENDAS ADDENDUM III
1249          KM   FOR BASIN #: 30      34      43      47&58
1250          KM        MAXIMUM VOLUME DIVERSION = 74.1 acre-feet
              *      1
1251          DT   BS455    74.1
1252          DI       0   10000
1253          DQ       0   10000
              * DDM   ***** Preserved *****

1254          KK   RT455
1255          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1256          DR   BS455
              * DDM   ***** Preserved *****

1257          KK    S455
1258          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1259          KM    74.1 ACRE-FEETx43560/36x3600=25cfs
1260          RS       1    STOR       0
1261          SV       0     .01    74.1
1262          SQ       0     3.0      25
              * DDM   ***** Preserved *****
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1263        KK    C455
1264        KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
            * KO      1
1265        HC        2

1266        KK   CC455
1267        KM  HYDROGRAPH COMBINATION OF 420C, R415 AND C455
            *      1       2
1268        HC        3
            *  KK  S440
            *  KM SPOOK HILL FRS PLANS DATED 6/15/77
            *  KM OUTLET PIPE=7'x7.5'RCBC; L=70 INLET INV.=1566; OUTLET INV.=1566
            *  KM EMERGENCY SPILLWAY ELEV.=1582; PRINCIPLE SPILLWAY ELEV.=1577.5
            *  KM STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 200 ACRE-FEET
            *  *   ESE = 1583.86 ft; PSE = 1579.36 ft; Sediment Vol. = 271 Ac-Ft.
            *  RS      1    STOR       0
            *  SV      0      81     363     533     719     925    1120    1399    1668     4
            *  SQ      0       0      10     180     367     595     800    1231    2625    24
            *  SE     76      78      80      81      82      83    83.9      85      86

1269        KK    S440
1270        KM    Spook Hill Reservoir Routing
1271        KM    See DMJM+HARRIS Technical Report No. 1 for supporting details
1272        KM    behind rating curves.
1273        KM
1274        KM    NGVD 29 elevations used in the computations.
1275        KM
1276        KM    Sediment Storage Volume Below Principle Spillway = 271 Ac-Ft (Elev=1577.5')
1277        RS       1    STOR       0
1278        SV       0     287     346   474.9     693    1120    1631    1919    2231    2927
1279        SV    3722    4158
1280        SQ       0       0     250     500     750     990    2860    4750    7000   12750
1281        SQ   19240   23050
1282        SE  1575.1  1577.5    1578  1578.8    1580    1582    1584    1585    1586    1588
1283        SE    1590    1591
            *
            * REMAINDER OF MODEL DELEATED FOR PURPOSES OF FRS HYDROLOGIC ANALYSIS
            * ******************************************************************************
1284        ZZ
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SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   58        10
              V
              V
   68       R10
              V
              V
   74       R12
              .
              .
   80         .          20
              .           .
              .           .
   90       C20............
              V
              V
   93       R20
              .
              .
   99         .          40
              .           .
              .           .
  109         .           .          60
              .           .           .
              .           .           .
  119       C60........................
              V
              V
  122       S60
              V
              V
  131       R60
              V
              V
  137      RR60
              .
              .
  143         .          80
              .           .
              .           .
  153       C80............
              V
              V
  156       R80
              .
              .
  162         .         100
              .           .
              .           .
  172      C100............
              V
              V
  175      R100
              .
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          .
181       .        120
          .          .
          .          .
191     C120............
          V
          V
194     R120
          .
          .
200       .        140
          .          .
          .          .
210       .          .        150
          .          .          V
          .          .          V
220       .          .       R150
          .          .          V
          .          .          V
226       .          .       R152
          .          .          .
          .          .          .
232       .          .          .        160
          .          .          .          .
          .          .          .          .
242       .          .          .          .        180
          .          .          .          .          .
          .          .          .          .          .
252     C180.............................................
          .
          .
255       .        210
          .          V
          .          V
265       .       R210
          .          .
          .          .
271       .          .        240
          .          .          .
          .          .          .
281       .       C240............
          .          V
          .          V
284       .       S240
          .          V
          .          V
291       .       R240
          .          .
          .          .
298       .          .        220
          .          .          .
          .          .          .
308       .       C220............
          .          V
          .          V
311       .       S220
          .          V
          .          V
318       .       R220
          .          .
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          .          .
325       .          .        190
          .          .          V
          .          .          V
 35       .          .       R190
          .          .          V
          .          .          V
341       .          .       R192
          .          .          .
          .          .          .
347       .          .          .        200
          .          .          .          .
          .          .          .          .
357       .       C200.......................
          .          V
          .          V
360       .       S200
          .          V
          .          V
367       .       R200
          .          V
          .          V
373       .      SS200
          .          V
          .          V
380       .      RR200
          .          .
          .          .
386    CC180............
          V
          V
389    S180
          V
          V
398    R180
          .
          .
407       .        260
          .          .
          .          .
417    C260............
          V
          V
420    R260
          .
          .
429       .        280
          .          .
          .          .
439    C280............
          V
          V
442    R280
          .
          .
451       .        300
          .          .
          .          .
461    C300............
          V
```

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            V
464       R300
            .
            .
473         .        305
            .          .
            .          .
483       C305............
            V
            V
486       R305
            .
            .
495         .        350
            .          .
            .          .
508         .          .-------->   SF350
505         .       D350
            .          V
            .          V
511         .       R350
            .          .
            .          .
518         .          .        310
            .          .          .
            .          .          .
528         .       C310............
            .          V
            .          V
531         .       R310
            .          .
            .          .
538         .          .        320
            .          .          .
            .          .          .
553         .          .          .-------->   BS320
548         .          .       D320
            .          .          .
            .          .          .
558         .          .          .          .<-------   BS320
556         .          .          .      RT320
            .          .          .          V
            .          .          .          V
559         .          .          .       S320
            .          .          .          .
            .          .          .          .
565       C320.................................
            .
            .
568         .        340
            .          .
            .          .
583         .          .-------->   BS340
578         .       D340
            .          .
            .          .
588         .          .          .<-------   BS340
586         .          .      RT340
            .          .          V
            .          .          V
```

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589          .          .        S340
             .          .          .
             .          .          .
595          .       340C............
             .          .
             .          .
598       C340............
             .
             .
603          .          .<-------   SF350
601          .      RT350
             .          V
             .          V
604          .      RR350
             .          .
             .          .
611          .          .        355
             .          .          .
             .          .          .
621          .       C355............
             .          V
             .          V
624          .       R355
             .          .
             .          .
631          .          .        360
             .          .          .
             .          .          .
645          .          .          .------->   BS360
641          .          .       D360
             .          .          .
             .          .          .
650          .          .          .           .<-------   BS360
648          .          .          .      RT360
             .          .          .          V
             .          .          .          V
651          .          .          .       S360
             .          .          .          .
             .          .          .          .
657          .       360C........................
             .          .
             .          .
660       C360............
             .
             .
663          .        370
             .          .
             .          .
673          .          .        395
             .          .          .
             .          .          .
683          .       C370............
             .          V
             .          V
686          .       R370
             .          .
             .          .
693          .          .        380
             .          .          .
             .          .          .
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707          .          .          .-------->   BS380
703          .          .       D380
             .          .          .
             .          .          .
712          .          .          .          .<-------   BS380
710          .          .          .      RT380
             .          .          .          V
             .          .          .          V
713          .          .          .       S380
             .          .          .          .
             .          .          .          .
719          .       380C.......................
             .          .
             .          .
722       C380............
             .
             .
725          .        390
             .          .
             .          .
739          .          .-------->   BS390
735          .       D390
             .          .
             .          .
744          .          .          .<-------   BS390
742          .          .      RT390
             .          .          V
             .          .          V
745          .          .       S390
             .          .          .
             .          .          .
751          .       C390............
             .          V
             .          V
754          .       R390
             .          .
             .          .
761          .          .        400
             .          .          .
             .          .          .
775          .          .          .-------->   BS400
771          .          .       D400
             .          .          .
             .          .          .
780          .          .          .          .<-------   BS400
778          .          .          .      RT400
             .          .          .          V
             .          .          .          V
781          .          .          .       S400
             .          .          .          .
             .          .          .          .
787          .          .       C400............
             .          .          .
             .          .          .
790          .       400C............
             .          .
             .          .
793       CC400............
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796          .        385
             .          .
             .          .
808          .          .-------->   SF385
806          .       D385
             .          V
             .          V
811          .       R385
             .          .
             .          .
818          .          .         420
             .          .           .
             .          .           .
832          .          .           .-------->   BS420
828          .          .        D420
             .          .           .
             .          .           .
837          .          .           .           .<-------   BS420
835          .          .           .       RT420
             .          .           .           V
             .          .           .           V
838          .          .           .        S420
             .          .           .           .
             .          .           .           .
844          .       C420 ......................
             .          .
             .          .
847       CC420............
             .
             .
850          .        440
             .          V
             .          V
860          .        R70
             .          .
             .          .
866          .          .         441
             .          .           .
             .          .           .
876          .       C108............
             .          .
             .          .
881          .          .-------->   SPLIT
879          .         D4
             .          V
             .          V
884          .       R108
             .          .
             .          .
890          .          .         442
             .          .           .
             .          .           .
900          .        C67............
             .          .
             .          .
906          .          .-------->  BASIN4
903          .         D6
             .          .
             .          .
911          .          .           .<-------  BASIN4
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909          .          .        RTD6
             .          .          V
             .          .          V
912          .          .         SD6
             .          .          .
             .          .          .
918          .        CD6............
             .          .
             .          .
921          .          .         443
             .          .          .
             .          .          .
934          .          .          .-------->   WSH66
931          .          .         D66
             .          .          V
             .          .          V
937          .          .        R113
             .          .          .
             .          .          .
943          .       C114............
             .          .
             .          .
946          .          .         444
             .          .          V
             .          .          V
956          .          .         R58
             .          .          .
             .          .          .
962          .          .          .        445
             .          .          .          .
             .          .          .          .
972          .          .        C107............
             .          .          V
             .          .          V
975          .          .        R107
             .          .          .
             .          .          .
983          .          .          .          .<-------   SPLIT
981          .          .          .       RTB2
             .          .          .          V
             .          .          .          V
984          .          .          .     RSPLIT
             .          .          .          .
             .          .          .          .
990          .          .          .          .        446
             .          .          .          .          .
             .          .          .          .          .
1000         .          .        C109........................
             .          .          .
             .          .          .
1006         .          .          .-------->  WSH404
1003         .          .         D5
             .          .          V
             .          .          V
1009         .          .        R109
             .          .          .
             .          .          .
1015         .          .          .        447
             .          .          .          .
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1027    .       .       .       .       .<-------  WSH404
1025    .       .       .       .     RT404
        .       .       .       .       V
        .       .       .       .       V
 28     .       .       .       .     R404
        .       .       .       .       .
        .       .       .       .       .
1034    .       .     C110.......................
        .       .       V
        .       .       V
1037    .       .     R110
        .       .       .
        .       .       .
1043    .     C115............
        .       V
        .       V
1046    .     R115
        .       .
        .       .
1052    .       .      448
        .       .       .
        .       .       .
1062    .       .       .      449
        .       .       .       .
        .       .       .       .
1072    .       .     C6364............
        .       .       V
        .       .       V
1075    .       .     R6364
        .       .       .
        .       .       .
1081    .       .       .      450
        .       .       .       .
        .       .       .       .
1091    .       .       .       .      451
        .       .       .       .       .
        .       .       .       .       .
1101    .       .       .     C451............
        .       .       .       .
        .       .       .       .
1106    .       .       .       .       .<-------   WSH66
1104    .       .       .       .     RT66
        .       .       .       .       .
        .       .       .       .       .
1107    .       .       .       .       .        452
        .       .       .       .       .          .
        .       .       .       .       .          .
1117    .       .       .       .     C6465............
        .       .       .       .       V
        .       .       .       .       V
1120    .       .       .       .     R6566
        .       .       .       .       .
        .       .       .       .       .
1126    .       .     C116.......................
        .       .       V
        .       .       V
1129    .       .    BASIN5
        .       .       V
        .       .       V
1136    .       .     R116
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            .          .          .
            .          .          .
1142        .          .          .        453
            .          .          .          .
            .          .          .          .
1152        .          .       C117............
            .          .          .
            .          .          .
1155        .       C118............
            .          V
            .          V
1158        .       R118
            .          .
            .          .
1167        .          .-------> BASIN6
1164        .         D7
            .          .
            .          .
1172        .          .          .<-------  BASIN6
1170        .          .       RTD7
            .          .          V
            .          .          V
1173        .          .        SD7
            .          .          .
            .          .          .
1179        .        CD7............
            .          .
            .          .
1182        .          .        454
            .          .          .
            .          .          .
1192        .       C119............
            .          V
            .          V
1195        .       R454
            .          .
            .          .
1202        .          .        415
            .          .          .
            .          .          .
1214        .          .          .          .<-------   SF385
1212        .          .          .      RT385
            .          .          .          V
            .          .          .          V
1215        .          .          .      RR385
            .          .          .          .
            .          .          .          .
1222        .          .      C415 ............
            .          .          .
            .          .          .
1225        .      CC415............
            .          V
            .          V
1228        .      R415
            .          .
            .          .
1236        .          .        455
            .          .          .
            .          .          .
1251        .          .          .------->   BS455
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1246          .          .       D455
              .          .          .
              .          .          .
1256          .          .          .          .<-------   BS455
 54           .          .          .      RT455
              .          .          .          V
              .          .          .          V
1257          .          .          .       S455
              .          .          .          .
              .          .          .          .
1263          .          .       C455............
              .          .          .
              .          .          .
1266       CC455........................
              V
              V
1269       S440
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
           VERSION 4.1                 *
*                                      *
*  RUN DATE   15MAY02  TIME  07:48:20  *
*                                      *
****************************************
```

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

Hydrologic model revised by DMJM+HARRIS
Existing Condition Base Model(50-year, 6-hour storm)
File Name: DHEL6.DAT

The Existing Condition Base Model with Spook Hill FRS Storage Routing (File Name: EC24BASE.DAT) developed by WPA as part of the ADMP update is the origin of this model.

The following concentration points were added to define the uniform lateral inflow hydrographs along the Spook Hill FRS:
340C, 360C, 380C, 400C
These hydrograph combination labels were used for consistency with the routing exhibit provided for the model.

The DDMS software was used to revise the precipitation and Clark Unit hydrograph variables for the frequency and duration of the storm event.

The hydrologic routing variable, NSTPS, was modified based on:
NSTPS = (Travel Time)*60/NMIN

A CONSERVATIVE ESTIMATE WAS USED FOR THE LOCATION OF THE CENTROID FOR PRECIPITATION VALUES
CHANNEL ROUTING INFORMATION FOR MCFCD FLOODWAYS WERE OBTAINED FROM MCFCD SPOOK HILL, SIGNAL BUTTE AND BULLDOG FLOODWAY PLANS

UPDATE TO EXISTING CONDITION 24-HR 100-YR MODEL RUN BASED ON RE-ALIGNMENT OF SUB-BASIN BOUNDARIES FOR SUB-BASINS 385 (REDUCED) & 415 (ENLARGED)
UPDATE BASED ON INFORMATION FROM 2' CONTOUR MAPPING.

ANALYSIS PERFORMED BY WOOD/PATEL; MW; 07/27/00 FILE: S24CE30Z.DAT

DDM MCUHP1 SPOOK HILL AMDP - EXISTING CONDITIONS MODEL - 100YR, 24HR STORM

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      3   0  ENDING DATE
                   NDTIME       1838  ENDING TIME
```

```
ICENT          19  CENTURY MARK

COMPUTATION INTERVAL     .03 HOURS
     TOTAL TIME BASE   66.63 HOURS

ENGLISH UNITS
     DRAINAGE AREA          SQUARE MILES
     PRECIPITATION DEPTH    INCHES
     LENGTH, ELEVATION      FEET
     FLOW                   CUBIC FEET PER SECOND
     STORAGE VOLUME         ACRE-FEET
     SURFACE AREA           ACRES
     TEMPERATURE            DEGREES FAHRENHEIT

37 JD        INDEX STORM NO. 1
                STRM        2.82  PRECIPITATION DEPTH
                TRDA         .01  TRANSPOSITION DRAINAGE AREA

38 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .01      .01      .01
                .01      .01      .01      .01      .01      .02      .02      .02      .02      .02
                .02      .02      .04      .06      .06      .06      .06      .06      .06      .06
                .01      .01      .01      .01      .01      .01      .01      .01      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00

41 JD        INDEX STORM NO. 2
                STRM        2.80  PRECIPITATION DEPTH
                TRDA         .50  TRANSPOSITION DRAINAGE AREA

 0 PI          PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .01      .01      .01
                .01      .01      .01      .01      .01      .02      .02      .02      .02      .02
                .02      .02      .04      .06      .06      .06      .06      .06      .06      .06
                .01      .01      .01      .01      .01      .01      .01      .01      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

42 JD INDEX STORM NO. 3

STRM 2.76 PRECIPITATION DEPTH

TRDA 2.80 TRANSPOSITION DRAINAGE AREA

43 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

46 JD INDEX STORM NO. 4

STRM 2.60 PRECIPITATION DEPTH

TRDA 16.00 TRANSPOSITION DRAINAGE AREA

47 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.03	.03	.03	.03	.03	.03	.03
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

50 JD INDEX STORM NO. 5

STRM 2.28 PRECIPITATION DEPTH

TRDA 90.00 TRANSPOSITION DRAINAGE AREA

51 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

54 JD INDEX STORM NO. 6

STRM 1.61 PRECIPITATION DEPTH

TRDA 500.00 TRANSPOSITION DRAINAGE AREA

55 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	10	1061.	4.27	126.	32.	11.	.70		
ROUTED TO	R10	990.	4.40	126.	32.	11.	.70		
ROUTED TO	R12	925.	4.60	126.	32.	11.	.70		
HYDROGRAPH AT	20	881.	4.50	138.	34.	12.	1.12		
2 COMBINED AT	C20	1486.	4.60	249.	62.	22.	1.82		
ROUTED TO	R20	1484.	4.63	249.	62.	22.	1.82		
HYDROGRAPH AT	40	1766.	4.40	246.	62.	22.	2.23		
HYDROGRAPH AT	60	1288.	4.50	237.	59.	21.	1.75		
3 COMBINED AT	C60	3504.	4.50	633.	159.	57.	5.80		
ROUTED TO	S60	116.	6.43	115.	110.	57.	5.80		
ROUTED TO	R60	116.	6.50	115.	110.	57.	5.80		
ROUTED TO	RR60	116.	6.57	115.	110.	57.	5.80		
HYDROGRAPH AT	80	1550.	4.33	189.	47.	17.	1.48		
2 COMBINED AT	C80	1598.	4.33	298.	159.	85.	1.48		
ROUTED TO	R80	1585.	4.33	298.	159.	85.	1.48		
HYDROGRAPH AT	100	475.	4.23	68.	17.	6.	.48		
2 COMBINED AT	C100	1791.	4.33	345.	171.	88.	1.96		
ROUTED TO	R100	1793.	4.37	345.	171.	88.	1.96		
HYDROGRAPH AT	120	2448.	4.33	343.	86.	31.	2.20		
2 COMBINED AT	C120	3613.	4.33	628.	240.	109.	4.16		
ROUTED TO	R120	3609.	4.37	628.	240.	109.	4.16		
HYDROGRAPH AT	140	734.	4.17	73.	18.	7.	.60		
HYDROGRAPH AT	150	720.	4.17	56.	14.	5.	.41		
ROUTED TO	R150	665.	4.20	56.	14.	5.	.41		
ROUTED TO	R152	618.	4.33	56.	14.	5.	.41		
HYDROGRAPH AT	160	253.	4.43	41.	10.	4.	.37		

HYDROGRAPH AT	180	693.	4.47	95.	24.	9.	1.00
5 COMBINED AT	C180	4388.	4.37	763.	272.	118.	6.54
HYDROGRAPH AT	210	1341.	4.17	117.	29.	11.	.79
ROUTED TO	R210	1293.	4.27	117.	29.	11.	.79
HYDROGRAPH AT	240	1176.	4.37	164.	41.	15.	1.41
2 COMBINED AT	C240	1877.	4.33	261.	65.	23.	2.20
ROUTED TO	S240	692.	4.87	210.	54.	20.	2.20
ROUTED TO	R240	691.	4.93	209.	54.	20.	2.20
HYDROGRAPH AT	220	800.	4.20	75.	19.	7.	.47
2 COMBINED AT	C220	791.	4.73	265.	69.	25.	2.67
ROUTED TO	S220	750.	4.97	256.	66.	24.	2.67
ROUTED TO	R220	749.	5.00	256.	66.	24.	2.67
HYDROGRAPH AT	190	1411.	4.20	127.	32.	11.	.92
ROUTED TO	R190	1369.	4.27	127.	32.	11.	.92
ROUTED TO	R192	1311.	4.33	127.	32.	11.	.92
HYDROGRAPH AT	200	987.	4.17	78.	20.	7.	.53
3 COMBINED AT	C200	1538.	4.33	400.	104.	38.	4.12
ROUTED TO	S200	1500.	4.43	388.	100.	36.	4.12
ROUTED TO	R200	1497.	4.43	388.	100.	36.	4.12
ROUTED TO	SS200	935.	5.00	267.	70.	25.	4.12
ROUTED TO	RR200	901.	5.20	266.	70.	25.	4.12
2 COMBINED AT	CC180	4388.	4.37	992.	334.	140.	10.66
ROUTED TO	S180	94.	26.77	94.	92.	72.	10.66
ROUTED TO	R180	94.	26.83	94.	92.	71.	10.66
HYDROGRAPH AT	260	506.	4.10	48.	12.	4.	.26
2 COMBINED AT	C260	508.	4.10	143.	129.	115.	.26
ROUTED TO	R260	493.	4.20	143.	129.	114.	.26
HYDROGRAPH AT	280	640.	4.10	51.	13.	5.	.32
2 COMBINED AT	C280	1032.	4.13	185.	139.	117.	.58
ROUTED TO	R280	1007.	4.20	185.	139.	117.	.58

HYDROGRAPH AT	300	510.	4.10	38.	9.	3.	.29
2 COMBINED AT	C300	1316.	4.17	212.	143.	117.	.87
ROUTED TO	R300	1235.	4.23	209.	142.	116.	.87
HYDROGRAPH AT	305	469.	4.30	85.	21.	8.	.70
2 COMBINED AT	C305	1393.	4.23	268.	153.	116.	1.57
ROUTED TO	R305	1382.	4.30	268.	152.	116.	1.57
HYDROGRAPH AT	350	1134.	4.23	109.	27.	10.	.97
DIVERSION TO	SF350	567.	4.23	54.	14.	5.	.97
HYDROGRAPH AT	D350	567.	4.23	54.	14.	5.	.97
ROUTED TO	R350	504.	4.43	54.	14.	5.	.97
HYDROGRAPH AT	310	427.	4.33	57.	14.	5.	.56
2 COMBINED AT	C310	825.	4.43	104.	26.	9.	1.04
ROUTED TO	R310	731.	4.77	104.	26.	9.	1.04
HYDROGRAPH AT	320	920.	4.23	130.	33.	12.	.95
DIVERSION TO	BS320	596.	4.03	25.	6.	2.	.95
HYDROGRAPH AT	D320	920.	4.23	106.	26.	10.	.95
HYDROGRAPH AT	RT320	596.	4.03	25.	6.	2.	.95
ROUTED TO	S320	4.	4.10	4.	4.	2.	.95
4 COMBINED AT	C320	1899.	4.40	406.	183.	121.	3.56
HYDROGRAPH AT	340	1230.	4.23	188.	47.	17.	1.44
DIVERSION TO	BS340	1230.	4.23	113.	28.	10.	1.44
HYDROGRAPH AT	D340	815.	4.57	76.	19.	7.	1.44
HYDROGRAPH AT	RT340	1230.	4.23	113.	28.	10.	1.44
ROUTED TO	S340	18.	4.57	17.	14.	9.	1.44
2 COMBINED AT	340C	833.	4.57	93.	33.	16.	1.44
2 COMBINED AT	C340	2094.	4.57	442.	199.	128.	5.00
HYDROGRAPH AT	RT350	567.	4.23	54.	14.	5.	.97
ROUTED TO	RR350	500.	4.47	54.	14.	5.	.97
HYDROGRAPH AT	355	549.	4.37	79.	20.	7.	.68
2 COMBINED AT	C355	909.	4.47	125.	31.	11.	1.16

ROUTED TO	R355	830.	4.77	125.	31.	11.	1.16
HYDROGRAPH AT	360	745.	4.27	119.	30.	11.	.88
DIVERSION TO	BS360	745.	4.27	58.	14.	5.	.88
HYDROGRAPH AT	D360	571.	4.53	62.	16.	6.	.88
HYDROGRAPH AT	RT360	745.	4.27	58.	14.	5.	.88
ROUTED TO	S360	9.	4.53	9.	7.	5.	.88
3 COMBINED AT	360C	1031.	4.73	171.	48.	20.	2.04
2 COMBINED AT	C360	2394.	4.57	535.	224.	136.	7.04
HYDROGRAPH AT	370	868.	4.27	88.	22.	8.	.67
HYDROGRAPH AT	395	281.	4.20	28.	7.	3.	.20
2 COMBINED AT	C370	1031.	4.23	111.	28.	10.	.87
ROUTED TO	R370	899.	4.57	111.	28.	10.	.87
HYDROGRAPH AT	380	563.	4.33	98.	25.	9.	.90
DIVERSION TO	BS380	563.	4.33	58.	14.	5.	.90
HYDROGRAPH AT	D380	330.	4.63	40.	10.	4.	.90
HYDROGRAPH AT	RT380	563.	4.33	58.	14.	5.	.90
ROUTED TO	S380	9.	5.00	9.	8.	5.	.90
3 COMBINED AT	380C	876.	4.63	138.	40.	17.	1.77
2 COMBINED AT	C380	2589.	4.57	596.	242.	142.	8.81
HYDROGRAPH AT	390	589.	4.03	38.	10.	3.	.24
DIVERSION TO	BS390	205.	3.83	7.	2.	1.	.24
HYDROGRAPH AT	D390	589.	4.03	31.	8.	3.	.24
HYDROGRAPH AT	RT390	205.	3.83	7.	2.	1.	.24
ROUTED TO	S390	1.	3.90	1.	1.	1.	.24
2 COMBINED AT	C390	590.	4.03	32.	9.	3.	.24
ROUTED TO	R390	405.	4.47	32.	9.	3.	.24
HYDROGRAPH AT	400	587.	4.20	71.	18.	6.	.62
DIVERSION TO	BS400	411.	4.07	11.	3.	1.	.62
HYDROGRAPH AT	D400	587.	4.20	60.	15.	5.	.62
HYDROGRAPH AT	RT400	411.	4.07	11.	3.	1.	.62

ROUTED TO	S400	2.	4.13	2.	2.	1.	.62
2 COMBINED AT	C400	589.	4.20	62.	17.	6.	.62
2 COMBINED AT	400C	751.	4.43	88.	24.	9.	.86
2 COMBINED AT	CC400	2826.	4.57	632.	252.	145.	9.67
HYDROGRAPH AT	385	717.	4.23	80.	20.	7.	.53
DIVERSION TO	SF385	430.	4.23	48.	12.	4.	.53
HYDROGRAPH AT	D385	287.	4.23	32.	8.	3.	.53
ROUTED TO	R385	237.	4.77	32.	8.	3.	.53
HYDROGRAPH AT	420	751.	4.23	100.	25.	9.	.85
DIVERSION TO	BS420	454.	4.03	17.	4.	2.	.85
HYDROGRAPH AT	D420	751.	4.23	83.	21.	7.	.85
HYDROGRAPH AT	RT420	454.	4.03	17.	4.	2.	.85
ROUTED TO	S420	3.	4.10	3.	2.	2.	.85
3 COMBINED AT	C420	745.	4.40	112.	30.	11.	1.06
2 COMBINED AT	CC420	3082.	4.57	682.	265.	150.	10.73
HYDROGRAPH AT	440	223.	4.03	14.	3.	1.	.08
ROUTED TO	R70	219.	4.07	14.	3.	1.	.08
HYDROGRAPH AT	441	20.	4.03	2.	0.	0.	.01
2 COMBINED AT	C108	238.	4.07	16.	4.	1.	.09
DIVERSION TO	SPLIT	119.	4.07	8.	2.	1.	.09
HYDROGRAPH AT	D4	119.	4.07	8.	2.	1.	.09
ROUTED TO	R108	108.	4.10	8.	2.	1.	.09
HYDROGRAPH AT	442	134.	4.07	11.	3.	1.	.10
2 COMBINED AT	C67	242.	4.10	18.	5.	2.	.19
DIVERSION TO	BASIN4	163.	4.10	7.	2.	1.	.19
HYDROGRAPH AT	D6	142.	4.27	12.	3.	1.	.19
HYDROGRAPH AT	RTD6	163.	4.10	7.	2.	1.	.19
ROUTED TO	SD6	1.	4.27	1.	1.	1.	.19
2 COMBINED AT	CD6	144.	4.27	12.	4.	2.	.19
HYDROGRAPH AT	443	183.	4.03	16.	4.	1.	.08

DIVERSION TO	WSH66	78.	3.87	11.	3.	1.	.08
HYDROGRAPH AT	D66	105.	4.03	5.	1.	0.	.08
ROUTED TO	R113	105.	4.07	5.	1.	0.	.08
2 COMBINED AT	C114	183.	4.07	17.	5.	2.	.27
HYDROGRAPH AT	444	102.	4.03	5.	1.	0.	.04
ROUTED TO	R58	97.	4.07	5.	1.	0.	.04
HYDROGRAPH AT	445	387.	4.03	22.	5.	2.	.19
2 COMBINED AT	C107	480.	4.03	27.	7.	2.	.23
ROUTED TO	R107	476.	4.07	27.	7.	2.	.23
HYDROGRAPH AT	RTB2	119.	4.07	8.	2.	1.	.09
ROUTED TO	RSPLIT	118.	4.07	8.	2.	1.	.09
HYDROGRAPH AT	446	81.	4.03	6.	2.	1.	.04
3 COMBINED AT	C109	674.	4.07	41.	10.	4.	.27
DIVERSION TO	WSH404	35.	3.73	7.	2.	1.	.27
HYDROGRAPH AT	D5	639.	4.07	34.	9.	3.	.27
ROUTED TO	R109	622.	4.07	34.	9.	3.	.27
HYDROGRAPH AT	447	182.	4.03	14.	3.	1.	.09
HYDROGRAPH AT	RT404	35.	3.73	7.	2.	1.	.27
ROUTED TO	R404	35.	3.87	7.	2.	1.	.27
3 COMBINED AT	C110	836.	4.07	55.	14.	5.	.36
ROUTED TO	R110	832.	4.07	55.	14.	5.	.36
2 COMBINED AT	C115	941.	4.07	69.	18.	7.	.63
ROUTED TO	R115	931.	4.10	69.	18.	7.	.63
HYDROGRAPH AT	448	111.	4.00	7.	2.	1.	.05
HYDROGRAPH AT	449	102.	4.03	6.	1.	1.	.05
2 COMBINED AT	C6364	213.	4.03	12.	3.	1.	.09
ROUTED TO	R6364	183.	4.17	12.	3.	1.	.09
HYDROGRAPH AT	450	78.	4.17	8.	2.	1.	.07
HYDROGRAPH AT	451	23.	4.17	2.	1.	0.	.03
2 COMBINED AT	C451	101.	4.17	10.	3.	1.	.09

HYDROGRAPH AT	RT66	78.	3.87	11.	3.	1.	.08
HYDROGRAPH AT	452	79.	4.03	5.	1.	0.	.04
2 COMBINED AT	C6465	157.	4.03	16.	4.	1.	.04
ROUTED TO	R6566	152.	4.10	16.	4.	1.	.04
3 COMBINED AT	C116	428.	4.17	39.	10.	3.	.23
ROUTED TO	BASIN5	185.	4.43	38.	10.	3.	.23
ROUTED TO	R116	184.	4.53	38.	10.	3.	.23
HYDROGRAPH AT	453	81.	4.10	8.	2.	1.	.06
2 COMBINED AT	C117	210.	4.47	46.	12.	4.	.29
2 COMBINED AT	C118	930.	4.10	108.	28.	10.	.92
ROUTED TO	R118	902.	4.13	107.	28.	10.	.92
DIVERSION TO	BASIN6	279.	4.10	6.	2.	1.	.92
HYDROGRAPH AT	D7	842.	4.13	101.	26.	10.	.92
HYDROGRAPH AT	RTD7	279.	4.10	6.	2.	1.	.92
ROUTED TO	SD7	1.	4.47	1.	1.	1.	.92
2 COMBINED AT	CD7	843.	4.13	102.	27.	10.	.92
HYDROGRAPH AT	454	200.	4.13	24.	6.	2.	.18
2 COMBINED AT	C119	939.	4.13	120.	31.	12.	1.10
ROUTED TO	R454	910.	4.23	120.	31.	12.	1.10
HYDROGRAPH AT	415	646.	4.17	86.	21.	8.	.61
HYDROGRAPH AT	RT385	430.	4.23	48.	12.	4.	.53
ROUTED TO	RR385	376.	4.53	48.	12.	4.	.53
2 COMBINED AT	C415	763.	4.23	127.	32.	11.	.93
2 COMBINED AT	CC415	1332.	4.23	224.	57.	21.	2.03
ROUTED TO	R415	1318.	4.30	224.	57.	21.	2.03
HYDROGRAPH AT	455	1252.	4.17	149.	38.	14.	1.11
DIVERSION TO	BS455	1252.	4.17	140.	35.	13.	1.11
HYDROGRAPH AT	D455	162.	4.70	9.	2.	1.	1.11
HYDROGRAPH AT	RT455	1252.	4.17	140.	35.	13.	1.11
ROUTED TO	S455	22.	5.27	21.	18.	11.	1.11

2 COMBINED AT	C455	184.	4.70	31.	20.	12.	1.11
3 COMBINED AT	CC455	3583.	4.43	804.	302.	166.	13.87
ROUTED TO	S440	248.	6.70	208.	158.	111.	13.87

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

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*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
            VERSION 4.1               *
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*  RUN DATE   15MAY02  TIME  07:48:40  *
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*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
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X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

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

  1           ID   Hydrologic model revised by DMJM+HARRIS
  2           ID   Existing Condition Base Model(100-year, 24-hour storm)
  3           ID   File Name: DHEC24.DAT
  4           ID
  5           ID   The Existing Condition Base Model with Spook Hill FRS Storage Routing
  6           ID   (File Name: EC24BASE.DAT) developed by WPA as part of the ADMP update
  7           ID   is the origin of this model.
  8           ID
  9           ID   The following concentration points were added to define the uniform
 10           ID   lateral inflow hydrographs along the Spook Hill FRS:
 11           ID        340C, 360C, 380C, 400C
 12           ID   These hydrograph combination labels were used for consistency with
 13           ID   the routing exhibit provided for the model.
 14           ID
 15           ID   A CONSERVATIVE ESTIMATE WAS USED FOR THE LOCATION OF THE CENTROID FOR
 16           ID   PRECIPITATION VALUES
 17           ID   CHANNEL ROUTING INFORMATION FOR MCFCD FLOODWAYS WERE OBTAINED
 18           ID   FROM MCFCD SPOOK HILL, SIGNAL BUTTE AND BULLDOG FLOODWAY PLANS
 19           ID
 20           ID
 21           ID   UPDATE TO EXISTING CONDITION 24-HR 100-YR MODEL RUN BASED ON RE-ALIGNMENT
 22           ID   OF SUB-BASIN BOUNDARIES FOR SUB-BASINS 385 (REDUCED) & 415 (ENLARGED)
 23           ID   UPDATE BASED ON INFORMATION FROM 2' CONTOUR MAPPING.
 24           ID
 25           ID   ANALYSIS PERFORMED BY WOOD/PATEL; MW;        07/27/00  FILE: S24CE30Z.DAT
 26           ID
 27           ID   DDM MCUHP1 SPOOK HILL AMDP - EXISTING CONDITIONS MODEL - 100YR, 24HR STORM
              *       Original File Name: S24CE30.DAT
              *       Modified File Name: S24CE30Z.DAT
              *       Changes: 1) No. of Hydrograph Ordinates Increased to 2000
              *                2) SE, SV and SQ Cards for the Three (3) FRSs Updated
              *                3) Sediment Volumes Subtracted from Storage Volumes
              *                4) Old Elevation Datum Adjusted to NAVD 1988
              *       Wood/Patel, July 19, 2000.  SZ.
              *
              *  As of 12/06/00 the following has been added to update the base hec1 file
              *  S24CE30z. This file is used   to begin update process towards resulting 100yr
              *  existing condition 24-hour hec run which upon its completion will be  file
              *  from which all subsequent (future) runs will be derived.
              *
              *  This new file will be named (labeled):    EC24base.dat
              *              E  =  Existing condition model
              *              C  =  100-year return period
              *              24 =  Storm Duration
              *
              *  MAJOR ASSUMPTIONS / CRITERIA / CHANGES FROM PREVIOUS MODELS: 2/14/1
              *
              *      1. Refinement of areas for sub-basins 200, 210, 220, 240, 260, 280, 300,
              *         305, 320, 340, 355, 360, 370, 380, 395 and 415 using CAD as follows:
              *              Area of 200 changes to  .530 sq. miles
              *              Area of 210 changes to  .792 sq. miles
              *              Area of 220 changes to  .473 sq. miles
              *              Area of 240 changes to 1.408 sq. miles
              *              Area of 260 changes to  .262 sq. miles
              *              Area of 280 changes to  .319 sq. miles
              *              Area of 300 changes to  .289 sq. miles
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*            Area of 305 changes to  .702 sq. miles
*            Area of 320 changes to  .950 sq. miles
*            Area of 340 changes to 1.440 sq. miles
*            Area of 355 changes to  .676 sq. miles
*            Area of 360 changes to  .880 sq. miles
*            Area of 370 changes to  .672 sq. miles
*            Area of 380 changes to  .898 sq. miles
*            Area of 395 changes to  .199 sq. miles
*            Area of 415 changes to  .609 sq. miles
*
*      2. The numbering system used when a sub-basin is further divide
*         is changed to a number letter combination from a number only system.
*         Now when a sub-basin is divided further, the original number  will
*         remain and a letter a,b,c will be attached depending on the
*         number of pieces that the sub-basin is divided into. This applies
*         only to future condition models.
*
*      3. The slope of R455 is incorrect and will change from .002 ft/ft
*         to .0002 ft/ft.
*
*      4. Changes to sub-basin areas will result in changes to soil type
*         percentages.  All changes to areas and soil make-up have been
*         obtained using CAD instead of hand planimeter.
*
*      5. Signal Butte Floodway reach lengths have been updated using
*         the as built plans dated March of 1983.  Hec routings affected by
*         this are as follows:
*              R180 increased 100' from 1500' to 1600'
*              R260 remained unchanged.
*              R280 decreased 400' from 2500' to 2100'
*              R300 increased 300' from 2200' to 2500'
*              RR300 is relabeled R305
*              R305 decreased 50' from 6050' to 6000'
*
*      6. "N - Steps" balanced using normal depth channel calcs and limiting
*         divergence from the resulting value by no more than 30%
*         higher or lower.
*
*
*
*
*DIAGRAM
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  28          IT       2                   2000
  29          IO       5
  30          IN      15
  31          JD    3.81    0.01
  32          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  33          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  34          PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  35          PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  36          PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  37          PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  38          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  39          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  40          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  41          PC    .983    .986    .989    .992    .995    .998   1.000
  42          JD   3.787    1.00
  43          JD   3.677    5.80
  44          JD   3.574   10.66
  45          JD   3.539   13.70
  46          JD   3.467   20.00
  47          JD   3.315   50.00
              * DDM   ***** Updated *****

  48          KK      10
  49          KM   SUB-BASIN 10
  50          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
  51          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
  52          KM     L = 2.00  Kb = .044  Adj. Slope =  165.0
  53          BA    .702
  54          LG    .350    .320   7.600    .090  15.000
  55          UC    .421    .302
  56          UA       0       3       5       8      12      20      43      75      90      96
  57          UA     100
              * DDM   ***** Preserved *****

  58          KK     R10
  59          KM   ROUTING OF FLOW FROM SUB-BASIN 10 TO R12
  60          RS       4    FLOW      -1
  61          RC    .045     .03    .045    8700    .021
  62          RX       0       1       2      17      27      42      43      44
  63          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

  64          KK     R12
  65          KM   ROUTING OF FLOW FROM R12 TO SUB-BASIN 20
  66          RS       6    FLOW      -1
  67          RC    .045     .03    .045    4500     .01
  68          RX       0       1      45    52.5    72.5      80     124     125
  69          RY       4     2.5     2.5       0       0     2.5     2.5       4
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 70           KK      20
 71           KM   SUB-BASIN 20
 72           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 73           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
 74           KM     L = 2.50  Kb = .041  Adj. Slope =   88.0
 75           BA   1.120
 76           LG    .350    .390   5.800    .190   1.000
 77           UC    .658    .454
 78           UA       0       3       5       8      12      20      43      75      90      96
 79           UA     100
              * DDM   ***** Preserved *****

 80           KK     C20
 81           KM   HYDROGRAPH COMBINATION OF SUB-BASINS 10 AND 20
 82           HC       2
              * DDM   ***** Preserved *****

 83           KK     R20
 84           KM        ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
 85           RS       1    FLOW      -1
 86           RC    .016    .016    .016     990    .004
 87           RX       0       5       7    14.5    34.5      42      44      50
 88           RY       4       2       2       0       0       2       2       4
              * DDM   ***** Updated *****

 89           KK      40
 90           KM   SUB-BASIN 40
 91           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 92           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
 93           KM     L = 3.08  Kb = .036  Adj. Slope =  189.0
 94           BA   2.233
 95           LG    .340    .340   4.900    .280   5.000
 96           UC    .496    .264
 97           UA       0       3       5       8      12      20      43      75      90      96
 98           UA     100
              * DDM   ***** Updated *****

 99           KK      60
100           KM   SUB-BASIN 60
101           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
102           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .990
103           KM     L = 4.19  Kb = .038  Adj. Slope =  209.6
104           BA   1.746
105           LG    .330    .350   5.800    .190   9.000
106           UC    .596    .477
107           UA       0       3       5       8      12      20      43      75      90      96
108           UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 109          KK     C60
 110          KM     C60GRAPH COMBINATION FOR APACHE JUNCTION FRS
              *      1       2
 111          HC       3
              * DDM   ***** Preserved *****

 112          KK     S60
 113          KM   APACHE JUNCTION FRS AS-BUILT PLANS 12/19/88
 114          KM   OUTLET PIPE=30"RCP; L=136.6'; INLET INV.=1783.5; OUTLET INV.=1783
 115          KM   EMERGENCY SPILLWAY ELEV.=1799.77'; PRINCIPLE SPILLWAY ELEV.=1793.5'
 116          KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 100 ACRE-FEET
              *  ESE = 1801.92 ft; PSE = 1795.65 ft; Sediment Vol. = 237 Ac-Ft.
 117          RS       1    STOR       0
 118          SV       0       0      77     242     371     439     563     687    2163
 119          SQ       0      12     103     114     120     362    1462    3101   30000
 120          SE    95.0    96.0    98.0   100.0   101.6   101.9   103.0   104.0   112.9
              * DDM   ***** Preserved *****

 121          KK     R60
 122          KM        ROUTE FLOW THROUGH BULLDOG FLOODWAY FROM APACHE JUNCTION FRS
 123          RS       1    FLOW      -1
 124          RC    .016    .016    .016    2850    .012
 125          RX       0       1       2     2.1     5.6     5.7       6       7
 126          RY     3.5     3.5     3.5       0       0     3.5     3.5     3.5
              * DDM   ***** Preserved *****

 127          KK    RR60
 128          KM   ROUTE FLOW FROM BULLDOG FLOODWAY TO SUB-BASIN 80
 129          RS       3    FLOW      -1
 130          RC    .016    .016    .016    3500    .005
 131          RX       0       1       2     2.1     7.1     7.2       8       9
 132          RY     3.5     3.5     3.5       0       0     3.5     3.5     3.5
              * DDM   ***** Updated *****

 133          KK      80
 134          KM   SUB-BASIN 80
 135          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 136          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
 137          KM     L = 2.69  Kb = .039  Adj. Slope =  229.8
 138          BA   1.475
 139          LG    .330    .330   5.600    .210   4.000
 140          UC    .433    .259
 141          UA       0       3       5       8      12      20      43      75      90      96
 142          UA     100
              * DDM   ***** Preserved *****

 143          KK     C80
 144          KM   HYDROGRAPH COMBINATION FOR FLOW FROM APACHE JUNCTION FRS & SUB-BASIN 80
 145          HC       2   1.475
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 146          KK     R80
 147          KM   ROUTE FLOW FROM SUB-BASIN 80 TO SUB-BASIN 100
 148          RS       1    FLOW      -1
 149          RC    .025    .016    .025    1200    .003
 150          RX       0       2       6     6.1    41.1    41.2    56.2    58.2
 151          RY     5.5     4.5     4.5       0       0     4.5     4.5     5.5
              * DDM   ***** Updated *****

 152          KK     100
 153          KM   SUB-BASIN 100
 154          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 155          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 156          KM     L = 1.94  Kb = .046  Adj. Slope =  108.0
 157          BA    .484
 158          LG    .320    .290   5.100    .260   3.000
 159          UC    .533    .473
 160          UA       0       5      16      30      65      77      84      90      94      97
 161          UA     100
              * DDM   ***** Preserved *****

 162          KK    C100
 163          KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 80 & 100
 164          HC       2
              * DDM   ***** Preserved *****

 165          KK    R100
 166          KM   ROUTE FLOW FROM SUB-BASIN 100 TO SUB-BASIN 120
 167          RS       1    FLOW      -1
 168          RC    .016    .016    .016     940    .005
 169          RX       0       1       2     2.1    52.1    52.2      53      54
 170          RY     4.5     4.5     4.5       0       0     4.5     4.5     4.5
              * DDM   ***** Updated *****

 171          KK     120
 172          KM   SUB-BASIN 120
 173          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 174          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
 175          KM     L = 3.07  Kb = .037  Adj. Slope =  239.0
 176          BA   2.202
 177          LG    .330    .280   6.800    .130  11.000
 178          UC    .429    .226
 179          UA       0       3       5       8      12      20      43      75      90      96
 180          UA     100
              * DDM   ***** Preserved *****

 181          KK    C120
 182          KM   HYDROGRAPH COMBINATION FOR FLOW FROM SUB-BASIN 100 & 120
 183          HC       2
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 184          KK    R120
 185          KM   ROUTE FLOW FROM SUB-BASIN 120 TO SIGNAL BUTTE FRS
 186          RS       1    FLOW      -1
 187          RC    .025    .016    .025    2100    .005
 188          RX       0       6      10    10.1    60.1    60.2    74.2    80.2
 189          RY       8       5       5       0       0       5       5       8
              * DDM   ***** Updated *****

 190          KK     140
 191          KM   SUB-BASIN 140
 192          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 193          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 194          KM     L = 1.61  Kb = .044  Adj. Slope =  149.0
 195          BA    .598
 196          LG    .310    .280   4.200    .440   5.000
 197          UC    .421    .278
 198          UA       0       5      16      30      65      77      84      90      94      97
 199          UA     100
              * DDM   ***** Updated *****

 200          KK     150
 201          KM   SUB-BASIN 150
 202          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 203          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 204          KM     L = 1.50  Kb = .047  Adj. Slope =  314.6
 205          BA    .408
 206          LG    .350    .360   5.100    .260   7.000
 207          UC    .296    .221
 208          UA       0       3       5       8      12      20      43      75      90      96
 209          UA     100
              * DDM   ***** Preserved *****

 210          KK    R150
 211          KM   ROUTING OF FLOW FROM SUB-BASIN 150 TO R152
 212          RS       2    FLOW      -1
 213          RC    .045     .04    .045    3100    .032
 214          RX       0       1       2      23      33      54      55      56
 215          RY       7       7       7       0       0       7       7       7
              * DDM   ***** Preserved *****

 216          KK    R152
 217          KM   ROUTING OF FLOW FROM R152 TO SUB-BASIN 160
 218          RS       3    FLOW      -1
 219          RC    .045     .03    .045    5900    .019
 220          RX       0       1       2       8      33      39      40      41
 221          RY       2       2       2       0       0       2       2       2
              * DDM   ***** Updated *****

 222          KK     160
 223          KM   SUB-BASIN 160
 224          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 225          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 226          KM     L = 2.10  Kb = .047  Adj. Slope =  129.0
 227          BA    .369
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 228          LG    .340    .330   4.150    .440   1.000
 229          UC    .587    .655
 230          UA       0       3       5       8      12      20      43      75      90      96
 231          UA     100
              * DDM   ***** Updated *****

 232          KK     180
 233          KM   SUB-BASIN 180
 234          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 235          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 236          KM     L = 2.42  Kb = .041  Adj. Slope =  140.0
 237          BA   1.000
 238          LG    .350    .350   4.150    .430    .000
 239          UC    .571    .403
 240          UA       0       3       5       8      12      20      43      75      90      96
 241          UA     100
              * DDM   ***** Preserved *****

 242          KK    C180
 243          KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
 244          HC       5
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 245          KK     210
 246          KM   SUB-BASIN 210
 247          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 248          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 249          KM     L = 1.84  Kb = .043  Adj. Slope =  315.0
 250          BA    .792
 251          LG    .350    .360   6.800    .130   4.000
 252          UC    .313    .189
 253          UA       0       3       5       8      12      20      43      75      90      96
 254          UA     100
              * DDM   ***** Preserved *****

 255          KK    R210
 256          KM   ROUTING OF FLOW FROM SUB-BASIN 210 TO SUB-BASIN 220
 257          RS       2    FLOW      -1
 258          RC    .045     .03    .045    5100    .022
 259          RX       0       1       2      14      34      46      47      48
 260          RY       4       4       4       0       0       4       4       4
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 261          KK     240
 262          KM   SUB-BASIN 240
 263          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 264          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .992
 265          KM     L = 3.50  Kb = .039  Adj. Slope =  298.6
 266          BA   1.408
 267          LG    .350    .370   5.300    .230   2.000
 268          UC    .467    .356
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 269          UA       0       3       5       8      12      20      43      75      90      96
 270          UA     100
              * DDM   ***** Preserved *****

 271          KK    C240
 272          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 273          HC       2
              * DDM   ***** Preserved *****

 274          KK    S240
 275          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 276          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 277          RS       1    STOR       0
 278          SA    1.38    14.2    36.5
 279          SE     1.7       5      11
 280          SS       5      42       3     1.5
              * DDM   ***** Preserved *****

 281          KK    R240
 282          KM   ROUTE FLOW FROM SUB-BASIN 240 TO SUB-BASIN 220
 283          KM   PASS MOUNTAIN DIVERSION
 284          RS       3    FLOW      -1
 285          RC    .035    .025    .035    1800    .005
 286          RX       0      15      30      39      69      81      96     111
 287          RY     3.6     3.3       3       0       0       3       3       4
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 288          KK     220
 289          KM   SUB-BASIN 220
 290          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 291          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 292          KM     L = 1.92  Kb = .046  Adj. Slope =  315.0
 293          BA    .473
 294          LG    .350    .350   7.000    .120   5.000
 295          UC    .333    .282
 296          UA       0       3       5       8      12      20      43      75      90      96
 297          UA     100
              * DDM   ***** Preserved *****

 298          KK    C220
 299          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 240 & 220
 300          HC       2
              * DDM   ***** Preserved *****

 301          KK    S220
 302          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 303          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 304          RS       1    STOR       0
 305          SA     .78     4.1    13.7
 306          SE       1       3      10
 307          SS       3      65       3     1.5
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 308          KK    R220
 309          KM   ROUTE FLOW FROM SUB-BASIN 220 TO SUB-BASIN 200
 310          KM   PASS MOUNTAIN DIVERSION
 311          RS       1    FLOW      -1
 312          RC    .035    .025    .035    1250    .005
 313          RX       0      50     100     109     139     148     178     184
 314          RY       5       4       3       0       0       3       3       5
              * DDM   ***** Updated *****

 315          KK     190
 316          KM   SUB-BASIN 190
 317          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 318          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 319          KM     L = 1.91  Kb = .042  Adj. Slope =  315.0
 320          BA    .918
 321          LG    .350    .390   5.800    .190   8.000
 322          UC    .321    .185
 323          UA       0       3       5       8      12      20      43      75      90      96
 324          UA     100
              * DDM   ***** Preserved *****

 325          KK    R190
 326          KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 327          RS       2    FLOW      -1
 328          RC    .045     .03    .045    4740     .03
 329          RX       0       1       2      17      37      52      53      54
 330          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 331          KK    R192
 332          KM   ROUTING OF FLOW FROM SUB-BASIN 190 TO SUB-BASIN 200
 333          RS       3    FLOW      -1
 334          RC    .045    .035    .045    2200    .018
 335          RX       0       1      50      59      79      88     137     138
 336          RY     4.5       3       3       0       0       3       3     4.5
              * DDM   ***** Updated *****

 337          KK     200
 338          KM   SUB-BASIN 200
 339          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 340          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 341          KM     L = 1.58  Kb = .045  Adj. Slope =  305.6
 342          BA    .530
 343          LG    .350    .390   5.700    .200  10.000
 344          UC    .300    .201
 345          UA       0       3       5       8      12      20      43      75      90      96
 346          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 347          KK    C200
 348          KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 220 & 200
 349          HC       3
              * DDM   ***** Preserved *****

 350          KK    S200
 351          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 352          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 353          RS       1    STOR       0
 354          SA    2.56     3.1     9.4
 355          SE       0       3      10
 356          SS       3     112       3     1.5
              * DDM   ***** Preserved *****

 357          KK    R200
 358          KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS through storage
 359          RS       1    FLOW      -1
 360          RC    .035    .025    .035     650    .005
 361          RX       0       1       2      17     117     132     133     134
 362          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 363          KK   SS200
 364          KM    WEIR GEOMETRY OBTAINED FROM AS-BUILT PLANS @ PASS MTN. DIVERSION.
 365          KM   WEIR STORAGE DATA OBTAINED FROM 2' CONTOUR MAPPING.
 366          RS       1    STOR       0
 367          SA       8     9.2     9.2
 368          SE       0       7      10
 369          SS       7     251       3     1.5
              * DDM   ***** Preserved *****

 370          KK   RR200
 371          KM   ROUTE FLOW FROM SUB-BASIN 200 TO SIGNAL BUTTE FRS
 372          RS       3    FLOW      -1
 373          RC    .035    .025    .035    3150    .005
 374          RX       0       1       2      17     117     132     133     134
 375          RY       5       5       5       0       0       5       5       5
              * DDM   ***** Preserved *****

 376          KK   CC180
 377          KM   HYDROGRAPH COMBINATION FOR SIGNAL BUTTE FRS
              *      1       2
 378          HC       2
              * DDM   ***** Preserved *****

 379          KK    S180
 380          KM   SIGNAL BUTTE FRS DATED 1/28/85
 381          KM   OUTLET PIPE=36"RCP; L= 147';  INLET INV.=1690; OUTLET INV.=1687
 382          KM   EMERGENCY SPILLWAY ELEV.=1712.4; PRINCIPLE SPILLWAY ELEV.=1701
 383          KM   STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 250 ACRE-FEET
              *  ESE = 1714.63 ft; PSE = 1703.23 ft; Sediment Vol. = 247 Ac-Ft.
 384          RS       1    STOR       0
 385          SV       0      92     226     462     742    1197    1418    1776    1941    3114
 386          SQ       0      10    10.5      98     133     149     155    1484    2567    6000
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 387          SE      99     101   103.0     106     109   113.0   114.6     117     118     120
              * DDM   ***** Preserved *****

 388          KK    R180
 389          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 390          KM   Routing length increased 100' from 1500' to 1600'    12/12/00
 391          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 392          KM   ROUTE FLOW FROM SIGNAL BUTTE FRS TO SUB-BASIN 260
 393          RS       2    FLOW      -1
 394          RC    .035    .025    .035    1600    .003
 395          RX       0       1       2    22.6    38.6    59.2      60      61
 396          RY     9.3     9.3     9.3       0       0     9.3     9.3     9.3
              * DDM   ***** Updated *****

 397          KK     260
 398          KM   SUB-BASIN 260
 399          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 400          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 401          KM     L =  .81  Kb = .049  Adj. Slope =   68.0
 402          BA    .262
 403          LG    .300    .190   6.600    .170  15.000
 404          UC    .363    .217
 405          UA       0       5      16      30      65      77      84      90      94      97
 406          UA     100
              * DDM   ***** Preserved *****

 407          KK    C260
 408          KM   HYDROGRAPH COMBINATION FOR OUTFLOW OF SIGNAL BUTTE FRS & SUB-BASIN 260
 409          HC       2    .262
              * DDM   ***** Preserved *****

 410          KK    R260
 411          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 412          KM   Routing length unchanged     12/12/00
 413          KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
 414          KM   ROUTE FLOW FROM SUB-BASIN 260 TO SUB-BASIN 280
 415          RS       3    FLOW      -1
 416          RC    .035    .025    .035    2300    .003
 417          RX       0       1       2    23.4    43.4    64.8      65      66
 418          RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              * DDM   ***** Updated *****

 419          KK     280
 420          KM   SUB-BASIN 280
 421          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 422          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
 423          KM     L =  .77  Kb = .048  Adj. Slope =   84.0
 424          BA    .319
 425          LG    .300    .250   5.300    .290  15.000
 426          UC    .329    .168
 427          UA       0       5      16      30      65      77      84      90      94      97
 428          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

429           KK    C280
430           KM   HYDROGRAPH COMBINATION FOR SUB-BASIN 260 & SUB-BASIN 280
431           HC       2
              * DDM   ***** Preserved *****

432           KK    R280
433           KM   Routing length updated using Signal Butte Floodway plans dated March 1983
434           KM   Routing length decreased 400' from 2500' to 2100'    12/12/00
435           KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
436           KM   ROUTE FLOW FROM SUB-BASIN 280 TO SUB-BASIN 300
437           RS       3    FLOW      -1
438           RC    .035    .025    .035    2100    .003
439           RX       0       1       2    23.4    43.4    64.8      65      66
440           RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

441           KK     300
442           KM   SUB-BASIN 300
443           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
444           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .998
445           KM     L =  .78  Kb = .049  Adj. Slope =  103.0
446           BA    .289
447           LG    .320    .290   4.200    .480  11.000
448           UC    .325    .177
449           UA       0       5      16      30      65      77      84      90      94      97
450           UA     100
              * DDM   ***** Preserved *****

451           KK    C300
452           KM   HYDROGRAPH COMBINATION OF SUB-BASIN 280 & 300
453           HC       2
              * DDM   ***** Preserved *****

454           KK    R300
455           KM   Routing length updated using Signal Butte Floodway plans dated March 1983
456           KM   Routing length increased 300' from 2200' to 2500'    12/12/00
457           KM   CHANNEL GEOMETRY FOR SIGNAL BUTTE FRS OBTAINED FROM AS-BUILT PLANS.
458           KM   ROUTE FLOW FROM SUB-BASIN 300 TO START OF FLOODWAY CONCRETE CHANNEL
459           RS       2    FLOW      -1
460           RC    .035    .025    .035    2500    .003
461           RX       0       1       2    23.4    55.4    76.8      77      78
462           RY     9.7     9.7     9.7       0       0     9.7     9.7     9.7
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

463           KK     305
464           KM   SUB-BASIN 305
465           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
466           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
467           KM     L = 2.50  Kb = .044  Adj. Slope =  116.0
468           BA    .702
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 469          LG    .340    .340   4.550    .350   6.000
 470          UC    .642    .576
 471          UA       0       5      16      30      65      77      84      90      94      97
 472          UA     100
              * DDM   ***** Preserved *****

 473          KK    C305
 474          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 300 AND 305
 475          HC       2
              * DDM   ***** Preserved *****

 476          KK    R305
 477          KM   Routing length updated using Signal Butte Floodway plans dated March 1983
 478          KM   Routing length decreased 50' from 6050' to 6000'     12/12/00
 479          KM   CHANNEL GEOMETRY FOR SPOOK HILL FRS OBTAINED FROM AS-BUILTS PLANS.
 480          KM   CONTINUE TO ROUTE FLOW WITHIN CONCRETE CHANNEL TO SPOOK HILL FRS
 481          RS       3    FLOW      -1
 482          RC    .016    .016    .016    6000   .0146
 483          RX       0       1       2     2.1    16.1    16.2      17      18
 484          RY     7.5     7.5     7.5       0       0     7.5     7.5     7.5
              *      1       2
              * DDM   ***** Updated *****

 485          KK     350
 486          KM   SUB-BASIN 350
 487          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 488          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 489          KM     L = 2.22  Kb = .042  Adj. Slope =  315.0
 490          BA    .970
 491          LG    .350    .350   4.550    .340   4.000
 492          UC    .367    .234
 493          UA       0       3       5       8      12      20      43      75      90      96
 494          UA     100
              * DDM   ***** Preserved *****

 495          KK    D350
 496          KM   DIVERT FLOW FROM SUB-BASIN 350. FOR MODELING PURPOSES THE SPLIT FLOW WILL
 497          KM   BE ROUTED BETWEEN SUB-BASINS 355 & 310. THE MAIN FLOW WILL ROUTED TO 310
 498          DT   SF350
 499          DI       0    5000
 500          DQ       0    2500
              * DDM   ***** Preserved *****

 501          KK    R350
 502          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING
 503          KM   ROUTING OF MAIN FLOW FROM DIVERSION OF SUB-BASIN 350 TO SUB-BASIN 310
 504          RS       6    FLOW      -1
 505          RC    .045    .035    .045    5150    .025
 506          RX       0       1      40      46      56      62     102     103
 507          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 508          KK     310
 509          KM   SUB-BASIN 310
 510          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 511          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
 512          KM     L = 2.70  Kb = .045  Adj. Slope =  283.5
 513          BA    .555
 514          LG    .350    .350   3.910    .480    .000
 515          UC    .483    .511
 516          UA       0       3       5       8      12      20      43      75      90      96
 517          UA     100
              * DDM   ***** Preserved *****

 518          KK    C310
 519          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 350 & 310
 520          HC       2    1.04
              * DDM   ***** Preserved *****

 521          KK    R310
 522          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 523          KM   ROUTING OF FLOW FROM SUB-BASIN 310 TO 320
 524          RS      10    FLOW      -1
 525          RC    .045    .035    .045   10050    .022
 526          RX       0       1      40      46      56      62     102     103
 527          RY       3       2       2       0       0       2       2       3
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 528          KK     320
 529          KM   SUB-BASIN 320
 530          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 531          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 532          KM     L = 2.20  Kb = .042  Adj. Slope =  132.0
 533          BA    .950
 534          LG    .310    .300   4.600    .350  14.000
 535          UC    .508    .338
 536          UA       0       5      16      30      65      77      84      90      94      97
 537          UA     100
              * DDM   ***** Preserved *****

 538          KK    D320
 539          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 540          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
 541          KM   SIERRA HEIGHTS       FALCON RIDGE    & MARBLE CREEK
 542          KM        MAXIMUM VOLUME DIVERSION = 12.27acre-feet
              *      1
 543          DT   BS320   12.27
 544          DI       0   10000
 545          DQ       0   10000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

546           KK   RT320
547           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
548           DR   BS320
              * DDM   ***** Preserved *****

549           KK    S320
550           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
551           KM   12.27 ACRE-FEETx43560/36x3600=4.1cfs
              *      1
552           RS       1    STOR       0
553           SV       0     .01    12.3
554           SQ       0     3.0     4.2
              * DDM   ***** Preserved *****

555           KK    C320
556           KM   HYDROGRAPH COMBINATION FOR INFLOW HYDROGRAPH
              * KO     1
557           HC       4
              * DDM   ***** Updated *****

558           KK     340
559           KM   SUB-BASIN 340
560           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
561           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .991
562           KM     L = 2.40  Kb = .042  Adj. Slope =  160.0
563           BA   1.440
564           LG    .280    .280   4.150    .520  21.000
565           UC    .512    .288
566           UA       0       5      16      30      65      77      84      90      94      97
567           UA     100
              * DDM   ***** Preserved *****

568           KK    D340
569           KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
570           KM   DETENTION/RETENTION BASINS LOCATED WITHIN THREE SUBDIVISIONS
571           KM   GRANDVIEW ESTATES    BOULDER MOUNTAIN & 33% OF MESA HIGHLANDS
572           KM        MAXIMUM VOLUME DIVERSION = 56.0 acre-feet
              *      1
573           DT   BS340      56
574           DI       0   10000
575           DQ       0   10000
              * DDM   ***** Preserved *****

576           KK   RT340
577           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
578           DR   BS340
              * DDM   ***** Preserved *****

579           KK    S340
580           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
581           KM    56.0 ACRE-FEETx43560/36x3600=18.8cfs
              *      1
582           RS       1    STOR       0
583           SV       0     .01      56
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 584          SQ       0     3.0    18.9
              * ***********************************************************************
              * MODIFIED BY DMJM+HARRIS

 585          KK    340C
 586          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO      1
 587          HC       2

 588          KK    C340
 589          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 590          HC       2
              * ***********************************************************************
              * DDM   ***** Preserved *****

 591          KK   RT350
 592          KM   RETRIEVE SPLIT FLOW FROM DIVERSION OF SUB-BASIN 350
 593          DR   SF350
              * DDM   ***** Preserved *****

 594          KK   RR350
 595          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 596          KM   ROUTING OF FLOW FROM SPLIT OF SUB-BASIN 350 TO 355
 597          RS       7    FLOW      -1
 598          RC    .045    .035    .045    6050    .025
 599          RX       0       1      40      46      56      62     102     103
 600          RY       3       2       2       0       0       2       2       3
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 601          KK     355
 602          KM   SUB-BASIN 355
 603          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 604          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 605          KM     L = 3.00  Kb = .044  Adj. Slope =  284.0
 606          BA    .676
 607          LG    .340    .340   4.450    .370   4.000
 608          UC    .488    .502
 609          UA       0       3       5       8      12      20      43      75      90      96
 610          UA     100
              * DDM   ***** Preserved *****

 611          KK    C355
 612          KM   HYDROGRAPH COMBINATION OF SUB-BASIN 355 AND THE SPLIT FLOW FROM SUB-BASIN 350
 613          HC       2   1.161
              * DDM   ***** Preserved *****

 614          KK    R355
 615          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 616          KM   ROUTING OF FLOW FROM SUB-BASIN 355 TO SUB-BASIN 360
 617          RS       9    FLOW      -1
 618          RC    .045    .035    .045   10100    .026
 619          RX       0       1      40      46      56      62     102     103
 620          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 621          KK     360
 622          KM   SUB-BASIN 360
 623          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 624          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 625          KM     L = 2.10  Kb = .047  Adj. Slope =  124.0
 626          BA    .880
 627          LG    .260    .270   4.100    .560  20.000
 628          UC    .575    .390
 629          UA       0       5      16      30      65      77      84      90      94      97
 630          UA     100
              * DDM   ***** Preserved *****

 631          KK    D360
 632          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 633          KM   DETENTION/RETENTION BASINS LOCATED WITHIN 33% OF MESA HIGHLANDS
 634          KM        MAXIMUM VOLUME DIVERSION = 28.6 acre-feet
              *      1
 635          DT   BS360    28.6
 636          DI       0   10000
 637          DQ       0   10000
              * DDM   ***** Preserved *****

 638          KK   RT360
 639          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 640          DR   BS360
              * DDM   ***** Preserved *****

 641          KK    S360
 642          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 643          KM    28.6 ACRE-FEETx43560/36x3600=9.6cfs
 644          RS       1    STOR       0
 645          SV       0     .01    28.6
 646          SQ       0     3.0     9.6
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

 647          KK    360C
 648          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 649          HC       3

 650          KK    C360
 651          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 652          HC       2
              * ******************************************************************************
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 653          KK     370
 654          KM   SUB-BASIN 370
 655          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 656          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 657          KM     L = 1.90  Kb = .044  Adj. Slope =  203.5
 658          BA    .672
 659          LG    .340    .320   4.650    .330   8.000
 660          UC    .404    .284
 661          UA       0       3       5       8      12      20      43      75      90      96
 662          UA     100
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

 663          KK     395
 664          KM   SUB-BASIN 395
 665          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 666          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 667          KM     L = 1.30  Kb = .051  Adj. Slope =  219.2
 668          BA    .199
 669          LG    .330    .320   4.900    .300  10.000
 670          UC    .333    .338
 671          UA       0       3       5       8      12      20      43      75      90      96
 672          UA     100
              * DDM   ***** Preserved *****

 673          KK    C370
 674          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 675          HC       2
              * DDM   ***** Preserved *****

 676          KK    R370
 677          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 678          KM   ROUTING OF FLOW FROM SUB-BASINS 370 AND 395 TO SUB-BASIN 380.
 679          RS      12    FLOW      -1
 680          RC    .045    .035    .045   10250    .023
 681          RX       0       1      40      46      56      62     102     103
 682          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 683          KK     380
 684          KM   SUB-BASIN 380
 685          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 686          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 687          KM     L = 2.20  Kb = .049  Adj. Slope =  114.0
 688          BA    .898
 689          LG    .300    .310   4.150    .500   7.000
 690          UC    .671    .475
 691          UA       0       5      16      30      65      77      84      90      94      97
 692          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 693          KK    D380
 694          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 695          KM   DETENTION/RETENTION BASINS LOCATED WITHIN 33% OF MESA HIGHLANDS
 696          KM        MAXIMUM VOLUME DIVERSION = 28.6 acre-feet
              *      1
 697          DT   BS380    28.6
 698          DI       0   10000
 699          DQ       0   10000
              * DDM   ***** Preserved *****

 700          KK   RT380
 701          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 702          DR   BS380
              * DDM   ***** Preserved *****

 703          KK    S380
 704          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 705          KM    28.6 ACRE-FEETx43560/36x3600=9.6cfs
 706          RS       1    STOR       0
 707          SV       0     .01    28.6
 708          SQ       0     3.0     9.6
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

 709          KK    380C
 710          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 711          HC       3

 712          KK    C380
 713          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 714          HC       2
              * ******************************************************************************
              * DDM   ***** Updated *****

 715          KK     390
 716          KM   SUB-BASIN 390
 717          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 718          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 719          KM     L =  .70  Kb = .050  Adj. Slope =  299.4
 720          BA    .244
 721          LG    .300    .250   4.700    .380  18.000
 722          UC    .204    .107
 723          UA       0       5      16      30      65      77      84      90      94      97
 724          UA     100
              * DDM   ***** Preserved *****

 725          KK    D390
 726          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 727          KM   DETENTION/RETENTION BASINS LOCATED WITHIN THUNDER MOUNTAIN ESTATES
 728          KM        MAXIMUM VOLUME DIVERSION  = 3.5 acre-feet
              *      1
 729          DT   BS390     3.5
 730          DI       0   10000
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 731          DQ       0   10000
              * DDM   ***** Preserved *****

 732          KK   RT390
 733          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 734          DR   BS390
              * DDM   ***** Preserved *****

 735          KK    S390
 736          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 737          KM     3.5 ACRE-FEETx43560/36x3600=1.2cfs
 738          RS       1    STOR       0
 739          SV       0     .01     3.5
 740          SQ       0     0.2     1.2
              * DDM   ***** Preserved *****

 741          KK    C390
 742          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 743          HC       2
              * DDM   ***** Preserved *****

 744          KK    R390
 745          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 746          KM   FROM SUB-BASIN 390 TO SUB-BASIN 400
 747          RS      15    FLOW      -1
 748          RC    .045    .045    .045    8800    .020
 749          RX       0       1      40      46      56      62     102     103
 750          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 751          KK     400
 752          KM   SUB-BASIN 400
 753          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 754          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
 755          KM     L = 1.64  Kb = .046  Adj. Slope =  110.0
 756          BA    .616
 757          LG    .320    .300   4.150    .490   6.000
 758          UC    .508    .342
 759          UA       0       5      16      30      65      77      84      90      94      97
 760          UA     100
              * DDM   ***** Preserved *****

 761          KK    D400
 762          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 763          KM   DETENTION/RETENTION BASIN LOCATED WITHIN SAGUARO VISTA SUBDIVISION
 764          KM        MAXIMUM VOLUME DIVERSION = 5.6 ACRE-FEET
              *      1
 765          DT   BS400     5.6
 766          DI       0   10000
 767          DQ       0   10000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

768           KK   RT400
769           KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
770           DR   BS400
              * DDM   ***** Preserved *****

771           KK    S400
772           KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
773           KM     5.6 ACRE-FEETx43560/36x3600 = 2 cfs
774           RS       1    STOR       0
775           SV       0     .01     5.6
776           SQ       0       1       2
              * DDM   ***** Preserved *****

777           KK    C400
778           KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
779           HC       2
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS

780           KK    400C
781           KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO      1
782           HC       2

783           KK   CC400
784           KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
785           HC       2
              * ******************************************************************************
              * DDM   ***** Updated *****

786           KK     385
787           KM   SUB-BASIN 385
788           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
789           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .997
790           KM     L = 2.30  Kb = .045  Adj. Slope =  303.0
791           BA    .527
792           LG    .340    .360   5.600    .220  13.000
793           UC    .383    .358
794           UA       0       3       5       8      12      20      43      75      90      96
795           UA     100
              * DDM   ***** Preserved *****

796           KK    D385
797           KM   DIVERT FLOW INTO SUB-BASINS 415 & 420
798           DT   SF385
799           DI       0    5000
800           DQ       0    3000
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 801          KK    R385
 802          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
 803          KM   ROUTING OF FLOW DIVERSION FROM SUB-BASIN 385 INTO SUB-BASIN 420
 804          RS      13    FLOW      -1
 805          RC    .045     .04    .045   10250    .022
 806          RX       0       1      40      46      56      62     102     103
 807          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Updated *****

 808          KK     420
 809          KM   SUB-BASIN 420
 810          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 811          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .995
 812          KM     L = 1.91  Kb = .042  Adj. Slope =  120.0
 813          BA    .849
 814          LG    .310    .270   3.880    .580  12.000
 815          UC    .512    .325
 816          UA       0       5      16      30      65      77      84      90      94      97
 817          UA     100
              * DDM   ***** Preserved *****

 818          KK    D420
 819          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
 820          KM   DETENTION/RETENTION BASINS LOCATED WITHIN GRAY FOX SUBDIVISION
 821          KM        MAXIMUM VOLUME DIVERSION = 8.65 acre-feet
              *      1
 822          DT   BS420    8.65
 823          DI       0   10000
 824          DQ       0   10000
              * DDM   ***** Preserved *****

 825          KK   RT420
 826          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
 827          DR   BS420
              * DDM   ***** Preserved *****

 828          KK    S420
 829          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 830          KM    8.65 ACRE-FEETx43560/36x3600=2.9cfs
 831          RS       1    STOR       0
 832          SV       0     .01    8.65
 833          SQ       0     1.0     2.9
              * DDM   ***** Preserved *****

 834          KK    C420
 835          KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
              * KO     1
 836          HC       3  1.0598
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 837          KK   CC420
 838          KM   HYDROGRAPH COMBINATION FOR SPOOK HILL FRS
 839          HC       2
              * DDM   ***** Updated *****

 840          KK     440
 841          KM   SUB-BASIN 440
 842          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 843          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 844          KM     L =  .40  Kb = .039  Adj. Slope =  315.0
 845          BA    .080
 846          LG    .190    .380   6.400    .140  13.000
 847          UC    .129    .077
 848          UA       0       3       5       8      12      20      43      75      90      96
 849          UA     100
              * DDM   ***** Preserved *****

 850          KK     R70
 851          KM   ROUTE FLOW FROM SUB-BASIN 440 TO C108
 852          RS       2    FLOW      -1
 853          RC     .05    .035     .05    2250     .08
 854          RX    1000    1025    1050    1070    1075    1095    1120    1145
 855          RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

 856          KK     441
 857          KM   SUB-BASIN 441
 858          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 859          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 860          KM     L =  .28  Kb = .069  Adj. Slope =  315.0
 861          BA    .010
 862          LG    .300    .250   5.600    .220   5.000
 863          UC    .150    .225
 864          UA       0       5      16      30      65      77      84      90      94      97
 865          UA     100
              * DDM   ***** Preserved *****

 866          KK    C108
 867          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 440 & 441
 868          HC       2
              * DDM   ***** Preserved *****

 869          KK      D4
 870          KM        SPLIT FLOW WITH TWO 42 INCH PIPES TO WEST AND SOUTH
              *      1
 871          DT   SPLIT
 872          DI       0      14      40      82     120     154     180
 873          DQ       0       7      20      41      60      77      90
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 874          KK    R108
 875          KM        ROUTE FLOW FROM SUB-BASIN C108 TO C67
 876          RS       2    FLOW      -1
 877          RC     .05    .035     .05    3200      .1
 878          RX    1000    1025    1050    1070    1075    1095    1120    1145
 879          RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

 880          KK     442
 881          KM   SUB-BASIN 442
 882          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 883          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
 884          KM     L =  .83  Kb = .055  Adj. Slope =  274.2
 885          BA    .100
 886          LG    .300    .270   3.290    .770   5.000
 887          UC    .258    .264
 888          UA       0       5      16      30      65      77      84      90      94      97
 889          UA     100
              * DDM   ***** Preserved *****

 890          KK     C67
 891          KM   COMBINE FLOW FROM SUB-BASIN 442 & DIV4
 892          HC       2
              * DDM   ***** Preserved *****

 893          KK      D6
 894          KM        OFFLINE BASIN WITH 25 FOOT WEIR SET AT 2.5 FEET ABOVE BOTTOM OF CHANNEL
 895          KM        FLOW CONTINUES BEYOND BASIN THROUGH 2-30" PIPES
              *      1
 896          DT  BASIN4     3.3
 897          DI       0      10      32      44    79.9   132.5     198   272.9   356.8
 898          DQ       0       0       0       0    23.9    67.5     124   190.9   266.8
              * DDM   ***** Preserved *****

 899          KK    RTD6
 900          KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
 901          DR  BASIN4
              * DDM   ***** Preserved *****

 902          KK     SD6
 903          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
 904          KM     3.3 ACRE-FEETx43560/36x3600=1.1cfs
              *      1
 905          RS       1    STOR       0
 906          SV       0     .01     3.3
 907          SQ       0     0.2     1.1
              * DDM   ***** Preserved *****

 908          KK     CD6
 909          KM   HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
 910          HC       2
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 911          KK     443
 912          KM   SUB-BASIN 443
 913          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 914          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 915          KM     L =  .71  Kb = .050  Adj. Slope =  315.0
 916          BA    .080
 917          LG    .250    .190   8.000    .080  10.000
 918          UC    .196    .194
 919          UA       0       5      16      30      65      77      84      90      94      97
 920          UA     100
              * DDM   ***** Preserved *****

 921          KK     D66
 922          KM        DIVERT FLOW INTO 3 NATURAL WASHES WITH ONE 24" PIPE IN EACH WASH.
 923          KM        EACH PIPE CAPACITY BASED ON 4 FEET OF HEAD
 924          DT   WSH66
 925          DI       0      78     100     200
 926          DQ       0      78      78      78
              * DDM   ***** Preserved *****

 927          KK    R113
 928          KM        ROUTE FLOW FROM C113 TO C114
 929          RS       1    FLOW      -1
 930          RC    .019    .019    .019    1300    .029
 931          RX    1000    1004    1008    1012    1018    1022    1026    1030
 932          RY      17   15.33   12.67      10      10   12.67   15.33      17
              * DDM   ***** Preserved *****

 933          KK    C114
 934          KM        COMBINE HYDROGRAPHS FROM SUB-BASIN 67 AND C113
 935          HC       2
              * DDM   ***** Updated *****

 936          KK     444
 937          KM   SUB-BASIN 444
 938          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 939          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
 940          KM     L =  .33  Kb = .034  Adj. Slope =  315.0
 941          BA    .040
 942          LG    .130    .350   4.450    .320   1.000
 943          UC    .112    .084
 944          UA       0       3       5       8      12      20      43      75      90      96
 945          UA     100
              * DDM   ***** Preserved *****

 946          KK     R58
 947          KM   ROUTE FLOW FROM SUB-BASIN 444 TO C107
 948          RS       2    FLOW      -1
 949          RC     .05    .035     .05    2370   .0516
 950          RX    1000    1010    1020    1050    1055    1085    1095    1105
 951          RY      19      18      17      10      10      17      18      19
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

952           KK     445
953           KM   SUB-BASIN 445
954           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
955           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
956           KM     L =  .82  Kb = .036  Adj. Slope =  315.0
957           BA    .190
958           LG    .170    .320   3.470    .590   3.000
959           UC    .192    .130
960           UA       0       5      16      30      65      77      84      90      94      97
961           UA     100
              * DDM   ***** Preserved *****

962           KK    C107
963           KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 444 & 445
964           HC       2
              * DDM   ***** Preserved *****

965           KK    R107
966           KM        ROUTE FLOW FROM C107 TO C109
967           RS       2    FLOW      -1
968           RC     .05    .035     .05     700   .0516
969           RX    1000    1010    1020    1050    1055    1085    1095    1105
970           RY      19      18      17      10      10      17      18      19
              * DDM   ***** Preserved *****

971           KK    RTB2
972           KM        RETRIEVE DIVERTED FLOW FROM BASIN 1
              *      1
973           DR   SPLIT
              * DDM   ***** Preserved *****

974           KK  RSPLIT
975           KM        ROUTE FLOW FROM SPLIT TO C109
976           RS       1    FLOW      -1
977           RC     .05    .035     .05     800     .05
978           RX    1000    1025    1050    1070    1075    1095    1120    1145
979           RY      30    22.9    15.7      10      10    15.7    22.9      30
              * DDM   ***** Updated *****

980           KK     446
981           KM   SUB-BASIN 446
982           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
983           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
984           KM     L =  .46  Kb = .061  Adj. Slope =  303.9
985           BA    .040
986           LG    .270    .250   4.500    .400  19.000
987           UC    .183    .189
988           UA       0       5      16      30      65      77      84      90      94      97
989           UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 990          KK    C109
 991          KM        COMBINE HYDROGRAPHS FROM COMBINES C107 AND C108
 992          HC       3
              * DDM   ***** Preserved *****

 993          KK      D5
 994          KM        DIVERT FLOW INTO WASHES TOWARDS WEST
 995          KM        DIVERSION THROUGH 36" PIPE WITH 3 FEET OF HEAD
              *      1
 996          DT  WSH404
 997          DI       0    40.7    71.2   121.6     190     276   379.4   500.6
 998          DQ       0      35      35      35      35      35      35      35
              * DDM   ***** Preserved *****

 999          KK    R109
1000          KM        ROUTE FLOW FROM C109 TO C110
1001          RS       1    FLOW      -1
1002          RC    .019    .019    .019    3080     .05
1003          RX    1000    1005    1010    1015    1025    1030    1035    1040
1004          RY   13.75    12.5   11.25      10      10   11.25    12.5   13.75
              * DDM   ***** Updated *****

1005          KK     447
1006          KM   SUB-BASIN 447
1007          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1008          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1009          KM     L =  .49  Kb = .056  Adj. Slope =  221.0
1010          BA    .090
1011          LG    .250    .270   3.350    .870  30.000
1012          UC    .208    .145
1013          UA       0       5      16      30      65      77      84      90      94      97
1014          UA     100
              * DDM   ***** Preserved *****

1015          KK   RT404
1016          KM        RETRIEVE DIVERTED FLOW FOR WASH 109
1017          DR  WSH404
              * DDM   ***** Preserved *****

1018          KK    R404
1019          KM        ROUTE FLOW FROM C110 TO C110
1020          RS       6    FLOW      -1
1021          RC    .019    .019    .019    3540     .03
1022          RX    1000    1012    1016    1020    1025    1029    1033    1045
1023          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1024          KK    C110
1025          KM   COMBINE HYDROGRAPHS FROM SUB-BASIN 447 AND R404
1026          HC       3
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1027          KK    R110
1028          KM        ROUTE FLOW FROM C110 TO C115
1029          RS       1    FLOW      -1
1030          RC    .019    .019    .019     580   .0291
1031          RX    1000    1012    1016    1020    1035    1039    1043    1055
1032          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1033          KK    C115
1034          KM        COMBINE HYDROGRAPHS FROM C114 AND C110
1035          HC       2
              * DDM   ***** Preserved *****

1036          KK    R115
              * ******OUTFLOW FROM THIS ROUTING IS GREATER THAN INFLOW TO THE
              * ******ROUTING BY 2cfs.  THIS IS NOTED BUT LEFT UNCHANGED WITHIN THE MODEL
1037          KM        ROUTE FLOW FROM C115 TO Sub 453
1038          RS       1    FLOW      -1
1039          RC    .019    .019    .019    2125    .029
1040          RX    1000    1012    1016    1020    1035    1039    1043    1055
1041          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Updated *****

1042          KK     448
1043          KM   SUB-BASIN 448
1044          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1045          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1046          KM     L =  .36  Kb = .042  Adj. Slope =  315.0
1047          BA    .045
1048          LG    .170    .310   4.200    .390  11.000
1049          UC    .133    .102
1050          UA       0       5      16      30      65      77      84      90      94      97
1051          UA     100
              * DDM   ***** Updated *****

1052          KK     449
1053          KM   SUB-BASIN 449
1054          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1055          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1056          KM     L =  .40  Kb = .054  Adj. Slope =  315.0
1057          BA    .050
1058          LG    .260    .280   3.500    .640   6.000
1059          UC    .167    .134
1060          UA       0       5      16      30      65      77      84      90      94      97
1061          UA     100
              * DDM   ***** Preserved *****

1062          KK   C6364
1063          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 448 & 449
1064          HC       2
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1065          KK   R6364
1066          KM   ROUTE FLOW FROM C116 AND SUB-BASINS 448 AND 449
1067          RS       5    FLOW      -1
1068          RC     .05    .035     .05    4375   .0333
1069          RX    1000    1027    1053    1080    1090    1117    1143    1170
1070          RY      15   13.33   11.67      10      10   11.67   13.33      15
              * DDM   ***** Updated *****

1071          KK     450
1072          KM   SUB-BASIN 450
1073          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1074          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1075          KM     L =  .85  Kb = .057  Adj. Slope =  210.5
1076          BA    .070
1077          LG    .340    .350   3.630    .570   4.000
1078          UC    .296    .383
1079          UA       0       3       5       8      12      20      43      75      90      96
1080          UA     100
              * DDM   ***** Updated *****

1081          KK     451
1082          KM   SUB-BASIN 451
1083          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1084          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1085          KM     L =  .57  Kb = .063  Adj. Slope =  175.0
1086          BA    .025
1087          LG    .340    .340   3.290    .750   3.000
1088          UC    .271    .453
1089          UA       0       3       5       8      12      20      43      75      90      96
1090          UA     100
              * DDM   ***** Preserved *****

1091          KK    C451
1092          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451
1093          HC       2
              * DDM   ***** Preserved *****

1094          KK    RT66
1095          KM       RETRIEVE DIVERTED FLOW FROM SUB-BASIN 66
1096          DR   WSH66
              * DDM   ***** Updated *****

1097          KK     452
1098          KM   SUB-BASIN 452
1099          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1100          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1101          KM     L =  .43  Kb = .055  Adj. Slope =  315.0
1102          BA    .040
1103          LG    .260    .280   3.700    .550   9.000
1104          UC    .171    .166
1105          UA       0       5      16      30      65      77      84      90      94      97
1106          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1107          KK   C6465
1108          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 443 AND 452
1109          HC       2
              * DDM   ***** Preserved *****

1110          KK   R6566
1111          KM        ROUTE FLOW FROM DIVERSIONS 65 AND 66 TO C116
1112          RS       3    FLOW      -1
1113          RC     .05    .035     .05    2435   .0282
1114          RX    1000    1045    1090    1150    1160    1220    1265    1310
1115          RY      25      23      20      10      10      20      23      25
              * DDM   ***** Preserved *****

1116          KK    C116
1117          KM   COMBINE HYDROGRAPHS FROM SUB-BASINS 450 & 451 AND R6364 & R6465
1118          HC       3
              * DDM   ***** Preserved *****

1119          KK  BASIN5
1120          KM        RESERVOIR WITHIN PARCEL 31      2-48 INCH PIPES AT OUTFALL
1121          KM        BASIN 5 FEET DEEP
1122          RS       1    ELEV       0
1123          SV       0     4.5     9.9
1124          SQ       0      69     190
1125          SE       0     2.5       5
              * DDM   ***** Preserved *****

1126          KK    R116
1127          KM   ROUTE FLOW FROM C116 TO C117
1128          RS       2    FLOW      -1
1129          RC     .05    .035     .05    1300   .0333
1130          RX    1000    1100    1200    1300    1320    1420    1520    1620
1131          RY      13      12      11      10      10      11      12      13
              * DDM   ***** Updated *****

1132          KK     453
1133          KM   SUB-BASIN 453
1134          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1135          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF 1.000
1136          KM     L =  .58  Kb = .058  Adj. Slope =  138.0
1137          BA    .060
1138          LG    .290    .300   3.290    .820  18.000
1139          UC    .275    .284
1140          UA       0       5      16      30      65      77      84      90      94      97
1141          UA     100
              * DDM   ***** Preserved *****

1142          KK    C117
1143          KM   COMBINE HYDROGRAPHS FROM SUB-BASIN 453 AND R116
1144          HC       2
              * DDM   ***** Preserved *****
```

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

1145          KK    C118
1146          KM   COMBINE HYDROGRAPHS FROM R115 AND C117
1147          HC       2
              * DDM   ***** Preserved *****

1148          KK    R118
1149          KM        ROUTE FLOW FROM C118 TO  DIV7
1150          RS       1    FLOW      -1
1151          RC    .019    .019    .019    1500    .024
1152          RX    1000    1012    1016    1020    1035    1039    1043    1055
1153          RY      15      12      11      10      10      11      12      15
              * DDM   ***** Preserved *****

1154          KK      D7
1155          KM        OFFLINE BASIN AT NORTH MOUNTAIN RIDGE   FLOWS ENTER BASIN OVER
1156          KM        30' WEIR SET AT 5.3' ABOVE THE CHANNEL BOTTOM
              *      1
1157          DT  BASIN6     3.6
1158          DI       0     363     487     563     645     844
1159          DQ       0       3      47      83     125     244
              * DDM   ***** Preserved *****

1160          KK    RTD7
1161          KM   RETRIEVE FLOW FROM DIVERSION INTO OFFLINE BASIN
1162          DR  BASIN6
              * DDM   ***** Preserved *****

1163          KK     SD7
1164          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1165          KM     3.6 ACRE-FEETx43560/36x3600=1.2cfs
1166          RS       1    STOR       0
1167          SV       0     .01     3.6
1168          SQ       0     0.2     1.2
              * DDM   ***** Preserved *****

1169          KK     CD7
1170          KM   HYDROGRAPH COMBINATION FOR OFFLINE BASIN BLEEDOFF
1171          HC       2
              * DDM   ***** Updated *****

1172          KK     454
1173          KM   SUB-BASIN 454
1174          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1175          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .999
1176          KM     L = 1.23  Kb = .051  Adj. Slope =  163.0
1177          BA    .180
1178          LG    .300    .310   3.780    .560  14.000
1179          UC    .379    .395
1180          UA       0       5      16      30      65      77      84      90      94      97
1181          UA     100
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1182          KK    C119
1183          KM        COMBINE HYDROGRAPHS FROM SUB-BASIN 454 AND C119
              *      1       2
1184          HC       2
              * DDM   ***** Preserved *****

1185          KK    R454
1186          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1187          KM   ROUTE FLOW FROM C119 TO 415C
1188          RS       3    FLOW      -1
1189          RC    .045    .035    .045    2200    .009
1190          RX       0      .5       1      33      42      67    67.5      68
1191          RY       5       4       4       0       0       6       6       6
              *
              * The sub-basin area and soil make-up have been updated from CAD file 12/07/00
              * DDM   ***** Updated *****

1192          KK     415
1193          KM   SUB-BASIN 415
1194          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1195          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .996
1196          KM     L = 2.58  Kb = .044  Adj. Slope =  298.5
1197          BA    .609
1198          LG    .320    .290   4.500    .400  15.000
1199          UC    .421    .401
1200          UA       0       5      16      30      65      77      84      90      94      97
1201          UA     100
              * DDM   ***** Preserved *****

1202          KK   RT385
1203          KM   RETRIEVE FLOW FROM DIVERSION OF SUB-BASIN 385 INTO SUB-BASIN 415
1204          DR   SF385
              * DDM   ***** Preserved *****

1205          KK   RR385
1206          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1207          KM   ROUTING OF SPLIT FLOW FROM SUB-BASIN 385 TO SUB-BASIN 415
1208          RS      11    FLOW      -1
1209          RC    .045     .04    .045    5878    .024
1210          RX       0       1      40      46      56      62     102     103
1211          RY       3       2       2       0       0       2       2       3
              * DDM   ***** Preserved *****

1212          KK   C415
1213          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 415 & SPLIT FLOW FROM 385
1214          HC       2  0.9252
              * DDM   ***** Preserved *****

1215          KK   CC415
1216          KM   HYDROGRAPH COMBINATION OF SUB-BASINS 415, R454 & SPLIT FLOW FROM 385
1217          HC       2
              * DDM   ***** Preserved *****
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1218          KK    R415
1219          KM   CHANNEL GEOMETRY OBTAINED FROM 2' CONTOUR MAPPING.
1220          KM   ROUTING OF FLOW FROM 415C TO 455C
1221          KM   HYDROGRAPH COMBINATION FOR LATERAL INFLOW HYDROGRAPH
              * KO      1
1222          RS       3    FLOW      -1
1223          RC    .045     .03    .045    4100    .024
1224          RX       0      .5       1       8      16      23    23.5      24
1225          RY       8       8       8       0       0       8       8       8
              * ******************************************************************************
              * DDM   ***** Updated *****

1226          KK     455
1227          KM   SUB-BASIN 455
1228          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
1229          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .993
1230          KM     L = 1.70  Kb = .041  Adj. Slope =  146.0
1231          BA   1.111
1232          LG    .270    .280   3.700    .640  24.000
1233          UC    .421    .204
1234          UA       0       5      16      30      65      77      84      90      94      97
1235          UA     100
              * DDM   ***** Preserved *****

1236          KK    D455
1237          KM        DIVERT FLOW INTO ONLINE  DETENTION BASIN
1238          KM   DETENTION/RETENTION BASINS LOCATED WITHIN LAS SENDAS ADDENDUM III
1239          KM   FOR BASIN #: 30      34      43      47&58
1240          KM        MAXIMUM VOLUME DIVERSION = 74.1 acre-feet
              *      1
1241          DT   BS455    74.1
1242          DI       0   10000
1243          DQ       0   10000
              * DDM   ***** Preserved *****

1244          KK   RT455
1245          KM   RETRIEVE FLOW FROM DIVERSION INTO ONLINE BASIN
1246          DR   BS455
              * DDM   ***** Preserved *****

1247          KK    S455
1248          KM   RETRIEVE FLOW INTO FICTICIOUS BASIN AND BLEED OFF WITHIN 36 HOURS.
1249          KM    74.1 ACRE-FEETx43560/36x3600=25cfs
1250          RS       1    STOR       0
1251          SV       0     .01    74.1
1252          SQ       0     3.0      25
              * DDM   ***** Preserved *****
              * ******************************************************************************
              * MODIFIED BY DMJM+HARRIS
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1253        KK    C455
1254        KM   HYDROGRAPH COMBINATION FOR UNIFORM LATERAL INFLOW HYDROGRAPH
1255        HC       2
            * KO     1

1256        KK   CC455
1257        KM  HYDROGRAPH COMBINATION OF 420C, R415 AND C455
            *      1       2
1258        HC       3
            *  KK  S440
            *  KM SPOOK HILL FRS PLANS DATED 6/15/77
            *  KM OUTLET PIPE=7'x7.5'RCBC; L=70 INLET INV.=1566; OUTLET INV.=1566
            *  KM EMERGENCY SPILLWAY ELEV.=1582; PRINCIPLE SPILLWAY ELEV.=1577.5
            *  KM STORAGE VOLUME BELOW PRINCIPLE SPILLWAY FOR SEDIMENT = 200 ACRE-FEET
            *  *   ESE = 1583.86 ft; PSE = 1579.36 ft; Sediment Vol. = 271 Ac-Ft.
            *  RS     1    STOR       0
            *  SV     0      81     363     533     719     925    1120    1399    1668    4
            *  SQ     0       0      10     180     367     595     800    1231    2625   24
            *  SE    76      78      80      81      82      83    83.9      85      86

1259        KK    S440
1260        KM    Spook Hill Reservoir Routing
1261        KM    See DMJM+HARRIS Technical Report No. 1 for supporting details
1262        KM    behind rating curves.
1263        KM
1264        KM    NGVD 29 elevations used in the computations.
1265        KM
1266        KM    Sediment Storage Volume Below Principle Spillway = 271 Ac-Ft (Elev=1577.5')
1267        RS       1    STOR       0
1268        SV       0     287     346   474.9     693    1120    1631    1919    2231    2927
1269        SV    3722    4158
1270        SQ       0       0     250     500     750     990    2860    4750    7000   12750
1271        SQ   19240   23050
1272        SE  1575.1  1577.5    1578  1578.8    1580    1582    1584    1585    1586    1588
1273        SE    1590    1591
            *
            * REMAINDER OF MODEL DELEATED FOR PURPOSES OF FRS HYDROLOGIC ANALYSIS
            * ******************************************************************************
1274        ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

  48          10
               V
               V
  58         R10
               V
               V
  64         R12
               .
               .
  70           .          20
               .           .
               .           .
  80         C20............
               V
               V
  83         R20
               .
               .
  89           .          40
               .           .
               .           .
  99           .           .          60
               .           .           .
               .           .           .
 109         C60........................
               V
               V
 112         S60
               V
               V
 121         R60
               V
               V
 127        RR60
               .
               .
 133           .          80
               .           .
               .           .
 143         C80............
               V
               V
 146         R80
               .
               .
 152           .         100
               .           .
               .           .
 162        C100............
               V
               V
 165        R100
               .
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            .
171         .        120
            .          .
            .          .
181       C120............
            V
            V
184       R120
            .
            .
190         .        140
            .          .
            .          .
200         .          .        150
            .          .          V
            .          .          V
210         .          .       R150
            .          .          V
            .          .          V
216         .          .       R152
            .          .          .
            .          .          .
222         .          .          .       160
            .          .          .         .
            .          .          .         .
232         .          .          .         .        180
            .          .          .         .          .
            .          .          .         .          .
242       C180.............................................
            .
            .
245         .        210
            .          V
            .          V
255         .       R210
            .          .
            .          .
261         .          .        240
            .          .          .
            .          .          .
271         .       C240............
            .          V
            .          V
274         .       S240
            .          V
            .          V
281         .       R240
            .          .
            .          .
288         .          .        220
            .          .          .
            .          .          .
298         .       C220............
            .          V
            .          V
301         .       S220
            .          V
            .          V
308         .       R220
            .          .
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            .           .
315         .           .         190
            .           .           V
            .           .           V
325         .           .        R190
            .           .           V
            .           .           V
331         .           .        R192
            .           .           .
            .           .           .
337         .           .           .         200
            .           .           .           .
            .           .           .           .
347         .        C200.......................
            .           V
            .           V
350         .        S200
            .           V
            .           V
357         .        R200
            .           V
            .           V
363         .       SS200
            .           V
            .           V
370         .       RR200
            .           .
            .           .
376      CC180............
            V
            V
379      S180
            V
            V
388      R180
            .
            .
397         .         260
            .           .
            .           .
407      C260............
            V
            V
410      R260
            .
            .
419         .         280
            .           .
            .           .
429      C280............
            V
            V
432      R280
            .
            .
441         .         300
            .           .
            .           .
451      C300............
            V
```

```
            V
454       R300
            .
            .
463         .        305
            .          .
            .          .
473       C305............
            V
            V
476       R305
            .
            .
485         .        350
            .          .
            .          .
498         .          .-------->   SF350
495         .       D350
            .          V
            .          V
501         .       R350
            .          .
            .          .
508         .          .        310
            .          .          .
            .          .          .
518         .       C310............
            .          V
            .          V
521         .       R310
            .          .
            .          .
528         .          .        320
            .          .          .
            .          .          .
543         .          .          .-------->   BS320
538         .          .       D320
            .          .          .
            .          .          .
548         .          .          .          .<--------   BS320
546         .          .          .      RT320
            .          .          .          V
            .          .          .          V
549         .          .          .       S320
            .          .          .          .
            .          .          .          .
555       C320...................................
            .
            .
558         .        340
            .          .
            .          .
573         .          .-------->   BS340
568         .       D340
            .          .
            .          .
578         .          .          .<--------   BS340
576         .          .      RT340
            .          .          V
            .          .          V
```

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579          .           .        S340
             .           .           .
             .           .           .
585          .        340C............
             .           .
             .           .
588       C340............
             .
             .
593          .           .<-------   SF350
591          .       RT350
             .           V
             .           V
594          .       RR350
             .           .
             .           .
601          .           .         355
             .           .           .
             .           .           .
611          .        C355............
             .           V
             .           V
614          .        R355
             .           .
             .           .
621          .           .         360
             .           .           .
             .           .           .
635          .           .           .------->   BS360
631          .           .        D360
             .           .           .
             .           .           .
640          .           .           .           .<-------   BS360
638          .           .           .       RT360
             .           .           .           V
             .           .           .           V
641          .           .           .        S360
             .           .           .           .
             .           .           .           .
647          .        360C........................
             .           .
             .           .
650       C360............
             .
             .
653          .         370
             .           .
             .           .
663          .           .         395
             .           .           .
             .           .           .
673          .        C370............
             .           V
             .           V
676          .        R370
             .           .
             .           .
683          .           .         380
             .           .           .
             .           .           .
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```
697          .          .          .-------->   BS380
693          .          .       D380
             .          .          .
             .          .          .
702          .          .          .          .<-------   BS380
700          .          .          .      RT380
             .          .          .          V
             .          .          .          V
703          .          .          .       S380
             .          .          .          .
             .          .          .          .
709          .       380C.......................
             .          .
             .          .
712       C380............
             .
             .
715          .        390
             .          .
             .          .
729          .          .-------->   BS390
725          .       D390
             .          .
             .          .
734          .          .          .<-------   BS390
732          .          .      RT390
             .          .          V
             .          .          V
735          .          .       S390
             .          .          .
             .          .          .
741          .       C390............
             .          V
             .          V
744          .       R390
             .          .
             .          .
751          .          .        400
             .          .          .
             .          .          .
765          .          .          .-------->   BS400
761          .          .       D400
             .          .          .
             .          .          .
770          .          .          .          .<-------   BS400
768          .          .          .      RT400
             .          .          .          V
             .          .          .          V
771          .          .          .       S400
             .          .          .          .
             .          .          .          .
777          .          .       C400............
             .          .          .
             .          .          .
780          .       400C............
             .          .
             .          .
783       CC400............
             .
             .
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```
786          .        385
             .          .
             .          .
798          .          .-------->   SF385
796          .       D385
             .          V
             .          V
801          .       R385
             .          .
             .          .
808          .          .         420
             .          .           .
             .          .           .
822          .          .           .-------->   BS420
818          .          .        D420
             .          .           .
             .          .           .
827          .          .           .           .<--------   BS420
825          .          .           .       RT420
             .          .           .           V
             .          .           .           V
828          .          .           .        S420
             .          .           .           .
             .          .           .           .
834          .       C420.........................
             .          .
             .          .
837       CC420............
             .
             .
840          .        440
             .          V
             .          V
850          .        R70
             .          .
             .          .
856          .          .         441
             .          .           .
             .          .           .
866          .       C108............
             .          .
             .          .
871          .          .-------->   SPLIT
869          .         D4
             .          V
             .          V
874          .       R108
             .          .
             .          .
880          .          .         442
             .          .           .
             .          .           .
890          .        C67............
             .          .
             .          .
896          .          .-------->  BASIN4
893          .         D6
             .          .
             .          .
901          .          .           .<--------  BASIN4
```

```
899          .          .        RTD6
             .          .          V
             .          .          V
902          .          .         SD6
             .          .          .
             .          .          .
908          .        CD6............
             .          .
             .          .
911          .          .         443
             .          .          .
             .          .          .
924          .          .          .-------->   WSH66
921          .          .         D66
             .          .          V
             .          .          V
927          .          .        R113
             .          .          .
             .          .          .
933          .       C114............
             .          .
             .          .
936          .          .         444
             .          .          V
             .          .          V
946          .          .         R58
             .          .          .
             .          .          .
952          .          .          .        445
             .          .          .          .
             .          .          .          .
962          .          .        C107............
             .          .          V
             .          .          V
965          .          .        R107
             .          .          .
             .          .          .
973          .          .          .          .<-------   SPLIT
971          .          .          .       RTB2
             .          .          .          V
             .          .          .          V
974          .          .          .     RSPLIT
             .          .          .          .
             .          .          .          .
980          .          .          .          .        446
             .          .          .          .          .
             .          .          .          .          .
990          .          .        C109........................
             .          .          .
             .          .          .
996          .          .          .-------> WSH404
993          .          .         D5
             .          .          V
             .          .          V
999          .          .        R109
             .          .          .
             .          .          .
1005         .          .          .        447
             .          .          .          .
             .          .          .          .
```

```
1017        .         .         .         .         .<-------  WSH404
1015        .         .         .         .      RT404
            .         .         .         .         V
            .         .         .         .         V
 018        .         .         .         .      R404
            .         .         .         .         .
            .         .         .         .         .
1024        .         .      C110.......................
            .         .         V
            .         .         V
1027        .         .      R110
            .         .         .
            .         .         .
1033        .      C115............
            .         V
            .         V
1036        .      R115
            .         .
            .         .
1042        .         .       448
            .         .         .
            .         .         .
1052        .         .         .       449
            .         .         .         .
            .         .         .         .
1062        .         .      C6364............
            .         .         V
            .         .         V
1065        .         .      R6364
            .         .         .
            .         .         .
1071        .         .         .       450
            .         .         .         .
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1091        .         .         .      C451............
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1096        .         .         .         .         .<-------   WSH66
1094        .         .         .         .      RT66
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1097        .         .         .         .         .        452
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1107        .         .         .         .      C6465............
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1110        .         .         .         .      R6566
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1116        .         .      C116.......................
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,119        .         .     BASIN5
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1126        .         .      R116
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1142          .          .       C117............
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1145          .       C118............
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1148          .       R118
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1157          .          .-------> BASIN6
1154          .         D7
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1162          .          .          .<-------  BASIN6
1160          .          .       RTD7
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1163          .          .        SD7
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1169          .        CD7............
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1172          .          .        454
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1182          .       C119............
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1185          .       R454
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1192          .          .        415
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1204          .          .          .          .<-------   SF385
1202          .          .          .      RT385
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1205          .          .          .      RR385
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1212          .          .      C415 ............
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1218          .       R415
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1226          .          .        455
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1241          .          .          .------->   BS455
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1236          .          .       D455
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1246          .          .          .          .<-------   BS455
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1247          .          .          .       S455
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1253          .          .       C455............
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1256       CC455........................
              V
              V
1259       S440
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(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
            VERSION 4.1               *
                                      *
* RUN DATE   15MAY02  TIME  07:48:40   *
*                                      *
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*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
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```

Hydrologic model revised by DMJM+HARRIS
Existing Condition Base Model(100-year, 24-hour storm)
File Name: DHEC24.DAT

The Existing Condition Base Model with Spook Hill FRS Storage Routing (File Name: EC24BASE.DAT) developed by WPA as part of the ADMP update is the origin of this model.

The following concentration points were added to define the uniform lateral inflow hydrographs along the Spook Hill FRS:
340C, 360C, 380C, 400C
These hydrograph combination labels were used for consistency with the routing exhibit provided for the model.

A CONSERVATIVE ESTIMATE WAS USED FOR THE LOCATION OF THE CENTROID FOR PRECIPITATION VALUES
CHANNEL ROUTING INFORMATION FOR MCFCD FLOODWAYS WERE OBTAINED FROM MCFCD SPOOK HILL, SIGNAL BUTTE AND BULLDOG FLOODWAY PLANS

UPDATE TO EXISTING CONDITION 24-HR 100-YR MODEL RUN BASED ON RE-ALIGNMENT OF SUB-BASIN BOUNDARIES FOR SUB-BASINS 385 (REDUCED) & 415 (ENLARGED)
UPDATE BASED ON INFORMATION FROM 2' CONTOUR MAPPING.

ANALYSIS PERFORMED BY WOOD/PATEL; MW; 07/27/00 FILE: S24CE30Z.DAT

DDM MCUHP1 SPOOK HILL AMDP - EXISTING CONDITIONS MODEL - 100YR, 24HR STORM

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

    IT        HYDROGRAPH TIME DATA
                     NMIN          2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      3   0  ENDING DATE
                   NDTIME       1838  ENDING TIME
                    ICENT         19  CENTURY MARK

              COMPUTATION INTERVAL     .03 HOURS
                   TOTAL TIME BASE   66.63 HOURS

         ENGLISH UNITS
```

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

31 JD INDEX STORM NO. 1

STRM	3.81	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

32 PI PRECIPITATION PATTERN

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42 JD INDEX STORM NO. 2

STRM 3.79 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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43 JD INDEX STORM NO. 3

STRM 3.68 PRECIPITATION DEPTH

TRDA 5.80 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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44 JD INDEX STORM NO. 4

STRM 3.57 PRECIPITATION DEPTH

TRDA 10.66 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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45 JD INDEX STORM NO. 5

STRM 3.54 PRECIPITATION DEPTH

TRDA 13.70 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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46 JD INDEX STORM NO. 6

STRM 3.47 PRECIPITATION DEPTH

TRDA 20.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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47 JD INDEX STORM NO. 7

STRM 3.32 PRECIPITATION DEPTH

TRDA 50.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	10	989.	12.27	119.	33.	12.	.70		
ROUTED TO	R10	920.	12.40	119.	33.	12.	.70		
ROUTED TO	R12	853.	12.60	119.	33.	12.	.70		
HYDROGRAPH AT	20	1011.	12.43	136.	34.	12.	1.12		
2 COMBINED AT	C20	1684.	12.53	252.	66.	24.	1.82		
ROUTED TO	R20	1683.	12.57	252.	66.	24.	1.82		
HYDROGRAPH AT	40	2695.	12.30	264.	69.	25.	2.23		
HYDROGRAPH AT	60	1623.	12.40	239.	64.	23.	1.75		
3 COMBINED AT	C60	5371.	12.37	733.	194.	70.	5.80		
ROUTED TO	S60	118.	14.27	118.	114.	70.	5.80		
ROUTED TO	R60	118.	14.37	118.	114.	70.	5.80		
ROUTED TO	RR60	118.	14.40	118.	114.	70.	5.80		
HYDROGRAPH AT	80	1956.	12.27	189.	49.	18.	1.48		
2 COMBINED AT	C80	2009.	12.27	295.	160.	90.	1.48		
ROUTED TO	R80	1981.	12.30	295.	160.	90.	1.48		
HYDROGRAPH AT	100	423.	12.20	60.	16.	6.	.48		
2 COMBINED AT	C100	2373.	12.27	351.	174.	95.	1.96		
ROUTED TO	R100	2370.	12.30	351.	174.	95.	1.96		
HYDROGRAPH AT	120	3352.	12.27	340.	92.	33.	2.20		
2 COMBINED AT	C120	5618.	12.27	673.	256.	126.	4.16		
ROUTED TO	R120	5546.	12.30	673.	256.	126.	4.16		
HYDROGRAPH AT	140	665.	12.13	67.	18.	6.	.60		
HYDROGRAPH AT	150	595.	12.17	51.	14.	5.	.41		
ROUTED TO	R150	568.	12.23	51.	14.	5.	.41		
ROUTED TO	R152	514.	12.33	51.	14.	5.	.41		
HYDROGRAPH AT	160	228.	12.40	37.	9.	3.	.37		

HYDROGRAPH AT	180	836.	12.37	97.	24.	9.	1.00
5 COMBINED AT	C180	7306.	12.30	898.	313.	146.	6.54
HYDROGRAPH AT	210	1322.	12.17	111.	29.	10.	.79
ROUTED TO	R210	1246.	12.23	111.	29.	10.	.79
HYDROGRAPH AT	240	1513.	12.30	167.	42.	15.	1.41
2 COMBINED AT	C240	2684.	12.27	273.	70.	25.	2.20
ROUTED TO	S240	799.	12.70	226.	59.	21.	2.20
ROUTED TO	R240	798.	12.77	225.	59.	21.	2.20
HYDROGRAPH AT	220	676.	12.20	68.	18.	6.	.47
2 COMBINED AT	C220	962.	12.60	288.	75.	27.	2.67
ROUTED TO	S220	900.	12.80	280.	73.	26.	2.67
ROUTED TO	R220	897.	12.83	280.	73.	26.	2.67
HYDROGRAPH AT	190	1471.	12.17	123.	33.	12.	.92
ROUTED TO	R190	1415.	12.23	123.	33.	12.	.92
ROUTED TO	R192	1359.	12.30	123.	33.	12.	.92
HYDROGRAPH AT	200	831.	12.17	72.	20.	7.	.53
3 COMBINED AT	C200	2254.	12.30	459.	122.	44.	4.12
ROUTED TO	S200	2135.	12.37	454.	119.	43.	4.12
ROUTED TO	R200	2127.	12.37	454.	119.	43.	4.12
ROUTED TO	SS200	1365.	12.73	333.	88.	32.	4.12
ROUTED TO	RR200	1330.	12.83	330.	88.	32.	4.12
2 COMBINED AT	CC180	7306.	12.30	1212.	399.	177.	10.66
ROUTED TO	S180	113.	29.07	113.	113.	88.	10.66
ROUTED TO	R180	113.	28.93	113.	113.	88.	10.66
HYDROGRAPH AT	260	416.	12.10	43.	12.	4.	.26
2 COMBINED AT	C260	421.	12.10	135.	124.	99.	.26
ROUTED TO	R260	407.	12.20	135.	124.	98.	.26
HYDROGRAPH AT	280	527.	12.10	46.	13.	5.	.32
2 COMBINED AT	C280	884.	12.13	176.	135.	103.	.58
ROUTED TO	R280	862.	12.20	176.	134.	103.	.58

HYDROGRAPH AT	300	415.	12.10	34.	10.	3.	.29
2 COMBINED AT	C300	1217.	12.17	207.	143.	106.	.87
ROUTED TO	R300	1172.	12.23	207.	142.	106.	.87
HYDROGRAPH AT	305	476.	12.27	81.	22.	8.	.70
2 COMBINED AT	C305	1624.	12.23	283.	161.	112.	1.57
ROUTED TO	R305	1603.	12.30	282.	161.	112.	1.57
HYDROGRAPH AT	350	1258.	12.20	109.	28.	10.	.97
DIVERSION TO	SF350	629.	12.20	55.	14.	5.	.97
HYDROGRAPH AT	D350	629.	12.20	55.	14.	5.	.97
ROUTED TO	R350	557.	12.40	55.	14.	5.	.97
HYDROGRAPH AT	310	398.	12.33	52.	13.	5.	.56
2 COMBINED AT	C310	928.	12.40	106.	27.	10.	1.04
ROUTED TO	R310	820.	12.73	106.	27.	10.	1.04
HYDROGRAPH AT	320	991.	12.20	127.	36.	13.	.95
DIVERSION TO	BS320	386.	11.93	21.	6.	2.	.95
HYDROGRAPH AT	D320	991.	12.20	113.	29.	11.	.95
HYDROGRAPH AT	RT320	386.	11.93	21.	6.	2.	.95
ROUTED TO	S320	4.	12.00	4.	4.	2.	.95
4 COMBINED AT	C320	2546.	12.30	491.	216.	132.	3.56
HYDROGRAPH AT	340	1534.	12.17	194.	57.	21.	1.44
DIVERSION TO	BS340	1534.	12.17	103.	28.	10.	1.44
HYDROGRAPH AT	D340	1285.	12.30	106.	29.	10.	1.44
HYDROGRAPH AT	RT340	1534.	12.17	103.	28.	10.	1.44
ROUTED TO	S340	18.	12.33	17.	14.	9.	1.44
2 COMBINED AT	340C	1303.	12.30	123.	43.	19.	1.44
2 COMBINED AT	C340	3733.	12.33	602.	255.	150.	5.00
HYDROGRAPH AT	RT350	629.	12.20	55.	14.	5.	.97
ROUTED TO	RR350	544.	12.43	55.	14.	5.	.97
HYDROGRAPH AT	355	546.	12.33	75.	19.	7.	.68
2 COMBINED AT	C355	1028.	12.40	129.	34.	12.	1.16

ROUTED TO	R355	941.	12.70	129.	34.	12.	1.16
HYDROGRAPH AT	360	773.	12.23	116.	34.	12.	.88
DIVERSION TO	BS360	773.	12.23	52.	14.	5.	.88
HYDROGRAPH AT	D360	709.	12.33	73.	20.	7.	.88
HYDROGRAPH AT	RT360	773.	12.23	52.	14.	5.	.88
ROUTED TO	S360	9.	12.33	8.	7.	5.	.88
3 COMBINED AT	360C	1286.	12.67	205.	59.	24.	2.04
2 COMBINED AT	C360	4484.	12.33	784.	307.	171.	7.04
HYDROGRAPH AT	370	817.	12.23	83.	22.	8.	.67
HYDROGRAPH AT	395	234.	12.20	26.	7.	3.	.20
2 COMBINED AT	C370	1046.	12.23	108.	29.	11.	.87
ROUTED TO	R370	913.	12.57	108.	29.	11.	.87
HYDROGRAPH AT	380	627.	12.27	97.	26.	9.	.90
DIVERSION TO	BS380	627.	12.27	56.	14.	5.	.90
HYDROGRAPH AT	D380	461.	12.57	44.	12.	4.	.90
HYDROGRAPH AT	RT380	627.	12.27	56.	14.	5.	.90
ROUTED TO	S380	9.	12.57	9.	7.	5.	.90
3 COMBINED AT	380C	1313.	12.60	156.	46.	19.	1.77
2 COMBINED AT	C380	4667.	12.37	911.	344.	186.	8.81
HYDROGRAPH AT	390	477.	12.03	35.	10.	4.	.24
DIVERSION TO	BS390	101.	11.73	6.	2.	1.	.24
HYDROGRAPH AT	D390	477.	12.03	31.	8.	3.	.24
HYDROGRAPH AT	RT390	101.	11.73	6.	2.	1.	.24
ROUTED TO	S390	1.	11.80	1.	1.	1.	.24
2 COMBINED AT	C390	478.	12.03	32.	9.	4.	.24
ROUTED TO	R390	342.	12.50	32.	9.	4.	.24
HYDROGRAPH AT	400	560.	12.20	66.	18.	6.	.62
DIVERSION TO	BS400	311.	12.00	10.	3.	1.	.62
HYDROGRAPH AT	D400	560.	12.20	58.	15.	5.	.62
HYDROGRAPH AT	RT400	311.	12.00	10.	3.	1.	.62

ROUTED TO	S400	2.	12.07	2.	2.	1.	.62
2 COMBINED AT	C400	562.	12.20	60.	16.	6.	.62
2 COMBINED AT	400C	712.	12.23	91.	25.	10.	.86
2 COMBINED AT	CC400	5262.	12.37	985.	365.	194.	9.67
HYDROGRAPH AT	385	613.	12.23	74.	20.	7.	.53
DIVERSION TO	SF385	368.	12.23	44.	12.	4.	.53
HYDROGRAPH AT	D385	245.	12.23	29.	8.	3.	.53
ROUTED TO	R385	208.	12.67	29.	8.	3.	.53
HYDROGRAPH AT	420	796.	12.20	98.	27.	10.	.85
DIVERSION TO	BS420	266.	11.93	14.	4.	2.	.85
HYDROGRAPH AT	D420	796.	12.20	89.	23.	8.	.85
HYDROGRAPH AT	RT420	266.	11.93	14.	4.	2.	.85
ROUTED TO	S420	3.	12.00	2.	2.	2.	.85
3 COMBINED AT	C420	805.	12.20	120.	33.	13.	1.06
2 COMBINED AT	CC420	5884.	12.37	1084.	392.	205.	10.73
HYDROGRAPH AT	440	184.	12.03	12.	3.	1.	.08
ROUTED TO	R70	181.	12.07	12.	3.	1.	.08
HYDROGRAPH AT	441	16.	12.03	1.	0.	0.	.01
2 COMBINED AT	C108	197.	12.07	14.	4.	1.	.09
DIVERSION TO	SPLIT	98.	12.07	7.	2.	1.	.09
HYDROGRAPH AT	D4	98.	12.07	7.	2.	1.	.09
ROUTED TO	R108	92.	12.13	7.	2.	1.	.09
HYDROGRAPH AT	442	105.	12.10	9.	2.	1.	.10
2 COMBINED AT	C67	195.	12.10	16.	4.	2.	.19
DIVERSION TO	BASIN4	121.	12.10	6.	2.	1.	.19
HYDROGRAPH AT	D6	74.	12.10	10.	3.	1.	.19
HYDROGRAPH AT	RTD6	121.	12.10	6.	2.	1.	.19
ROUTED TO	SD6	1.	12.47	1.	1.	0.	.19
2 COMBINED AT	CD6	74.	12.10	10.	3.	1.	.19
HYDROGRAPH AT	443	151.	12.07	15.	4.	1.	.08

DIVERSION TO	WSH66	78.	11.87	12.	3.	1.	.08
HYDROGRAPH AT	D66	73.	12.07	3.	1.	0.	.08
ROUTED TO	R113	71.	12.07	3.	1.	0.	.08
2 COMBINED AT	C114	144.	12.07	13.	4.	2.	.27
HYDROGRAPH AT	444	83.	12.03	5.	1.	0.	.04
ROUTED TO	R58	79.	12.07	5.	1.	0.	.04
HYDROGRAPH AT	445	307.	12.03	19.	5.	2.	.19
2 COMBINED AT	C107	382.	12.03	23.	6.	2.	.23
ROUTED TO	R107	382.	12.07	23.	6.	2.	.23
HYDROGRAPH AT	RTB2	98.	12.07	7.	2.	1.	.09
ROUTED TO	RSPLIT	98.	12.07	7.	2.	1.	.09
HYDROGRAPH AT	446	66.	12.03	6.	2.	1.	.04
3 COMBINED AT	C109	545.	12.07	36.	10.	3.	.27
DIVERSION TO	WSH404	35.	11.70	8.	2.	1.	.27
HYDROGRAPH AT	D5	510.	12.07	28.	7.	3.	.27
ROUTED TO	R109	493.	12.10	28.	7.	3.	.27
HYDROGRAPH AT	447	141.	12.07	12.	4.	1.	.09
HYDROGRAPH AT	RT404	35.	11.70	8.	2.	1.	.27
ROUTED TO	R404	35.	11.83	8.	2.	1.	.27
3 COMBINED AT	C110	666.	12.07	48.	13.	5.	.36
ROUTED TO	R110	663.	12.10	48.	13.	5.	.36
2 COMBINED AT	C115	805.	12.07	61.	17.	7.	.63
ROUTED TO	R115	799.	12.10	61.	17.	7.	.63
HYDROGRAPH AT	448	89.	12.03	6.	2.	1.	.05
HYDROGRAPH AT	449	81.	12.03	5.	1.	0.	.05
2 COMBINED AT	C6364	170.	12.03	11.	3.	1.	.09
ROUTED TO	R6364	145.	12.17	11.	3.	1.	.09
HYDROGRAPH AT	450	63.	12.20	7.	2.	1.	.07
HYDROGRAPH AT	451	18.	12.17	2.	1.	0.	.03
2 COMBINED AT	C451	80.	12.20	9.	2.	1.	.09

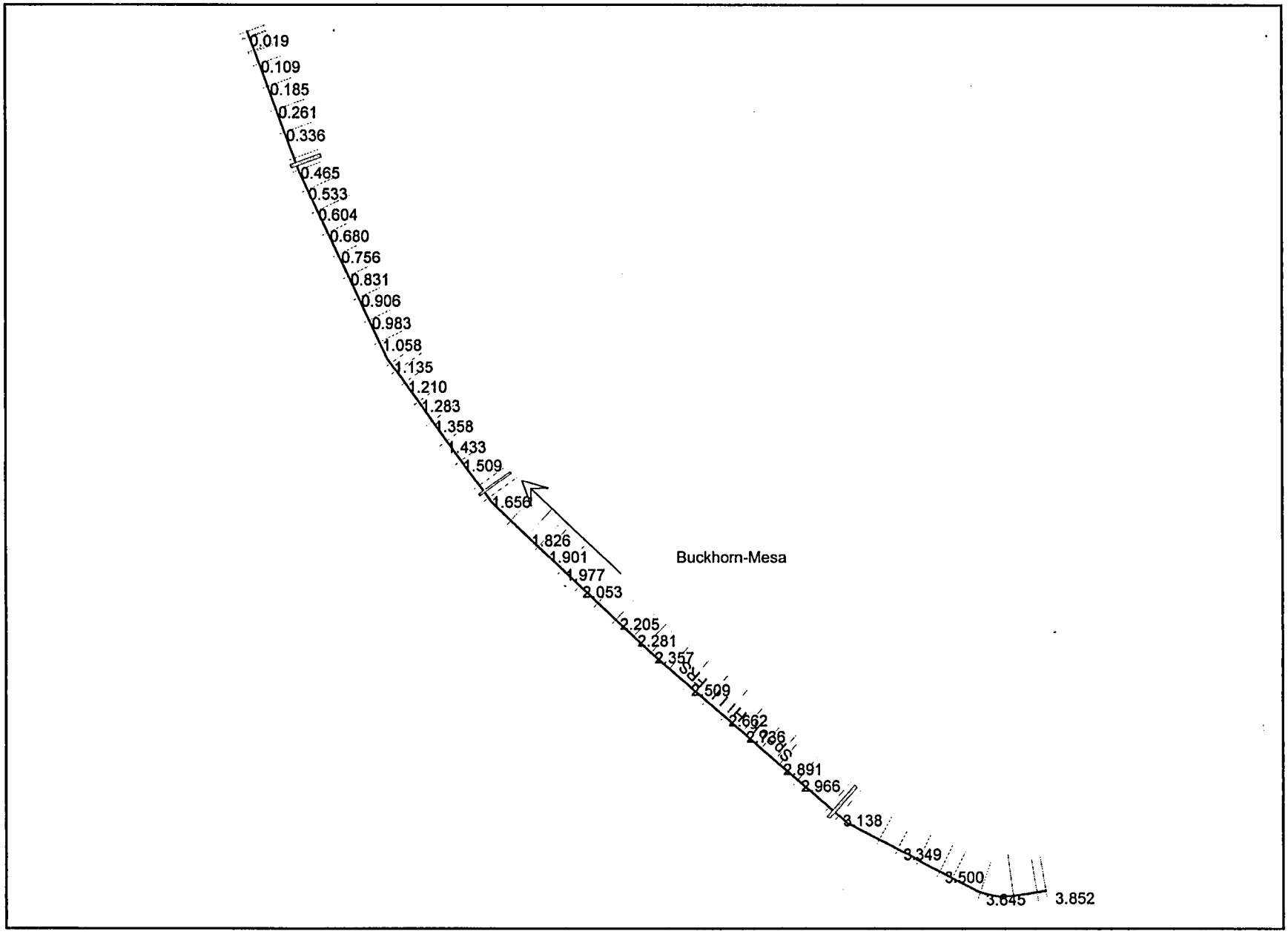
HYDROGRAPH AT	RT66	78.	11.87	12.	3.	1.	.08
HYDROGRAPH AT	452	63.	12.03	5.	1.	0.	.04
2 COMBINED AT	C6465	141.	12.03	17.	4.	2.	.04
ROUTED TO	R6566	137.	12.10	17.	4.	2.	.04
3 COMBINED AT	C116	357.	12.17	36.	10.	3.	.23
ROUTED TO	BASIN5	159.	12.47	36.	10.	3.	.23
ROUTED TO	R116	157.	12.53	36.	10.	3.	.23
HYDROGRAPH AT	453	63.	12.10	7.	2.	1.	.06
2 COMBINED AT	C117	177.	12.47	43.	12.	4.	.29
2 COMBINED AT	C118	892.	12.10	104.	29.	11.	.92
ROUTED TO	R118	887.	12.13	104.	29.	11.	.92
DIVERSION TO	BASIN6	270.	12.13	7.	2.	1.	.92
HYDROGRAPH AT	D7	737.	12.20	97.	27.	10.	.92
HYDROGRAPH AT	RTD7	270.	12.13	7.	2.	1.	.92
ROUTED TO	SD7	1.	12.23	1.	1.	1.	.92
2 COMBINED AT	CD7	739.	12.20	97.	28.	11.	.92
HYDROGRAPH AT	454	162.	12.13	21.	6.	2.	.18
2 COMBINED AT	C119	885.	12.20	118.	34.	13.	1.10
ROUTED TO	R454	833.	12.27	118.	34.	13.	1.10
HYDROGRAPH AT	415	589.	12.17	80.	23.	8.	.61
HYDROGRAPH AT	RT385	368.	12.23	44.	12.	4.	.53
ROUTED TO	RR385	322.	12.57	44.	12.	4.	.53
2 COMBINED AT	C415	757.	12.23	124.	35.	13.	.93
2 COMBINED AT	CC415	1540.	12.27	238.	67.	25.	2.03
ROUTED TO	R415	1527.	12.30	238.	67.	25.	2.03
HYDROGRAPH AT	455	1418.	12.13	150.	45.	16.	1.11
DIVERSION TO	BS455	1418.	12.13	139.	37.	13.	1.11
HYDROGRAPH AT	D455	145.	12.80	24.	8.	3.	1.11
HYDROGRAPH AT	RT455	1418.	12.13	139.	37.	13.	1.11
ROUTED TO	S455	23.	12.80	22.	18.	11.	1.11

2 COMBINED AT	C455	169.	12.80	46.	26.	14.	1.11
3 COMBINED AT	CC455	7116.	12.37	1301.	464.	237.	13.87
ROUTED TO	S440	565.	14.03	517.	326.	180.	13.87

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

APPENDIX B

HEC-RAS OUTPUT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0.983
1.058
1.135
1.210
1.283
1.358
1.433
1.509
1.656
1.826
1.901
1.977
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2.205
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2.357
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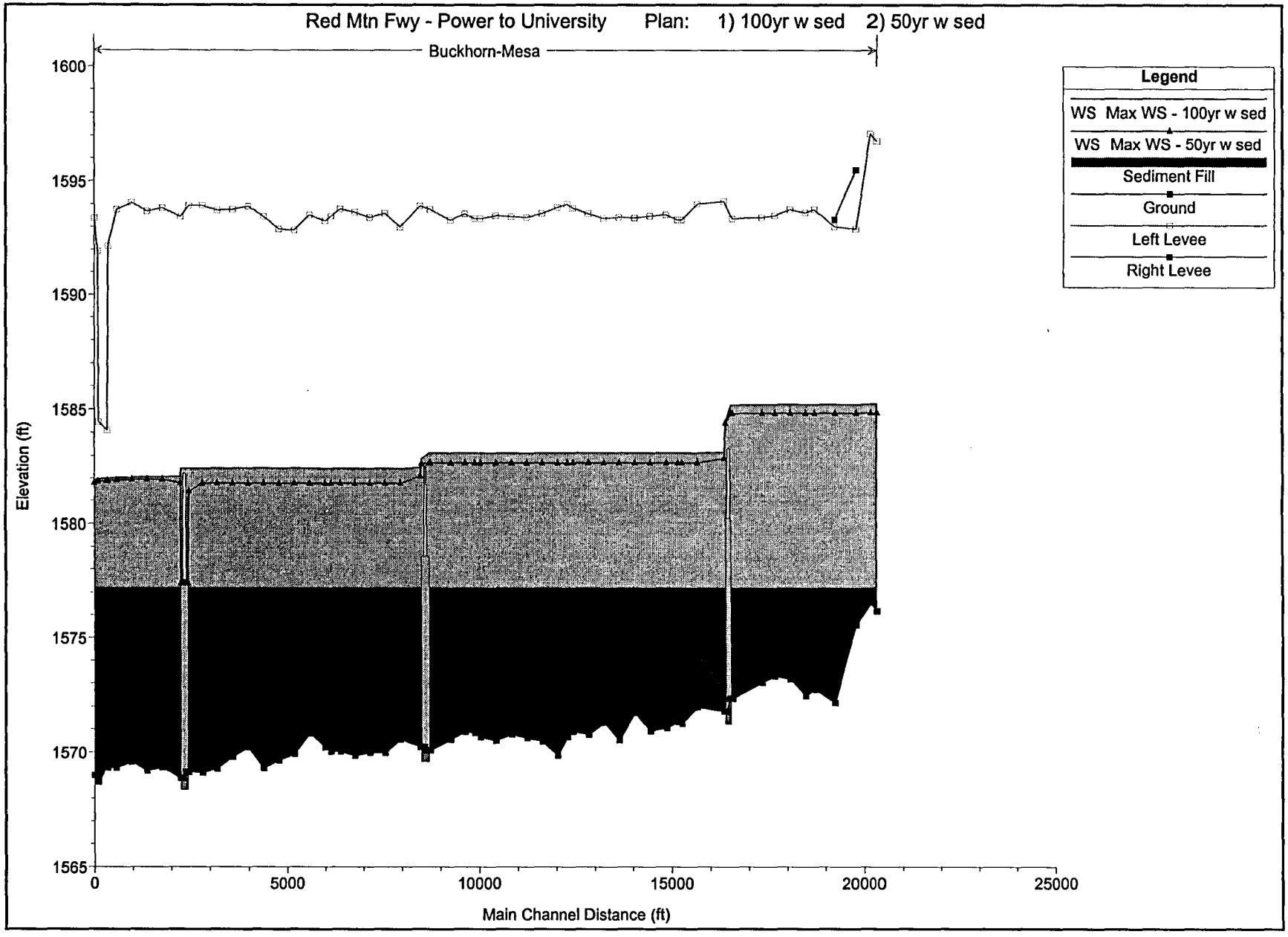
3.645
3.852
Buckhorn-Mesa


Red Mtn Fwy - Power to University
Plan: 1) 100yr w sed 2) 50yr w sed
Buckhorn-Mesa
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Sediment Fill
Ground
Left Levee
Right Levee
Elevation (ft)
1600
1595
1590
1585
1580
1575
1570
1565
0
5000
10000
15000
20000
25000
Main Channel Distance (ft)

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS

Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	0.000	50yr w sed	724.93	1577.20	1581.78	1578.85	1581.85	0.000420	2.17	356.60	115.39	0.19
Buckhorn-Mesa	0.000	100yr w sed	751.08	1577.20	1581.91	1578.88	1581.98	0.000402	2.17	371.76	116.17	0.19
Buckhorn-Mesa	0.016	50yr w sed	720.17	1577.20	1581.84		1581.87	0.000151	1.35	539.82	130.37	0.12
Buckhorn-Mesa	0.016	100yr w sed	752.80	1577.20	1581.97		1582.00	0.000150	1.37	556.42	131.11	0.12
Buckhorn-Mesa	0.019	50yr w sed	719.34	1577.20	1581.85		1581.87	0.000145	1.33	544.71	129.51	0.11
Buckhorn-Mesa	0.019	100yr w sed	753.08	1577.20	1581.97		1582.00	0.000145	1.35	561.21	130.17	0.11
Buckhorn-Mesa	0.063	50yr w sed	706.51	1577.20	1581.88		1581.91	0.000124	1.26	605.77	196.39	0.11
Buckhorn-Mesa	0.063	100yr w sed	765.31	1577.20	1582.00		1582.03	0.000132	1.32	629.22	198.06	0.11
Buckhorn-Mesa	0.068	50yr w sed	705.60	1577.20	1581.89		1581.91	0.000124	1.28	613.74	218.61	0.11
Buckhorn-Mesa	0.068	100yr w sed	767.43	1577.20	1582.01		1582.03	0.000136	1.36	639.90	220.66	0.11
Buckhorn-Mesa	0.109	50yr w sed	693.19	1577.20	1581.92		1581.93	0.000067	0.98	827.62	245.74	0.08
Buckhorn-Mesa	0.109	100yr w sed	772.86	1577.20	1582.04		1582.05	0.000078	1.07	857.52	256.74	0.09
Buckhorn-Mesa	0.185	50yr w sed	673.57	1577.20	1581.94		1581.95	0.000045	0.81	1155.69	437.89	0.07
Buckhorn-Mesa	0.185	100yr w sed	791.12	1577.20	1582.06		1582.07	0.000056	0.91	1206.35	442.47	0.07
Buckhorn-Mesa	0.261	50yr w sed	657.57	1577.20	1581.96		1581.96	0.000026	0.62	1355.76	423.40	0.05
Buckhorn-Mesa	0.261	100yr w sed	767.09	1577.20	1582.07		1582.08	0.000032	0.69	1405.26	429.46	0.06
Buckhorn-Mesa	0.336	50yr w sed	645.22	1577.20	1581.96		1581.97	0.000034	0.70	1192.98	431.77	0.06
Buckhorn-Mesa	0.336	100yr w sed	767.52	1577.20	1582.08		1582.09	0.000042	0.80	1246.15	440.27	0.06
Buckhorn-Mesa	0.425	50yr w sed	-131.73	1577.20	1581.79		1581.95	0.000740	-3.19	41.31	417.71	0.26
Buckhorn-Mesa	0.425	100yr w sed	-156.19	1577.20	1582.09		1582.28	0.000844	-3.55	43.98	423.13	0.28
Buckhorn-Mesa	0.445		Culvert									
Buckhorn-Mesa	0.465	50yr w sed	180.80	1577.20	1581.40		1581.75	0.001877	4.79	37.77	209.03	0.41
Buckhorn-Mesa	0.465	100yr w sed	231.14	1577.20	1582.45		1582.45	0.000011	0.39	815.14	482.24	0.03
Buckhorn-Mesa	0.533	50yr w sed	180.65	1577.20	1581.78		1581.78	0.000004	0.22	1019.39	546.78	0.02
Buckhorn-Mesa	0.533	100yr w sed	237.62	1577.20	1582.46		1582.46	0.000003	0.23	1444.06	667.09	0.02
Buckhorn-Mesa	0.604	50yr w sed	180.55	1577.20	1581.78		1581.78	0.000002	0.17	1253.71	388.52	0.01
Buckhorn-Mesa	0.604	100yr w sed	151.09	1577.20	1582.46		1582.46	0.000001	0.12	1521.21	398.19	0.01
Buckhorn-Mesa	0.680	50yr w sed	180.28	1577.20	1581.78		1581.78	0.000003	0.21	994.32	292.47	0.02

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	0.680	100yr w sed	148.31	1577.20	1582.47		1582.47	0.000001	0.15	1213.57	342.48	0.01
Buckhorn-Mesa	0.756	50yr w sed	180.13	1577.20	1581.78		1581.79	0.000006	0.27	855.00	305.26	0.02
Buckhorn-Mesa	0.756	100yr w sed	151.49	1577.20	1582.47		1582.47	0.000002	0.19	1074.78	341.40	0.01
Buckhorn-Mesa	0.831	50yr w sed	179.94	1577.20	1581.79		1581.79	0.000003	0.19	1165.92	371.77	0.02
Buckhorn-Mesa	0.831	100yr w sed	154.40	1577.20	1582.47		1582.47	0.000001	0.13	1421.95	388.84	0.01
Buckhorn-Mesa	0.906	50yr w sed	179.74	1577.20	1581.79		1581.79	0.000001	0.13	1595.59	449.15	0.01
Buckhorn-Mesa	0.906	100yr w sed	159.28	1577.20	1582.47		1582.47	0.000001	0.10	1902.90	457.40	0.01
Buckhorn-Mesa	0.983	50yr w sed	179.66	1577.20	1581.79		1581.79	0.000002	0.14	1509.48	458.69	0.01
Buckhorn-Mesa	0.983	100yr w sed	167.09	1577.20	1582.46		1582.46	0.000001	0.11	1829.20	485.85	0.01
Buckhorn-Mesa	1.058	50yr w sed	179.43	1577.20	1581.79		1581.79	0.000001	0.12	1753.79	518.82	0.01
Buckhorn-Mesa	1.058	100yr w sed	171.32	1577.20	1582.46		1582.46	0.000001	0.10	2111.64	547.55	0.01
Buckhorn-Mesa	1.135	50yr w sed	179.40	1577.20	1581.79		1581.79	0.000001	0.09	2188.39	525.40	0.01
Buckhorn-Mesa	1.135	100yr w sed	177.36	1577.20	1582.46		1582.46	0.000000	0.07	2545.46	532.51	0.01
Buckhorn-Mesa	1.164	50yr w sed	179.12	1577.20	1581.79		1581.79	0.000001	0.09	2076.11	506.86	0.01
Buckhorn-Mesa	1.164	100yr w sed	181.43	1577.20	1582.46		1582.46	0.000000	0.08	2420.16	517.65	0.01
Buckhorn-Mesa	1.210	50yr w sed	179.19	1577.20	1581.79		1581.79	0.000001	0.11	1888.40	532.49	0.01
Buckhorn-Mesa	1.210	100yr w sed	185.47	1577.20	1582.46		1582.46	0.000001	0.10	2253.76	552.37	0.01
Buckhorn-Mesa	1.283	50yr w sed	178.72	1577.20	1581.79		1581.79	0.000000	0.08	2441.78	587.12	0.01
Buckhorn-Mesa	1.283	100yr w sed	189.16	1577.20	1582.46		1582.46	0.000000	0.07	2841.79	599.74	0.01
Buckhorn-Mesa	1.358	50yr w sed	178.41	1577.20	1581.79		1581.79	0.000000	0.07	2748.73	658.67	0.01
Buckhorn-Mesa	1.358	100yr w sed	219.85	1577.20	1582.46		1582.46	0.000000	0.07	3195.88	677.18	0.01
Buckhorn-Mesa	1.433	50yr w sed	178.22	1577.20	1581.79		1581.79	0.000000	0.06	2884.65	696.22	0.01
Buckhorn-Mesa	1.433	100yr w sed	201.56	1577.20	1582.46		1582.46	0.000000	0.06	3341.79	704.01	0.00
Buckhorn-Mesa	1.509	50yr w sed	178.02	1577.20	1581.79		1581.79	0.000001	0.10	1749.63	579.82	0.01
Buckhorn-Mesa	1.509	100yr w sed	199.98	1577.20	1582.46		1582.46	0.000001	0.10	2012.33	586.24	0.01
Buckhorn-Mesa	1.607	50yr w sed	203.19	1577.20	1582.11		1582.44	0.001408	4.60	44.16	585.05	0.37
Buckhorn-Mesa	1.607	100yr w sed	233.83	1577.20	1582.50		1582.88	0.001439	4.90	47.74	631.46	0.37
Buckhorn-Mesa	1.632		Culvert									

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

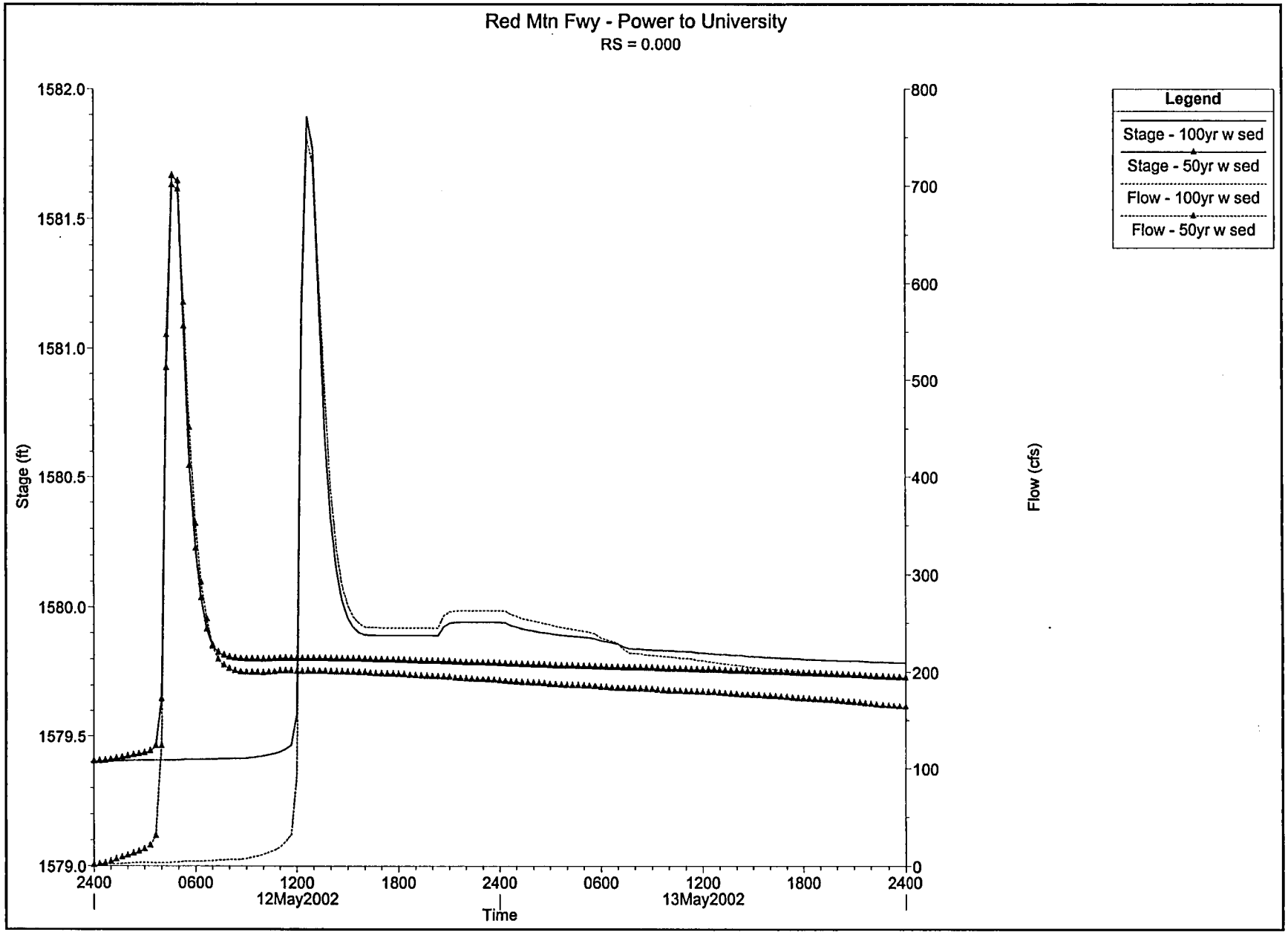
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	1.656	50yr w sed	232.30	1577.20	1582.70		1582.70	0.000001	0.11	2795.14	838.47	0.01
Buckhorn-Mesa	1.656	100yr w sed	315.48	1577.20	1583.15		1583.15	0.000001	0.13	3185.16	895.88	0.01
Buckhorn-Mesa	1.756	50yr w sed	232.04	1577.20	1582.70		1582.70	0.000001	0.13	2481.82	798.53	0.01
Buckhorn-Mesa	1.756	100yr w sed	316.69	1577.20	1583.15		1583.15	0.000001	0.15	2838.23	803.31	0.01
Buckhorn-Mesa	1.826	50yr w sed	231.80	1577.20	1582.70		1582.70	0.000000	0.09	2672.86	543.44	0.01
Buckhorn-Mesa	1.826	100yr w sed	317.79	1577.20	1583.15		1583.15	0.000001	0.12	2921.45	569.77	0.01
Buckhorn-Mesa	1.874	50yr w sed	231.63	1577.20	1582.70		1582.70	0.000001	0.11	2284.27	490.54	0.01
Buckhorn-Mesa	1.874	100yr w sed	316.52	1577.20	1583.15		1583.15	0.000001	0.14	2503.89	494.48	0.01
Buckhorn-Mesa	1.901	50yr w sed	231.04	1577.20	1582.70		1582.70	0.000001	0.11	2208.25	461.91	0.01
Buckhorn-Mesa	1.901	100yr w sed	315.88	1577.20	1583.15		1583.15	0.000001	0.14	2415.63	468.21	0.01
Buckhorn-Mesa	1.977	50yr w sed	229.46	1577.20	1582.70		1582.70	0.000001	0.12	2206.30	510.30	0.01
Buckhorn-Mesa	1.977	100yr w sed	313.79	1577.20	1583.15		1583.15	0.000001	0.15	2434.86	514.84	0.01
Buckhorn-Mesa	2.053	50yr w sed	227.07	1577.20	1582.70		1582.70	0.000001	0.12	2169.39	519.84	0.01
Buckhorn-Mesa	2.053	100yr w sed	312.37	1577.20	1583.15		1583.15	0.000001	0.15	2402.08	523.80	0.01
Buckhorn-Mesa	2.129	50yr w sed	226.30	1577.20	1582.70		1582.70	0.000000	0.09	2617.63	506.04	0.01
Buckhorn-Mesa	2.129	100yr w sed	309.90	1577.20	1583.15		1583.15	0.000001	0.11	2844.08	509.60	0.01
Buckhorn-Mesa	2.205	50yr w sed	224.77	1577.20	1582.70		1582.70	0.000001	0.10	2446.88	479.97	0.01
Buckhorn-Mesa	2.205	100yr w sed	308.61	1577.20	1583.15		1583.15	0.000001	0.12	2662.62	488.89	0.01
Buckhorn-Mesa	2.281	50yr w sed	222.12	1577.20	1582.70		1582.70	0.000001	0.09	2569.40	530.55	0.01
Buckhorn-Mesa	2.281	100yr w sed	306.31	1577.20	1583.15		1583.15	0.000001	0.12	2815.91	566.39	0.01
Buckhorn-Mesa	2.328	50yr w sed	221.13	1577.20	1582.70		1582.70	0.000001	0.10	2468.56	509.15	0.01
Buckhorn-Mesa	2.328	100yr w sed	305.04	1577.20	1583.15		1583.15	0.000001	0.12	2696.87	516.74	0.01
Buckhorn-Mesa	2.357	50yr w sed	221.65	1577.20	1582.70		1582.70	0.000001	0.10	2483.23	525.89	0.01
Buckhorn-Mesa	2.357	100yr w sed	304.55	1577.20	1583.15		1583.15	0.000001	0.13	2721.53	546.32	0.01
Buckhorn-Mesa	2.433	50yr w sed	218.18	1577.20	1582.70		1582.70	0.000001	0.10	2453.86	546.13	0.01
Buckhorn-Mesa	2.433	100yr w sed	300.57	1577.20	1583.15		1583.15	0.000001	0.13	2698.62	552.77	0.01
Buckhorn-Mesa	2.509	50yr w sed	217.23	1577.20	1582.70		1582.70	0.000000	0.09	2647.66	542.58	0.01
Buckhorn-Mesa	2.509	100yr w sed	294.83	1577.20	1583.15		1583.15	0.000001	0.11	2891.78	569.28	0.01

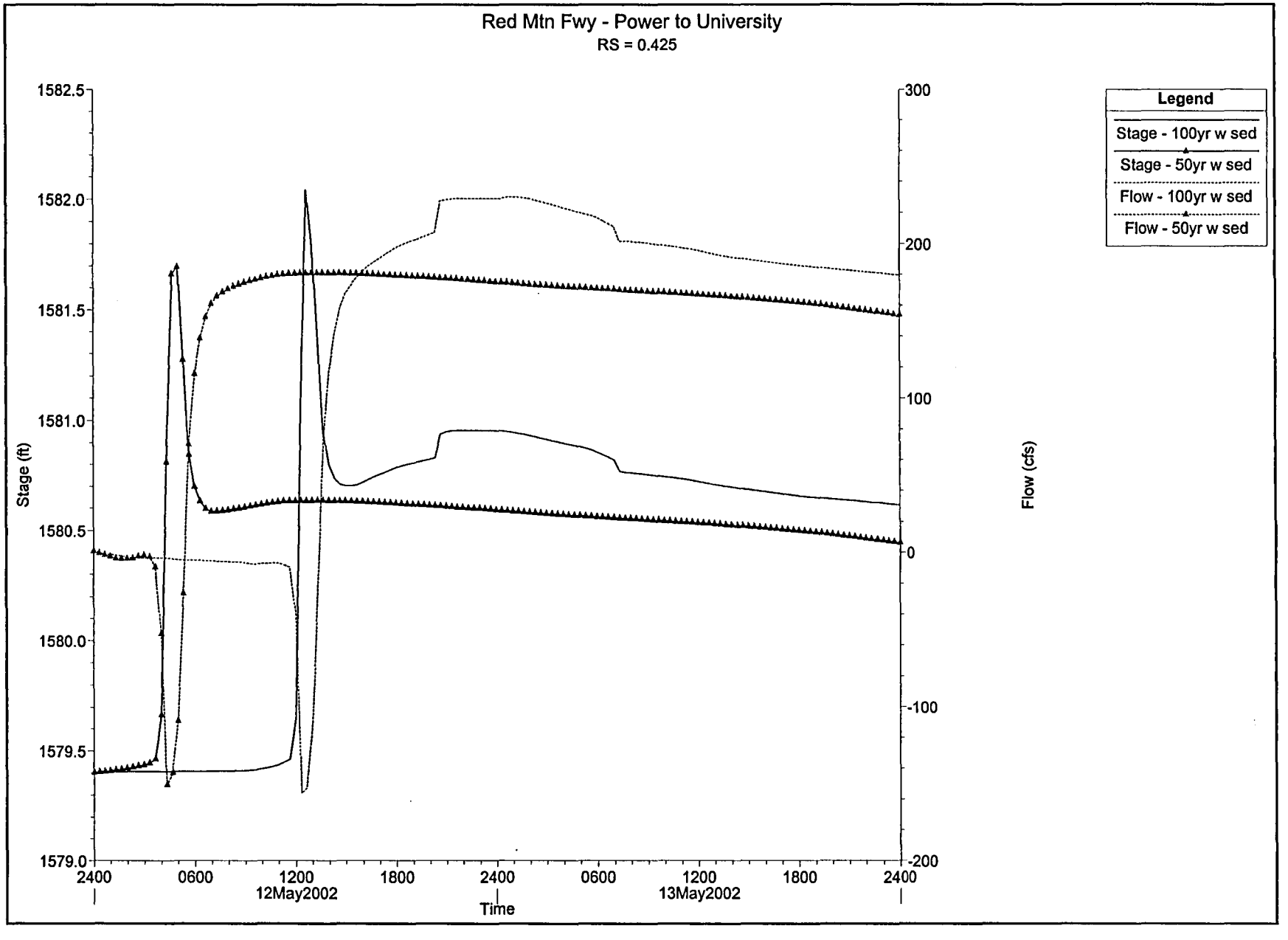
HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

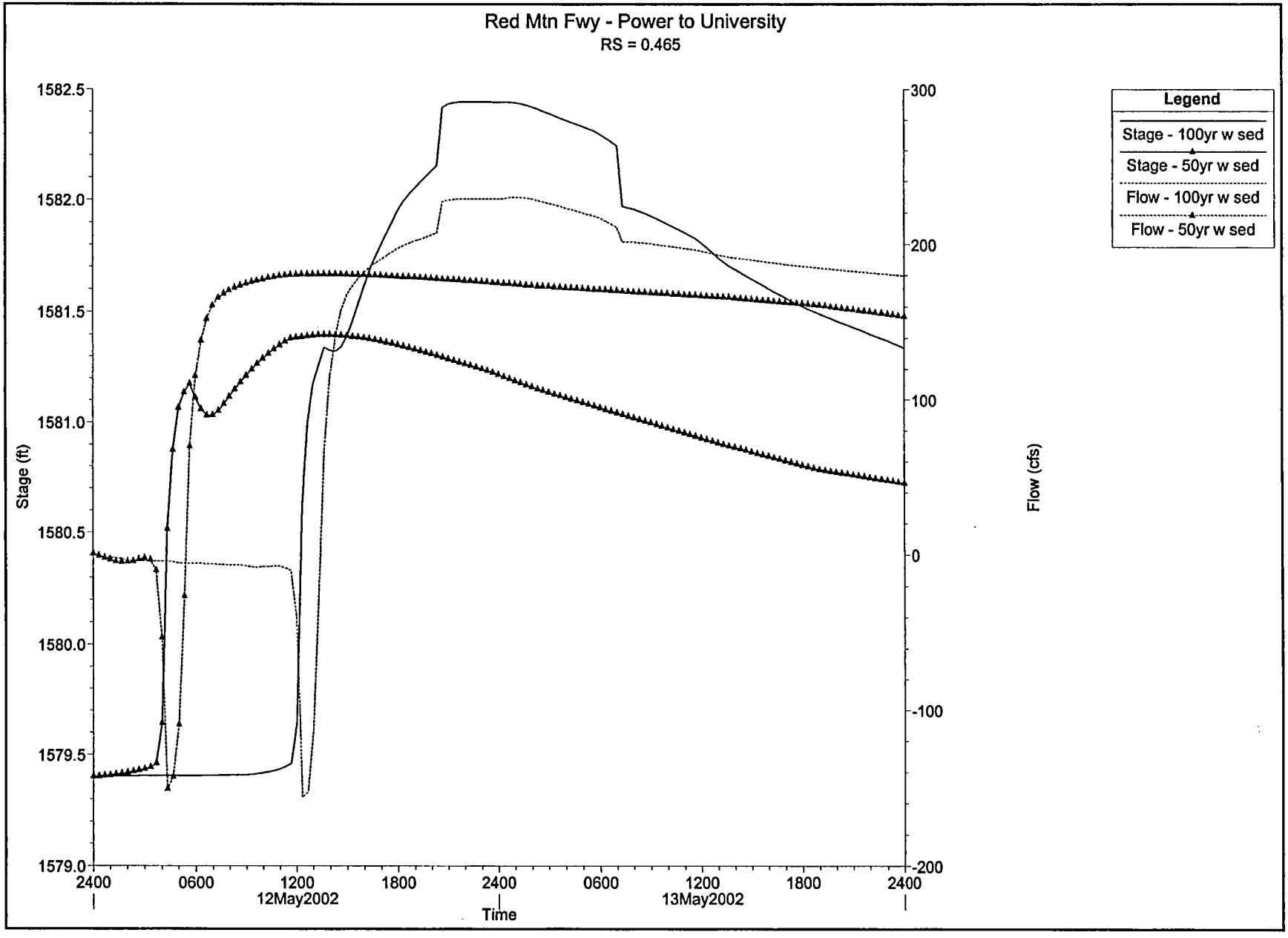
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	2.585	50yr w sed	214.98	1577.20	1582.70		1582.70	0.000000	0.09	2693.45	598.53	0.01
Buckhorn-Mesa	2.585	100yr w sed	291.25	1577.20	1583.15		1583.15	0.000001	0.11	2965.22	626.86	0.01
Buckhorn-Mesa	2.662	50yr w sed	212.75	1577.20	1582.70		1582.70	0.000000	0.09	2657.69	614.21	0.01
Buckhorn-Mesa	2.662	100yr w sed	287.80	1577.20	1583.15		1583.15	0.000001	0.11	2940.08	649.44	0.01
Buckhorn-Mesa	2.736	50yr w sed	210.51	1577.20	1582.70		1582.70	0.000000	0.09	2498.73	487.66	0.01
Buckhorn-Mesa	2.736	100yr w sed	284.01	1577.20	1583.15		1583.15	0.000001	0.11	2721.28	502.17	0.01
Buckhorn-Mesa	2.815	50yr w sed	208.91	1577.20	1582.70		1582.70	0.000000	0.09	2630.23	635.01	0.01
Buckhorn-Mesa	2.815	100yr w sed	280.30	1577.20	1583.15		1583.15	0.000001	0.12	2918.17	646.14	0.01
Buckhorn-Mesa	2.871	50yr w sed	205.76	1577.20	1582.70		1582.70	0.000000	0.09	2529.97	523.58	0.01
Buckhorn-Mesa	2.871	100yr w sed	278.80	1577.20	1583.15		1583.15	0.000001	0.11	2771.60	558.43	0.01
Buckhorn-Mesa	2.891	50yr w sed	207.48	1577.20	1582.70		1582.70	0.000001	0.14	2037.30	591.47	0.01
Buckhorn-Mesa	2.891	100yr w sed	278.05	1577.20	1583.15		1583.15	0.000001	0.16	2308.86	625.41	0.01
Buckhorn-Mesa	2.966	50yr w sed	203.79	1577.20	1582.70		1582.70	0.000001	0.14	1766.03	482.85	0.01
Buckhorn-Mesa	2.966	100yr w sed	269.38	1577.20	1583.15		1583.15	0.000001	0.17	1984.94	503.81	0.01
Buckhorn-Mesa	3.096	50yr w sed	697.62	1577.20	1582.90	1582.90	1585.77	0.010052	13.59	51.34	405.08	1.00
Buckhorn-Mesa	3.096	100yr w sed	274.42	1577.20	1583.18		1583.59	0.001326	5.10	53.86	462.97	0.37
Buckhorn-Mesa	3.117		Culvert									
Buckhorn-Mesa	3.138	50yr w sed	710.04	1577.20	1584.85		1584.85	0.000008	0.45	2198.12	516.87	0.03
Buckhorn-Mesa	3.138	100yr w sed	1113.17	1577.20	1585.22		1585.22	0.000014	0.64	2391.84	524.68	0.04
Buckhorn-Mesa	3.285	50yr w sed	684.34	1577.20	1584.85		1584.86	0.000015	0.62	1462.13	324.85	0.04
Buckhorn-Mesa	3.285	100yr w sed	1085.36	1577.20	1585.23		1585.24	0.000030	0.90	1587.04	342.90	0.06
Buckhorn-Mesa	3.349	50yr w sed	669.13	1577.20	1584.85		1584.85	0.000005	0.36	2294.74	428.11	0.02
Buckhorn-Mesa	3.349	100yr w sed	1077.75	1577.20	1585.24		1585.24	0.000010	0.54	2459.41	431.90	0.03
Buckhorn-Mesa	3.424	50yr w sed	628.78	1577.20	1584.85		1584.86	0.000002	0.26	2840.25	469.47	0.02
Buckhorn-Mesa	3.424	100yr w sed	1093.32	1577.20	1585.24		1585.24	0.000006	0.42	3022.68	481.16	0.03
Buckhorn-Mesa	3.500	50yr w sed	617.65	1577.20	1584.86		1584.86	0.000002	0.22	3208.74	522.70	0.01
Buckhorn-Mesa	3.500	100yr w sed	1094.82	1577.20	1585.24		1585.24	0.000005	0.37	3410.03	535.23	0.02

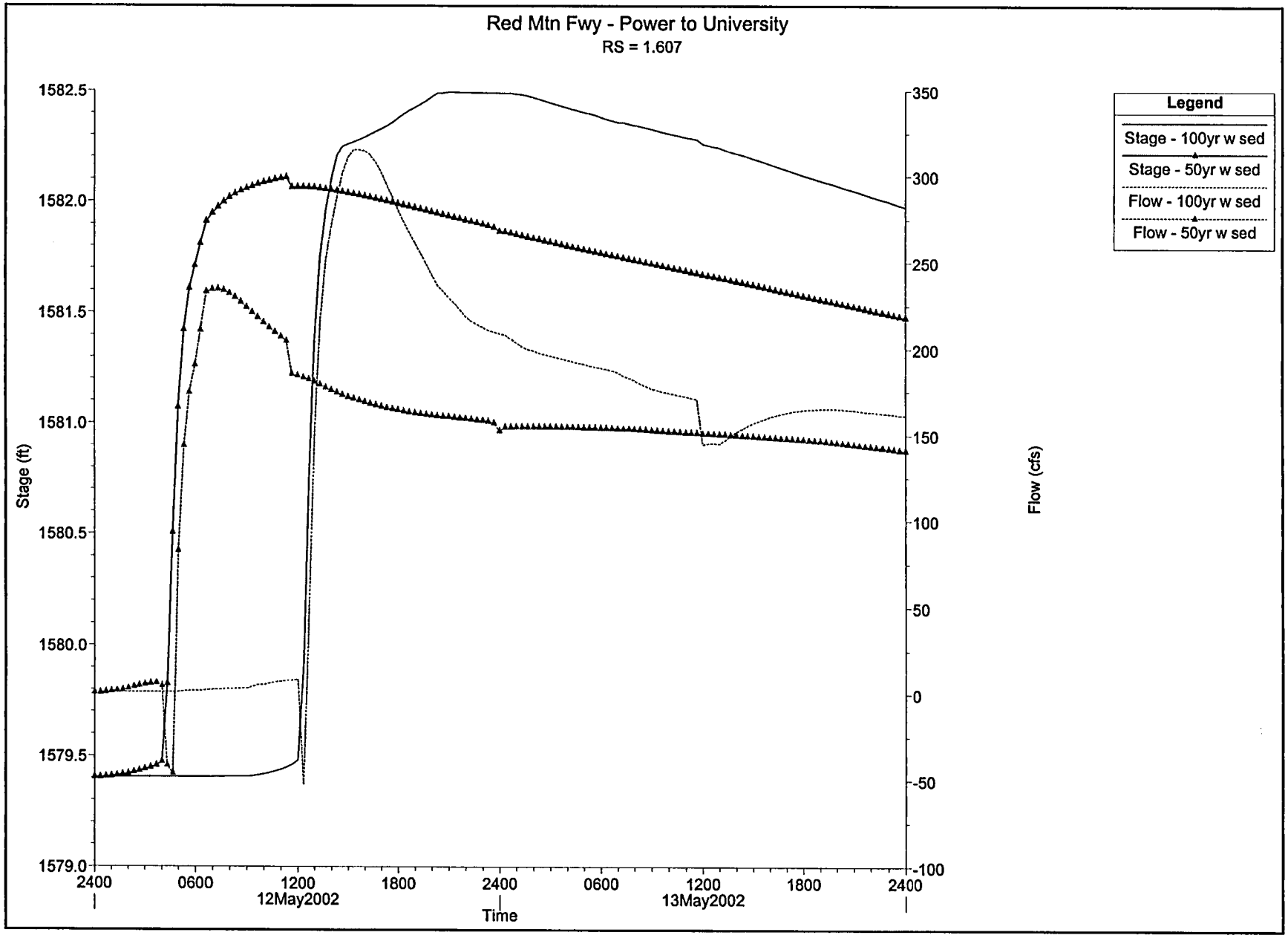
HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

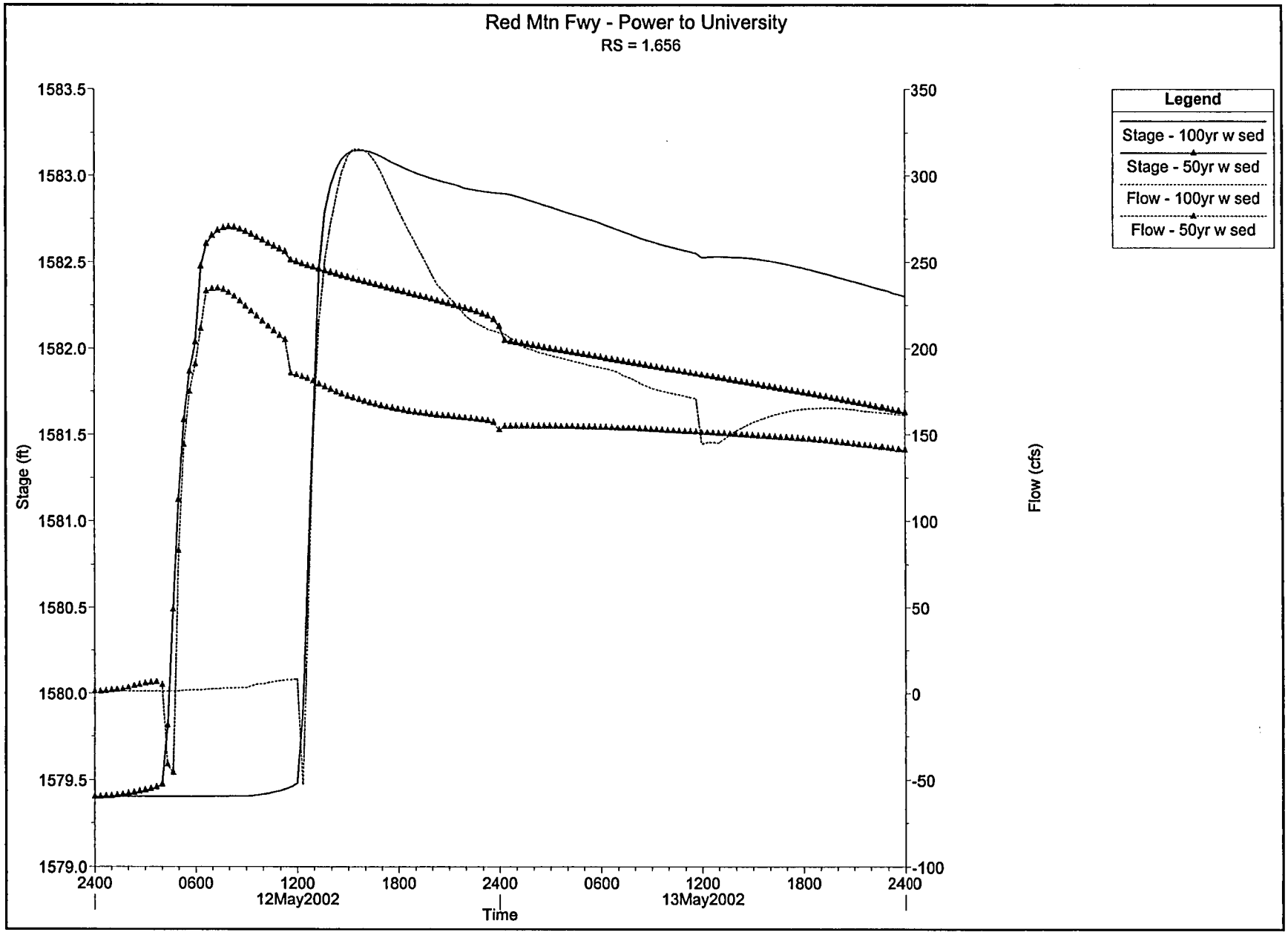
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	3.545	50yr w sed	611.61	1577.20	1584.86		1584.86	0.000002	0.22	2983.06	652.69	0.01
Buckhorn-Mesa	3.545	100yr w sed	952.61	1577.20	1585.24		1585.24	0.000004	0.32	3147.88	666.22	0.02
Buckhorn-Mesa	3.645	50yr w sed	614.29	1577.20	1584.86		1584.86	0.000005	0.35	1886.09	281.33	0.02
Buckhorn-Mesa	3.645	100yr w sed	950.08	1577.20	1585.24		1585.24	0.000009	0.52	1993.24	284.03	0.03
Buckhorn-Mesa	3.749	50yr w sed	615.96	1577.20	1584.86		1584.87	0.000020	0.66	932.31	166.91	0.05
Buckhorn-Mesa	3.749	100yr w sed	1141.31	1577.20	1585.24		1585.26	0.000058	1.16	999.06	184.39	0.08
Buckhorn-Mesa	3.824	50yr w sed	618.49	1577.20	1584.86		1584.87	0.000021	0.68	907.70	137.41	0.05
Buckhorn-Mesa	3.824	100yr w sed	1148.43	1577.20	1585.25		1585.28	0.000062	1.19	961.83	139.45	0.08
Buckhorn-Mesa	3.852	50yr w sed	620.83	1577.20	1584.87		1584.87	0.000011	0.50	1250.66	181.84	0.03
Buckhorn-Mesa	3.852	100yr w sed	1148.94	1577.20	1585.27		1585.28	0.000031	0.87	1323.92	183.58	0.06

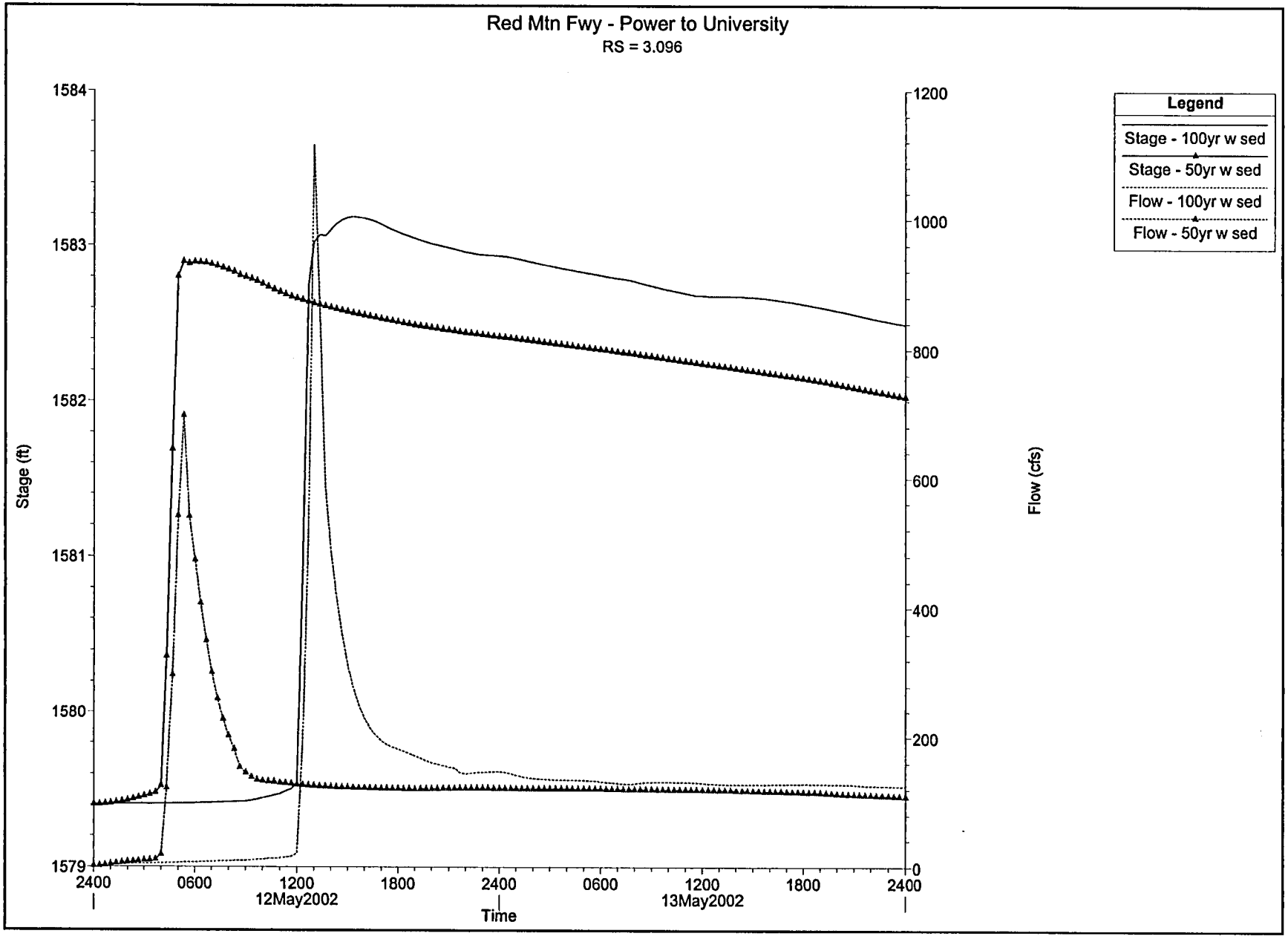

Red Mtn Fwy - Power to University
RS = 0.000
Stage (ft)
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
800
700
600
500
400
300
200
100
0
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

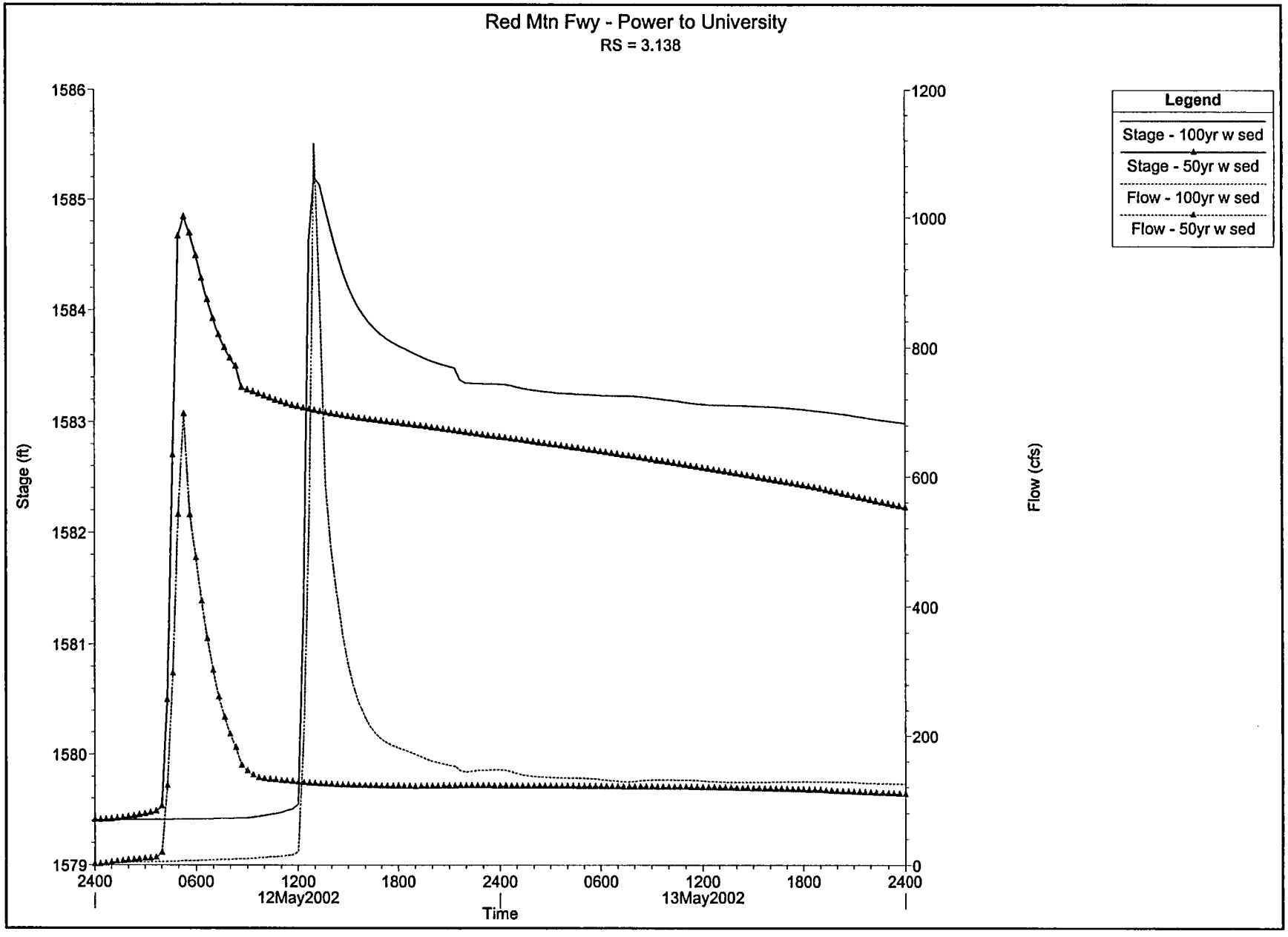

Red Mtn Fwy - Power to University
RS = 0.425
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed
Stage (ft)
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
300
200
100
0
-100
-200
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time

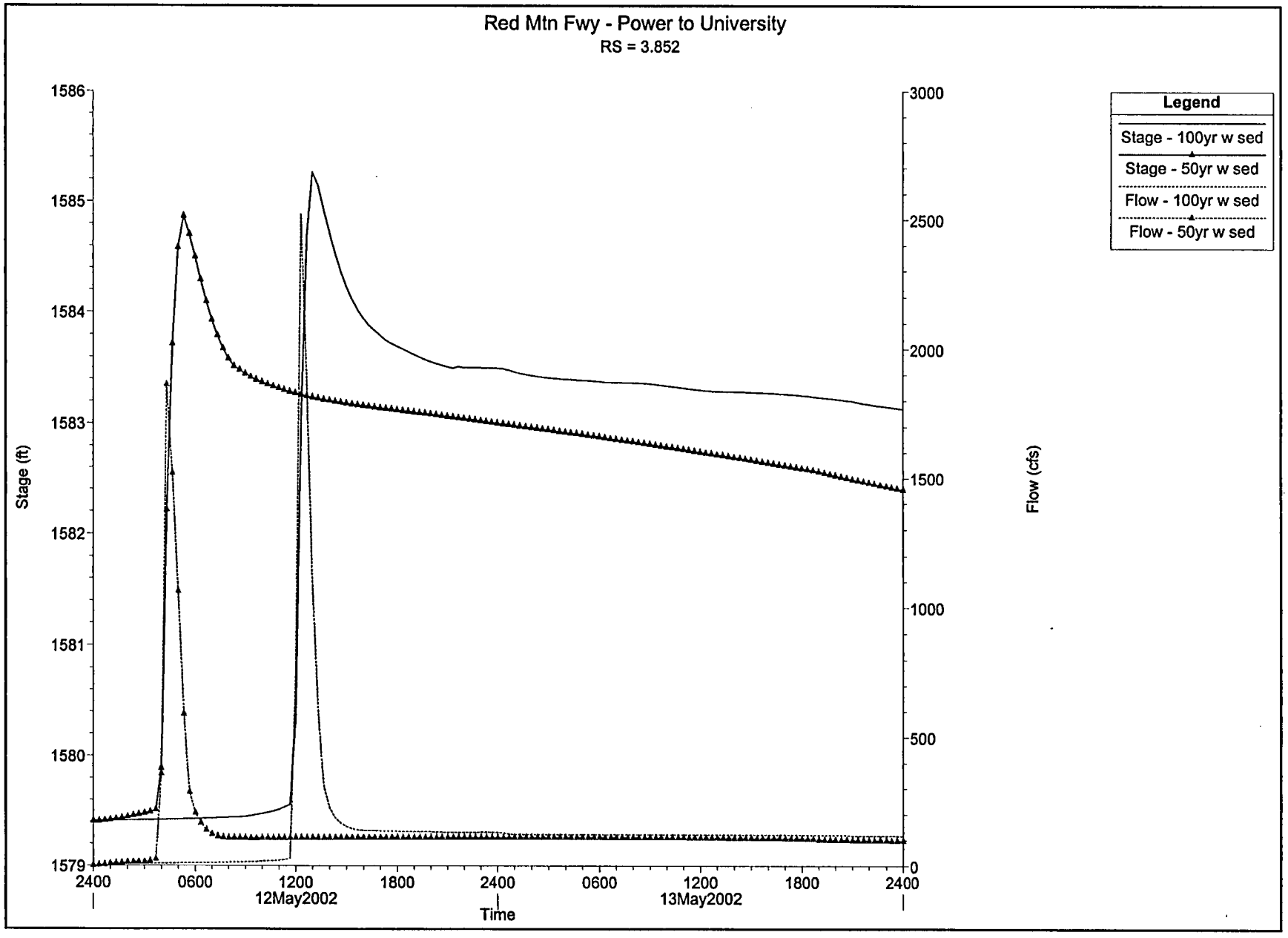

Red Mtn Fwy - Power to University
RS = 0.465
Stage (ft)
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
300
200
100
0
-100
-200
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

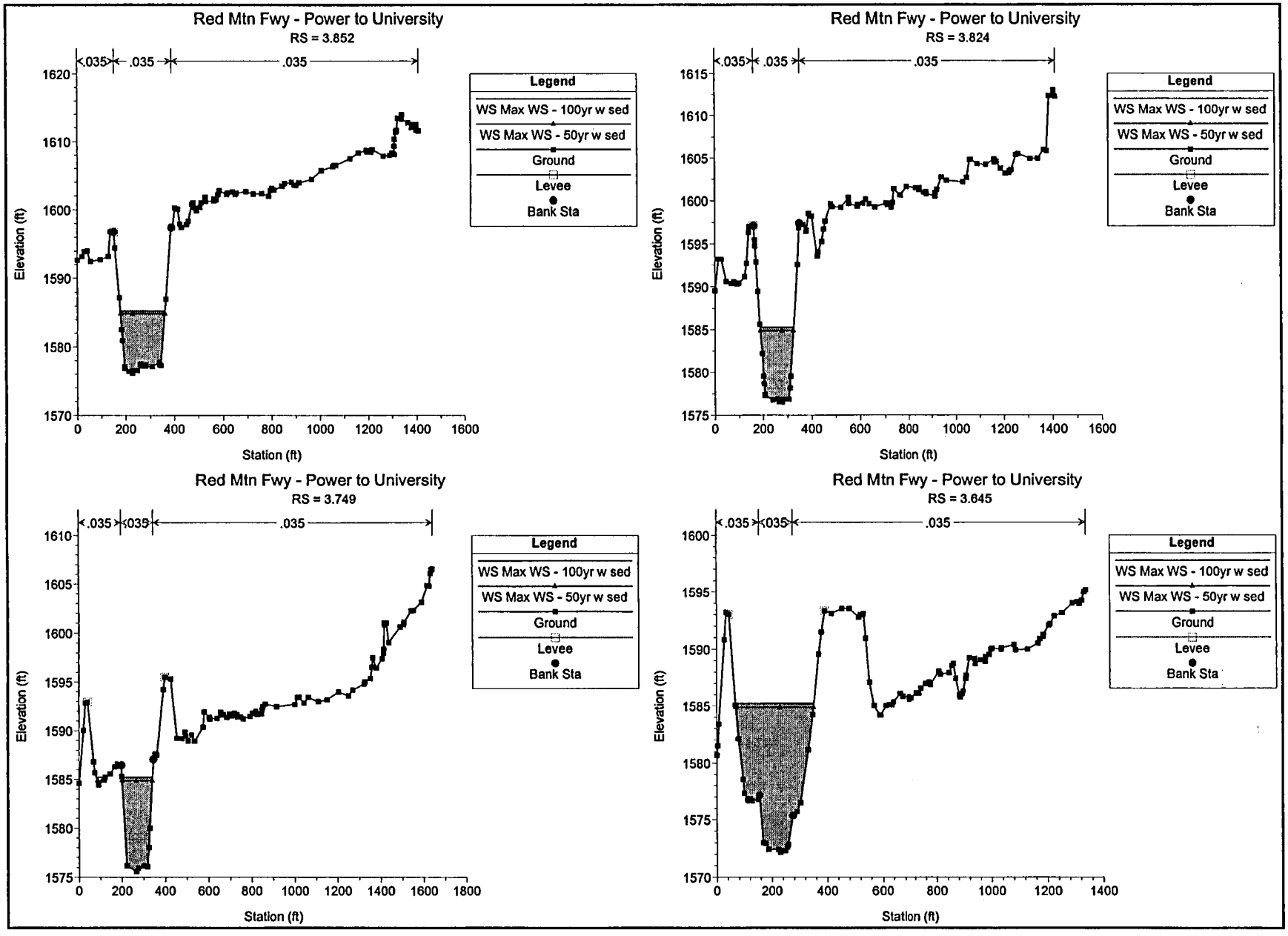

Red Mtn Fwy - Power to University
RS = 1.607
Stage (ft)
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
350
300
250
200
150
100
50
0
-50
-100
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

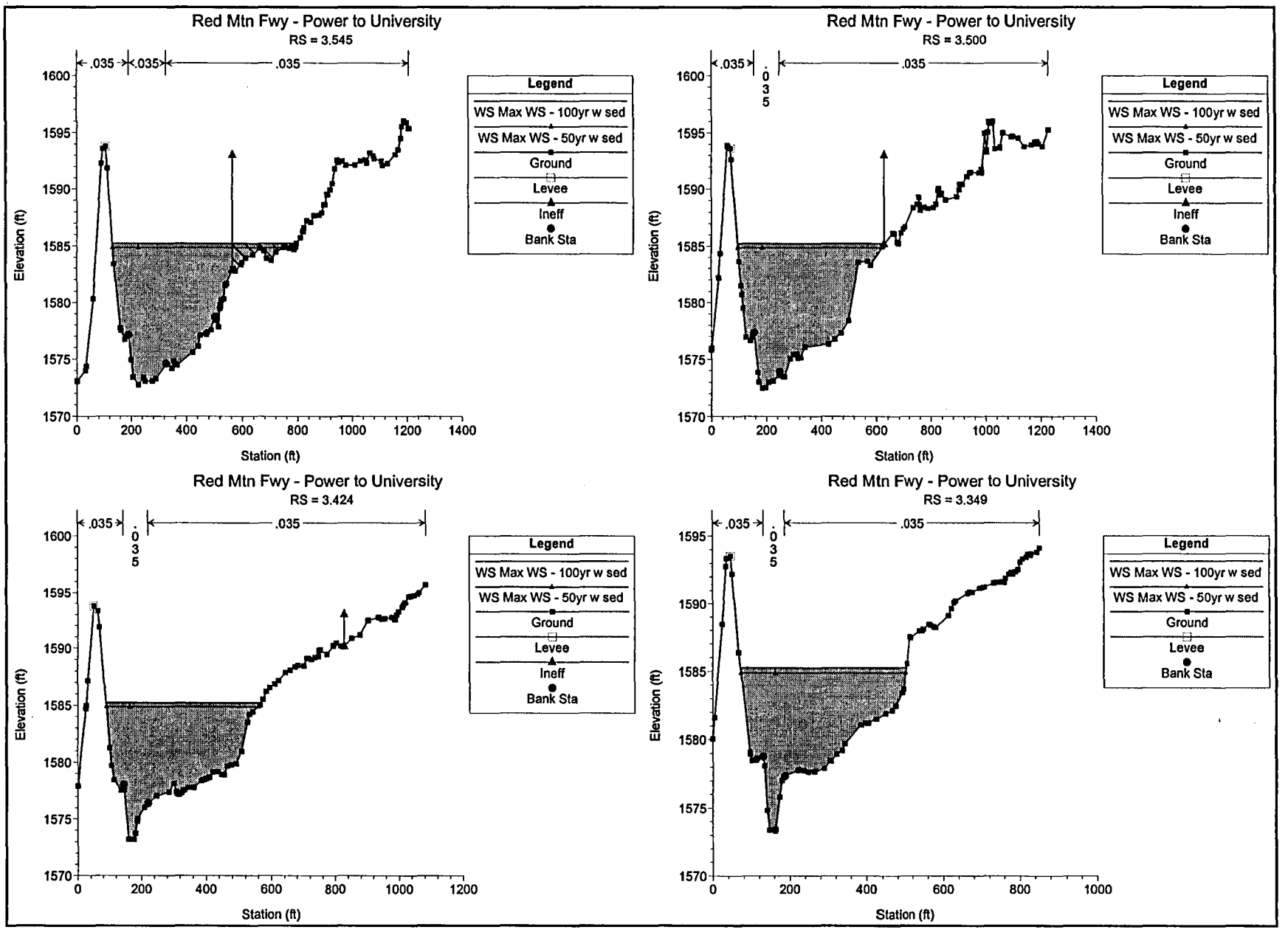

Red Mtn Fwy - Power to University
RS = 1.656
Stage (ft)
1583.5
1583.0
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
350
300
250
200
150
100
50
0
-50
-100
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

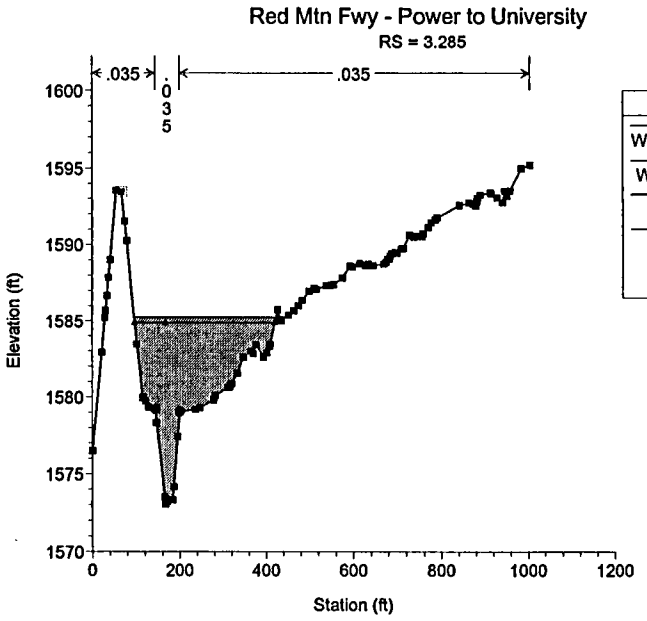

Red Mtn Fwy - Power to University
RS = 3.096
Stage (ft)
1584
1583
1582
1581
1580
1579
Flow (cfs)
1200
1000
800
600
400
200
0
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

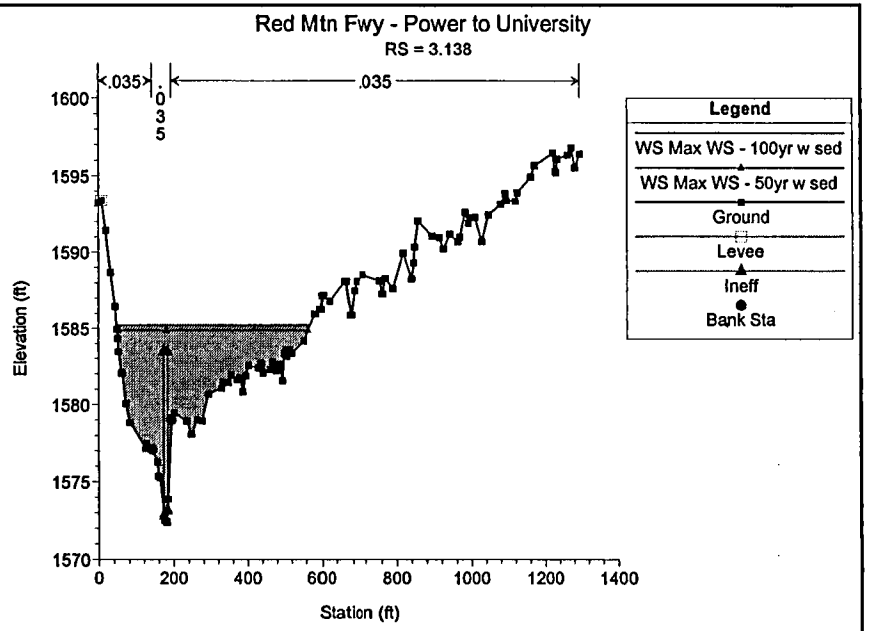

Red Mtn Fwy - Power to University
RS = 3.138
Stage (ft)
1586
1585
1584
1583
1582
1581
1580
1579
Flow (cfs)
1200
1000
800
600
400
200
0
2400
0600
1200
12May2002
1800
2400
Time
0600
1200
13May2002
1800
2400
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

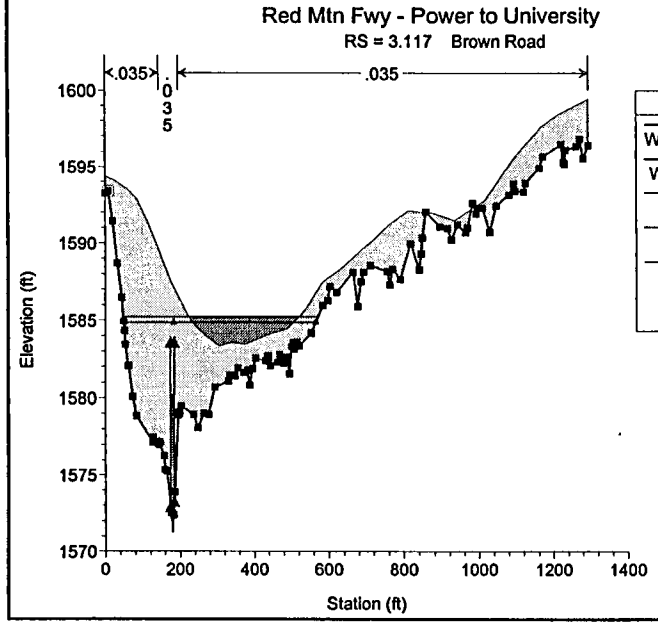

Red Mtn Fwy - Power to University
RS = 3.852
Stage (ft)
1586
1585
1584
1583
1582
1581
1580
1579
Flow (cfs)
3000
2500
2000
1500
1000
500
0
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr w sed
Stage - 50yr w sed
Flow - 100yr w sed
Flow - 50yr w sed

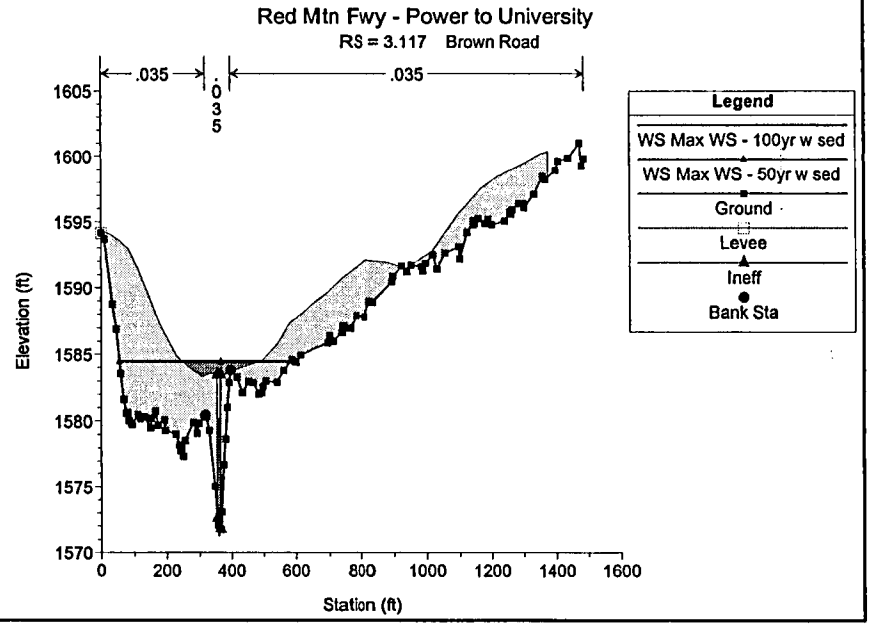

Red Mtn Fwy - Power to University
RS = 3.852
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.824
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.749
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.645
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

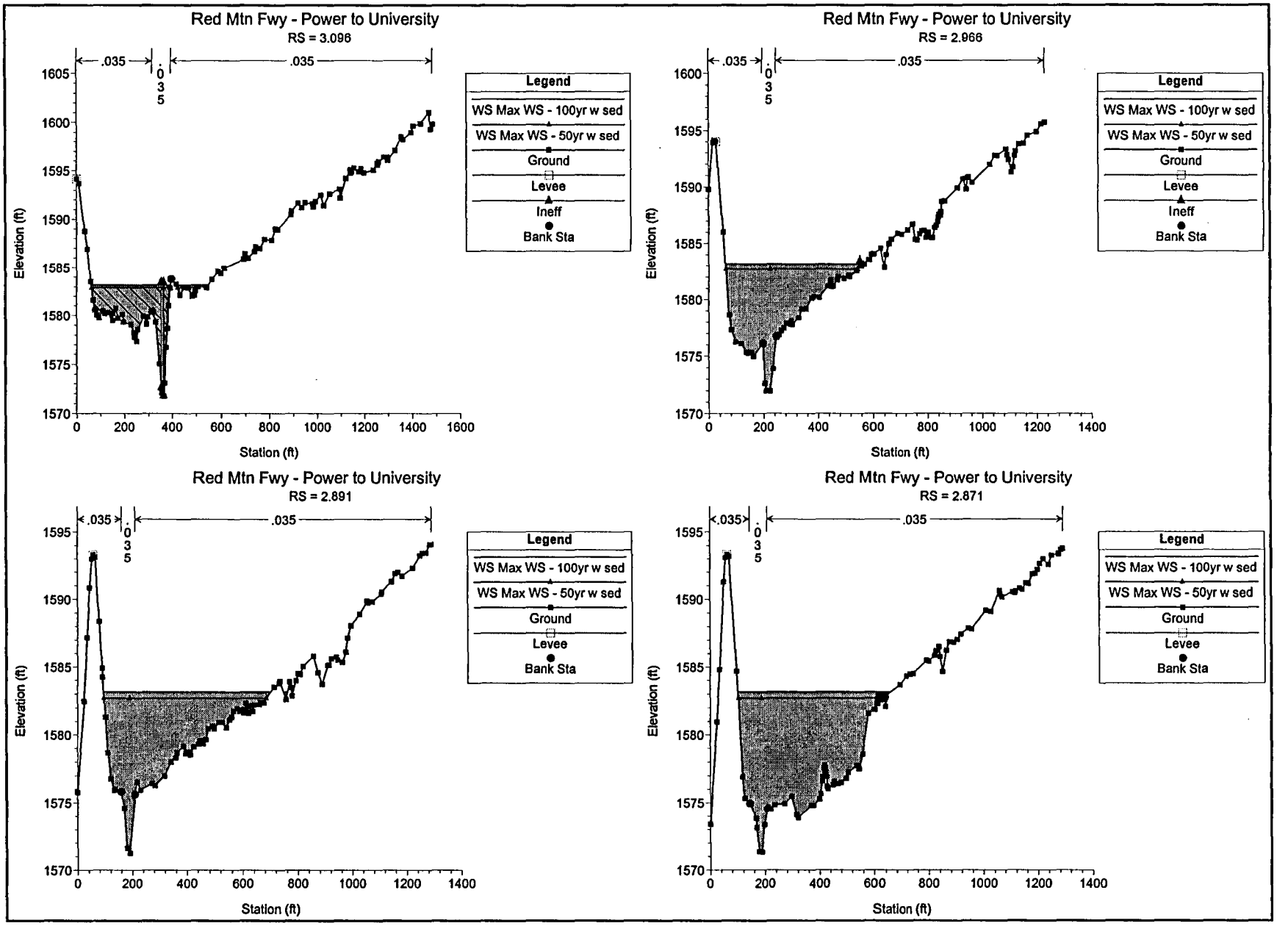

Red Mtn Fwy - Power to University
RS = 3.545
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.500
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.424
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.349
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

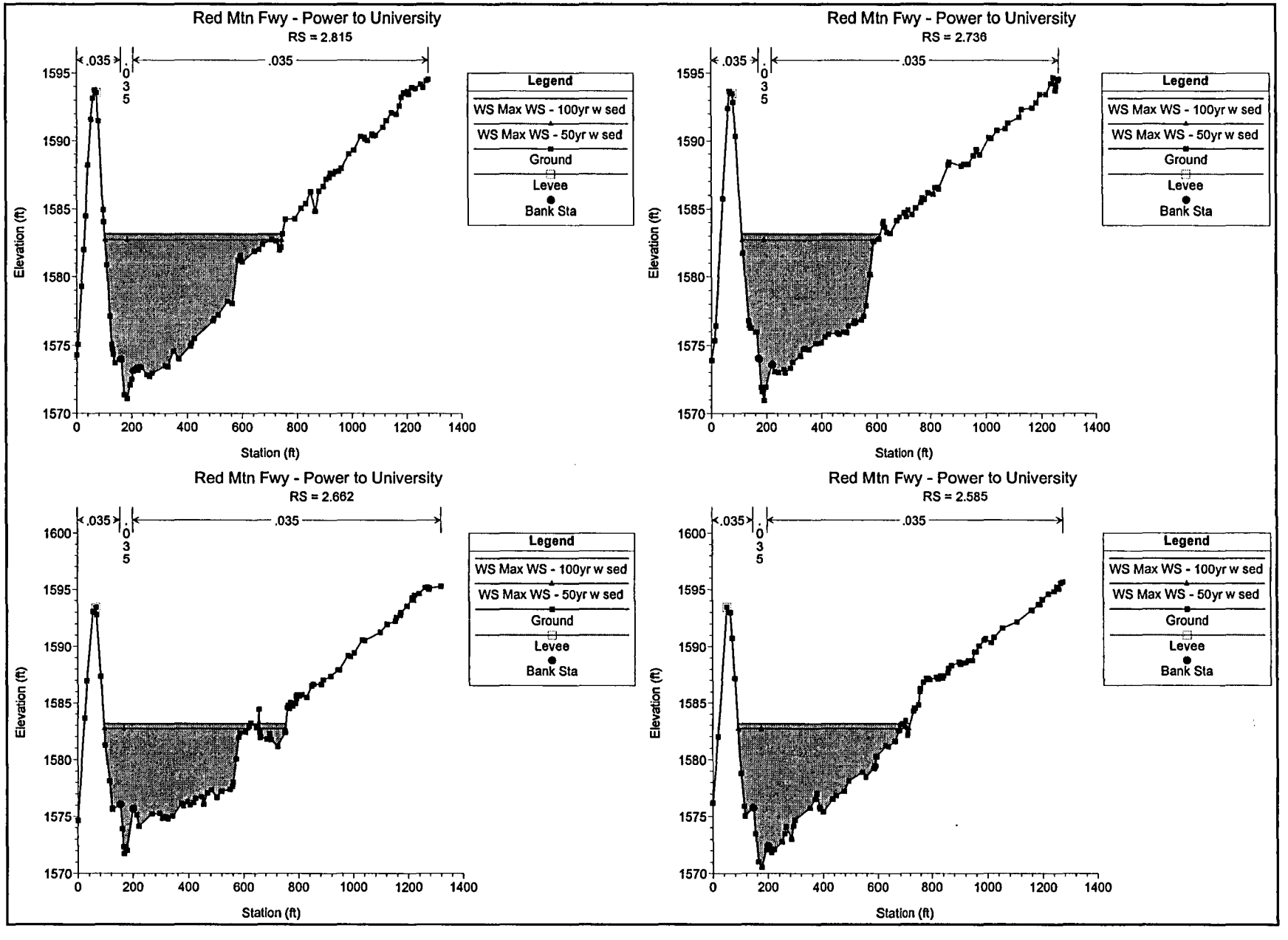

Red Mtn Fwy - Power to University
RS = 3.285
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

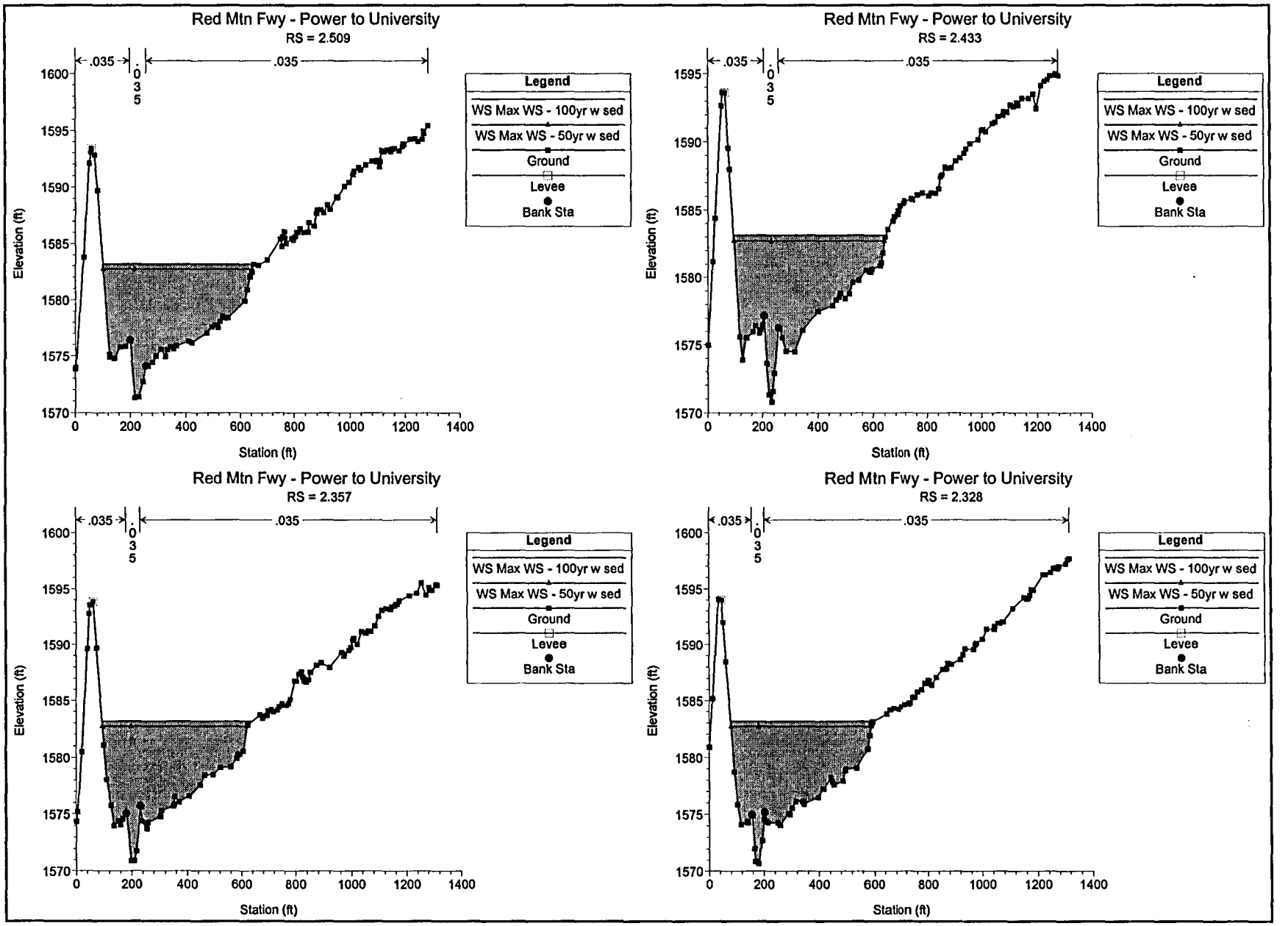

Red Mtn Fwy - Power to University
RS = 3.138
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta

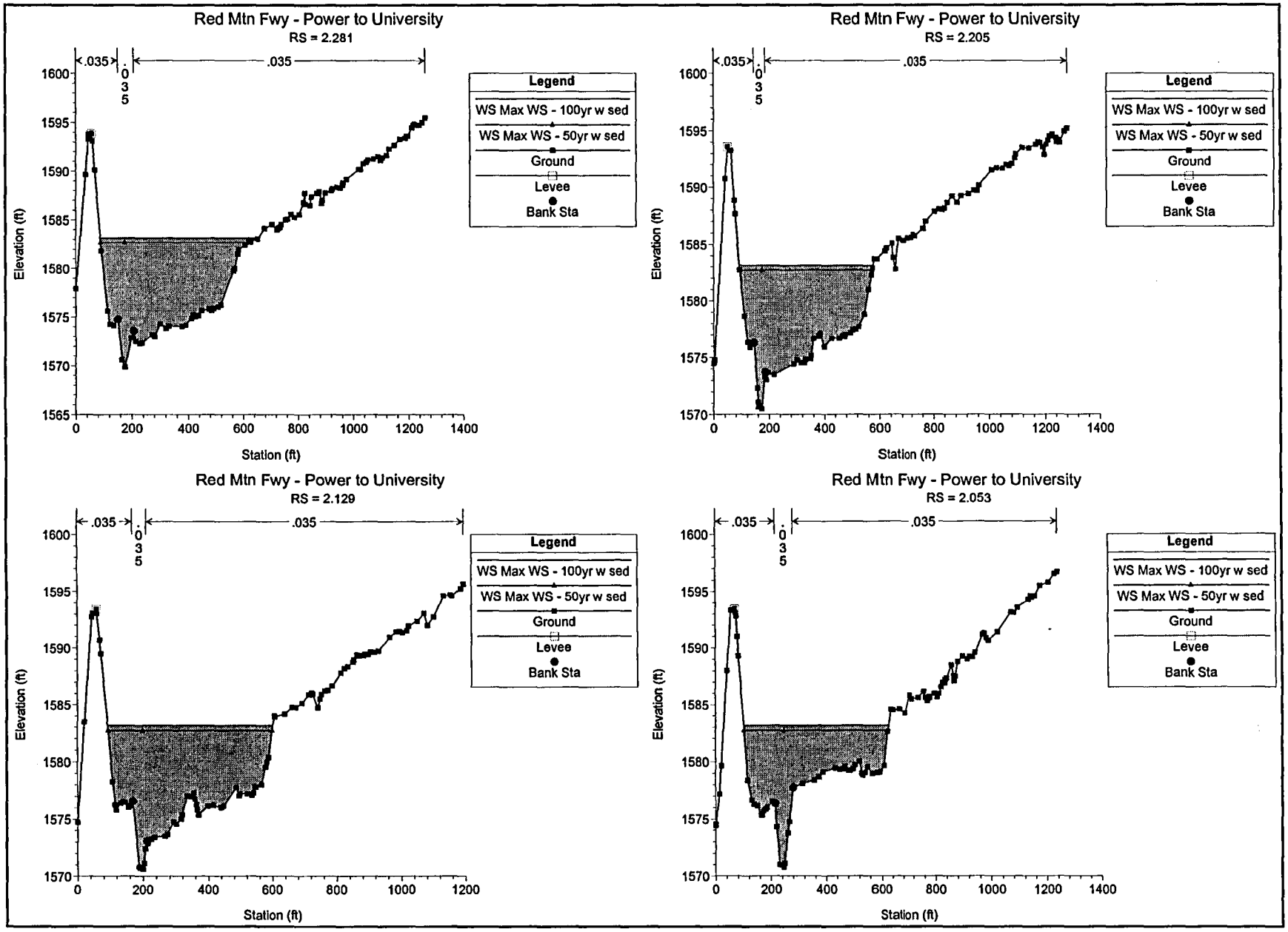

Red Mtn Fwy - Power to University
RS = 3.117 Brown Road
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta

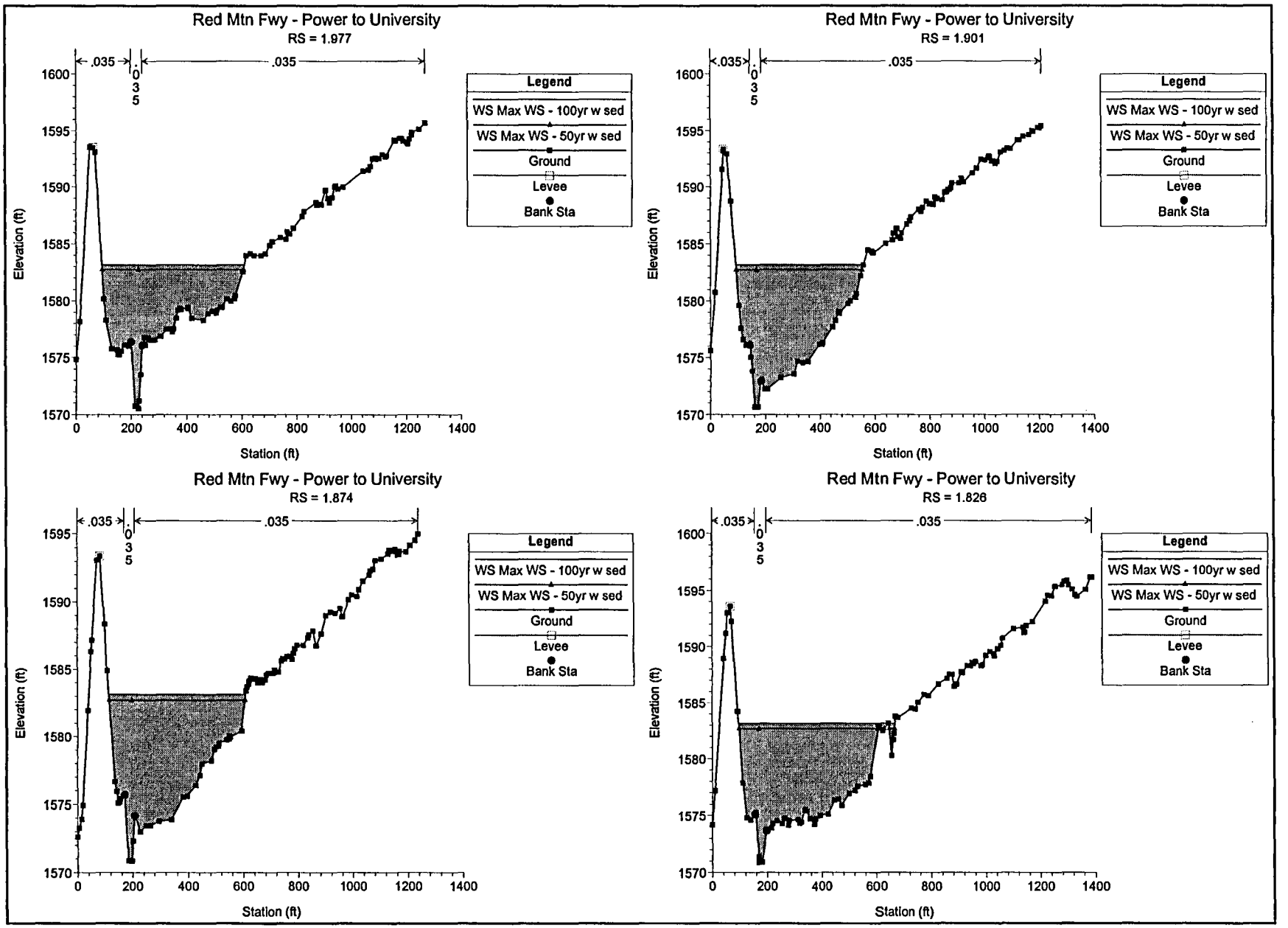

Red Mtn Fwy - Power to University
RS = 3.117 Brown Road
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta

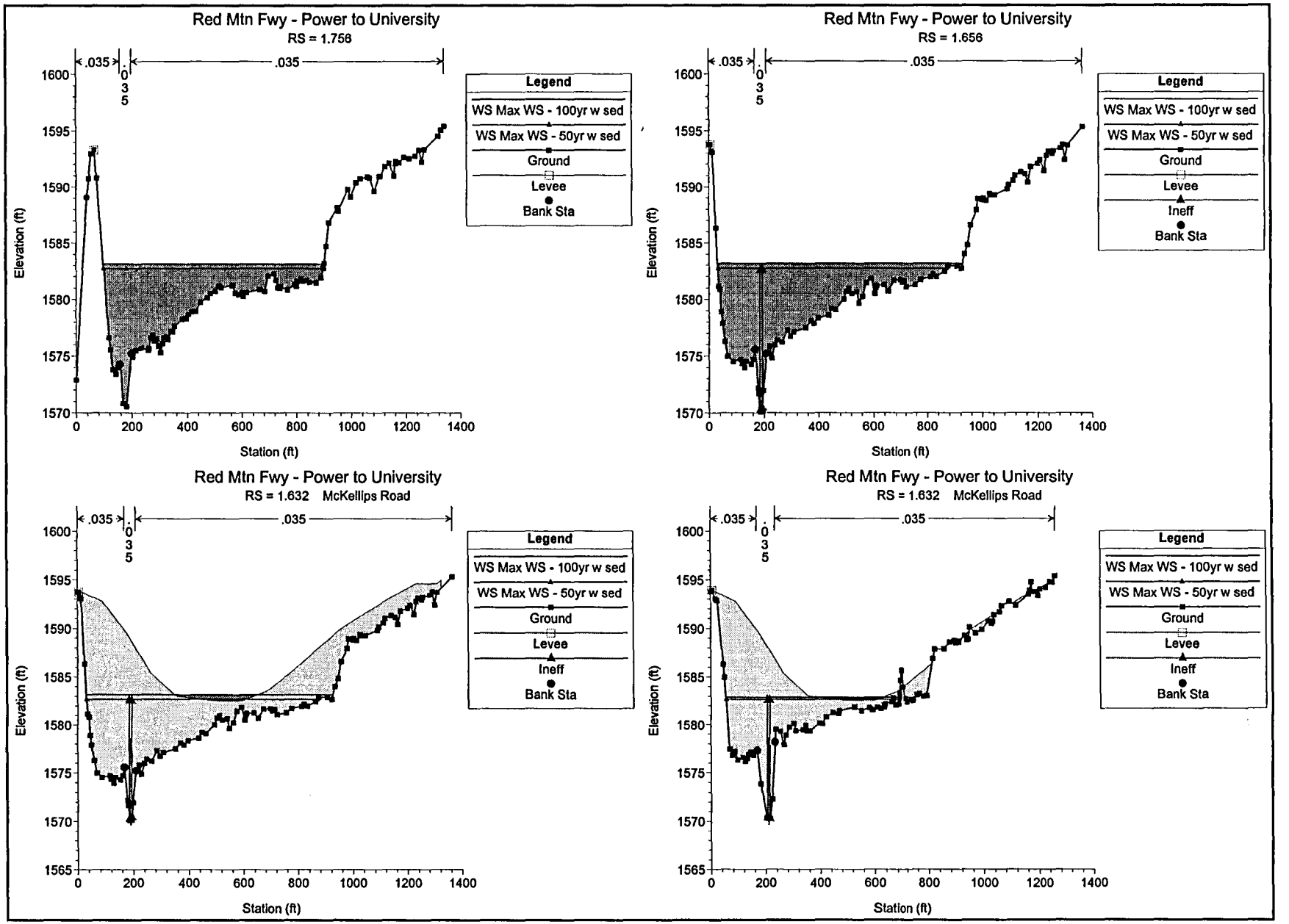

Red Mtn Fwy - Power to University
RS = 3.096
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.966
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.891
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.871
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

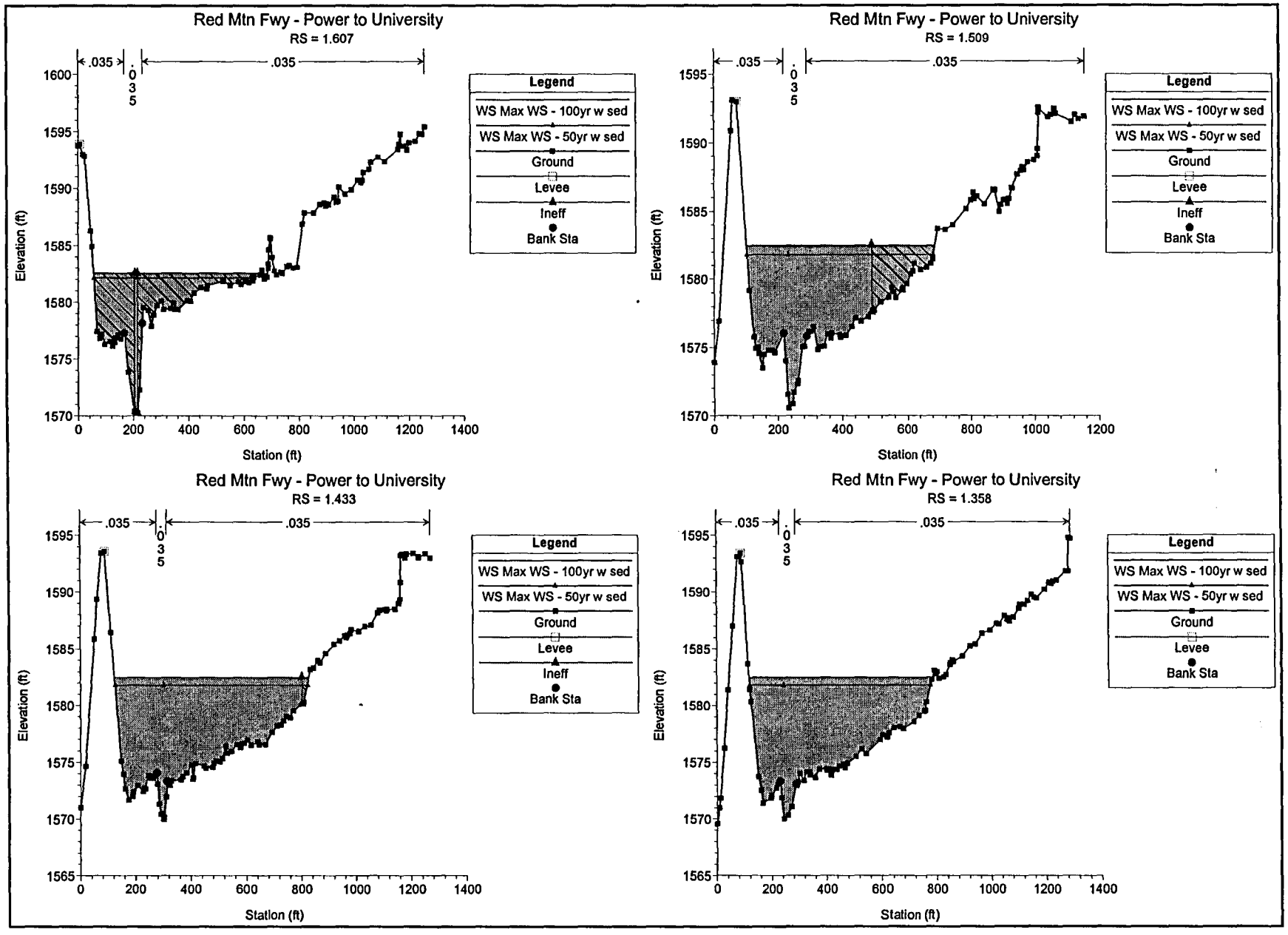

Red Mtn Fwy - Power to University
RS = 2.815
Red Mtn Fwy - Power to University
RS = 2.736
Red Mtn Fwy - Power to University
RS = 2.662
Red Mtn Fwy - Power to University
RS = 2.585
.035
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1570
1575
1580
1585
1590
1595
1600
0
200
400
600
800
1000
1200
1400

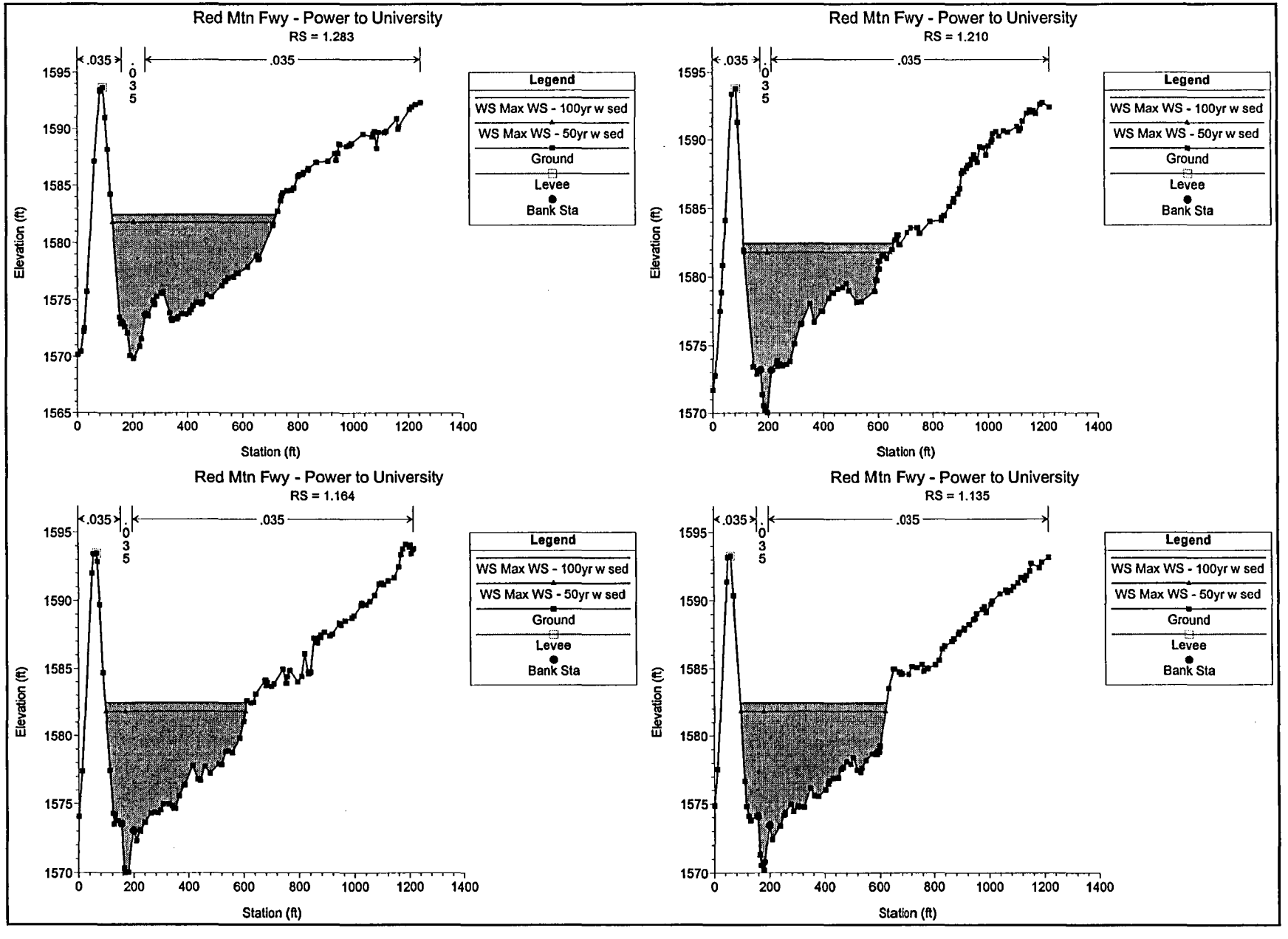

Red Mtn Fwy - Power to University
RS = 2.509
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.433
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.357
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.328
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

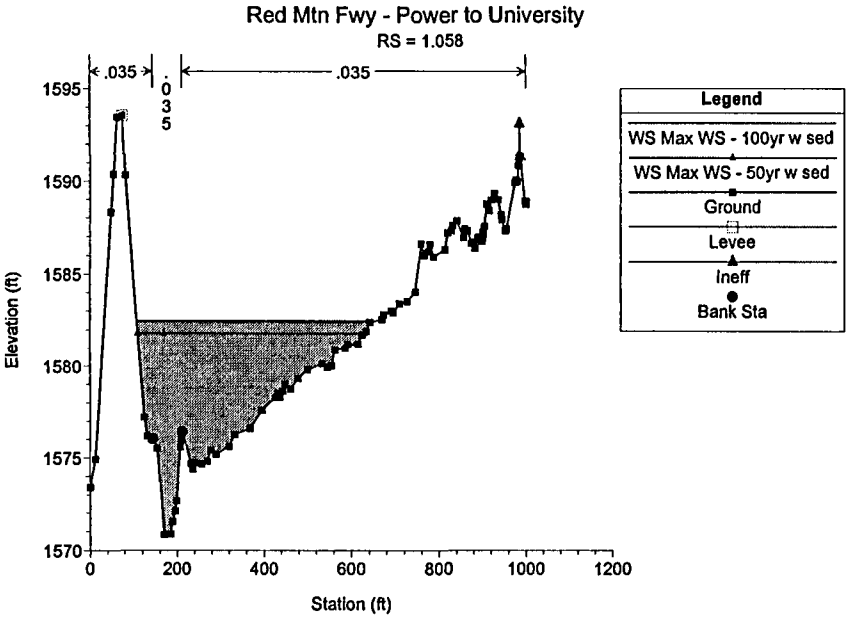

Red Mtn Fwy - Power to University
RS = 2.281
.035
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 2.205
.035
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 2.129
.035
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 2.053
.035
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

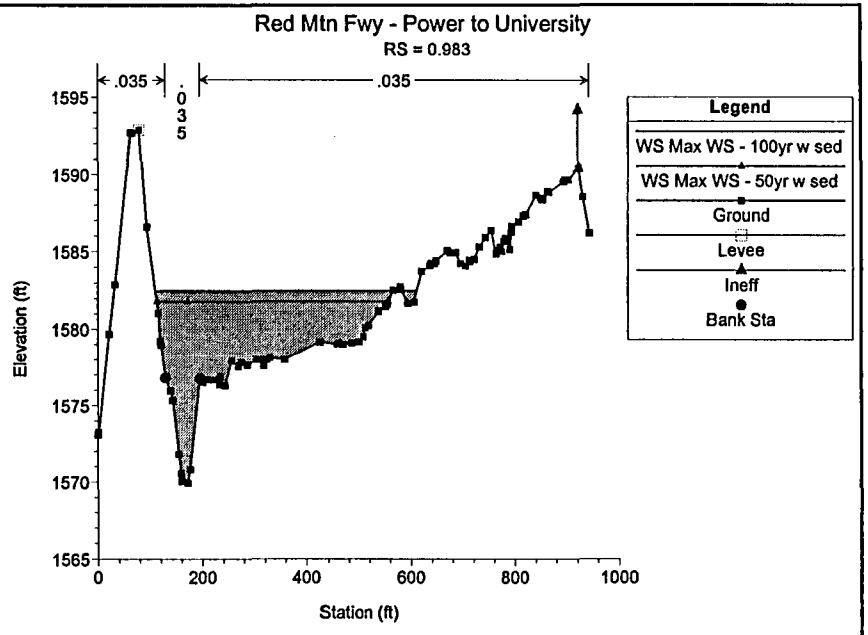

Red Mtn Fwy - Power to University
RS = 1.977
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.901
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.874
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.826
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

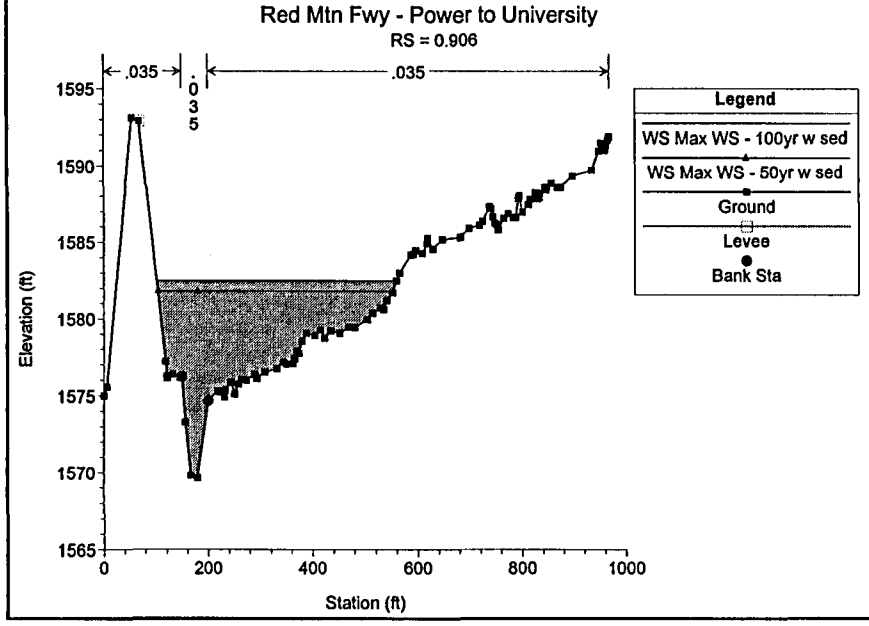

Red Mtn Fwy - Power to University
RS = 1.756
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.656
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.632 McKellips Road
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.632 McKellips Road
.035
.035
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

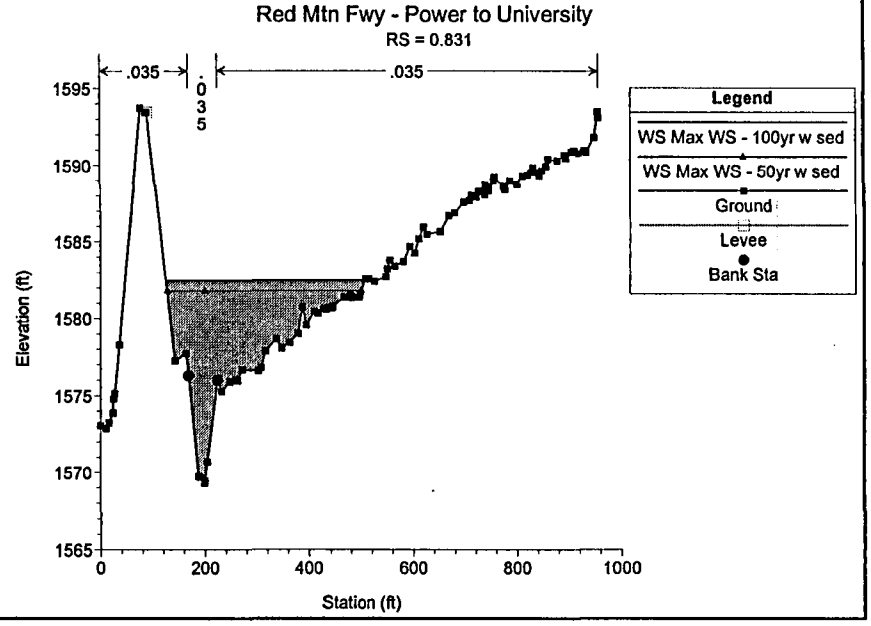

Red Mtn Fwy - Power to University
RS = 1.607
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.509
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.433
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.358
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

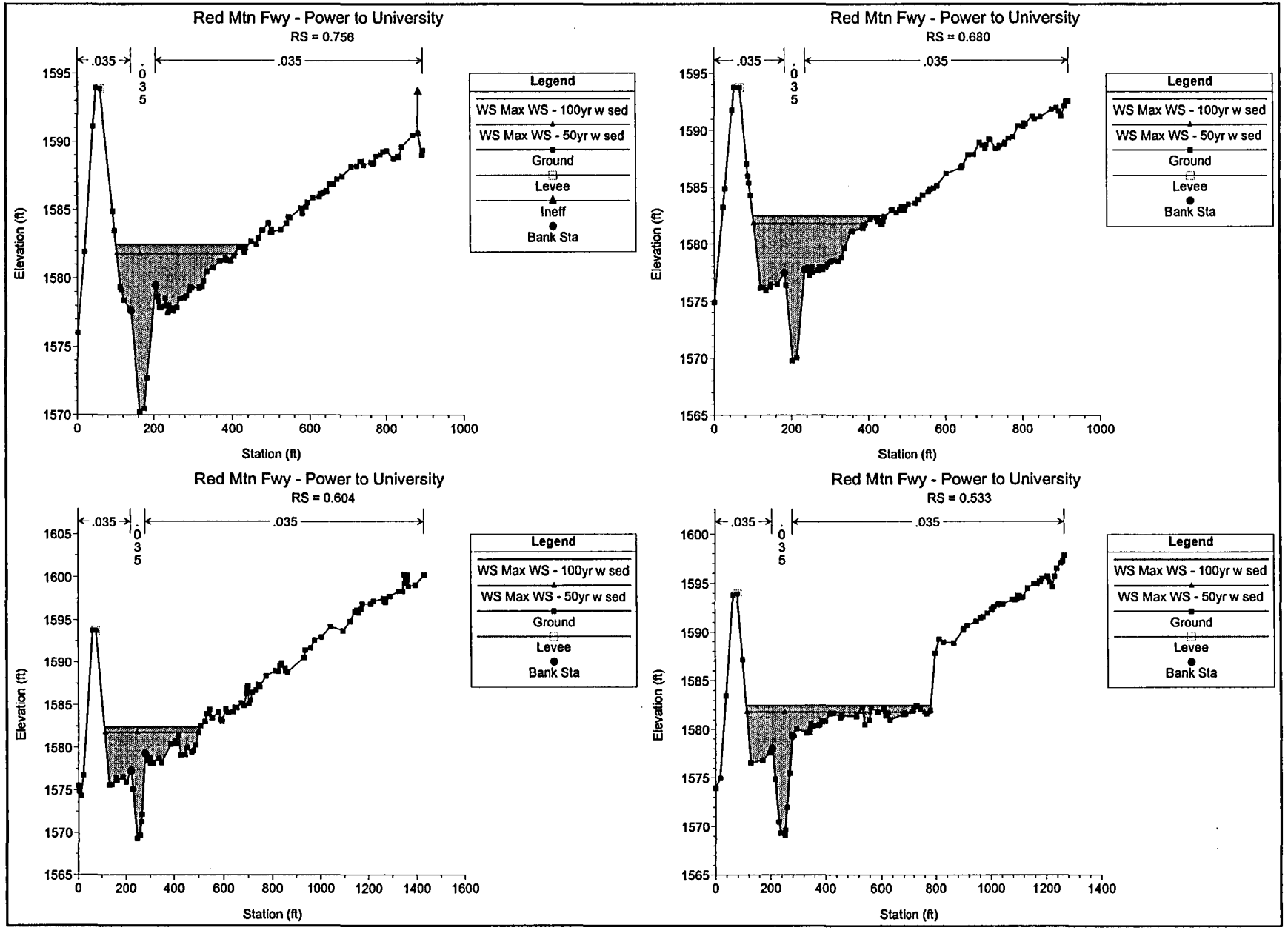

Red Mtn Fwy - Power to University
RS = 1.283
Red Mtn Fwy - Power to University
RS = 1.210
Red Mtn Fwy - Power to University
RS = 1.164
Red Mtn Fwy - Power to University
RS = 1.135
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

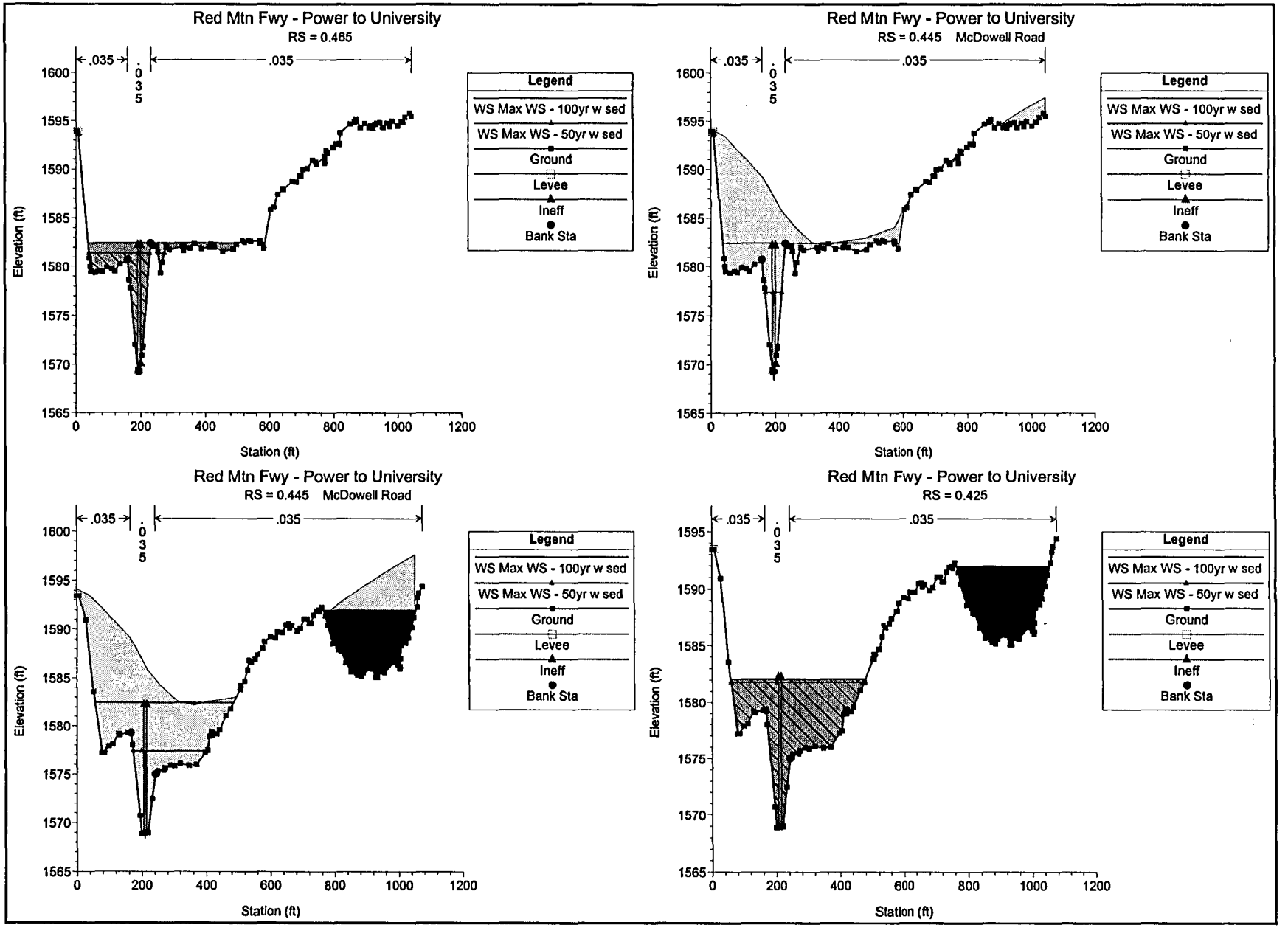

Red Mtn Fwy - Power to University
RS = 1.058
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta

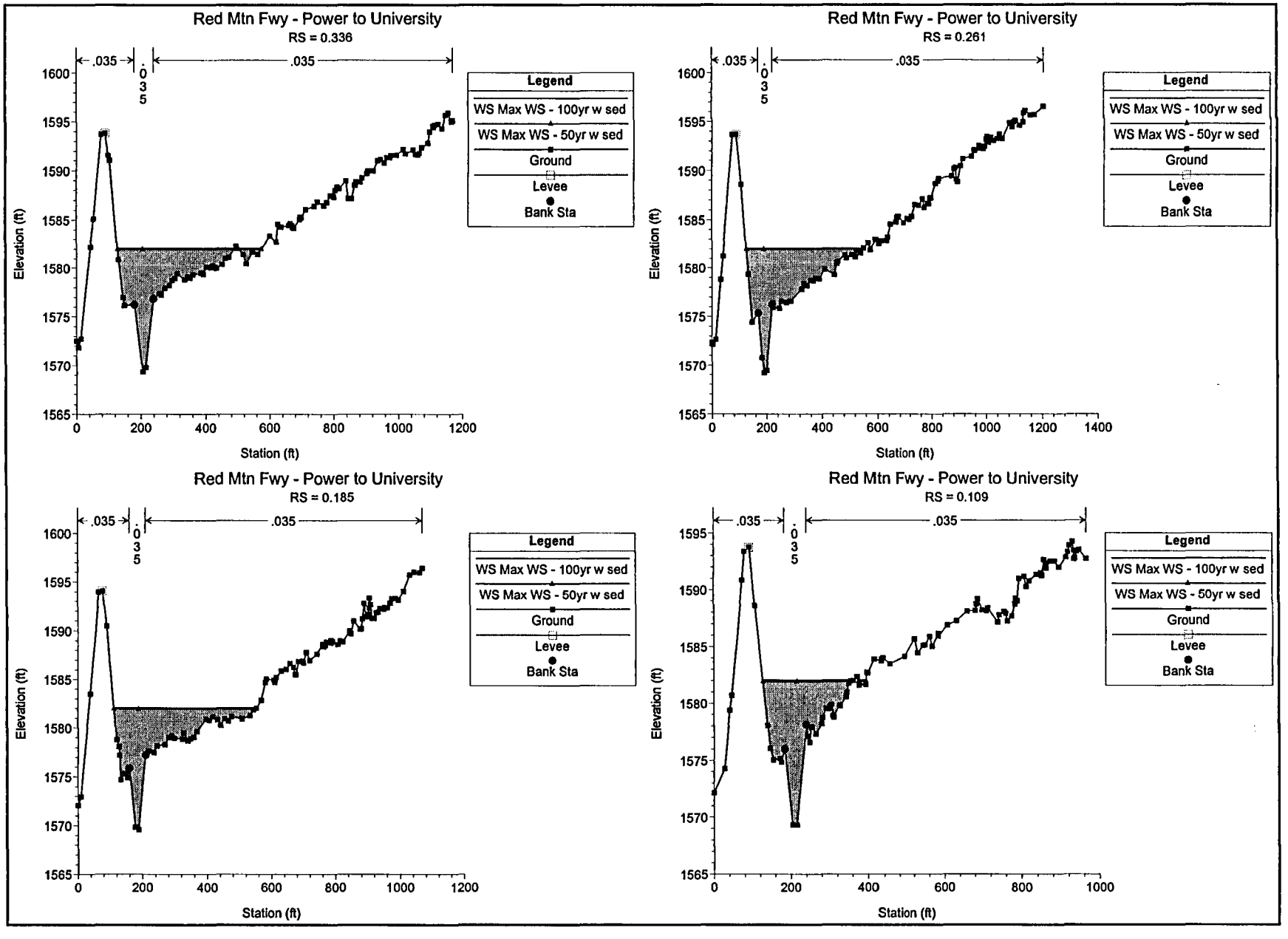

Red Mtn Fwy - Power to University
RS = 0.983
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta

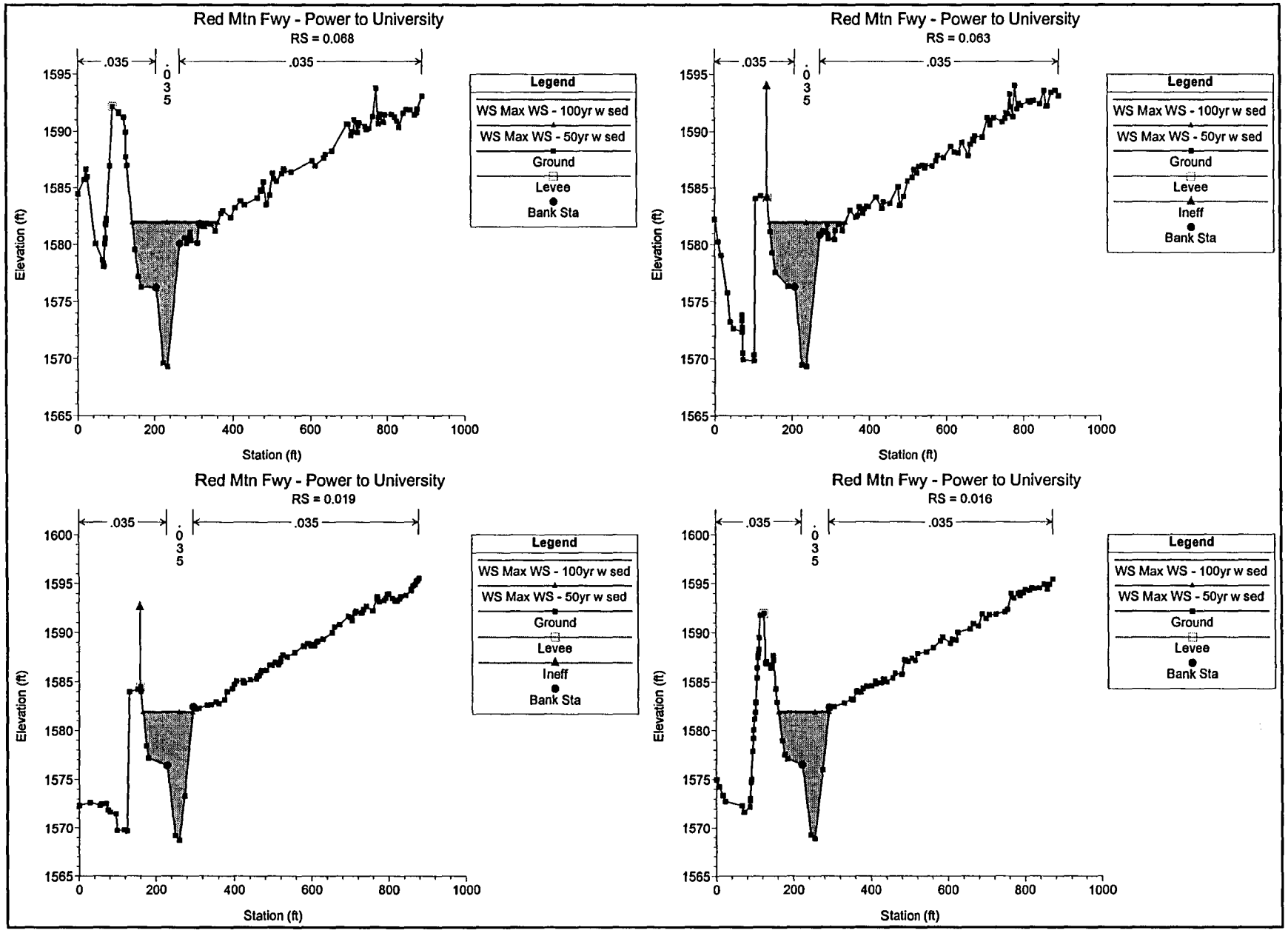

Red Mtn Fwy - Power to University
RS = 0.906
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

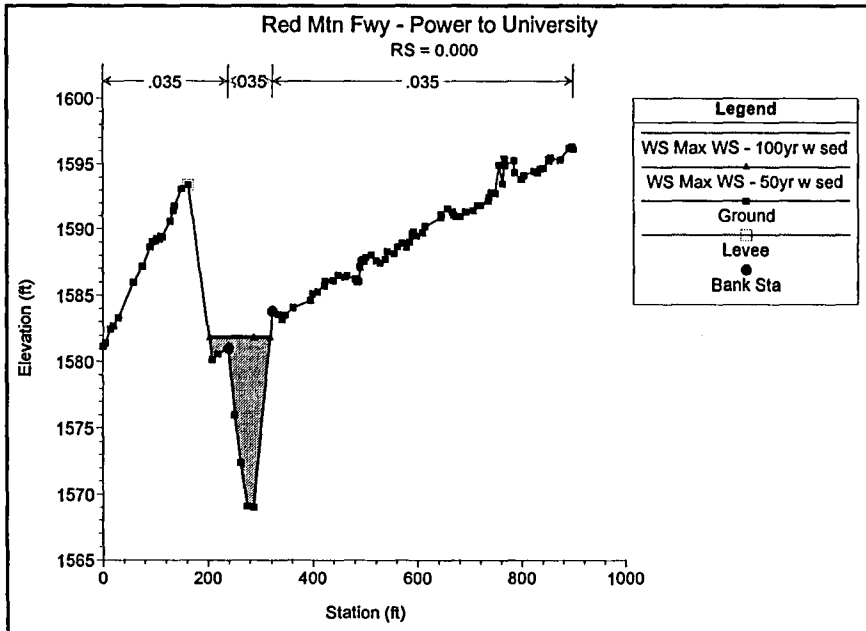

Red Mtn Fwy - Power to University
RS = 0.831
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta

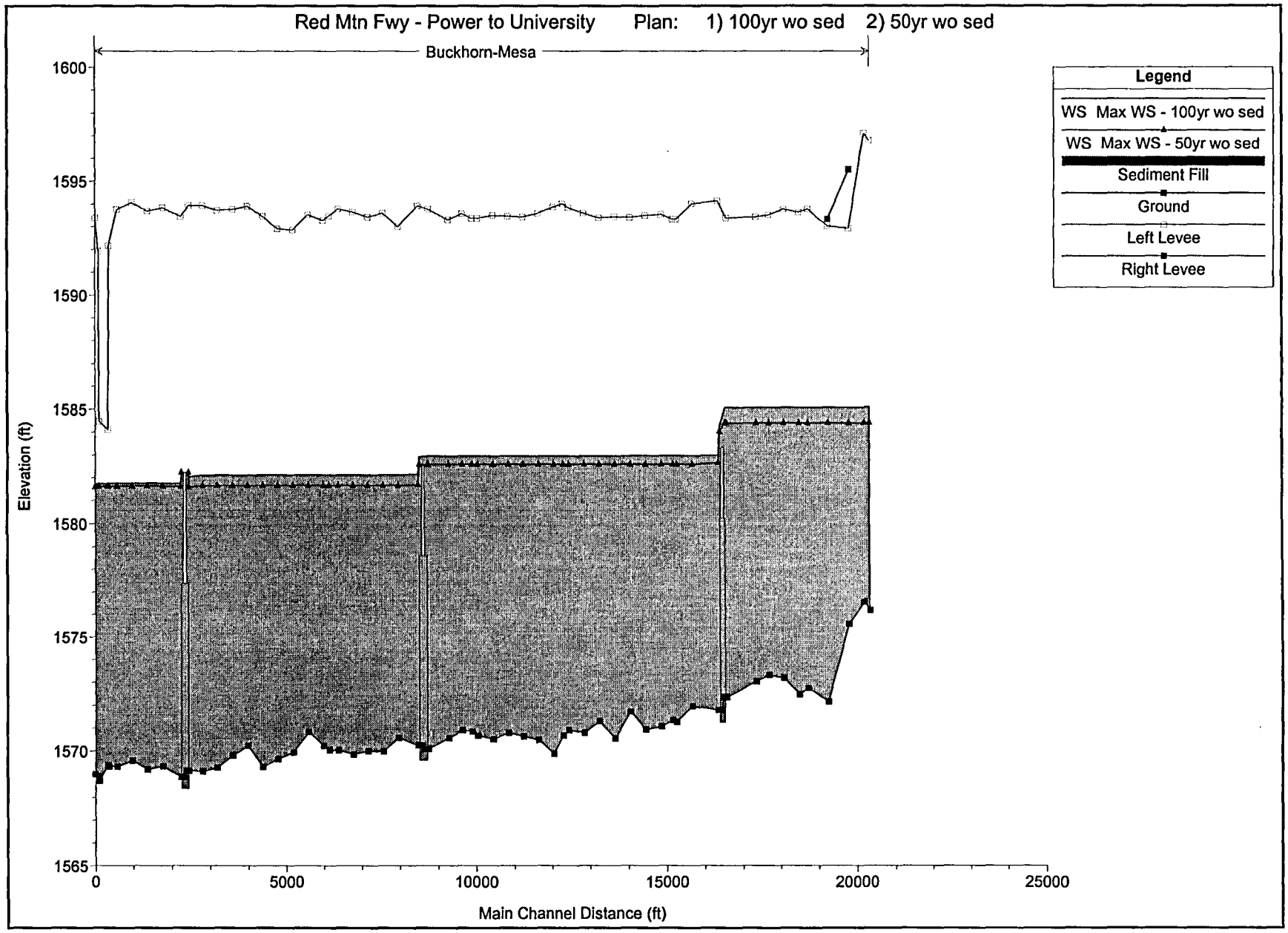

Red Mtn Fwy - Power to University
RS = 0.756
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.680
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.604
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.533
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
RS = 0.465
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.445 McDowell Road
Red Mtn Fwy - Power to University
RS = 0.445 McDowell Road
Red Mtn Fwy - Power to University
RS = 0.425


Red Mtn Fwy - Power to University
RS = 0.336
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.261
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.185
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.109
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
RS = 0.068
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.063
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.019
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.016
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
RS = 0.000
.035
.035
.035
Elevation (ft)
1600
1595
1590
1585
1580
1575
1570
1565
0
200
400
600
800
1000
Station (ft)
Legend
WS Max WS - 100yr w sed
WS Max WS - 50yr w sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
Plan: 1) 100yr wo sed 2) 50yr wo sed
Buckhorn-Mesa
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Sediment Fill
Ground
Left Levee
Right Levee
Elevation (ft)
1600
1595
1590
1585
1580
1575
1570
1565
0
5000
10000
15000
20000
25000
Main Channel Distance (ft)

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS

Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	0.000	50yr wo sed	685.60	1568.99	1581.59	1572.53	1581.61	0.000051	1.14	628.46	114.26	0.07
Buckhorn-Mesa	0.000	100yr wo sed	712.52	1568.99	1581.72	1572.60	1581.74	0.000052	1.16	643.25	115.03	0.07
Buckhorn-Mesa	0.016	50yr wo sed	680.52	1568.89	1581.60		1581.61	0.000032	0.94	809.44	128.95	0.06
Buckhorn-Mesa	0.016	100yr wo sed	711.76	1568.89	1581.73		1581.74	0.000033	0.96	826.11	129.71	0.06
Buckhorn-Mesa	0.019	50yr wo sed	679.65	1568.71	1581.60		1581.62	0.000030	0.93	820.12	128.23	0.06
Buckhorn-Mesa	0.019	100yr wo sed	711.63	1568.71	1581.73		1581.74	0.000032	0.96	836.71	128.91	0.06
Buckhorn-Mesa	0.063	50yr wo sed	666.08	1569.37	1581.61		1581.62	0.000030	0.92	843.86	182.70	0.06
Buckhorn-Mesa	0.063	100yr wo sed	709.60	1569.37	1581.74		1581.75	0.000032	0.95	867.85	189.16	0.06
Buckhorn-Mesa	0.068	50yr wo sed	664.79	1569.32	1581.61		1581.62	0.000029	0.92	854.05	188.74	0.06
Buckhorn-Mesa	0.068	100yr wo sed	709.43	1569.32	1581.74		1581.75	0.000031	0.96	879.32	200.64	0.06
Buckhorn-Mesa	0.109	50yr wo sed	653.01	1569.32	1581.62		1581.63	0.000018	0.76	1104.73	232.79	0.04
Buckhorn-Mesa	0.109	100yr wo sed	707.98	1569.32	1581.75		1581.76	0.000020	0.81	1135.72	239.97	0.05
Buckhorn-Mesa	0.185	50yr wo sed	633.16	1569.58	1581.63		1581.63	0.000017	0.75	1319.45	428.01	0.04
Buckhorn-Mesa	0.185	100yr wo sed	706.55	1569.58	1581.76		1581.77	0.000019	0.81	1375.74	430.78	0.05
Buckhorn-Mesa	0.261	50yr wo sed	614.86	1569.20	1581.63		1581.64	0.000009	0.57	1632.04	401.88	0.03
Buckhorn-Mesa	0.261	100yr wo sed	706.55	1569.20	1581.77		1581.77	0.000011	0.64	1685.48	408.18	0.04
Buckhorn-Mesa	0.336	50yr wo sed	595.12	1569.34	1581.63		1581.64	0.000012	0.64	1373.48	405.94	0.04
Buckhorn-Mesa	0.336	100yr wo sed	709.37	1569.34	1581.77		1581.77	0.000016	0.74	1428.41	418.18	0.04
Buckhorn-Mesa	0.425	50yr wo sed	-220.12	1568.88	1581.61		1581.67	0.000070	-1.93	113.95	413.28	0.10
Buckhorn-Mesa	0.425	100yr wo sed	-257.96	1568.88	1581.74		1581.82	0.000093	-2.24	115.11	416.49	0.11
Buckhorn-Mesa	0.445		Culvert									
Buckhorn-Mesa	0.465	50yr wo sed	312.23	1569.15	1581.59		1581.71	0.000162	2.84	109.91	213.64	0.14
Buckhorn-Mesa	0.465	100yr wo sed	371.22	1569.15	1582.05		1582.22	0.000202	3.25	114.09	399.97	0.16
Buckhorn-Mesa	0.533	50yr wo sed	311.90	1569.13	1581.65		1581.65	0.000003	0.32	1310.11	497.42	0.02
Buckhorn-Mesa	0.533	100yr wo sed	371.01	1569.13	1582.13		1582.13	0.000003	0.34	1587.29	638.18	0.02
Buckhorn-Mesa	0.604	50yr wo sed	311.53	1569.28	1581.65		1581.65	0.000003	0.28	1562.89	386.96	0.02
Buckhorn-Mesa	0.604	100yr wo sed	370.25	1569.28	1582.13		1582.13	0.000003	0.29	1749.74	393.48	0.02
Buckhorn-Mesa	0.680	50yr wo sed	311.13	1569.80	1581.65		1581.65	0.000004	0.35	1231.24	286.82	0.02

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	0.680	100yr wo sed	370.27	1569.80	1582.13		1582.13	0.000004	0.37	1375.53	317.48	0.02
Buckhorn-Mesa	0.756	50yr wo sed	310.79	1570.22	1581.66		1581.66	0.000006	0.42	1045.00	302.53	0.03
Buckhorn-Mesa	0.756	100yr wo sed	368.70	1570.22	1582.13		1582.14	0.000006	0.43	1192.53	317.81	0.03
Buckhorn-Mesa	0.831	50yr wo sed	310.26	1569.31	1581.66		1581.66	0.000003	0.31	1491.65	370.08	0.02
Buckhorn-Mesa	0.831	100yr wo sed	368.74	1569.31	1582.14		1582.14	0.000003	0.33	1670.43	376.35	0.02
Buckhorn-Mesa	0.906	50yr wo sed	309.87	1569.66	1581.66		1581.66	0.000001	0.23	2026.83	446.97	0.01
Buckhorn-Mesa	0.906	100yr wo sed	368.98	1569.66	1582.14		1582.14	0.000002	0.25	2242.11	453.41	0.01
Buckhorn-Mesa	0.983	50yr wo sed	309.53	1569.94	1581.66		1581.66	0.000002	0.26	1755.23	442.73	0.02
Buckhorn-Mesa	0.983	100yr wo sed	368.46	1569.94	1582.14		1582.14	0.000002	0.27	1976.47	472.77	0.02
Buckhorn-Mesa	1.058	50yr wo sed	309.31	1570.83	1581.66		1581.66	0.000001	0.20	2257.95	514.16	0.01
Buckhorn-Mesa	1.058	100yr wo sed	369.14	1570.83	1582.14		1582.14	0.000001	0.21	2508.24	529.28	0.01
Buckhorn-Mesa	1.135	50yr wo sed	308.82	1570.23	1581.66		1581.66	0.000001	0.14	3035.38	524.06	0.01
Buckhorn-Mesa	1.135	100yr wo sed	370.24	1570.23	1582.14		1582.14	0.000001	0.15	3287.10	529.10	0.01
Buckhorn-Mesa	1.164	50yr wo sed	308.73	1570.04	1581.66		1581.66	0.000001	0.15	2934.26	505.53	0.01
Buckhorn-Mesa	1.164	100yr wo sed	367.23	1570.04	1582.14		1582.14	0.000001	0.16	3177.11	510.50	0.01
Buckhorn-Mesa	1.210	50yr wo sed	308.59	1570.03	1581.66		1581.66	0.000001	0.19	2523.48	527.96	0.01
Buckhorn-Mesa	1.210	100yr wo sed	369.53	1570.03	1582.14		1582.14	0.000001	0.21	2779.75	542.58	0.01
Buckhorn-Mesa	1.283	50yr wo sed	308.36	1569.85	1581.66		1581.66	0.000000	0.11	3674.54	584.72	0.01
Buckhorn-Mesa	1.283	100yr wo sed	370.85	1569.85	1582.14		1582.14	0.000000	0.12	3956.77	593.69	0.01
Buckhorn-Mesa	1.358	50yr wo sed	308.16	1570.00	1581.66		1581.66	0.000000	0.10	4168.33	657.11	0.01
Buckhorn-Mesa	1.358	100yr wo sed	371.94	1570.00	1582.14		1582.14	0.000000	0.11	4484.48	662.94	0.01
Buckhorn-Mesa	1.433	50yr wo sed	307.95	1569.98	1581.66		1581.66	0.000000	0.10	4293.35	694.74	0.01
Buckhorn-Mesa	1.433	100yr wo sed	373.49	1569.98	1582.14		1582.14	0.000000	0.11	4617.86	700.28	0.01
Buckhorn-Mesa	1.509	50yr wo sed	307.71	1570.57	1581.66		1581.66	0.000001	0.15	2432.95	578.60	0.01
Buckhorn-Mesa	1.509	100yr wo sed	373.99	1570.57	1582.14		1582.14	0.000001	0.17	2619.32	583.17	0.01
Buckhorn-Mesa	1.607	50yr wo sed	352.96	1570.24	1581.69		1581.88	0.000256	3.44	102.56	505.18	0.18
Buckhorn-Mesa	1.607	100yr wo sed	375.14	1570.24	1582.18		1582.37	0.000252	3.51	106.93	591.44	0.18
Buckhorn-Mesa	1.632		Culvert									

HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

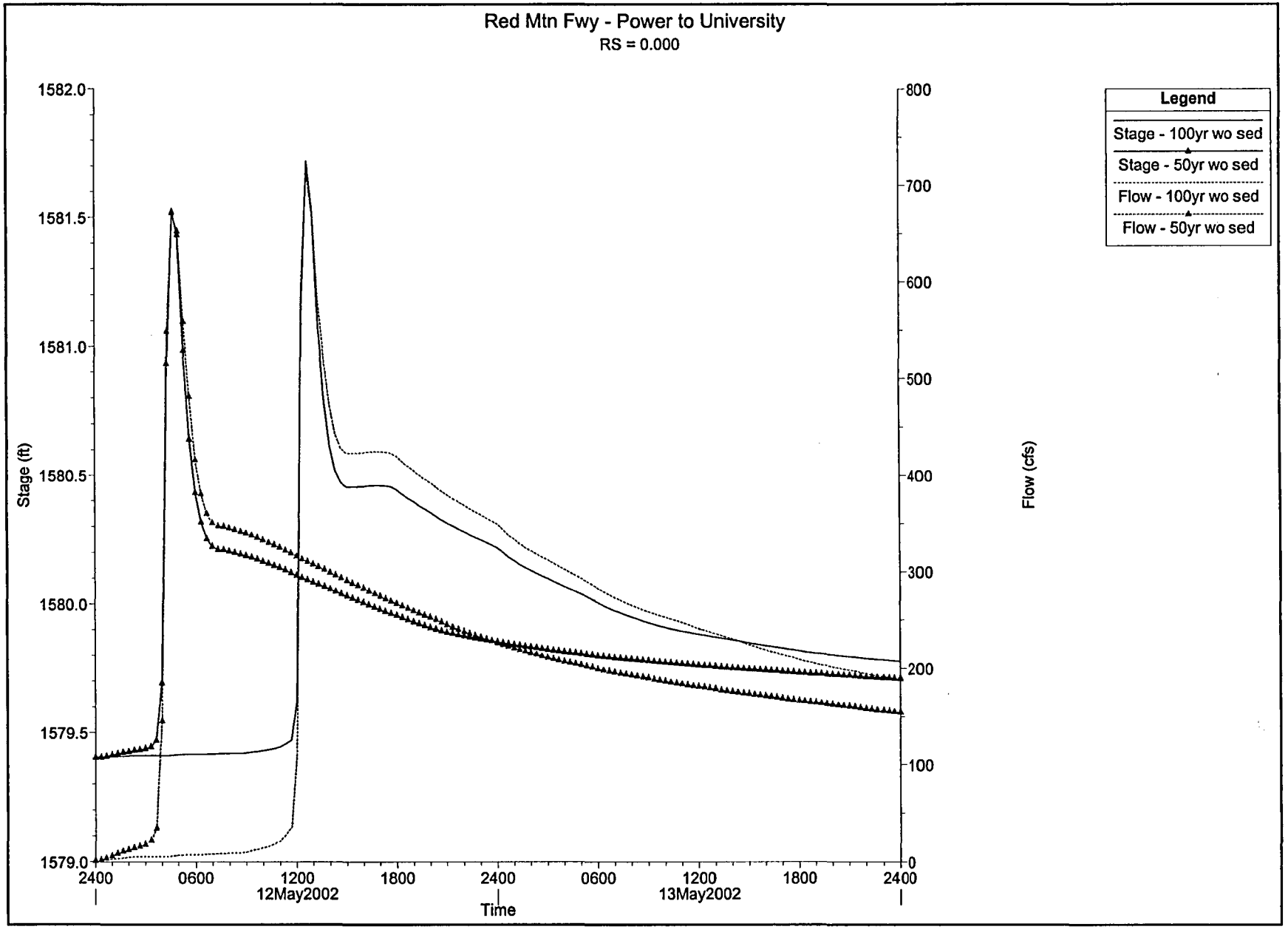
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	1.656	50yr wo sed	386.43	1570.09	1582.59		1582.59	0.000001	0.19	3280.53	833.62	0.01
Buckhorn-Mesa	1.656	100yr wo sed	494.41	1570.09	1582.97		1582.97	0.000001	0.22	3604.79	893.96	0.01
Buckhorn-Mesa	1.756	50yr wo sed	388.43	1570.56	1582.59		1582.59	0.000001	0.24	2899.31	796.99	0.01
Buckhorn-Mesa	1.756	100yr wo sed	496.14	1570.56	1582.97		1582.97	0.000002	0.27	3203.09	801.49	0.01
Buckhorn-Mesa	1.826	50yr wo sed	379.47	1570.90	1582.59		1582.59	0.000000	0.14	3577.78	534.19	0.01
Buckhorn-Mesa	1.826	100yr wo sed	497.25	1570.90	1582.97		1582.97	0.000001	0.17	3786.58	562.08	0.01
Buckhorn-Mesa	1.874	50yr wo sed	379.74	1570.85	1582.59		1582.59	0.000001	0.16	3123.22	489.55	0.01
Buckhorn-Mesa	1.874	100yr wo sed	497.53	1570.85	1582.97		1582.97	0.000001	0.20	3309.89	492.91	0.01
Buckhorn-Mesa	1.901	50yr wo sed	379.80	1570.66	1582.59		1582.59	0.000001	0.15	3136.76	460.33	0.01
Buckhorn-Mesa	1.901	100yr wo sed	483.45	1570.66	1582.97		1582.97	0.000001	0.19	3312.70	465.69	0.01
Buckhorn-Mesa	1.977	50yr wo sed	377.77	1570.52	1582.59		1582.59	0.000001	0.22	2493.93	509.15	0.01
Buckhorn-Mesa	1.977	100yr wo sed	480.44	1570.52	1582.97		1582.97	0.000002	0.26	2688.64	513.04	0.01
Buckhorn-Mesa	2.053	50yr wo sed	377.59	1570.79	1582.59		1582.59	0.000001	0.22	2470.16	518.84	0.01
Buckhorn-Mesa	2.053	100yr wo sed	474.59	1570.79	1582.97		1582.97	0.000002	0.25	2667.97	522.22	0.01
Buckhorn-Mesa	2.129	50yr wo sed	358.77	1570.63	1582.59		1582.59	0.000001	0.14	3319.59	505.14	0.01
Buckhorn-Mesa	2.129	100yr wo sed	472.45	1570.63	1582.97		1582.97	0.000001	0.17	3512.62	508.18	0.01
Buckhorn-Mesa	2.205	50yr wo sed	356.56	1570.47	1582.59		1582.59	0.000001	0.14	3206.04	478.87	0.01
Buckhorn-Mesa	2.205	100yr wo sed	483.72	1570.47	1582.97		1582.97	0.000001	0.18	3388.88	484.64	0.01
Buckhorn-Mesa	2.281	50yr wo sed	355.44	1569.87	1582.59		1582.59	0.000000	0.12	3842.67	524.70	0.01
Buckhorn-Mesa	2.281	100yr wo sed	476.65	1569.87	1582.97		1582.97	0.000001	0.15	4047.69	555.62	0.01
Buckhorn-Mesa	2.328	50yr wo sed	354.02	1570.67	1582.59		1582.59	0.000001	0.15	3163.69	508.13	0.01
Buckhorn-Mesa	2.328	100yr wo sed	474.58	1570.67	1582.97		1582.97	0.000001	0.19	3357.44	511.90	0.01
Buckhorn-Mesa	2.357	50yr wo sed	351.65	1570.91	1582.59		1582.59	0.000001	0.15	3161.52	524.85	0.01
Buckhorn-Mesa	2.357	100yr wo sed	474.37	1570.91	1582.97		1582.97	0.000001	0.19	3362.25	536.67	0.01
Buckhorn-Mesa	2.433	50yr wo sed	345.72	1570.78	1582.59		1582.59	0.000001	0.16	2954.00	545.00	0.01
Buckhorn-Mesa	2.433	100yr wo sed	467.17	1570.78	1582.97		1582.97	0.000001	0.20	3161.23	548.85	0.01
Buckhorn-Mesa	2.509	50yr wo sed	340.02	1571.29	1582.59		1582.59	0.000001	0.14	3301.61	541.47	0.01
Buckhorn-Mesa	2.509	100yr wo sed	460.00	1571.29	1582.97		1582.97	0.000001	0.17	3507.50	545.27	0.01

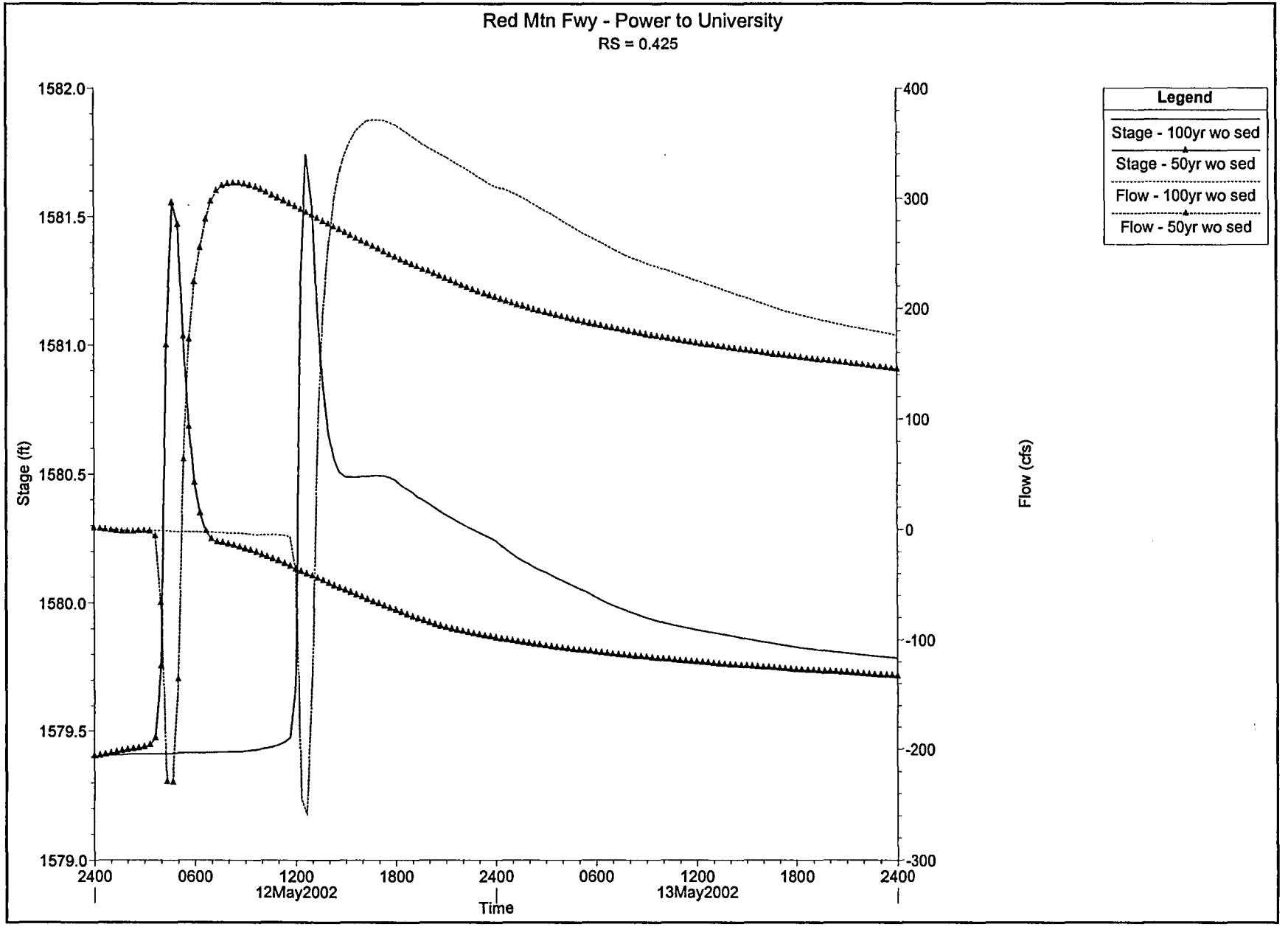
HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

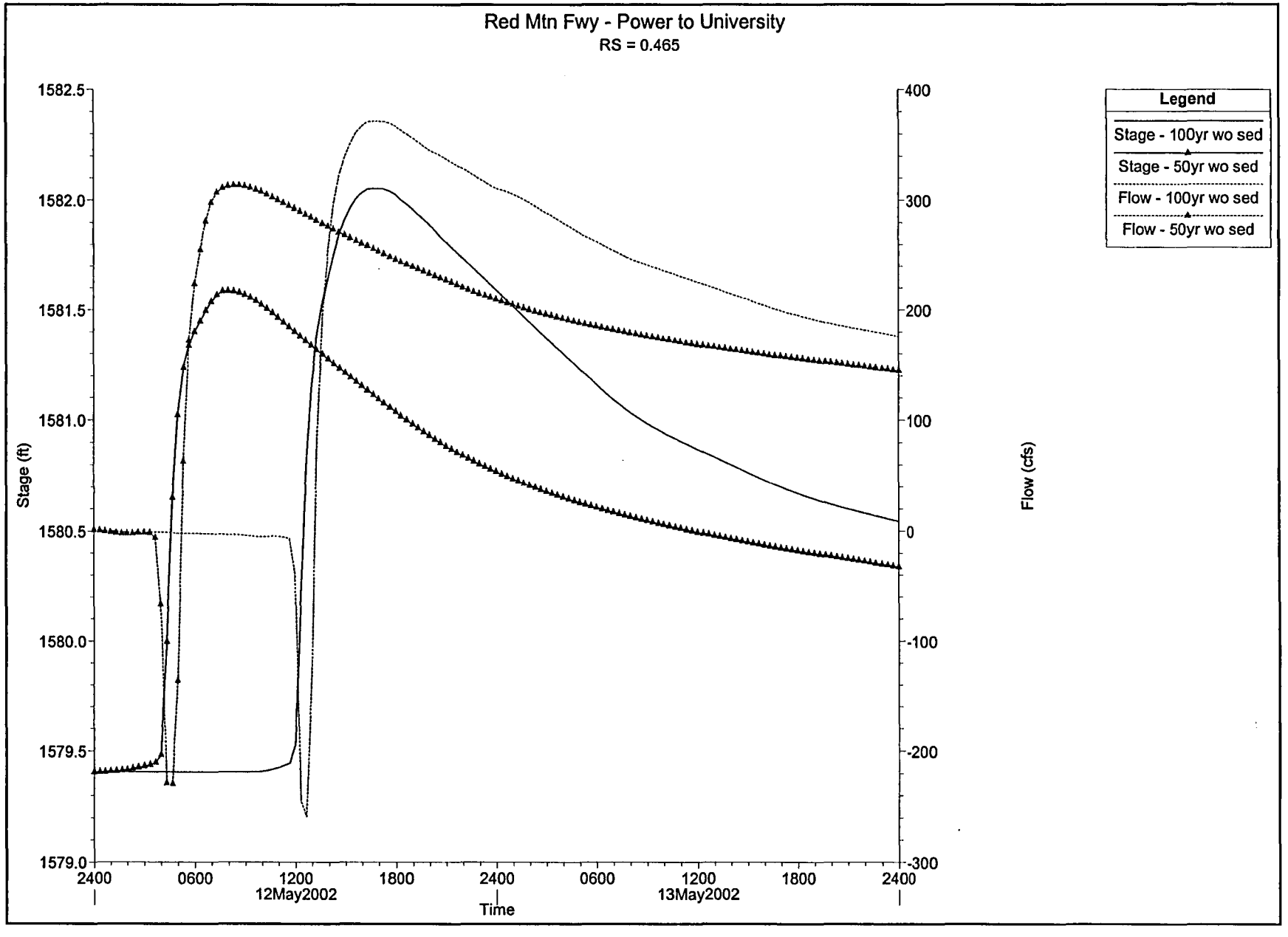
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	2.585	50yr wo sed	332.42	1570.54	1582.59		1582.59	0.000000	0.13	3603.64	595.56	0.01
Buckhorn-Mesa	2.585	100yr wo sed	458.73	1570.54	1582.97		1582.97	0.000001	0.17	3831.36	608.10	0.01
Buckhorn-Mesa	2.662	50yr wo sed	326.99	1571.72	1582.59		1582.59	0.000000	0.13	3271.56	610.28	0.01
Buckhorn-Mesa	2.662	100yr wo sed	450.92	1571.72	1582.97		1582.97	0.000001	0.17	3506.89	636.19	0.01
Buckhorn-Mesa	2.736	50yr wo sed	321.31	1570.94	1582.59		1582.59	0.000000	0.12	3461.38	478.23	0.01
Buckhorn-Mesa	2.736	100yr wo sed	442.11	1570.94	1582.97		1582.97	0.000001	0.15	3647.85	499.30	0.01
Buckhorn-Mesa	2.815	50yr wo sed	319.50	1571.07	1582.59		1582.59	0.000000	0.12	3749.79	610.96	0.01
Buckhorn-Mesa	2.815	100yr wo sed	441.22	1571.07	1582.97		1582.97	0.000001	0.16	3991.14	644.71	0.01
Buckhorn-Mesa	2.871	50yr wo sed	318.62	1571.33	1582.59		1582.59	0.000000	0.12	3327.85	518.59	0.01
Buckhorn-Mesa	2.871	100yr wo sed	438.06	1571.33	1582.97		1582.97	0.000001	0.16	3528.42	546.83	0.01
Buckhorn-Mesa	2.891	50yr wo sed	317.20	1571.26	1582.59		1582.59	0.000001	0.22	2306.19	585.62	0.01
Buckhorn-Mesa	2.891	100yr wo sed	437.39	1571.26	1582.97		1582.97	0.000002	0.27	2532.44	610.65	0.02
Buckhorn-Mesa	2.966	50yr wo sed	315.34	1571.96	1582.59		1582.59	0.000001	0.22	2068.24	479.08	0.01
Buckhorn-Mesa	2.966	100yr wo sed	435.16	1571.96	1582.97		1582.97	0.000002	0.27	2252.26	493.14	0.02
Buckhorn-Mesa	3.096	50yr wo sed	362.58	1571.78	1582.67		1582.89	0.000344	3.79	95.75	376.90	0.20
Buckhorn-Mesa	3.096	100yr wo sed	430.48	1571.78	1583.01		1583.30	0.000437	4.36	98.82	454.28	0.23
Buckhorn-Mesa	3.117		Culvert									
Buckhorn-Mesa	3.138	50yr wo sed	661.61	1572.36	1584.39		1584.39	0.000007	0.48	2078.23	506.59	0.03
Buckhorn-Mesa	3.138	100yr wo sed	865.68	1572.36	1585.07		1585.08	0.000008	0.53	2429.46	521.70	0.03
Buckhorn-Mesa	3.285	50yr wo sed	630.20	1573.04	1584.39		1584.40	0.000012	0.62	1437.50	319.91	0.04
Buckhorn-Mesa	3.285	100yr wo sed	835.26	1573.04	1585.08		1585.08	0.000014	0.71	1659.01	332.45	0.04
Buckhorn-Mesa	3.349	50yr wo sed	613.64	1573.32	1584.40		1584.40	0.000004	0.38	2218.40	423.59	0.02
Buckhorn-Mesa	3.349	100yr wo sed	815.85	1573.32	1585.08		1585.08	0.000005	0.44	2510.49	430.36	0.02
Buckhorn-Mesa	3.424	50yr wo sed	597.10	1573.19	1584.40		1584.40	0.000002	0.27	2819.51	450.29	0.02
Buckhorn-Mesa	3.424	100yr wo sed	789.01	1573.19	1585.08		1585.08	0.000003	0.33	3136.90	477.79	0.02
Buckhorn-Mesa	3.500	50yr wo sed	586.28	1572.48	1584.40		1584.40	0.000001	0.21	3672.27	510.94	0.01
Buckhorn-Mesa	3.500	100yr wo sed	776.70	1572.48	1585.09		1585.09	0.000001	0.25	4027.29	529.27	0.01

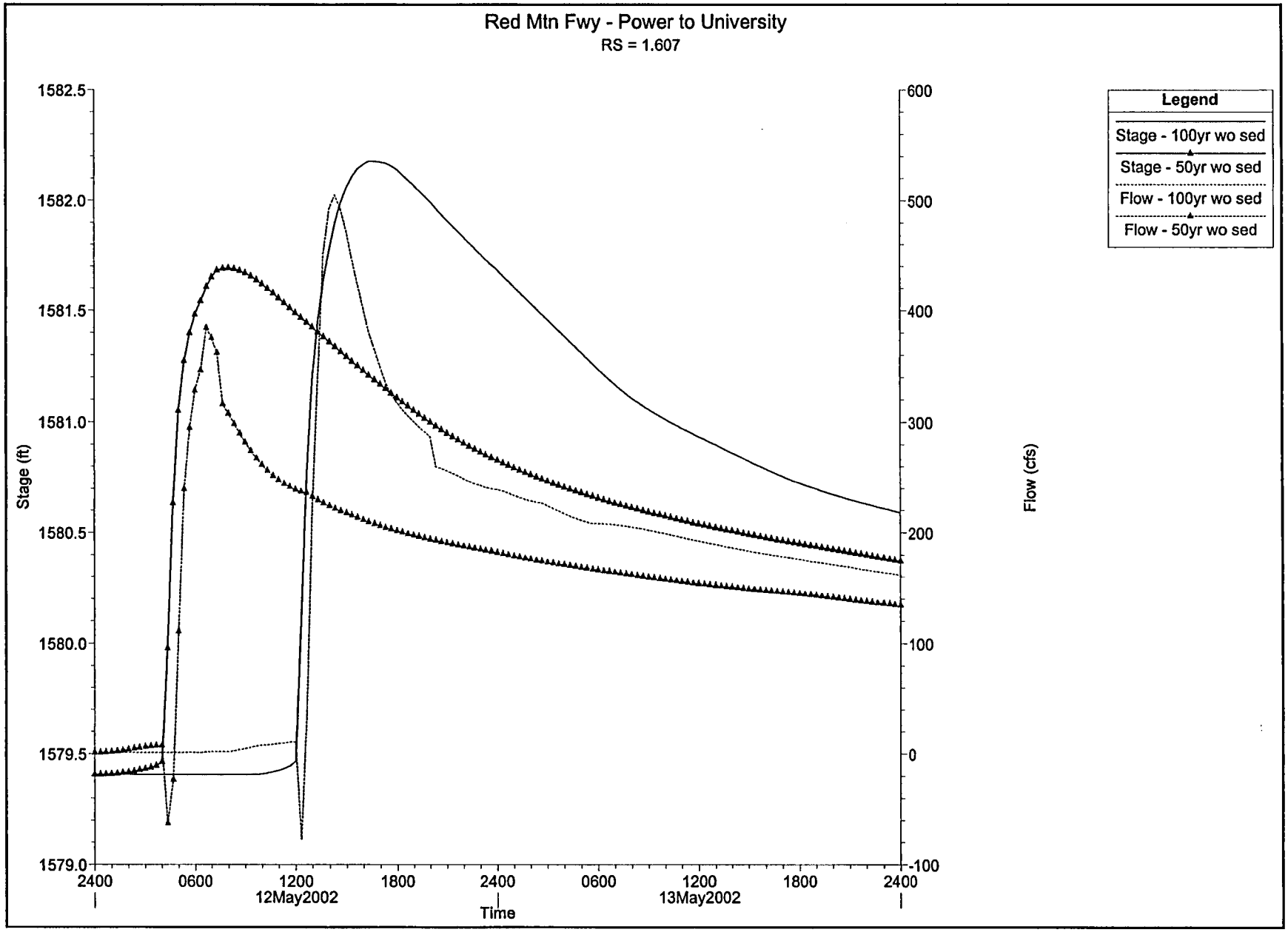
HEC-RAS River: Spook Hill FRS Reach: Buckhorn-Mesa Profile: Max WS (Continued)

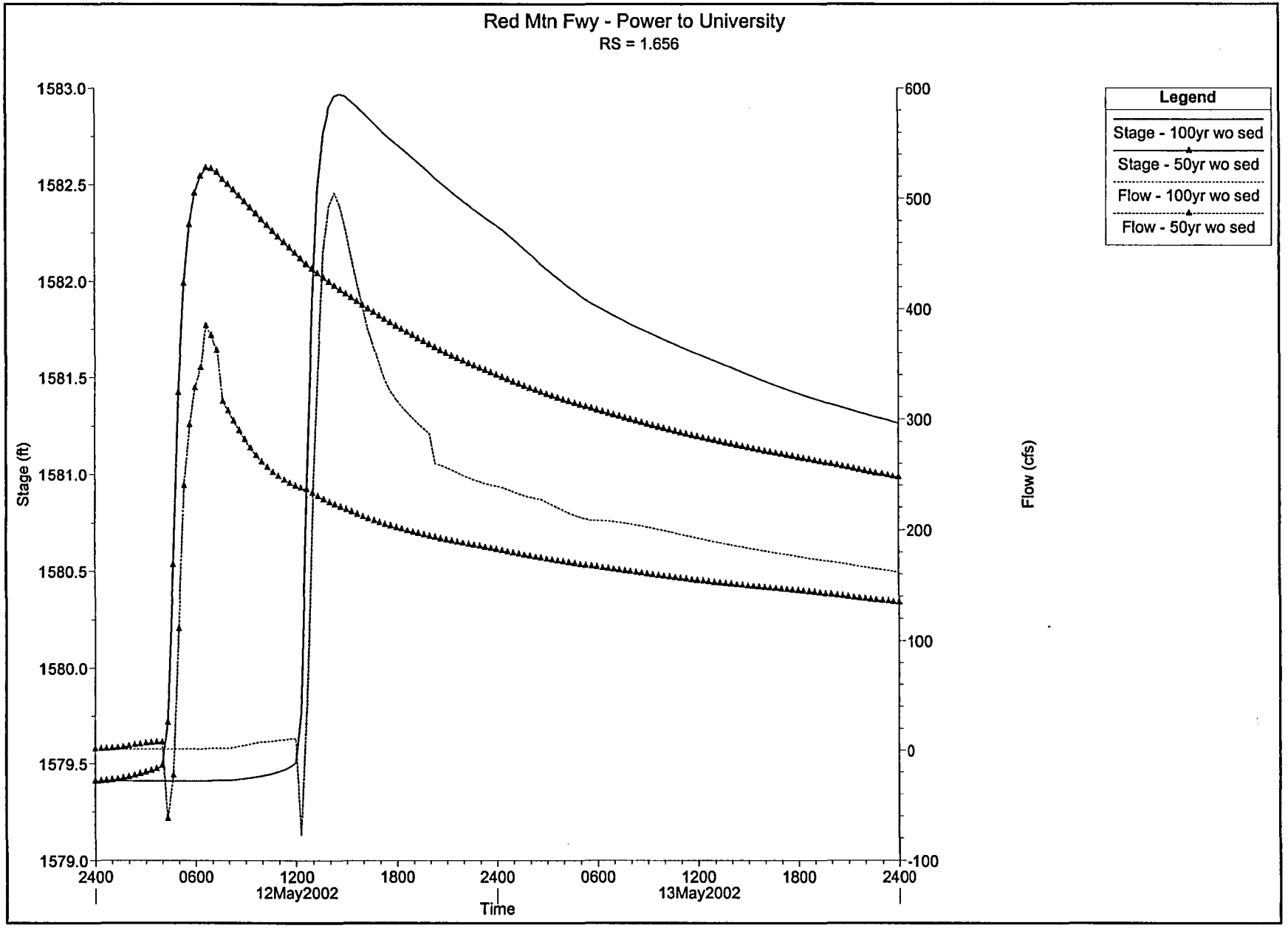
Reach	River Sta	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Buckhorn-Mesa	3.545	50yr wo sed	580.13	1572.75	1584.40		1584.40	0.000001	0.19	3546.26	553.33	0.01
Buckhorn-Mesa	3.545	100yr wo sed	769.99	1572.75	1585.09		1585.09	0.000001	0.23	3841.90	664.25	0.01
Buckhorn-Mesa	3.645	50yr wo sed	583.29	1572.16	1584.40		1584.40	0.000002	0.29	2329.57	278.05	0.02
Buckhorn-Mesa	3.645	100yr wo sed	775.32	1572.16	1585.09		1585.09	0.000003	0.36	2521.15	282.96	0.02
Buckhorn-Mesa	3.749	50yr wo sed	586.10	1575.57	1584.40		1584.41	0.000015	0.59	985.44	137.10	0.04
Buckhorn-Mesa	3.749	100yr wo sed	776.29	1575.57	1585.08		1585.09	0.000019	0.72	1093.54	177.64	0.05
Buckhorn-Mesa	3.824	50yr wo sed	580.04	1576.54	1584.40		1584.41	0.000020	0.66	878.20	135.01	0.05
Buckhorn-Mesa	3.824	100yr wo sed	773.31	1576.54	1585.09		1585.10	0.000027	0.80	971.78	138.58	0.05
Buckhorn-Mesa	3.852	50yr wo sed	580.29	1576.18	1584.41		1584.41	0.000010	0.48	1208.49	179.83	0.03
Buckhorn-Mesa	3.852	100yr wo sed	778.33	1576.18	1585.09		1585.10	0.000014	0.58	1332.71	182.81	0.04

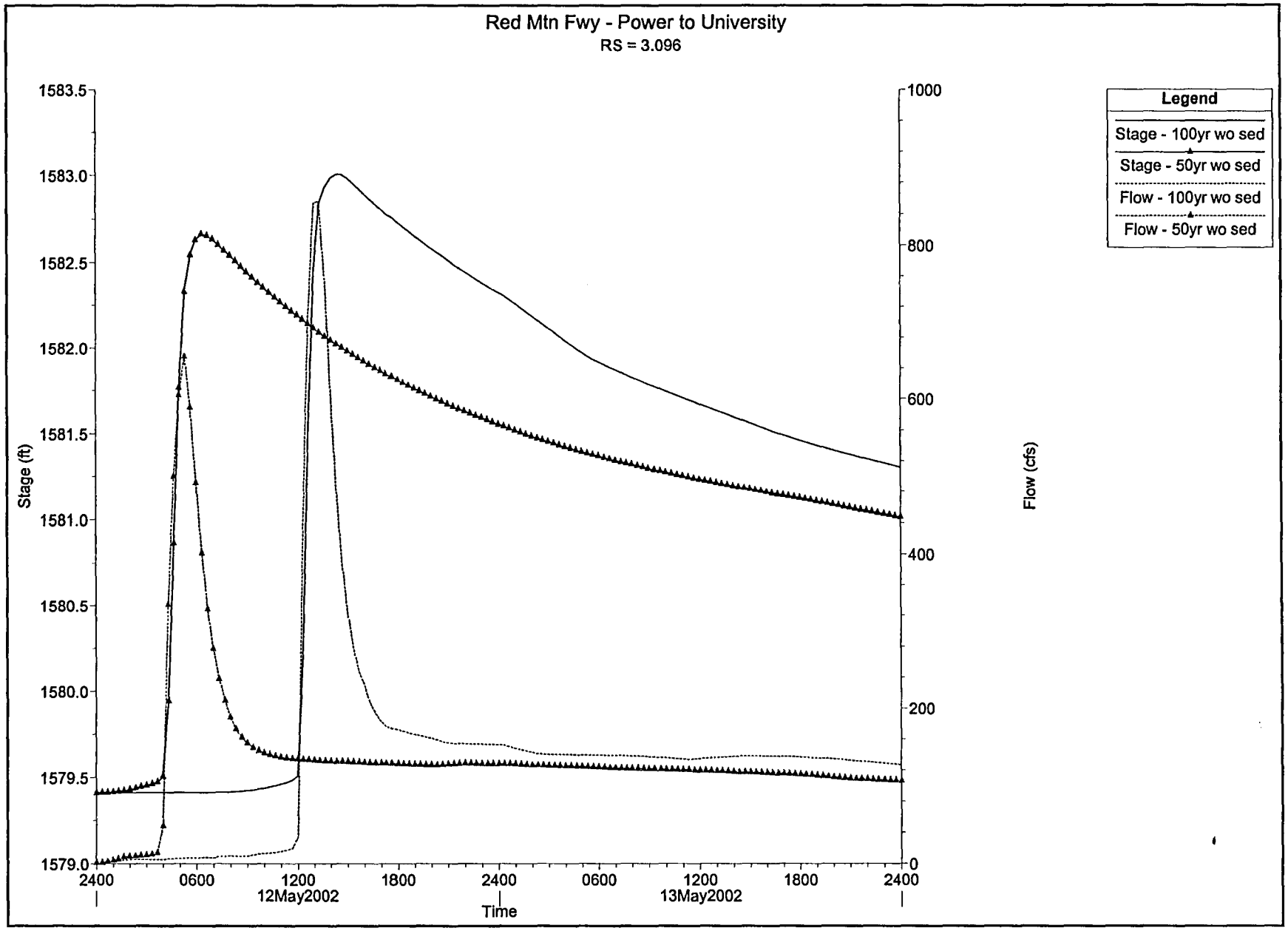

Red Mtn Fwy - Power to University
RS = 0.000
Stage (ft)
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
800
700
600
500
400
300
200
100
0
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

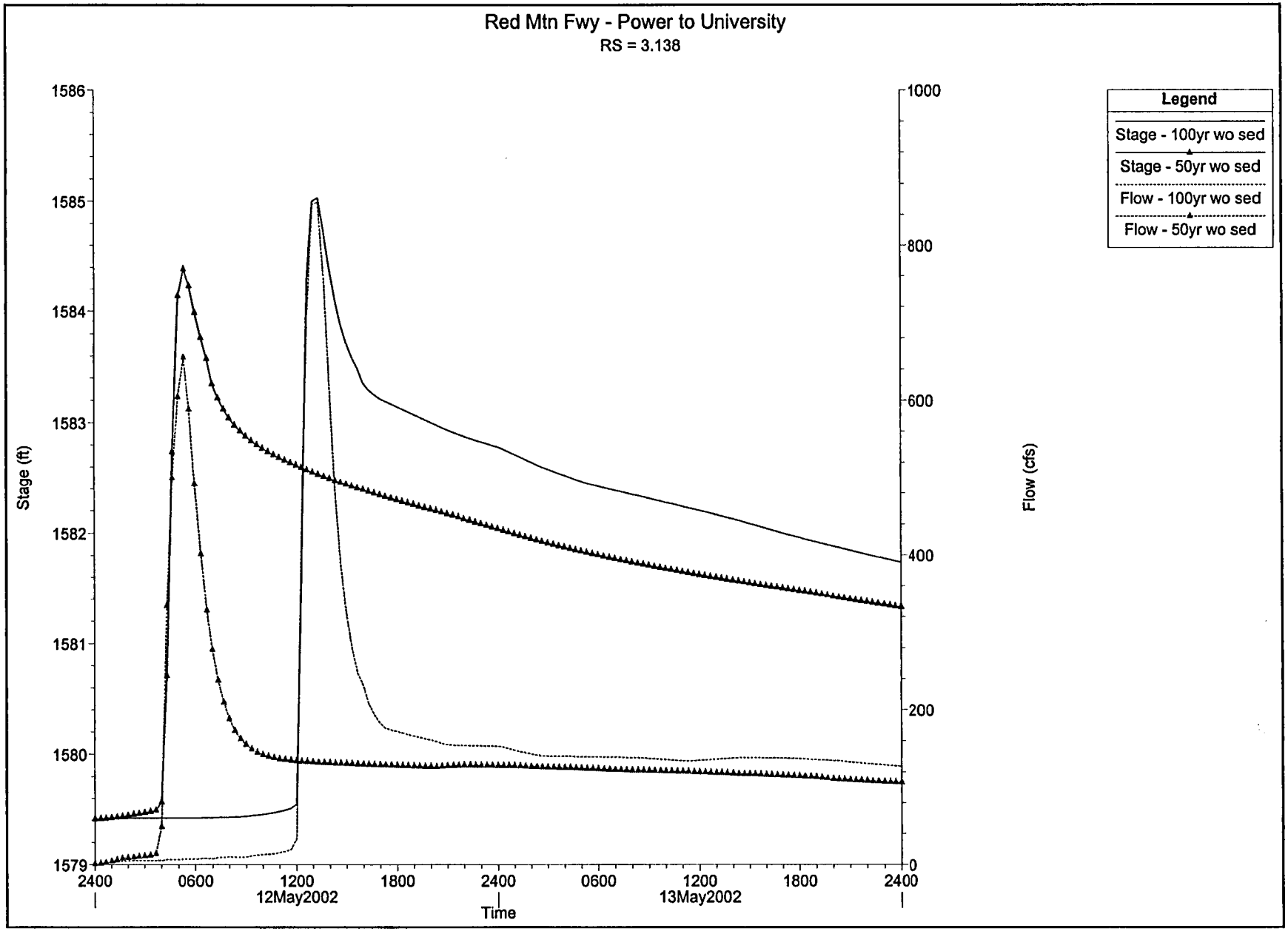

Red Mtn Fwy - Power to University
RS = 0.425
Stage (ft)
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
400
300
200
100
0
-100
-200
-300
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

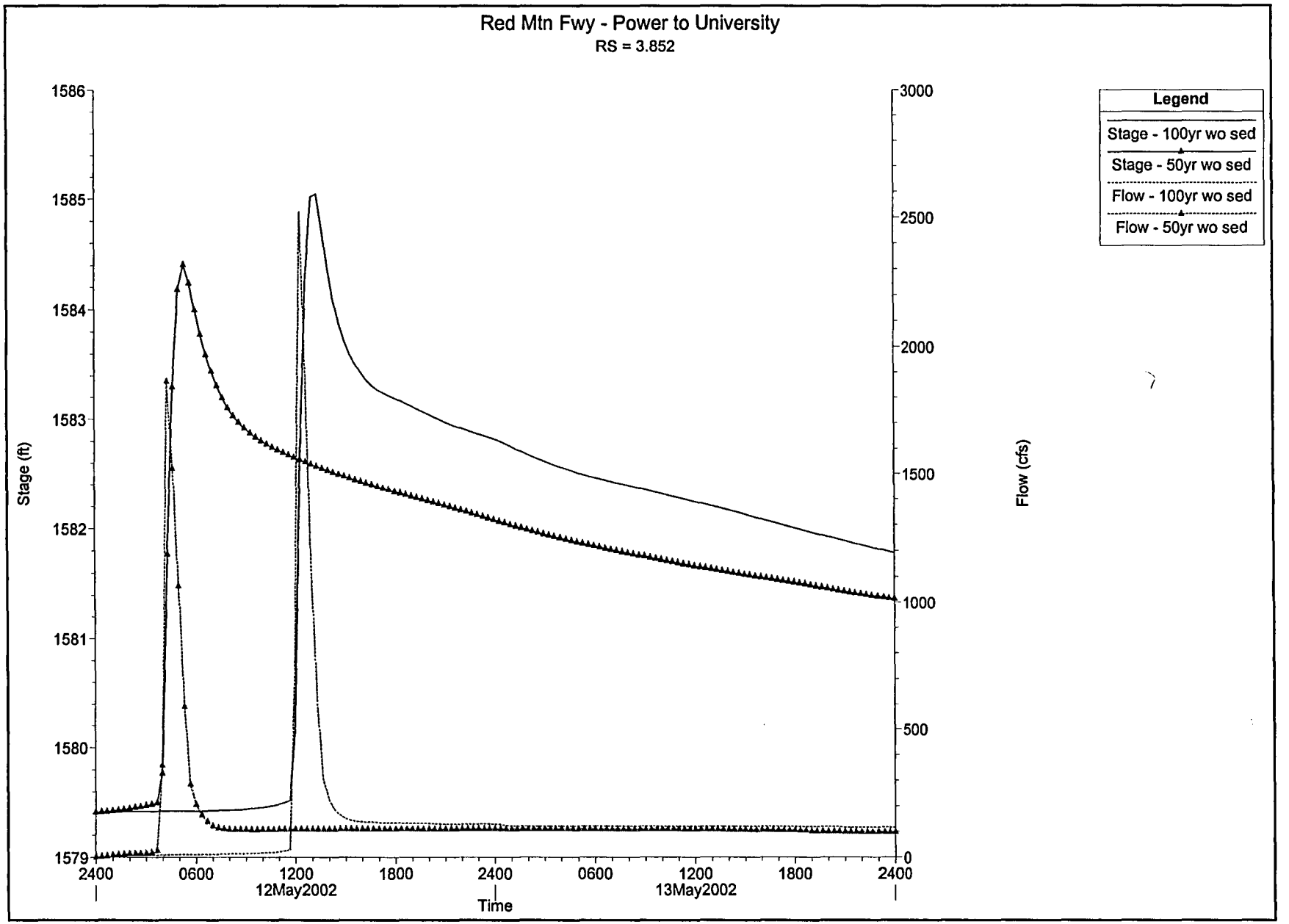

Red Mtn Fwy - Power to University
RS = 0.465
Stage (ft)
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
400
300
200
100
0
-100
-200
-300
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

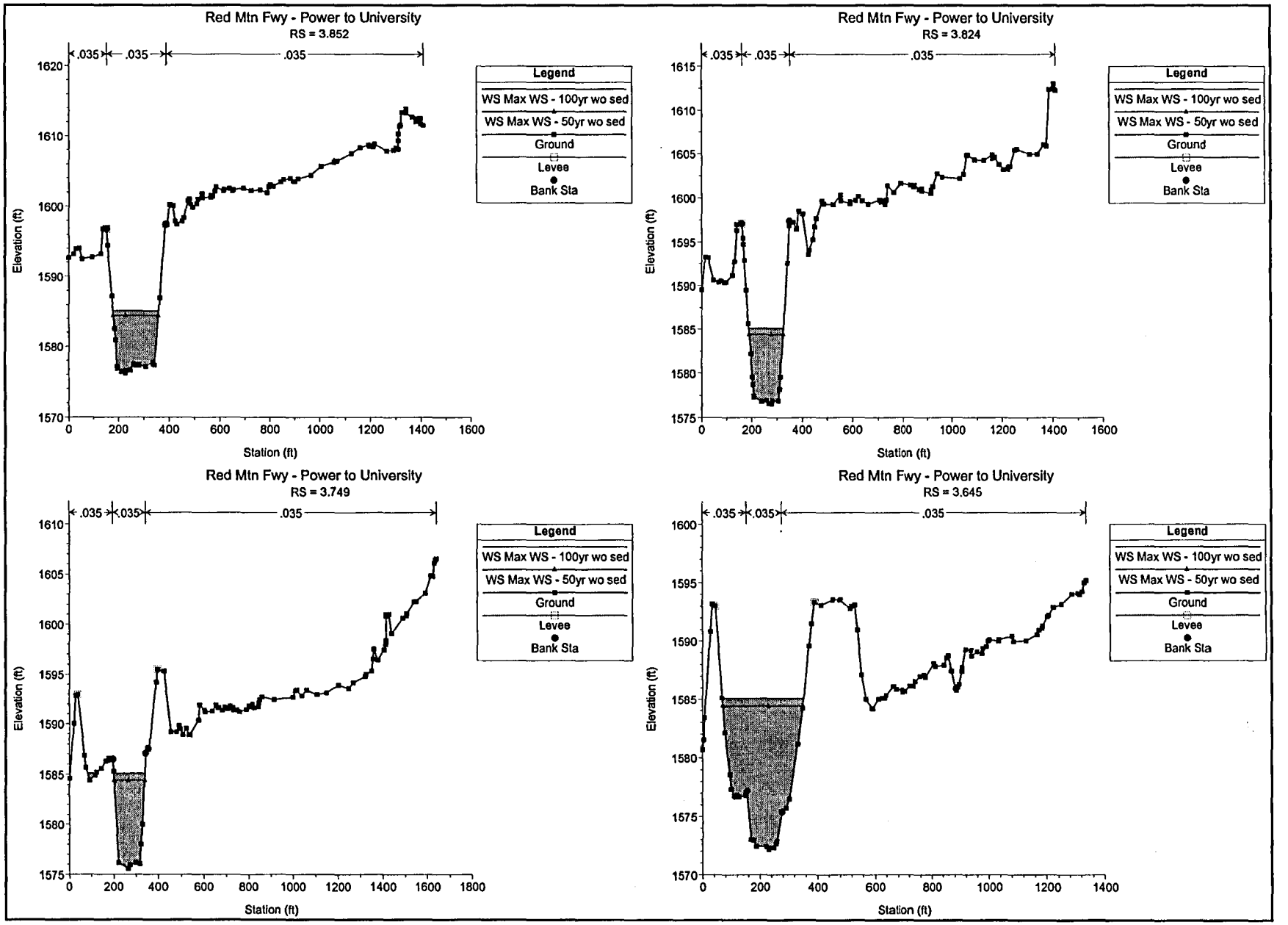

Red Mtn Fwy - Power to University
RS = 1.607
Stage (ft)
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
600
500
400
300
200
100
0
-100
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

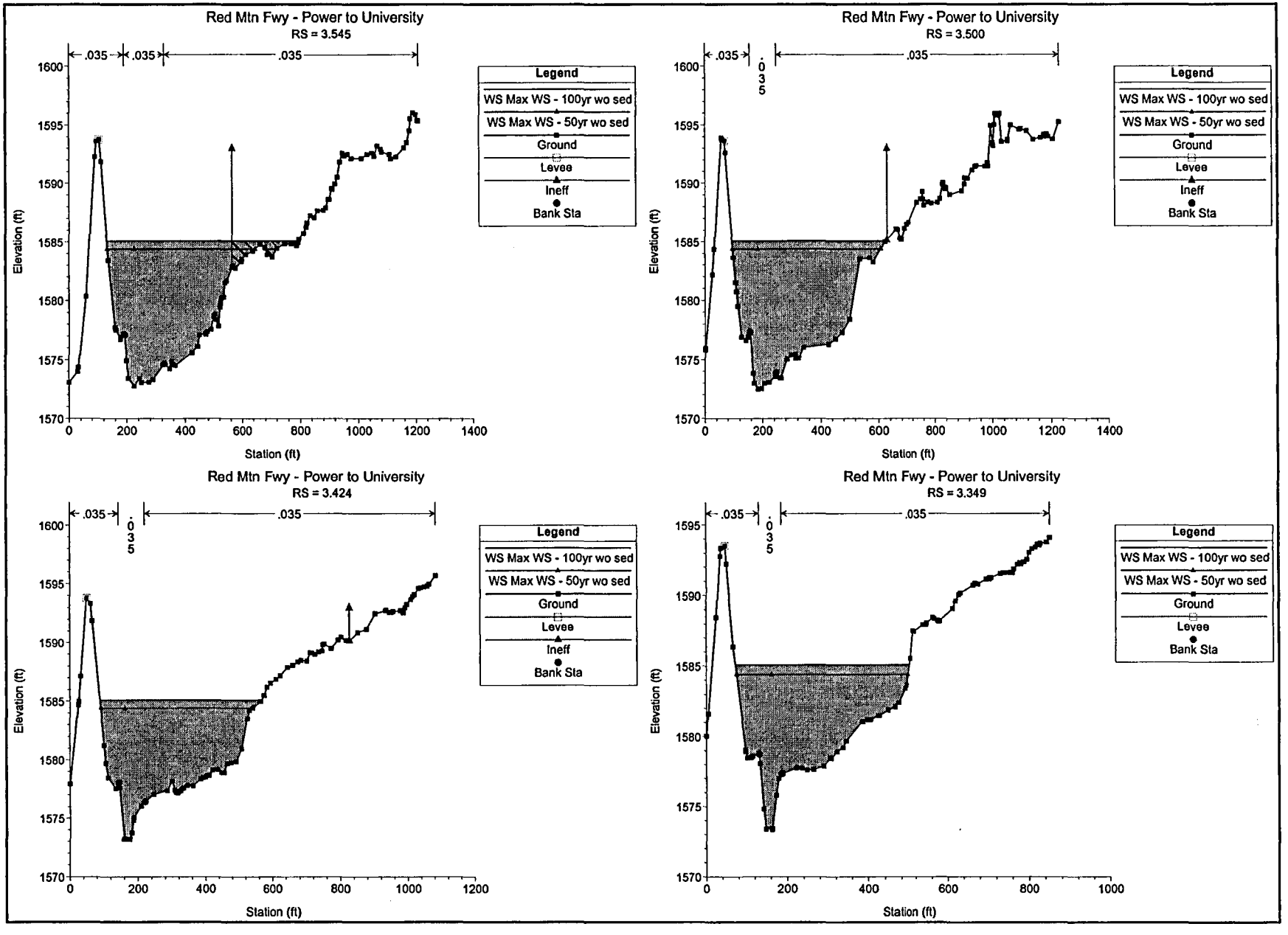

Red Mtn Fwy - Power to University
RS = 1.656
Stage (ft)
1583.0
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
600
500
400
300
200
100
0
-100
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

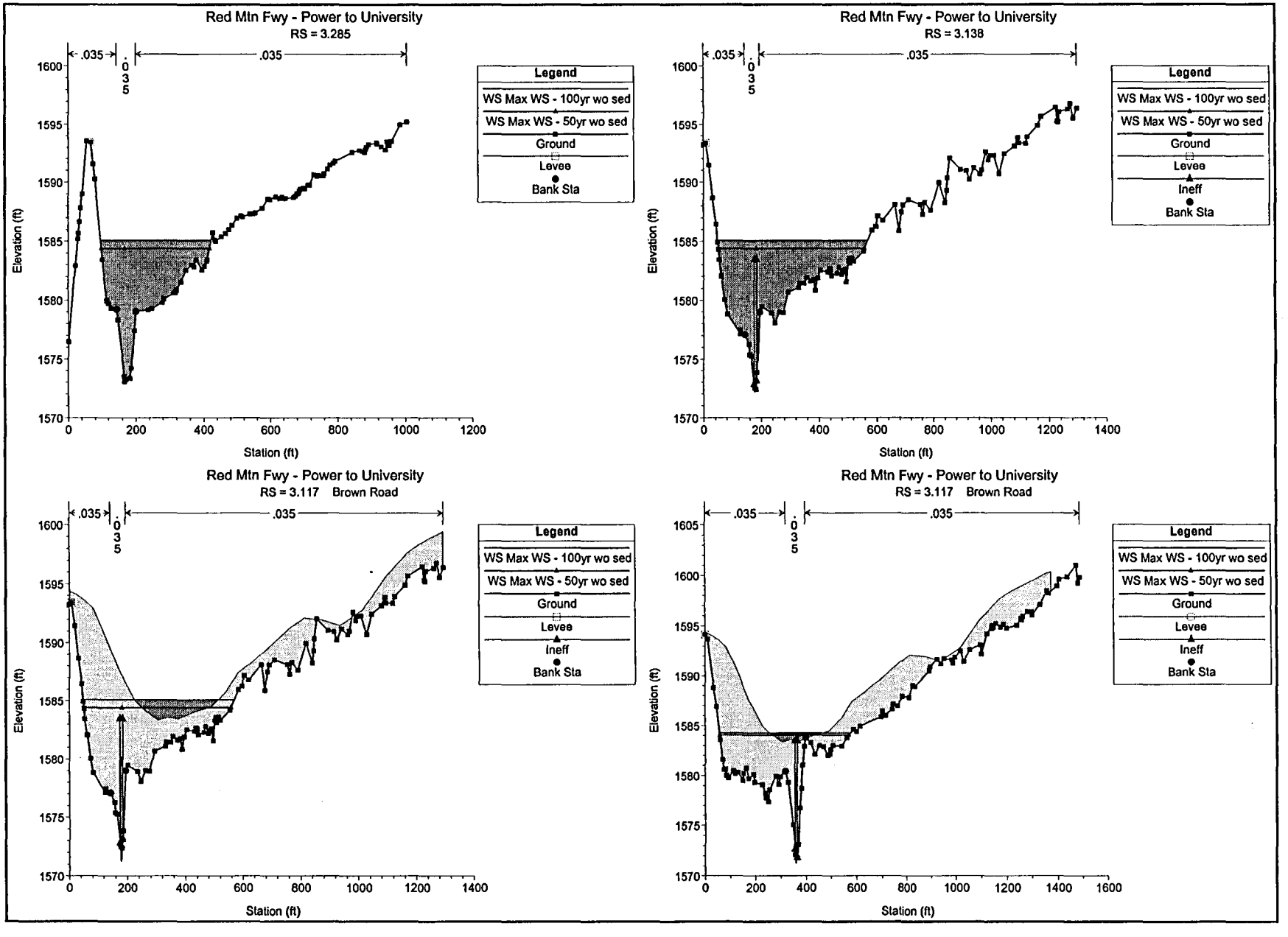

Red Mtn Fwy - Power to University
RS = 3.096
Stage (ft)
1583.5
1583.0
1582.5
1582.0
1581.5
1581.0
1580.5
1580.0
1579.5
1579.0
Flow (cfs)
1000
800
600
400
200
0
2400
0600
1200
12May2002
1800
2400
Time
0600
1200
13May2002
1800
2400
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

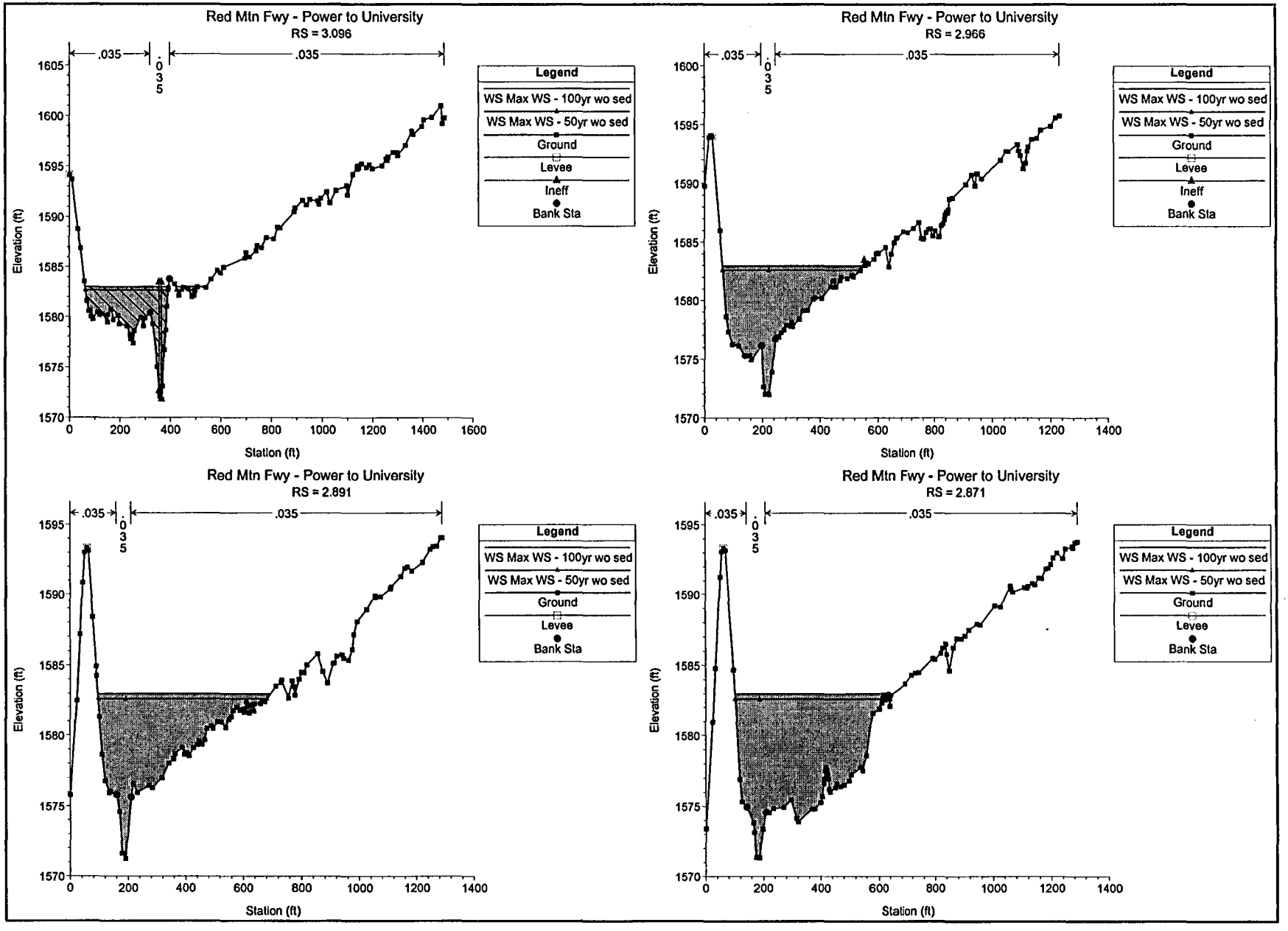

Red Mtn Fwy - Power to University
RS = 3.138
Stage (ft)
1586
1585
1584
1583
1582
1581
1580
1579
Flow (cfs)
1000
800
600
400
200
0
2400
0600
1200
12May2002
1800
2400
Time
0600
1200
13May2002
1800
2400
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

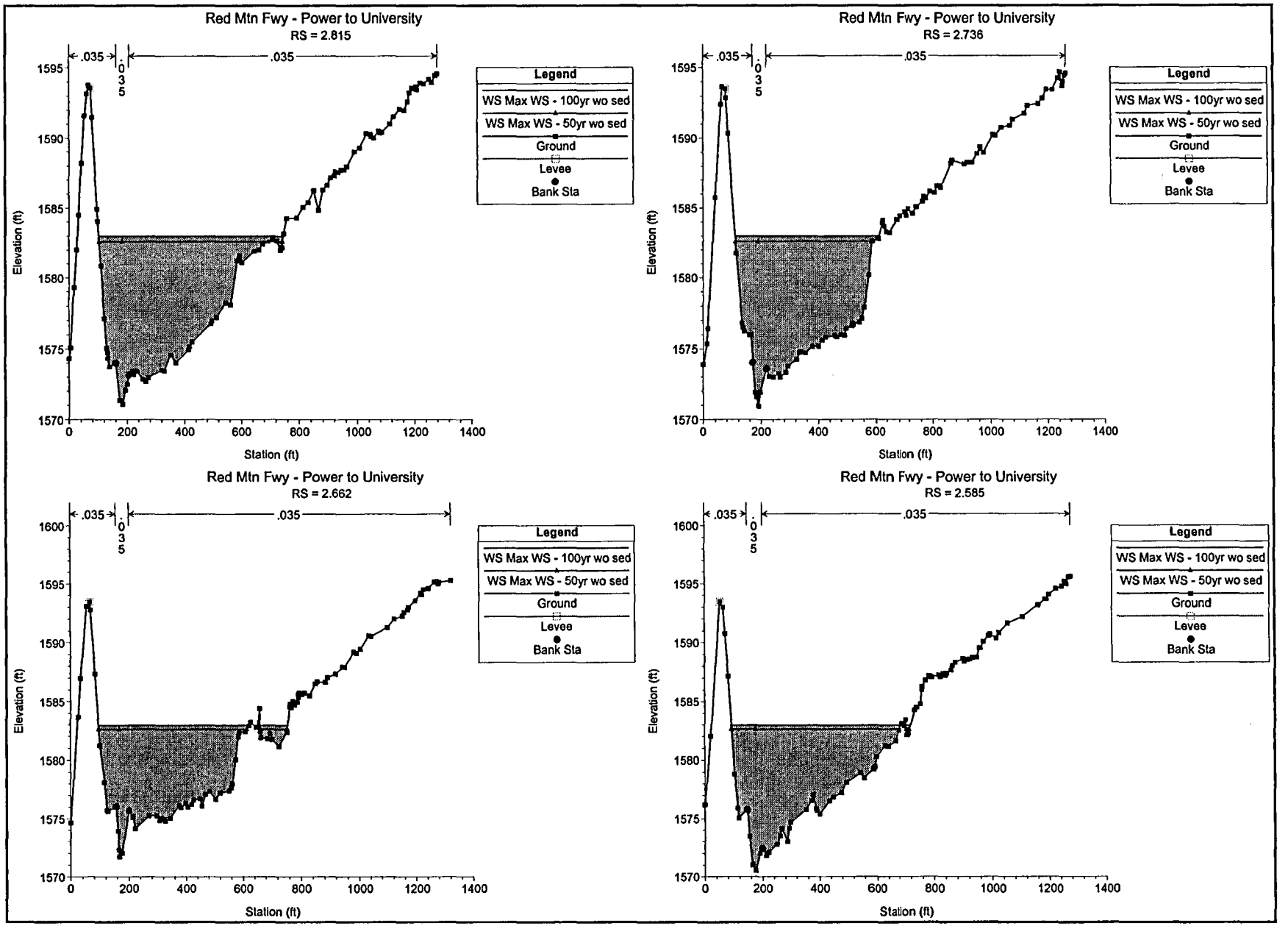

Red Mtn Fwy - Power to University
RS = 3.852
Stage (ft)
1586
1585
1584
1583
1582
1581
1580
1579
Flow (cfs)
3000
2500
2000
1500
1000
500
0
2400
0600
1200
12May2002
1800
2400
0600
1200
13May2002
1800
2400
Time
Legend
Stage - 100yr wo sed
Stage - 50yr wo sed
Flow - 100yr wo sed
Flow - 50yr wo sed

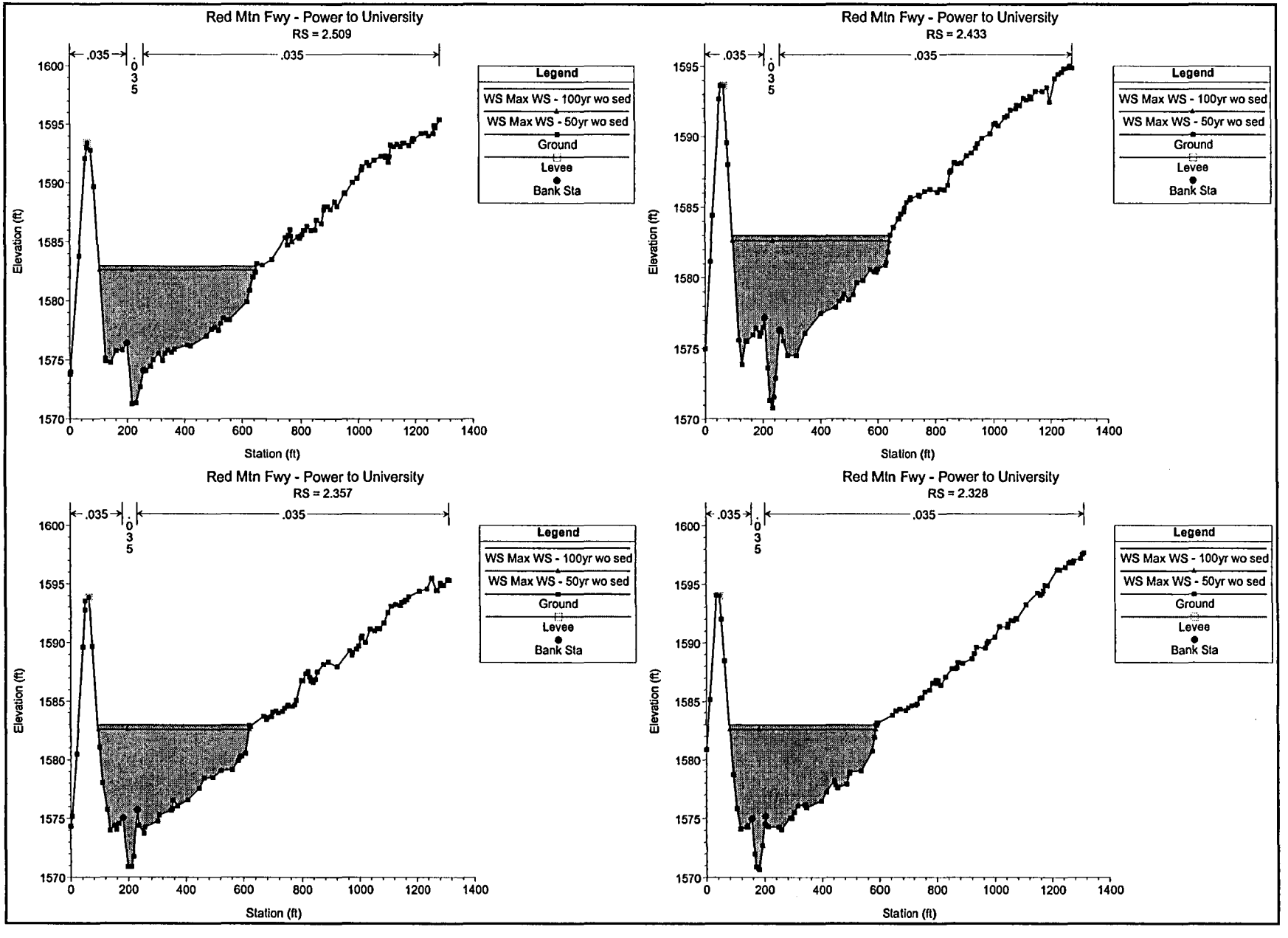

Red Mtn Fwy - Power to University
RS = 3.852
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.824
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.749
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.645
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

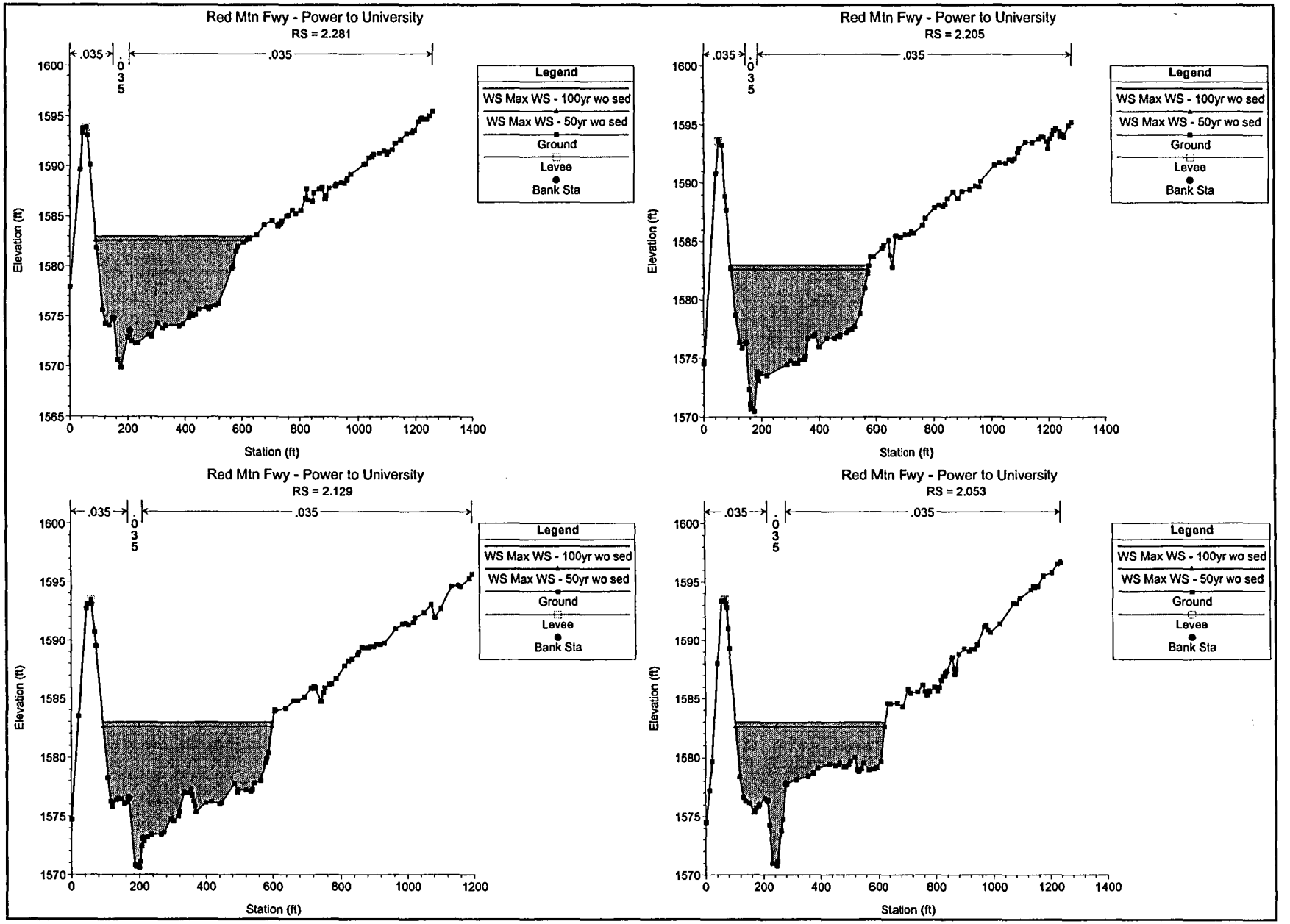

Red Mtn Fwy - Power to University
RS = 3.545
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.500
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.424
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.349
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

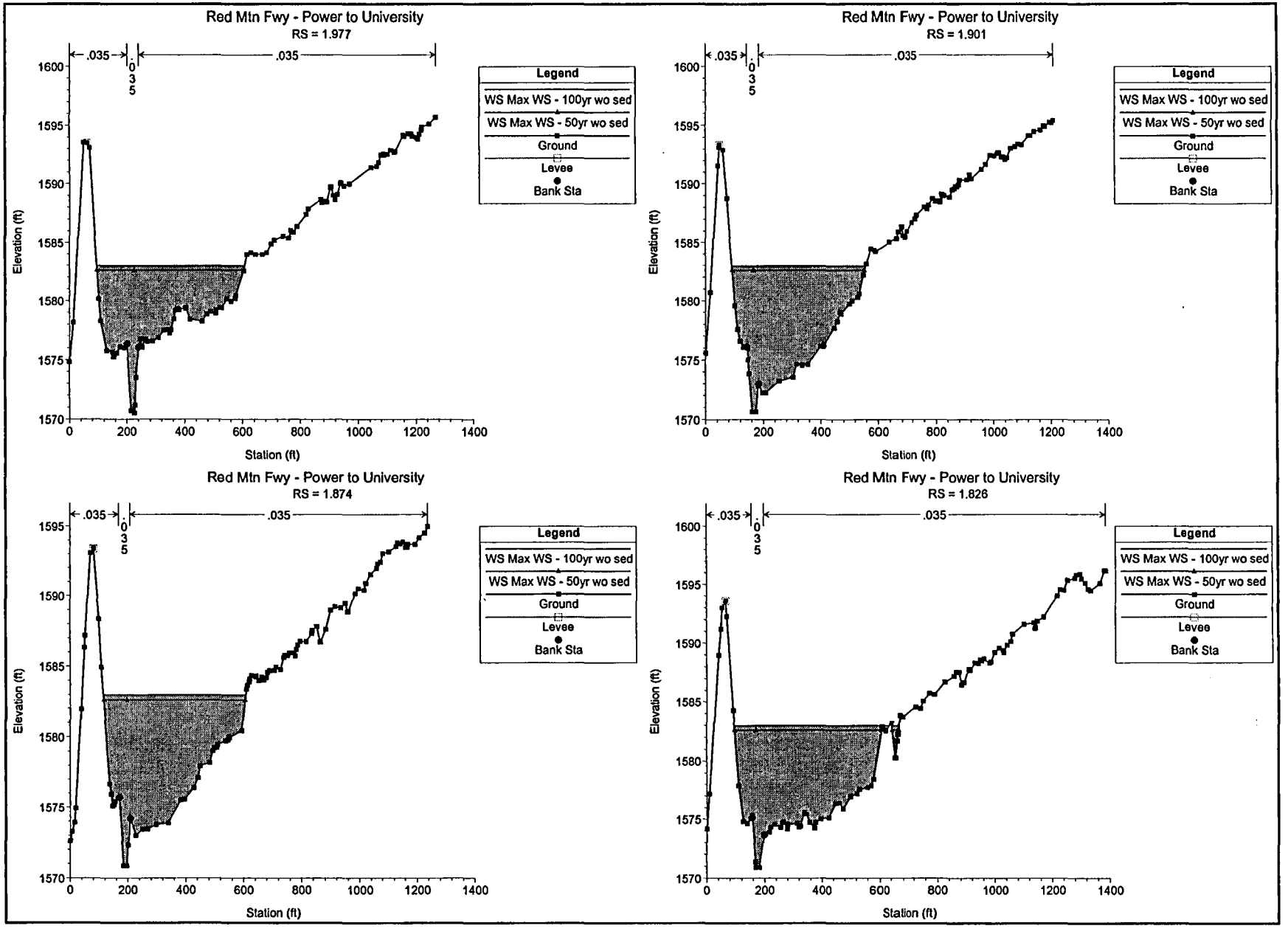

Red Mtn Fwy - Power to University
RS = 3.285
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.138
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.117 Brown Road
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 3.117 Brown Road
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta

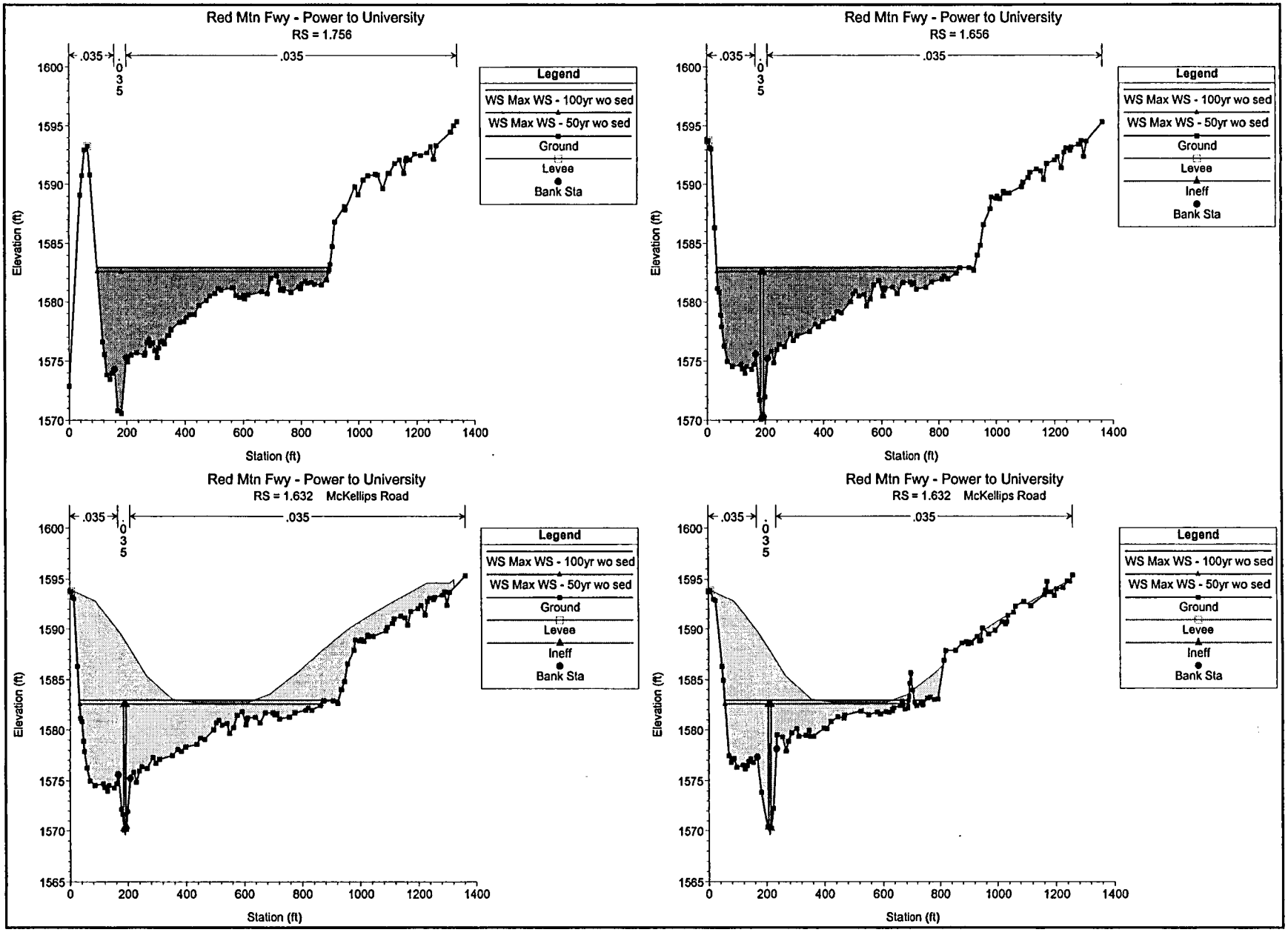

Red Mtn Fwy - Power to University
RS = 3.096
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.966
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.891
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 2.871
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

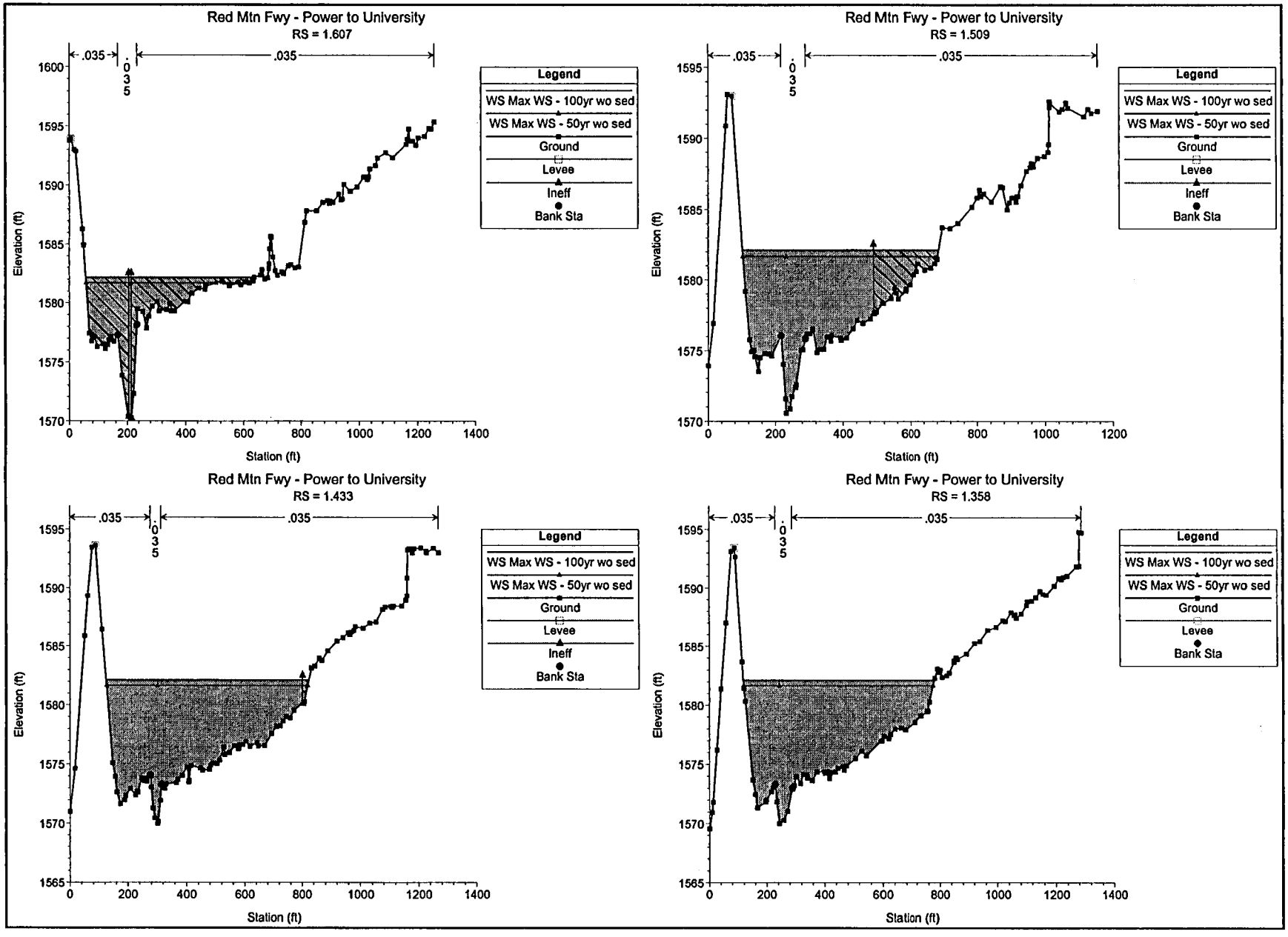

Red Mtn Fwy - Power to University
RS = 2.815
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 2.736
Red Mtn Fwy - Power to University
RS = 2.662
Red Mtn Fwy - Power to University
RS = 2.585

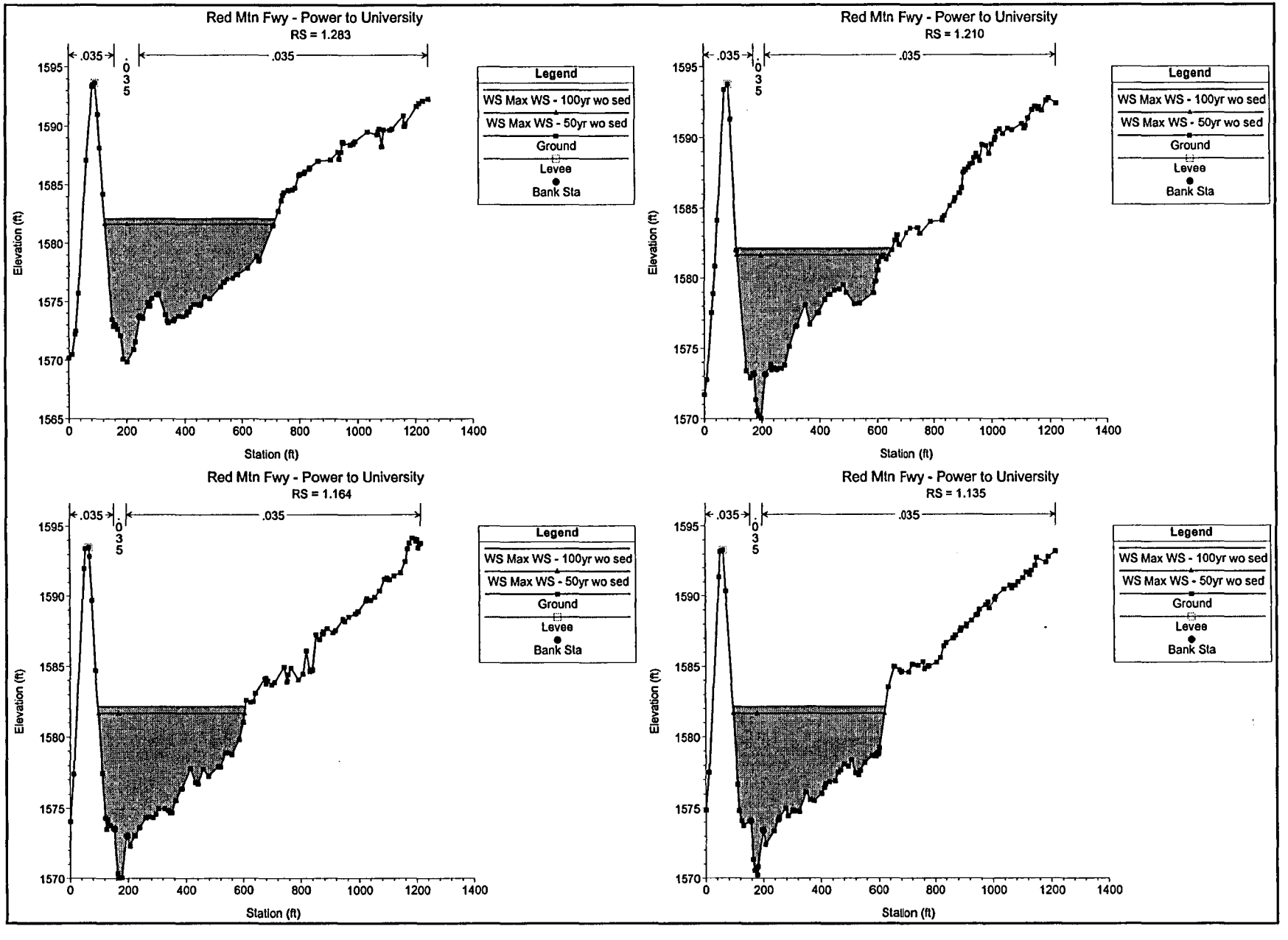

Red Mtn Fwy - Power to University
RS = 2.509
Red Mtn Fwy - Power to University
RS = 2.433
Red Mtn Fwy - Power to University
RS = 2.357
Red Mtn Fwy - Power to University
RS = 2.328
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

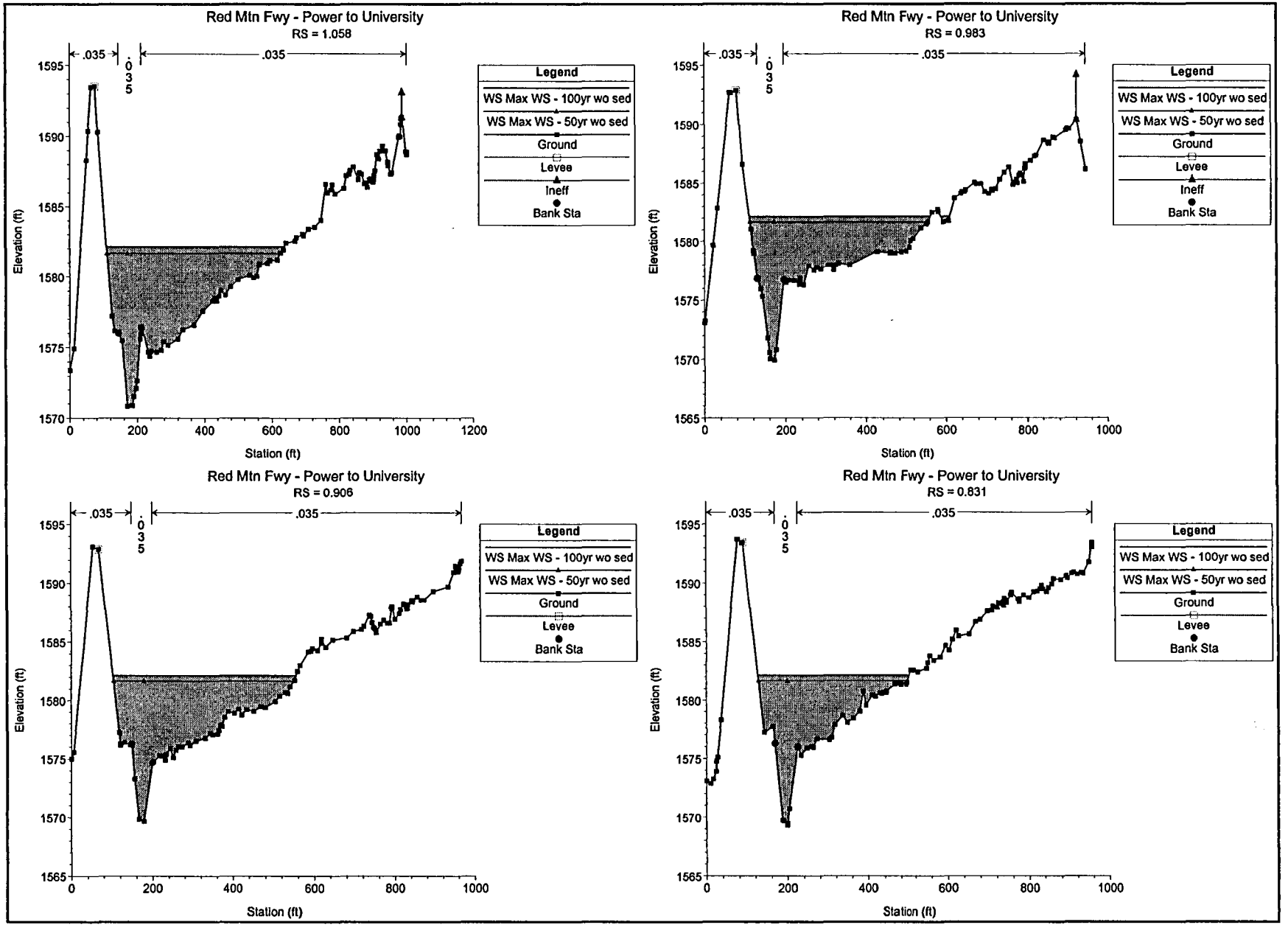

Red Mtn Fwy - Power to University
RS = 2.281
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 2.205
Red Mtn Fwy - Power to University
RS = 2.129
Red Mtn Fwy - Power to University
RS = 2.053

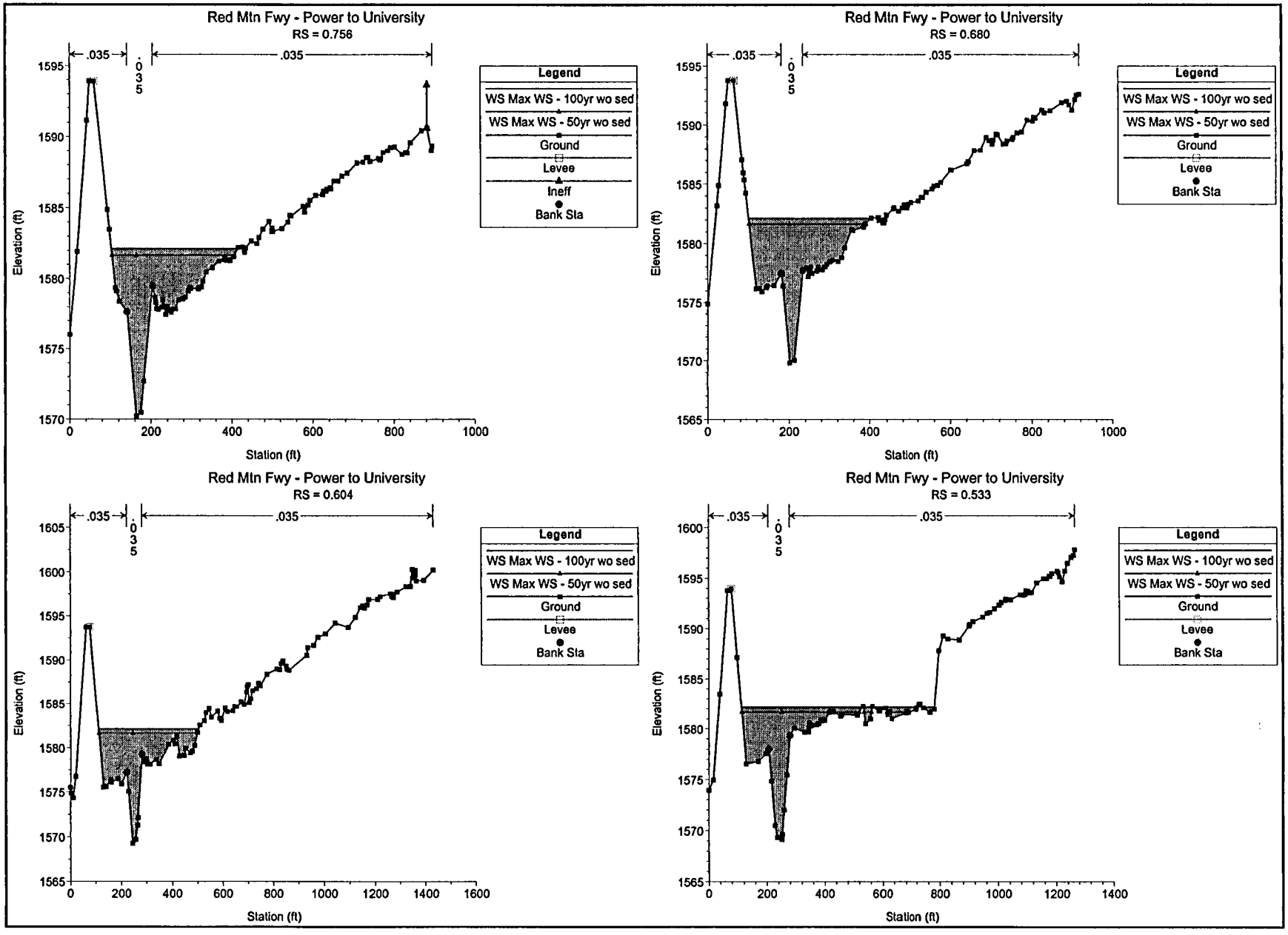

Red Mtn Fwy - Power to University
RS = 1.977
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.901
Red Mtn Fwy - Power to University
RS = 1.874
Red Mtn Fwy - Power to University
RS = 1.826

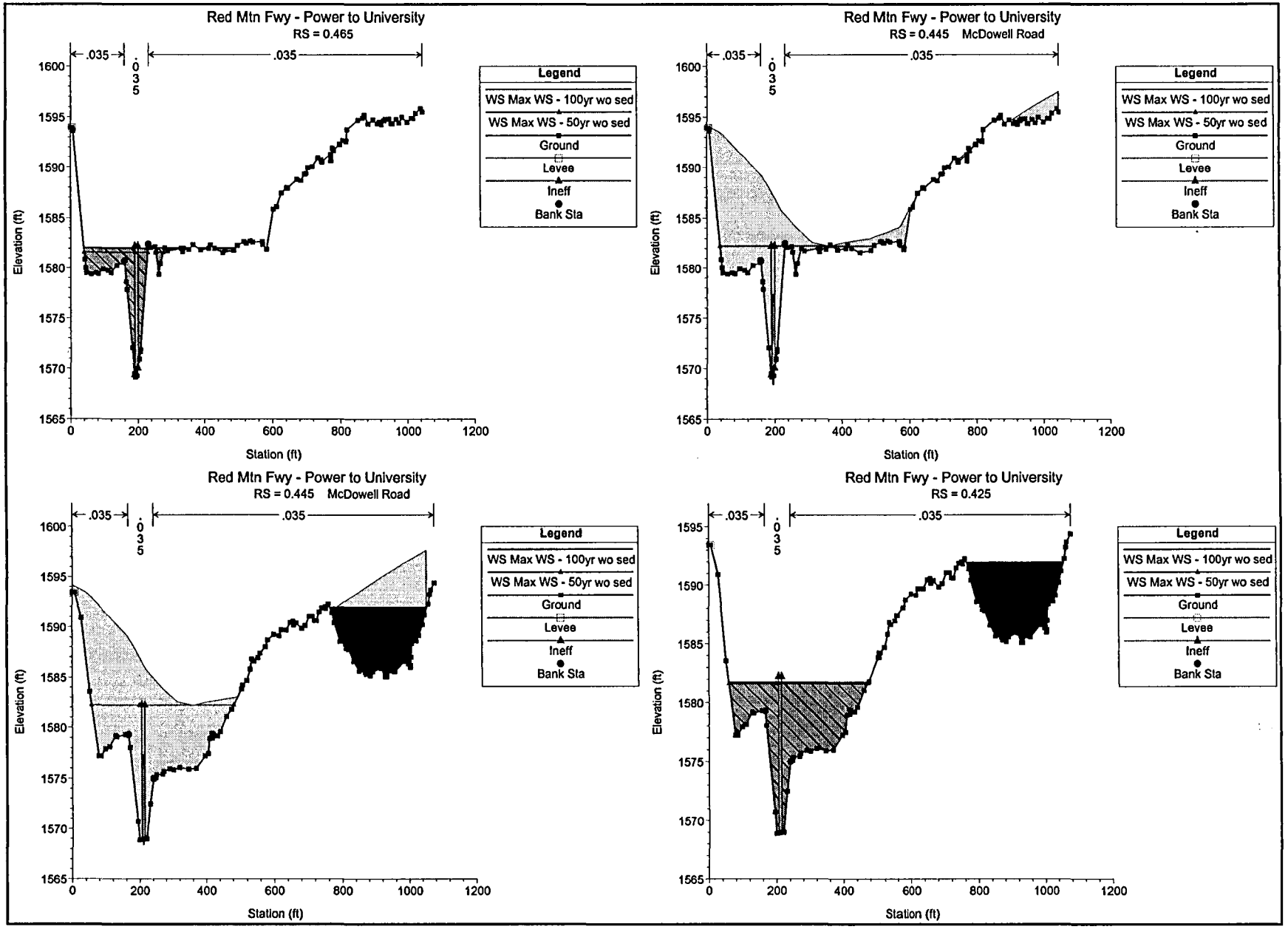

Red Mtn Fwy - Power to University
RS = 1.756
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.656
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.632 McKellips Road
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.632 McKellips Road
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

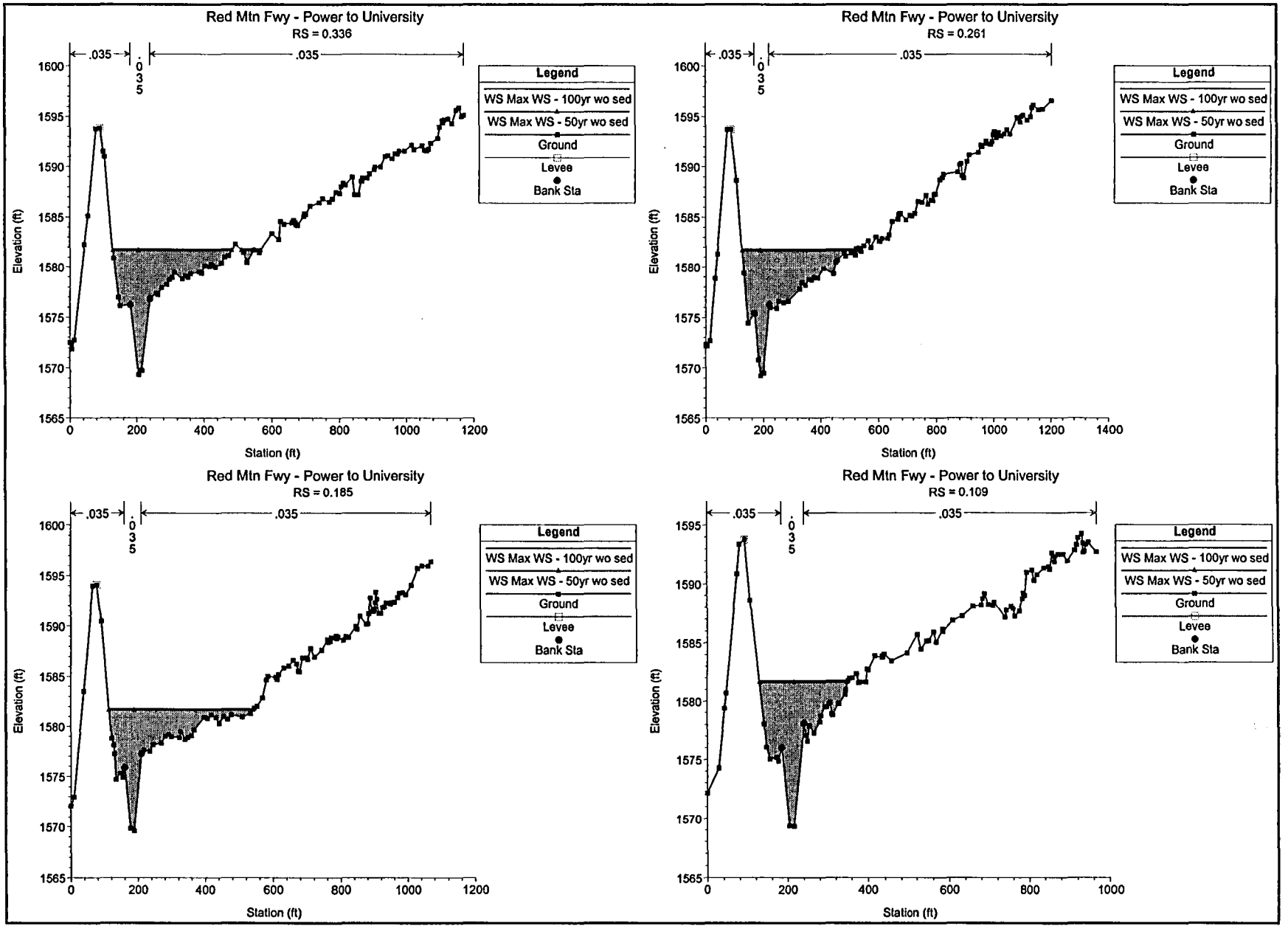

Red Mtn Fwy - Power to University
RS = 1.607
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.509
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.433
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 1.358
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

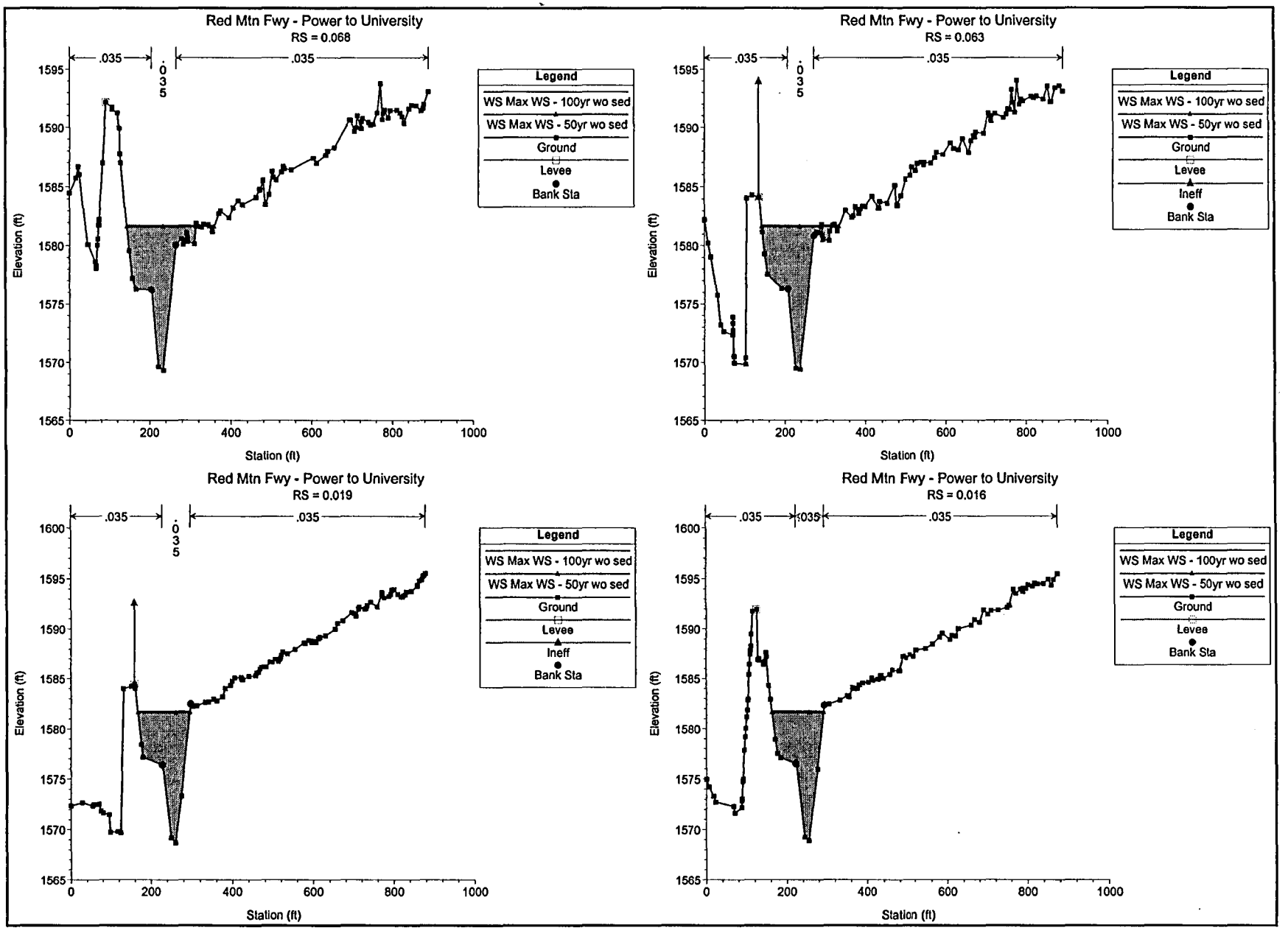

Red Mtn Fwy - Power to University
RS = 1.283
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.210
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.164
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 1.135
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

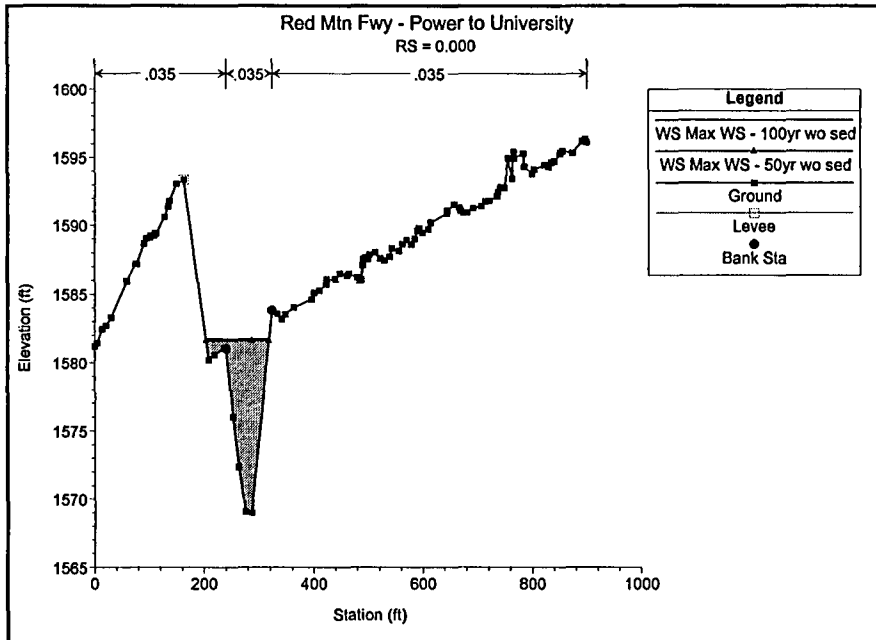

Red Mtn Fwy - Power to University
RS = 1.058
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.983
Red Mtn Fwy - Power to University
RS = 0.906
Red Mtn Fwy - Power to University
RS = 0.831


Red Mtn Fwy - Power to University
RS = 0.756
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.680
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.604
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.533
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
RS = 0.465
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.445 McDowell Road
Red Mtn Fwy - Power to University
RS = 0.445 McDowell Road
Red Mtn Fwy - Power to University
RS = 0.425


Red Mtn Fwy - Power to University
RS = 0.336
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.261
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.185
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Red Mtn Fwy - Power to University
RS = 0.109
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta


Red Mtn Fwy - Power to University
RS = 0.068
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 0.063
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 0.019
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Red Mtn Fwy - Power to University
RS = 0.016
.035
.035
.035
.035
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Red Mtn Fwy - Power to University
RS = 0.000
.035
.035
.035
Elevation (ft)
1600
1595
1590
1585
1580
1575
1570
1565
0
200
400
600
800
1000
Station (ft)
Legend
WS Max WS - 100yr wo sed
WS Max WS - 50yr wo sed
Ground
Levee
Bank Sta

```
                    HEC-RAS Version 3.0.1  Mar 2001
                      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
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```

****

PROJECT DATA
Project Title: Red Mtn Fwy - Power to University
Project File : SHELC_2.prj
Run Date and Time: 8/19/2002 8:55:27 AM

Project in English units

Project Description:
Red Mountain Freeway (202L)
Power Road to University Drive

Spook Hill
Floodwater Retarding Structure (FRS)
Existing Condition Hydraulics
50-Year
and 100-year Storm Events

Prepared for:
Arizona Department of
Transportation

Prepared by:
DMJM+HARRIS
2777 East Camelback Road, Suite
200
Phoenix, Arizona 85016
(602) 337-2777

****

PLAN DATA

Plan Title: SpookHill FRS 100-Year Hydraulics (w/ sediment)
Plan File : C:\HEC\Spook\SHELC_2.p03

Geometry Title: Existing Conditions w/ Sediment
Geometry File : C:\HEC\Spook\SHELC_2.g02

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 59 Mulitple Openings = 0
Culverts = 3 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
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: Subcritical Flow

****

GEOMETRY DATA

Geometry Title: Existing Conditions w/ Sediment
Geometry File : C:\HEC\Spook\SHELC_2.g02

CROSS SECTION RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa RS: 3.852

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1592.65	18.33	1593.17	28.07	1593.9	39.76	1594	54.17	1592.48
95.17	1592.72	128.47	1593.21	137.97	1596.8	152.56	1596.78	156.4	1594.45
173.36	1587.18	183.46	1582.52	187.7	1580.91	195.22	1577.13	196.05	1576.83
211.63	1576.4	227.29	1576.18	230.62	1576.53	247.11	1576.55	259.99	1577.5
265.56	1577.25	266.09	1577.38	281.1	1577.38	281.85	1577.21	307.63	1577.13
336.92	1577.77	337.84	1577.46	343.74	1577.33	364.76	1586.95	386.48	1597.33
389.41	1597.44	389.45	1597.44	393.19	1597.38	403.08	1600.23	414.93	1600.08
424.37	1597.9	430.48	1597.47	450.73	1597.89	458.14	1598.35	473.44	1600.77
477.86	1601	484.1	1600.28	492.2	1599.87	506.78	1600.38	512.61	1601
529.05	1601.8	529.72	1601.19	562.85	1601.3	563.84	1601.56	570.44	1601.44
579.92	1602.18	584.36	1602.73	614.35	1602.2	617.42	1602.41	637.81	1602.54
649.72	1602.2	653.6	1602.38	694.35	1602.59	724.85	1602.23	760.47	1602.3
788.69	1601.95	795.24	1602.77	801.88	1603.06	812.1	1602.83	844	1603.43
855.09	1603.79	883.3	1603.97	895.09	1603.59	901.54	1603.55	914.53	1603.91
966.77	1604.41	1006.88	1605.69	1055.12	1606.26	1061.61	1606.47	1067.42	1606.46
1125.59	1607.45	1160.94	1608.28	1193.42	1608.69	1196.84	1608.48	1211.84	1608.44
1213.53	1608.65	1217.91	1608.83	1265.1	1607.84	1291.18	1607.95	1301.95	1608.28
1309.11	1608.1	1309.62	1609.33	1309.97	1610.35	1316.15	1611.42	1319.07	1611.58
1324.39	1613.39	1340.35	1613.89	1340.94	1613.28	1366.58	1612.72	1382.28	1612.04
1383.54	1612.46	1393.39	1612.29	1399.82	1612.49	1400.69	1611.69	1409.89	1611.54

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	152.56	.035	389.41	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
152.56	389.41	147.5	147.5	147.5	.1	.3

Left Levee Station= 152.56 Elevation= 1596.78
Sediment Elevation = 1577.2

CROSS SECTION RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa RS: 3.824

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1589.53	15.02	1593.24	26.4	1593.19	47.51	1590.62	68.84	1590.38
78.5	1590.55	90.39	1590.36	97.69	1590.39	123.38	1591.16	131.17	1592.7
140.33	1596.32	141.23	1596.99	160.1	1597.1	164.74	1595.43	166.14	1594.75
170.97	1592.88	177.12	1589.47	185.36	1585.64	195.76	1582.2	201.24	1579.53
203.87	1578.68	207.12	1577.4	207.82	1577.29	239.14	1576.78	258.06	1576.89
265.63	1576.59	277.51	1576.54	282.02	1576.86	304.24	1576.88	310.15	1578.16
313.39	1579.54	342.06	1592.55	349.55	1596.88	351.52	1597.37	366.73	1597.24
378.66	1596.47	379.12	1596.56	379.15	1596.57	387.88	1598.51	401.46	1598.2
424.11	1593.58	427.48	1594.05	442.78	1595.25	450.69	1596.73	456.51	1597.66
478.58	1599.63	485.87	1599.32	522.82	1599.25	553.15	1600.34	554.19	1599.69
589.91	1599.34	591.31	1599.57	612.77	1599.71	623.6	1600.15	638.71	1599.66
662.84	1599.3	706.31	1599.75	712.26	1599.54	720.66	1599.68	726.95	1599.27
728.29	1599.7	733.12	1599.78	738.82	1601.37	763.91	1600.64	790.45	1601.66
832.98	1601.47	846.93	1601.27	848.1	1601.47	867.17	1600.99	876.53	1601.04
877.77	1600.8	914.6	1600.53	915.28	1600.91	921.98	1601.29	940.49	1602.74
960.77	1602.36	1030.07	1602.21	1045.64	1602.69	1057.09	1604.8	1062.2	1604.82
1089.31	1604.31	1126.18	1604.25	1160.33	1604.86	1160.97	1604.49	1169.04	1604.6
1186.5	1603.78	1205.84	1603.23	1221.9	1603.26	1223.04	1603.48	1230.05	1603.61
1250.09	1605.41	1258.43	1605.54	1308.17	1604.94	1338.34	1604.96	1363.47	1606.03
1373.19	1605.87	1384.64	1612.38	1402.83	1613.02	1403.77	1612.4	1409.9	1612.26

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0    .035   160.1    .035  351.52    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         160.1  351.52            392.3   392.3   392.3             .1       .3
Left Levee      Station=   160.1      Elevation=  1597.1
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.749

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  1584.6   19.48 1590.03    29.1 1592.85   39.24 1592.93   67.83 1586.84
   74.06 1585.68   91.24 1584.42   116.4 1584.93   122.3 1585.22  144.52 1585.58
  165.59 1586.29  175.89 1586.35  179.37 1586.58  197.04 1586.46  199.02  1585.3
  221.74 1576.17   265.5 1575.57   274.1 1575.93  299.27 1576.14   316.4 1576.06
  323.46 1578.02  328.45    1580  344.36 1587.07  351.39 1587.55  355.23 1587.66
  359.75  1587.5  392.07 1594.22  397.59  1595.5   400.1 1595.46  425.92 1595.31
  454.19 1589.22  478.59 1589.21  491.17 1589.83   495.1 1589.48  506.45 1588.95
  521.45 1589.55  533.37 1588.93  536.91 1588.93  576.55 1590.37  581.68 1591.89
  603.62 1591.36  606.51 1591.18  639.17 1591.27  655.74 1591.87  662.54 1591.59
   668.5 1591.65  683.98 1591.37  695.77 1591.68   707.2 1591.51  713.34 1591.56
  718.76 1591.79  730.73 1591.62  734.53 1591.38  748.11 1591.39   760.7 1591.22
  791.04 1591.46  803.06  1591.8  810.89 1591.72  819.75 1591.97  826.31 1591.62
  844.47 1591.73  847.25 1592.12  852.05 1592.45   862.6 1592.72  916.24 1592.44
 1001.28  1592.7 1013.35  1593.4 1018.57 1593.44 1042.46 1592.85 1063.89 1593.43
 1109.27 1592.99 1150.33 1593.17 1203.49 1593.95 1249.76 1593.58 1269.94 1594.17
 1322.94  1594.8 1327.11 1595.02 1352.55 1595.35 1359.48 1596.52 1363.38  1597.5
 1379.83 1596.45 1408.62 1597.43 1414.88 1597.98 1415.55 1598.39 1417.67    1601
 1418.63 1600.83 1428.16 1601.01 1438.85 1599.08 1491.69 1600.63 1507.29 1600.87
 1509.89 1601.07 1543.03 1602.24 1552.54  1602.3 1591.94 1603.11 1618.47 1604.83
 1626.39 1604.81 1633.52  1606.1 1638.07 1606.45 1643.11 1606.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  197.04    .035  344.36    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        197.04  344.36            550.4   550.4   550.4             .1       .3
Left Levee      Station=   39.24      Elevation= 1592.93
Right Levee     Station=  397.59      Elevation=  1595.5
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.645

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1580.67    3.09 1581.51    6.83  1583.4   28.12 1590.81   35.34 1593.18
   45.32 1593.02   68.62 1585.09   77.79 1582.12   94.81 1578.56   99.04 1577.34
  110.96 1576.77  114.96 1576.68   120.5 1576.84  128.01  1576.7  150.55 1576.79
  154.58 1577.15  168.36 1573.02  177.79 1572.93  187.44 1572.42  223.41 1572.38
  230.76 1572.16  235.96  1572.3  247.77 1572.31  256.22 1572.62     259 1572.84
  276.27 1575.39  291.45 1575.72  303.49 1576.51  331.21 1581.16  348.01 1584.21
  369.99 1589.57  380.26 1591.48  391.04 1593.32   414.8 1593.08   453.7 1593.52
  453.72 1593.52  479.49 1593.51  514.49 1592.78  520.56 1592.97  530.91 1593.07
   539.3 1590.94  553.26  1587.1  569.85 1585.02  591.05 1584.19  611.23 1585.02
  623.35 1585.12  632.85 1585.09  637.33 1585.33  662.72 1586.09  672.14 1585.86
  693.77 1585.79  695.93 1585.61  705.49  1585.7  724.04 1586.14  733.38 1586.13
  740.68 1586.56  757.65 1586.97  772.07 1587.09  776.85  1586.9   806.8 1588.06
  812.88 1587.81  844.26 1587.93  853.82 1588.55  859.91 1588.73  868.51 1587.44
   882.1 1585.96  884.84 1585.79  889.18 1586.09  890.82 1586.05  894.61  1586.3
  905.13 1587.42  906.33 1587.71  918.69 1589.24  937.76 1589.18  940.17 1588.73
  958.91 1589.07  976.54 1588.92   978.6 1589.35  990.09 1589.52   997.3 1589.99
 1001.22 1590.09  1033.4 1589.99 1034.66 1590.11 1080.12  1590.4 1085.78 1589.95
 1128.11    1590 1166.14 1590.52 1173.29 1590.91 1183.81  1591.1 1185.17 1591.27
 1203.46 1592.08 1208.61 1592.19 1224.52 1592.88 1251.89 1593.15 1287.76    1594
 1306.72 1594.09 1313.45 1593.96 1322.28 1594.22 1330.77 1594.99 1337.23 1595.16

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  154.58    .035  276.27    .035
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.58  276.27            526.7   526.7   526.7             .1       .3
Left Levee      Station=   45.32      Elevation= 1593.02
Right Levee     Station=  391.04      Elevation= 1593.32
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.545

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1573.05   29.42 1573.98   32.11 1574.36   58.93 1580.33   89.84 1592.27
   95.09 1593.61  104.58 1593.78  110.67 1591.85  135.06 1583.38  158.65 1577.73
  160.94  1577.5  176.99 1576.72  178.57 1576.92  190.03  1577.1  199.17 1574.92
  204.63  1573.4  225.45 1572.75   243.3 1573.39  249.32 1573.06  276.08 1573.08
  276.14 1573.08  288.53 1573.29  327.15 1574.62   346.9 1574.22   353.6 1574.84
  359.77 1574.55  365.35 1574.49  422.41 1575.58  441.86 1576.12  448.81 1577.08
   468.9 1577.25   470.9 1577.15  475.37 1577.37  488.79 1577.57  498.57 1578.69
  503.73 1578.85  506.28 1578.37  514.56 1577.84  520.19 1579.48  521.52  1579.6
  522.46 1579.85  525.96 1580.21  533.59  1580.3  537.44 1581.49  543.33 1581.66
  566.61 1582.97  574.56 1582.75  595.51 1583.31  598.18 1583.52  612.34 1583.91
  637.98 1584.22  662.13  1584.8  678.09 1584.56  686.77  1583.9  703.99 1583.69
  721.37 1584.46  748.94 1584.85   769.5  1584.8  780.17 1584.92  787.15 1584.69
  793.16 1584.95  795.73 1585.23  809.98 1585.73  818.72 1586.28  820.21 1586.26
  822.57 1586.61  834.26 1587.23  847.97 1587.07  859.53 1587.65  878.62  1587.7
  887.93  1587.9  895.52 1588.61  899.73 1588.63  908.37 1589.55  910.69 1589.49
  919.82 1589.95  927.74  1590.5   936.2 1591.81  945.18 1592.57  952.56 1592.35
  963.71 1592.47  976.32 1592.13 1010.88 1592.14 1031.37 1592.48 1047.12 1592.59
 1054.21 1592.32 1065.11  1593.2  1076.4 1592.94 1080.52 1592.69 1108.05 1592.48
 1112.54 1592.11 1129.95 1592.28 1157.32 1593.06 1167.73  1593.5 1177.34 1594.52
  1180.2 1595.54 1188.41 1596.03 1198.09 1595.87 1204.33 1595.38 1207.43 1595.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  190.03    .035  327.15    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        190.03  327.15            238.9   238.9   238.9             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888        F
Left Levee      Station=  104.53      Elevation= 1593.78
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.500

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1575.82     .81 1575.96   25.44 1582.17   31.55 1584.36   57.32 1593.89
   58.74 1593.75   60.79 1593.77   68.13 1593.63   70.84 1592.62    98.8 1583.62
     105 1581.49  108.86 1580.73  113.71 1579.51  124.94 1576.92   141.4 1576.63
  148.23 1576.91  154.78  1577.3   167.6 1573.84  170.47 1572.99  184.53 1572.48
  196.48 1572.52  207.49 1572.98  223.11 1573.07  243.92 1573.56   247.1  1573.9
  260.69 1573.46  264.52 1573.44  285.03 1575.05  297.75  1575.4  310.59 1575.46
   312.9 1575.11  323.03 1575.16  339.64 1576.05  425.66 1576.31  449.77 1576.75
  472.02 1577.29  499.63  1578.4  535.89 1583.53  569.67 1583.62  581.49 1583.27
  621.63 1585.03  659.03 1586.12  663.37 1586.05  674.25 1585.36  677.95 1585.23
  687.14 1586.16  695.08 1586.49  702.32 1586.68  734.83 1588.36  749.33 1588.66
  752.48 1588.65  755.47 1589.29  757.49 1588.62  760.34 1588.14  774.35 1588.41
  787.67 1588.31  807.68 1588.39  817.04 1588.68  826.62 1589.89   828.3 1590.04
  834.68 1589.51  837.99 1589.64  852.03 1589.05  893.14 1589.34  902.94 1589.95
  904.56 1590.46  913.49 1590.43  930.48 1591.13  940.35 1591.44  944.61 1591.51
  974.94 1591.47  983.37 1591.78  985.04 1591.47  995.72 1594.97  1001.3 1593.48
 1002.56 1593.26 1006.62 1595.05 1009.21 1595.97 1011.67 1595.86 1013.09 1595.93
 1019.97  1595.8 1023.87 1595.98 1032.23  1593.6 1050.99 1593.64 1051.65 1593.77
 1062.25    1595 1091.56 1594.64 1096.43  1594.7 1116.12 1594.53 1139.21 1593.78
 1165.22 1593.94 1176.93  1594.2  1179.6 1594.03 1180.61 1594.15 1182.04 1594.05
 1184.87 1594.25 1190.69 1594.03 1205.08 1593.79 1226.33 1595.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
************************************************
       0    .035  154.78    .035   247.1    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.78   247.1               400     400     400              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=   68.13      Elevation= 1593.63
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.424

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1577.92   24.42 1584.68   25.57 1584.97   31.49 1587.13   50.08 1593.77
   62.07 1593.32   67.47 1591.88  100.47 1581.23  105.59 1579.69  112.87 1578.44
  135.29 1577.52  143.08 1577.96  144.39 1578.02  145.92 1577.58  160.24 1573.21
  162.55 1573.19  176.36  1573.2  181.71 1573.74  186.46 1574.79  188.16 1575.05
  208.97 1576.05  220.76  1576.4   246.3 1577.04  285.91 1577.37   300.5 1578.15
  307.98 1577.41  312.04 1577.22  316.64 1577.17  320.54 1577.29  325.72 1577.34
  329.45 1577.52   334.6 1577.57  345.33 1577.78  361.89 1577.77  385.23 1578.37
  391.97 1578.46  399.57 1578.53  406.09 1578.65  410.24 1578.67  421.03 1579.12
  436.23 1579.16   447.9 1578.91  455.18  1578.9  465.07 1579.67  476.04 1579.76
  476.07 1579.76  490.97 1579.86   508.4 1580.94  526.68  1583.5  532.22 1584.22
  541.91 1584.42  565.14 1585.02  574.53 1585.52  584.17 1586.22  594.17 1586.55
  611.01 1586.88  623.51 1587.17  644.72 1587.87  659.61 1588.07  674.57 1588.36
  683.85 1588.49  701.56 1588.45  711.56 1589.13  716.63 1589.11  725.58    1589
  736.95  1589.2  746.72 1589.29  748.95  1589.8  752.85 1589.87  773.98 1589.49
  793.81  1590.2  794.91 1590.27  803.06 1590.47  817.27 1590.22  825.68 1590.14
  827.17 1590.15  851.84 1590.87  877.62 1591.16  902.62 1592.46  904.11  1592.5
  935.27 1592.73  937.14  1592.8  946.83  1592.6  953.16 1592.62   957.1 1592.67
  978.55 1592.74  980.98 1592.77  986.44 1592.56  987.97 1592.57  992.65 1592.97
  998.08 1593.25 1010.06 1593.67  1014.1 1593.89 1019.93 1594.08 1031.94  1594.6
 1038.62 1594.67 1048.44 1594.73 1057.97 1594.82 1063.47 1594.99 1083.39 1595.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  144.39    .035  220.76    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        144.39  220.76             400.3   400.3   400.3              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=   50.08      Elevation= 1593.77
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.349

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1580.04    4.43  1581.6    24.6 1588.46   34.96 1592.76   36.27 1593.34
   39.09 1593.38   47.21 1593.51   50.48 1592.22   66.22 1586.36   96.69 1579.04
   97.43 1578.93  102.05 1578.47  110.91 1578.49  113.26 1578.57  115.64 1578.62
  131.26 1578.74  133.37 1578.06  141.52 1574.82  147.33 1573.38  161.12 1573.43
  161.98 1573.32  163.21 1573.41  173.83  1575.8  179.28    1577  187.09 1577.33
  187.44 1577.35  189.73 1577.37  221.35 1577.74  223.05 1577.78  236.09 1577.73
  248.08 1577.61  263.36 1577.64  264.09 1577.65  264.49 1577.64  289.38 1577.88
  305.38 1578.46  308.23 1578.43  323.05 1578.93  337.47  1579.2  344.81 1579.68
  385.13 1581.07  386.81 1581.06  396.94 1581.21  400.98 1581.19  405.78 1581.21
  405.79 1581.21  406.39 1581.21  425.08 1581.49   447.5 1581.87  464.96 1582.11
     474 1582.43  490.49 1583.43  493.81 1583.67  504.54 1585.54  511.83  1587.5
  514.75 1587.45  538.06 1587.94  544.68 1587.96  547.45 1588.07  562.86 1588.46
  566.25 1588.37  574.91 1588.26  577.54 1588.19  578.91 1588.22  580.62 1588.22
  612.96  1589.1  619.98 1589.61  620.26 1589.63  627.54 1590.07  631.96 1590.19
  663.76 1590.74  669.13 1590.87  675.36 1590.82  695.95 1591.16  702.93 1591.19
  703.39 1591.18   703.9 1591.17  704.64 1591.23  707.94 1591.25  730.97 1591.54
  737.21 1591.59  746.92  1591.6  755.18 1591.64  758.73 1591.59  760.61 1591.63
  763.52 1591.88  772.79 1592.19  778.27 1592.31  780.91 1592.22  786.43 1592.36
  788.18 1592.38  794.65 1592.55  800.45 1593.06  807.61 1593.31   816.6 1593.42
```

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  821.55 1593.63  827.17 1593.57  829.44 1593.69  844.05 1593.78  850.89  1594.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  131.26    .035  187.09    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        131.26  187.09            333.7   333.7   333.7            .1        .3
Left Levee      Station=   47.19      Elevation= 1593.51
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.285

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1576.49   20.91  1582.9   28.58 1585.21   29.98 1585.67   33.75 1586.66
   36.94 1587.84   40.94 1589.01   55.13 1593.54   66.83 1593.43   74.05 1591.52
   79.28 1590.25   101.2 1583.45   115.1 1579.94  117.02 1580.01  121.19 1579.72
  128.42 1579.32  144.05 1579.21  146.62 1578.32  165.39 1573.48  167.22 1573.04
   171.6  1573.2  183.43 1573.31   186.7 1574.18  195.73  1577.4  200.56 1579.04
  236.48 1579.18  246.74 1579.28  278.57 1579.79  282.59 1580.08  311.78 1580.59
  316.27 1580.64  317.72 1580.76  320.52 1580.85  333.57 1581.53  347.55 1582.55
  364.62 1582.97  371.05 1582.82  377.35 1583.41  394.54 1582.56  402.11 1582.87
  409.34 1583.28  410.83 1583.44   428.2 1585.73  433.28 1585.11  436.25 1585.01
  452.82 1585.37  452.86 1585.37  465.62 1585.66  475.78 1585.99  484.27 1586.36
  500.13 1586.96  511.78 1587.15  516.52 1587.07  539.44 1587.32  549.03 1587.34
  555.61 1587.41  575.93 1587.82  593.13 1588.59  598.97 1588.55  616.43 1588.77
  629.03 1588.63  633.12 1588.65  635.25 1588.73  646.02 1588.63  669.97 1588.73
  675.21 1588.84  678.79 1589.03  683.25 1589.07  685.72 1589.26  689.41 1589.41
  697.31 1589.48  701.24 1589.45  711.42 1589.72  715.35 1589.75  729.21  1590.6
  738.41 1590.49  742.91 1590.54   756.4 1590.52  759.75 1590.71  770.13 1591.11
  777.07 1591.43   786.4  1591.6  792.04 1591.76  842.79 1592.54   864.7 1592.71
  874.11 1592.64  879.93 1592.53   882.4  1592.8  884.97 1592.99  891.29 1593.23
  914.87 1593.38   916.8 1593.28  930.09 1593.04  942.04 1592.75   946.6 1593.48
  952.73 1593.16  958.05  1593.5  959.75 1593.52  985.46 1594.97 1005.15  1595.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  144.05    .035  200.56    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        144.05  200.56            778.7   778.7   778.7            .1        .3
Left Levee      Station=   66.78      Elevation= 1593.43
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.138

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.23   8.027 1593.38  18.686 1591.43  31.208 1588.67  43.529 1586.45
  48.335 1584.93  51.446 1584.33  53.328 1583.45  60.643 1582.03  62.059 1582.08
   72.79 1580.06  82.388 1578.83   125.6 1577.15 127.463 1577.46 142.772 1577.09
 156.756 1576.27 158.515 1575.36 163.748 1575.25 175.817 1572.49 181.541 1572.36
 185.435 1573.86 194.735 1578.98 202.393 1579.45 235.677 1578.91 247.164 1578.09
 263.716 1578.99 276.619 1578.94 294.005 1580.68 330.244 1581.08 333.375 1581.43
 348.348 1581.43 356.336  1581.9 371.419 1581.61 381.017 1581.76 387.602 1580.83
 395.221 1581.87 404.082 1582.53 430.555 1582.39 435.898 1582.69 437.967 1582.35
 439.118  1582.6 443.284 1582.06 462.895 1582.28 468.884 1582.78 478.799 1582.19
 484.452 1582.44 488.359 1582.61 495.208 1581.56 501.372 1583.31 505.602 1583.56
 507.555 1583.12  514.34 1583.59 520.873 1583.33 553.878 1584.17 584.801 1585.95
 597.472 1586.26  603.52 1587.16 620.375  1586.8 664.221  1588.1 676.943 1585.89
 685.623  1587.5 692.182 1588.09 710.848 1588.53 755.716 1588.13  762.61 1587.29
 770.197 1588.28 790.849 1587.64 818.804 1589.95  840.84 1588.26 845.859  1589.3
 848.478 1590.34 857.727 1592.03 895.869 1591.05 915.001 1590.95 925.614 1590.22
 942.657 1591.18 963.684 1590.69 969.176 1590.98 983.166 1592.59 991.632 1591.89
 998.533 1592.261009.995 1592.281028.622 1590.711046.972 1592.411080.598 1593.12
1092.616 1593.841096.677 1593.37 1119.71 1593.341124.949  1593.91161.518 1594.91
1171.944 1595.661221.857 1596.451227.659 1595.281230.763 1595.211233.823 1596.07
1262.566 1596.331272.307 1596.77 1281.42 1595.54 1294.66 1596.39
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035 142.772    .035 194.735    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       142.772 194.735            220.7   220.7   220.7              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    8.02      Elevation= 1593.38
Skew Angle = 49.7
Sediment Elevation = 1577.2

CULVERT                 RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.117

INPUT
Description: Brown Road
Distance from Upstream XS =    80.2
Deck/Roadway Width        =    60.3
Weir Coefficient          =    2.67
Upstream  Deck/Roadway Coordinates
    num=      74
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************************************
       0 1594.35    1570   22.12 1594.12    1570  55.482 1593.58    1570
  56.387 1593.57    1570  83.902  1592.9    1570  84.296 1592.87    1570
 108.622 1591.58    1570 108.997 1591.56    1570 138.769  1589.8    1570
 139.099 1589.78    1570 174.582 1587.52    1570 174.724 1587.52    1570
 189.749  1586.8    1570 202.064 1586.21    1570 202.199 1586.21    1570
 229.397 1584.92    1570 229.888  1584.9    1570 264.272 1584.08    1570
 264.608 1584.07    1570 278.191 1583.84    1570  305.02 1583.35    1570
 305.634 1583.34    1570 327.314 1583.51    1570 336.447 1583.57    1570
 336.648 1583.57    1570 357.985 1583.52    1570 375.209 1583.47    1570
 375.442 1583.47    1570  400.99 1583.73    1570 430.943 1584.03    1570
 431.254 1584.03    1570 431.525 1584.03    1570  447.32 1584.16    1570
 491.638 1584.49    1570 491.884  1584.5    1570 493.688 1584.55    1570
 503.927 1584.82    1570 503.953 1584.82    1570 541.266  1585.8    1570
 582.893 1587.45    1570 582.906 1587.45    1570 582.913 1587.45    1570
 584.924 1587.49    1570 632.289 1588.34    1570 632.438 1588.34    1570
 632.541 1588.34    1570 704.367 1589.92    1570   704.6 1589.92    1570
  704.82 1589.92    1570 766.452 1591.31    1570 766.996 1591.32    1570
 813.416 1592.11    1570 813.733 1592.11    1570 845.594 1592.01    1570
 846.518 1592.02    1570 877.086 1591.94    1570 930.103 1591.51    1570
 933.867 1591.49    1570 936.228  1591.5    15701014.988 1592.77    1570
1018.448 1592.88    15701020.744 1592.98    15701090.818 1595.47    1570
 1096.05 1595.64    15701158.116 1597.34    15701166.434 1597.58    1570
1216.683 1598.46    15701229.211  1598.6    15701238.001 1598.74    1570
1295.171 1599.43    15701304.116 1599.53    15701353.026 1600.22    1570
1359.636 1600.24    15701373.167 1600.37    1570

Upstream Bridge Cross Section Data
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1593.23   8.027 1593.38  18.686 1591.43  31.208 1588.67  43.529 1586.45
  48.335 1584.93  51.446 1584.33  53.328 1583.45  60.643 1582.03  62.059 1582.08
   72.79 1580.06  82.388 1578.83   125.6 1577.15 127.463 1577.46 142.772 1577.09
 156.756 1576.27 158.515 1575.36 163.748 1575.25 175.817 1572.49 181.541 1572.36
 185.435 1573.86 194.735 1578.98 202.393 1579.45 235.677 1578.91 247.164 1578.09
 263.716 1578.99 276.619 1578.94 294.005 1580.68 330.244 1581.08 333.375 1581.43
 348.348 1581.43 356.336  1581.9 371.419 1581.61 381.017 1581.76 387.602 1580.83
 395.221 1581.87 404.082 1582.53 430.555 1582.39 435.898 1582.69 437.967 1582.35
 439.118  1582.6 443.284 1582.06 462.895 1582.28 468.884 1582.78 478.799 1582.19
 484.452 1582.44 488.359 1582.61 495.208 1581.56 501.372 1583.31 505.602 1583.56
 507.555 1583.12  514.34 1583.59 520.873 1583.33 553.878 1584.17 584.801 1585.95
 597.472 1586.26  603.52 1587.16 620.375  1586.8 664.221  1588.1 676.943 1585.89
 685.623  1587.5 692.182 1588.09 710.848 1588.53 755.716 1588.13  762.61 1587.29
 770.197 1588.28 790.849 1587.64 818.804 1589.95  840.84 1588.26 845.859  1589.3
 848.478 1590.34 857.727 1592.03 895.869 1591.05 915.001 1590.95 925.614 1590.22
 942.657 1591.18 963.684 1590.69 969.176 1590.98 983.166 1592.59 991.632 1591.89
 998.533 1592.261009.995 1592.281028.622 1590.711046.972 1592.411080.598 1593.12
1092.616 1593.841096.677 1593.37 1119.71 1593.341124.949  1593.91161.518 1594.91
1171.944 1595.661221.857 1596.451227.659 1595.281230.763 1595.211233.823 1596.07
1262.566 1596.331272.307 1596.77 1281.42 1595.54 1294.66 1596.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**********************************************
       0    .035 142.772    .035 194.735    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       142.772 194.735             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F
Left Levee      Station=    8.02      Elevation= 1593.38
Skew Angle = 49.7
Sediment Elevation = 1577.2

Downstream  Deck/Roadway Coordinates
    num=      74
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
       0 1594.35    1570   22.12 1594.12    1570  55.482 1593.58    1570
  56.387 1593.57    1570  83.902  1592.9    1570  84.296 1592.87    1570
 108.622 1591.58    1570 108.997 1591.56    1570 138.769  1589.8    1570
 139.099 1589.78    1570 174.582 1587.52    1570 174.724 1587.52    1570
 189.749  1586.8    1570 202.064 1586.21    1570 202.199 1586.21    1570
 229.397 1584.92    1570 229.888  1584.9    1570 264.272 1584.08    1570
 264.608 1584.07    1570 278.191 1583.84    1570  305.02 1583.35    1570
 305.634 1583.34    1570 327.314 1583.51    1570 336.447 1583.57    1570
 336.648 1583.57    1570 357.985 1583.52    1570 375.209 1583.47    1570
 375.442 1583.47    1570  400.99 1583.73    1570 430.943 1584.03    1570
 431.254 1584.03    1570 431.525 1584.03    1570  447.32 1584.16    1570
 491.638 1584.49    1570 491.884  1584.5    1570 493.688 1584.55    1570
 503.927 1584.82    1570 503.953 1584.82    1570 541.266  1585.8    1570
 582.893 1587.45    1570 582.906 1587.45    1570 582.913 1587.45    1570
 584.924 1587.49    1570 632.289 1588.34    1570 632.438 1588.34    1570
 632.541 1588.34    1570 704.367 1589.92    1570   704.6 1589.92    1570
  704.82 1589.92    1570 766.452 1591.31    1570 766.996 1591.32    1570
 813.416 1592.11    1570 813.733 1592.11    1570 845.594 1592.01    1570
 846.518 1592.02    1570 877.086 1591.94    1570 930.103 1591.51    1570
 933.867 1591.49    1570 936.228  1591.5    15701014.988 1592.77    1570
1018.448 1592.88    15701020.744 1592.98    15701090.818 1595.47    1570
 1096.05 1595.64    15701158.116 1597.34    15701166.434 1597.58    1570
1216.683 1598.46    15701229.211  1598.6    15701238.001 1598.74    1570
1295.171 1599.43    15701304.116 1599.53    15701353.026 1600.22    1570
1359.636 1600.24    15701373.167 1600.37    1570

Downstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
***************************************************************************************
       0 1594.13   8.984 1593.69  32.708 1588.77  44.952 1586.89  58.444 1583.55
   68.21  1581.6  76.101 1580.58  79.911 1580.61  84.729 1580.03  92.497 1579.76
 111.532 1580.46 118.084 1580.18 130.761 1580.31 149.771 1579.49 152.895  1580.2
 164.408 1580.74 172.441  1579.7 192.284 1580.09 195.589  1579.3  227.03 1579.05
 238.918 1578.22  241.55 1577.78 250.528 1577.37 255.747 1578.56 281.172  1579.9
 291.586 1579.11 298.746 1579.85 318.466 1580.39 329.501  1579.3 347.462 1575.03
 357.319 1572.08 365.443 1571.78 369.104 1573.09 374.608 1576.71 380.914 1578.68
 386.379 1581.03  392.66 1582.89  396.98 1583.78 416.423 1583.28 433.388 1582.13
  452.21 1582.94 467.047 1582.87 485.332 1582.02 492.822 1582.12 496.948 1582.59
 506.734    1583 540.639 1582.93 561.672 1583.77 561.718 1583.77 587.363  1584.6
 599.374 1584.39 613.247 1584.94 694.555 1585.88 700.034 1586.42 713.137 1585.99
 740.904 1586.64 744.785 1587.13 761.582 1586.96 781.464  1587.9 810.059 1587.81
 825.064 1588.98 834.204  1588.9 891.697 1590.48 895.073 1590.88 922.898 1591.64
 937.871 1591.22 951.499 1591.72 982.124 1591.59 986.691 1591.29 995.306 1591.85
1017.614 1592.481030.647 1591.421054.313 1592.611096.186 1593.091099.821 1592.18
1122.096  1594.21140.284 1594.951140.982 1594.751142.367 1595.061146.739 1594.87
1156.699 1595.241176.646 1594.881187.183 1595.151199.355 1594.781238.667 1595.05
1255.244 1595.741258.756 1595.58 1262.43 1595.911282.455 1596.381296.801 1596.36
1299.989 1596.061330.149 1597.111356.396 1598.481362.812 1598.221396.523 1598.95
1405.021 1599.61 1436.43 1599.871471.938    16011478.439 1599.271486.019 1599.81

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
       0    .035 318.466    .035  396.98    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       318.466  396.98             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F
Left Levee      Station=     .05      Elevation= 1594.13
```

```
Skew Angle = 49.7
Sediment Elevation = 1577.2

Upstream Embankment side slope              =       3 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 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 =  1

Culvert Name     Shape      Rise    Span
Brown           Circular      9
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 2 - Mitered to conform to slope
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
              39.35     142       .024                   .5                1
Upstream   Elevation =  1571.24
           Centerline Station =  179
Downstream Elevation =  1571.24
           Centerline Station =  360

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 3.096

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1594.13   8.984 1593.69  32.708 1588.77  44.952 1586.89  58.444 1583.55
   68.21  1581.6  76.101 1580.58  79.911 1580.61  84.729 1580.03  92.497 1579.76
 111.532 1580.46 118.084 1580.18 130.761 1580.31 149.771 1579.49 152.895  1580.2
 164.408 1580.74 172.441  1579.7 192.284 1580.09 195.589  1579.3  227.03 1579.05
 238.918 1578.22  241.55 1577.78 250.528 1577.37 255.747 1578.56 281.172  1579.9
 291.586 1579.11 298.746 1579.85 318.466 1580.39 329.501  1579.3 347.462 1575.03
 357.319 1572.08 365.443 1571.78 369.104 1573.09 374.608 1576.71 380.914 1578.68
 386.379 1581.03  392.66 1582.89  396.98 1583.78 416.423 1583.28 433.388 1582.13
  452.21 1582.94 467.047 1582.87 485.332 1582.02 492.822 1582.12 496.948 1582.59
 506.734    1583 540.639 1582.93 561.672 1583.77 561.718 1583.77 587.363  1584.6
 599.374 1584.39 613.247 1584.94 694.555 1585.88 700.034 1586.42 713.137 1585.99
 740.904 1586.64 744.785 1587.13 761.582 1586.96 781.464  1587.9 810.059 1587.81
 825.064 1588.98 834.204  1588.9 891.697 1590.48 895.073 1590.88 922.898 1591.64
 937.871 1591.22 951.499 1591.72 982.124 1591.59 986.691 1591.29 995.306 1591.85
1017.614 1592.481030.647 1591.421054.313 1592.611096.186 1593.091099.821 1592.18
1122.096  1594.21140.284 1594.951140.982 1594.751142.367 1595.061146.739 1594.87
1156.699 1595.241176.646 1594.881187.183 1595.151199.355 1594.781238.667 1595.05
1255.244 1595.741258.756 1595.58 1262.43 1595.911282.455 1596.381296.801 1596.36
1299.989 1596.061330.149 1597.111356.396 1598.481362.812 1598.221396.523 1598.95
1405.021 1599.61 1436.43 1599.871471.938    16011478.439 1599.271486.019 1599.81

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .035 318.466    .035  396.98    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       318.466  396.98            684.7   684.7   684.7              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=     .05      Elevation= 1594.13
Skew Angle = 49.7
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.966

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1589.79   15.16 1593.94   21.93 1594.08   26.77 1594.01   52.66    1586
   73.02  1578.6   81.19  1577.3    96.2 1576.25  116.87 1576.11  136.22 1575.34
  143.18 1575.25  155.56 1575.31  162.26 1574.98   196.4 1576.13  203.76 1572.62
```

```
  209.39 1571.98  222.61 1571.96  233.26 1573.89  245.77 1576.73  246.68 1576.65
  256.21 1576.87  263.95 1577.22  273.49 1577.47  282.42 1577.87  296.91 1577.79
  300.04 1578.06  303.65 1577.77  326.84 1578.38  340.18 1579.12  355.58 1579.16
  376.36 1580.11  383.27 1580.23  404.67 1580.17   436.3  1581.2  444.76 1581.68
   448.5 1581.72  450.16 1581.16  455.27 1581.19  470.12 1581.73   474.1 1582.02
  495.51 1581.89  510.16 1582.17  515.87 1582.04  540.39 1582.57  561.93 1583.26
  568.62 1583.13  587.19 1583.55  597.05 1584.02  601.66 1584.07  601.67 1584.07
  626.62 1584.54  639.06 1582.89  646.82 1584.01  657.41 1584.95  664.81 1585.36
  687.29 1585.88  704.81 1585.82  726.95 1586.18  745.41 1586.68  755.83 1585.35
   762.6 1585.28  771.26 1585.84  779.34  1586.1  786.75 1586.15  793.89 1585.53
  795.92 1585.54  802.64 1585.97  814.87 1585.47  817.59 1585.51  825.18 1586.42
   830.7 1586.59  836.44 1586.96  839.02 1587.34  842.77 1587.57  847.05 1587.51
  849.17  1587.8  853.04 1588.69  862.93 1588.77   909.4  1589.9  929.58  1590.7
  941.74  1589.8  945.98  1590.8  948.87 1590.83  962.59  1590.4  1027.6 1591.96
 1047.62 1592.75  1055.3 1592.72 1086.57 1593.31 1090.72 1592.79 1096.66 1592.38
 1105.88 1591.28 1112.65 1591.74 1118.55 1592.75 1121.89 1593.14 1134.71 1593.78
 1151.83 1593.86 1166.06 1594.56 1199.74 1594.88 1216.35 1595.58 1229.63 1595.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035   196.4    .035  245.77    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         196.4  245.77              400     400     400              .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=   26.77      Elevation= 1594.01
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.891

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1575.78   22.72 1582.48    34.2 1587.18   43.63 1590.85   50.81 1592.99
   57.52 1593.32   63.68 1593.12   78.24 1588.37   89.66 1584.91   90.89 1584.23
  100.53  1581.3  109.97 1578.65  120.83 1576.77  134.64 1575.94  137.66 1576.02
  160.16 1575.81  169.88 1574.59  179.81 1571.62  190.64 1571.26  210.61 1575.63
  217.33 1576.55  231.15 1575.95  272.46 1576.44  283.66 1576.29   318.2 1576.99
  342.27 1578.01  358.72 1578.31  363.82 1578.68     388 1579.12  395.46 1578.63
  404.75 1578.73  412.39 1578.53  427.14  1579.1  441.78 1579.31  447.44 1579.57
  457.85 1579.34  466.94 1579.65  475.71 1580.46  490.25 1580.65  496.17 1580.46
  512.98 1580.93  525.61 1580.93  540.74 1580.55  551.38 1581.12  557.89 1581.31
  565.75 1581.74  577.55 1581.97  587.41 1581.75  590.62 1581.83  601.87 1581.63
  606.48 1581.86  610.51 1582.34  616.27 1582.13  619.71 1581.58  631.03 1582.18
  635.44 1581.73  639.01  1582.2  659.04 1582.24  665.85  1582.4  675.02 1582.39
  713.28 1583.52  731.17 1583.76  731.21 1583.76  733.84 1583.94  756.82 1582.64
   769.9  1583.9  774.94 1583.49  778.23 1582.88  791.92 1583.99   801.1 1584.51
  808.16 1584.46  818.75 1585.04   856.2  1585.8  873.86 1584.57  889.55 1583.75
   909.9 1585.14  914.11 1585.17  922.44 1585.63  939.77 1585.74  945.92 1585.51
  962.89 1585.36  976.29 1586.12  982.59 1587.16  994.58 1588.06 1027.03 1588.91
 1056.11 1589.88 1057.69 1589.76 1074.56 1589.82 1109.03 1590.39 1110.91 1590.55
 1145.19  1591.3 1159.28 1591.89 1168.28 1591.98 1183.57  1591.7 1222.35  1592.3
 1249.02 1593.24 1258.95 1593.42 1272.24 1593.46  1286.4 1594.07 1290.75 1594.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  160.16    .035  210.61    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        160.16  210.61              102     102     102              .1       .3
Left Levee      Station=   57.52      Elevation= 1593.32
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.871

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  1573.4   24.13 1580.96   33.74  1584.8   50.75 1591.26   56.56 1593.08
   63.09 1593.32   69.56 1593.16   95.89 1584.66  117.12 1576.89  124.79 1575.32
```

```
  143.09 1574.93  165.34 1573.82  168.13 1573.11  176.36 1571.36  186.97 1571.33
   197.3 1573.34  208.27 1574.55  219.55 1574.51  233.86 1574.83  269.93 1574.91
  295.64 1575.45  314.24 1574.11  320.29 1573.88  369.04 1574.79  377.48 1574.81
  398.73 1575.27     404 1575.68  410.28  1576.6   410.8 1576.89  415.08 1577.51
  417.81 1577.75  419.51 1577.55  421.12 1577.53  422.34 1577.24  426.09 1576.92
  427.48 1576.22  431.27 1576.04  449.61 1576.32  454.23 1576.57  467.32  1576.4
  479.36 1576.48  497.71 1576.81  505.18 1577.23  536.66 1577.72  543.83  1577.5
  557.84 1578.56  578.92 1581.57  599.43 1581.86  608.91 1582.29  610.93 1582.68
   613.7 1582.89  616.94 1582.56  620.83 1582.53  626.33  1582.9  632.16 1582.95
  634.98 1582.59  637.75 1582.08  640.34 1582.86  691.54 1583.68     716  1584.3
  729.91 1584.45  729.95 1584.45  742.33 1584.49  791.63 1585.49  797.99 1585.42
  820.05 1585.86  825.54  1586.2  836.44  1586.5  839.82 1585.78  849.59 1584.64
  862.49 1586.24  875.17 1586.86  890.22 1586.85  903.42 1587.05  916.73 1587.46
   944.5 1587.88   955.4 1587.82 1007.15 1589.16 1025.42  1589.1 1059.49 1590.62
 1062.16 1590.36 1068.27 1590.17 1107.01 1590.51  1114.9 1590.46 1118.31  1590.6
 1133.63 1590.81 1141.93  1590.7 1156.43 1591.19 1165.01 1591.16 1180.19 1591.85
 1189.75  1591.9  1197.9 1592.17 1206.33 1592.63 1219.44 1592.97 1239.06 1592.57
 1249.34 1593.27 1273.12 1593.42 1274.79 1593.34 1282.89 1593.69 1290.74 1593.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035  143.09    .035  208.27    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        143.09  208.27            294.9   294.9   294.9             .1       .3
Left Levee      Station=    63.1      Elevation= 1593.32
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.815

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.29    3.87 1575.07   16.29  1579.3   25.24 1582.01   31.61 1584.49
   40.39 1588.18   51.08 1591.59   59.22 1593.15   65.22 1593.74   71.44 1593.54
   77.45 1591.47    94.6 1584.93   96.38 1584.04  108.06 1580.85  119.02 1577.12
  126.27 1575.05  129.36 1574.71  131.18 1574.33  138.23 1573.71  159.53 1573.98
  171.89 1571.33  182.43 1571.07  192.68 1572.06  198.75 1572.48  205.28 1573.13
  214.39 1573.22  217.07  1573.4  222.31 1573.16   225.1 1573.42  233.34 1573.38
  253.71 1572.83  263.92 1572.68  272.46 1572.94  319.28  1573.5  328.26 1573.42
  350.01 1574.57  368.52 1574.02  412.19 1574.95   415.2 1575.16  425.41 1575.49
  492.26 1576.78  496.29 1576.96  511.24  1577.2  545.14 1578.21  562.35 1578.07
  584.84 1581.22     592 1581.43  592.84 1581.59  595.15 1581.18  600.19 1581.08
  644.55  1581.9  661.07 1582.01   674.2  1582.4   707.3 1582.73  707.34 1582.73
  723.38 1582.64  735.67    1582  737.89 1582.19  741.57 1582.18  745.82 1583.16
  756.39 1584.25  790.43 1584.29  813.64 1585.05  830.77 1585.39  850.02 1586.24
  864.69 1584.84  880.34 1586.29  896.11 1586.63  906.26 1587.15  917.92  1587.3
  922.19 1587.59  932.34 1587.54  941.33 1587.71  951.75 1587.73  961.54 1587.94
  988.45 1588.99 1006.78 1589.28 1031.07 1590.31 1045.09 1590.27 1047.05 1590.12
  1056.1 1590.01 1073.26  1590.5 1078.52 1590.36 1085.96 1590.41 1113.58    1591
  1125.4 1591.51 1145.87 1592.08 1162.27 1591.99  1174.9 1592.59  1181.5 1593.23
 1189.93 1593.56 1194.01  1593.5 1204.38 1593.65 1207.55 1593.44  1219.9 1593.92
 1232.07 1593.86 1251.37 1594.17 1259.54 1593.95    1272 1594.43  1278.4 1594.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035  159.53    .035  205.28    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        159.53  205.28            417.3   417.3   417.3             .1       .3
Left Levee      Station=   71.44      Elevation= 1593.54
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.736

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1573.89   11.99 1575.35   15.23 1576.42   41.38 1585.73   61.12 1592.41
   66.36 1593.65   77.24 1593.49    78.7 1592.86   87.36 1590.34  113.68 1581.75
  134.08  1576.8  136.77 1576.48  141.33 1576.26  159.92 1575.97  163.94 1575.99
  170.81 1574.01     179 1571.88  183.44 1571.58  190.03 1570.94  196.46  1571.9
```

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  218.96 1573.59  227.58 1573.05  242.61 1572.97  261.96 1573.22  266.26 1572.97
  285.26 1573.31  293.88 1573.76  321.91 1574.23  333.76 1574.72  338.68 1574.79
  353.41  1574.7  378.92 1575.15   398.1 1575.18  412.67 1575.61  424.06 1575.82
  457.66 1575.92  464.09 1575.84  478.91 1575.99  491.43 1575.93  497.75 1576.42
  518.05 1576.61   520.1 1576.79     524  1576.7  544.46 1576.86  553.42 1577.13
  562.62  1577.9  578.19 1580.16   589.4 1582.61  606.86 1582.79  621.76 1583.93
  623.35 1583.96   623.8 1584.09  629.44 1583.66  636.75  1583.3  648.68 1583.21
  672.12 1584.17  682.24  1584.4   682.3  1584.4  699.67 1584.72  705.04 1584.64
  708.25 1584.45  711.46 1584.44  716.74 1584.91  731.86  1584.6  744.86 1585.06
  765.13 1585.47   770.3 1585.81  771.84 1585.71  776.93 1585.68  792.48 1586.17
  807.88 1586.08  816.26 1586.54  825.64 1586.57   828.7 1586.45  864.36 1588.18
  867.01 1588.38  909.98 1588.11  919.24 1588.23  935.57 1588.25  954.11 1588.87
  964.62 1589.34  965.11 1589.19  975.74 1588.94  1010.3 1590.23  1017.4 1590.16
  1039.3 1590.75 1068.09  1590.9 1077.02 1591.32  1116.6 1591.75 1128.02 1592.31
 1165.94 1592.44 1180.47 1592.82 1194.56 1593.43 1215.83 1593.43 1235.02 1594.22
 1242.75 1594.67 1250.53  1593.7 1252.65 1594.01  1258.3 1594.43 1261.78 1594.56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .035  170.81    .035  218.96    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.81  218.96            414.3     395   381.7              .1       .3
Left Levee      Station=   77.24      Elevation= 1593.49
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.662

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.63   24.97 1583.64   33.21 1586.95   54.83 1593.06   65.53 1593.41
   67.77 1592.76   83.35 1587.33   99.38 1581.23  114.79 1578.12  123.97 1575.71
  126.76 1575.62  154.63 1576.04  161.41 1573.91  165.45 1572.31  167.51 1571.72
  177.44 1572.02  200.72 1575.68  212.27 1575.08  213.38 1575.15  220.94 1574.14
  269.15 1575.24  295.85 1575.25  306.75 1574.85  311.56 1575.01  322.39 1574.95
  326.15 1574.79  343.55 1575.03  375.31 1576.15  381.27 1575.95  397.07  1576.3
  405.81 1576.02  418.44 1576.24  426.12 1576.59  447.67 1576.73  455.37 1576.08
   468.6 1577.08  482.25 1577.34  502.98 1576.68   520.1 1577.22  550.32  1577.4
  558.32 1577.66  561.91 1578.02  573.74 1580.06  583.29 1581.96  586.92 1582.33
  608.07 1582.41  621.87 1582.91  626.56 1583.22  647.05 1582.79  651.02 1582.83
  656.54 1584.41  660.18  1582.4  661.34  1581.9  685.25 1581.77  694.46 1582.23
   701.1 1581.72  725.08 1581.16  751.92 1582.36  760.08 1584.56  762.64  1584.8
  765.99 1584.49  771.59 1585.06  778.59 1584.71  782.39 1584.97  787.57 1584.94
  791.13 1585.61  792.24 1585.37  794.56 1585.73  803.35 1585.64  811.92 1585.75
  828.71 1585.52   848.1 1586.51  855.29 1586.67  882.57 1586.65  891.09 1587.04
   918.5 1587.34  944.34 1587.92  949.52 1587.91  980.78  1589.2  989.91 1589.11
 1003.14 1589.45 1033.12 1590.59 1041.51 1590.54 1098.72 1591.28 1123.07 1591.99
 1152.32 1592.26 1157.55 1592.56 1171.06 1592.77  1174.2 1592.98 1196.95 1593.54
 1216.16 1594.24 1219.49 1594.07 1226.11  1594.5 1241.43 1594.61 1263.51 1595.16
 1272.18 1595.21 1276.66 1595.01  1279.9 1595.14 1320.59 1595.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .035  154.63    .035  200.72    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        154.63  200.72            402.4   402.4   402.4              .1       .3
Left Levee      Station=   65.51      Elevation= 1593.41
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.585

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1576.21   19.57 1581.99    52.4 1593.44   63.68 1592.97   70.51 1590.75
    80.4 1587.16  100.86 1578.81  113.44  1575.9  116.51 1575.03  145.99 1575.75
   153.3 1573.46  164.23 1571.01  175.47 1570.54     192 1572.03  198.79 1572.42
  211.99 1571.82  216.85 1572.07  221.08 1572.09  249.82 1572.78  260.97 1573.49
  265.32 1574.09  285.33 1573.01   292.3 1574.15  296.78 1574.66  351.75 1575.75
     370 1576.52  376.22 1577.04  386.95 1575.84  389.35 1575.67  400.14  1575.4
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  434.16 1576.53  447.22 1576.84  476.12 1577.22  493.68 1578.13  542.22  1578.9
  555.92 1578.48  585.48 1579.23  590.07 1579.44  595.18 1580.26  628.26 1581.19
  638.18 1581.13  662.26  1581.6  674.36  1582.5  677.62  1582.5  682.23 1583.04
  686.44 1583.12   692.9 1583.08  692.95 1583.08   694.3 1583.07  696.99 1582.86
   701.8 1583.41  708.99  1582.1  711.51 1582.25  732.22 1584.26  736.99 1584.53
  739.62 1584.51  751.39  1584.8  756.76 1586.02  758.26 1586.27  770.08 1586.82
  781.86 1587.17  783.38 1587.08  787.53 1587.14  791.86 1587.06  816.59 1587.24
   821.4  1587.1  823.27 1587.21  831.52 1587.37  838.69 1587.19  843.36 1587.39
  858.39 1587.66  862.15 1588.05  871.57  1588.3  898.01 1588.62  902.77 1588.41
  912.43 1588.56  921.55 1588.58  930.47 1588.73  945.83 1588.75   954.4 1589.52
  958.27 1589.54  969.49 1590.06  987.35 1590.57  990.55 1590.58  992.38 1590.68
 1013.14 1590.36 1023.86  1590.8 1053.92 1591.62 1105.72 1592.16 1158.63 1593.16
 1160.94 1593.14 1183.92 1593.66 1188.73 1593.66 1197.55 1594.07 1222.14 1594.56
 1242.93 1594.79 1252.59  1595.2 1258.89 1594.99 1267.15 1595.56 1273.95 1595.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .035  145.99    .035  198.79    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        145.99  198.79            402.4   402.4   402.4             .1       .3
Left Levee      Station=    52.4      Elevation= 1593.44
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.509

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  1573.8    1.31 1573.97   30.73 1583.78   51.31 1592.07   58.14 1593.02
   59.79 1593.39   70.16  1592.8   82.15  1589.7  123.95 1575.13  125.06 1574.89
  141.67 1574.78  161.89 1575.77  181.73 1575.83  198.31 1576.42   215.2 1571.29
  229.07 1571.35  244.89 1572.71  256.14 1574.11   263.5  1574.1  280.23 1574.45
  290.74 1574.99  310.02 1575.56  325.05 1574.96  332.96 1575.55  342.96 1575.81
  354.18 1575.63  364.24  1575.9  409.73 1576.29  420.14 1576.18   475.8 1577.04
   494.8 1577.61  506.14 1577.77  517.74 1577.54  525.35  1578.1  534.43 1578.55
  544.37 1578.39  555.19 1578.41  615.36 1579.91  625.07 1580.89  635.91 1582.03
  642.78 1582.42  648.08 1583.16  665.48 1583.05  698.61 1583.55  747.68  1585.4
  752.68 1584.76  756.76  1585.6  762.97 1586.06   765.4  1585.5  769.45 1585.03
  790.79 1585.46  796.52 1585.34  798.38 1585.51   804.7 1585.65  809.13 1585.99
  815.19 1586.01  821.68 1586.33  835.79    1586     849 1586.03  854.65 1586.86
  871.35 1586.57  879.27 1587.71  882.27    1588  892.91 1588.02  903.18 1587.76
   917.9 1588.43  926.05 1588.05  951.09 1589.16  954.02  1589.1  979.94 1590.06
  996.11 1590.42 1010.66 1591.11 1013.87  1591.4 1030.53 1591.71 1037.54  1591.5
 1055.23 1591.93 1078.99 1592.27 1094.92 1592.18 1095.81 1592.32 1098.67 1592.28
 1105.16 1591.78 1108.37 1592.22  1113.6 1593.23 1123.96 1593.12 1134.53  1593.3
 1146.37 1593.12 1153.57 1593.37 1160.34 1593.42 1177.07 1593.21 1188.86 1593.56
 1191.81  1593.8 1195.55 1593.74 1219.38 1594.23 1236.95 1594.26  1246.9 1594.03
 1261.73 1594.22 1267.28 1594.93 1268.78 1594.73 1284.04 1595.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .035  198.31    .035  256.14    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        198.31  256.14            402.4   402.4   402.4             .1       .3
Left Levee      Station=    59.79     Elevation= 1593.39
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.433

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.97   16.97 1581.16   25.44 1584.39   49.31 1592.66    53.7 1593.62
   63.27 1593.59   74.38 1589.54   78.25 1587.97  116.17 1575.59  125.73 1573.87
   139.6 1575.54   142.7 1575.51  166.66 1575.97  174.86 1576.42  188.34 1575.89
  192.61 1576.12  194.94 1576.11  199.87 1576.48  205.15 1577.17   214.3 1573.62
  221.69 1571.32  232.32 1570.78  236.43 1571.55  242.18 1572.89  257.92 1576.29
  261.69 1576.21  269.51 1575.53  284.68 1574.52  315.11 1574.49  344.73 1576.08
   400.6 1577.49  452.61 1577.91  465.38 1578.33  476.84 1578.52  481.74 1578.81
   498.7 1578.43  514.02 1578.78  527.22 1579.62   548.9 1579.79  574.56 1580.53
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  588.14 1580.42  588.16 1580.42  593.35 1580.38  596.28 1580.58  623.95 1580.87
  627.31 1581.09  634.25 1581.82  642.62    1583   654.3 1583.55  671.69 1584.17
  678.01  1584.5  688.22 1584.67  691.06 1584.94  697.35 1585.31  709.65 1585.48
   714.2 1585.67  715.69 1585.57  742.66 1585.85   745.7 1585.76  764.12 1586.11
  782.59 1586.26  806.66 1586.05  816.18 1586.25  832.12 1586.22  843.91 1586.53
  850.66 1587.44  855.28 1587.56  866.27 1588.13  875.55 1588.04  888.44 1588.09
   906.3  1588.6   922.1  1588.8  937.53 1589.17  944.06 1589.47  959.45 1589.85
  988.17 1590.16 1001.02 1590.84 1006.75  1590.9 1016.24 1590.74 1040.32 1591.34
  1050.2 1591.45 1061.57 1591.86 1079.13 1591.95 1082.63 1592.21  1092.5 1592.18
 1106.46 1592.71 1116.16 1592.59  1128.4 1592.85 1133.02 1592.68 1147.79 1593.19
  1171.5 1593.19 1187.55 1593.47 1197.72 1592.45 1215.41 1594.12 1227.93 1594.43
 1238.59 1594.55  1246.9 1594.82 1263.09 1594.87 1266.43 1594.98 1276.07 1594.87

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .035  205.15    .035  257.92    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        205.15  257.92             402.4   402.4   402.4              .1       .3
Left Levee      Station=   63.26      Elevation= 1593.59
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.357

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.34    5.07 1575.17   20.67 1580.47   41.36 1589.61   48.85 1592.74
   51.06 1593.52   63.44 1593.84   74.21 1589.68   99.67 1581.08  110.31 1578.03
  126.22 1575.76  136.87 1573.99   151.4 1574.38  159.46 1574.08  167.71 1574.55
  181.27 1575.02  197.73 1570.91  209.34 1570.93  217.31 1571.79  231.81 1575.71
  236.83 1574.39  254.44 1573.75  257.57 1574.26   303.7 1574.78  308.31  1575.3
  350.82  1575.7  353.86 1575.85  355.92 1576.52  371.36 1576.07  407.28 1576.57
  446.28 1577.55  464.08 1578.44   494.5 1578.48  522.86 1579.09  561.05 1579.17
  582.91 1579.91  586.92 1580.21  594.11 1580.31  594.13 1580.31  607.08 1580.56
  622.08 1582.91  624.04 1582.84  668.58 1583.71  678.98 1583.42  682.27  1583.6
   694.8 1583.68   699.5 1584.04  710.77 1584.14  718.41 1583.98     733 1584.12
  739.87  1584.4  749.96 1584.55  751.87 1584.71  767.55 1584.57  774.73 1584.73
  780.45 1585.09   797.8 1586.77  803.08 1586.75  813.02 1587.35  821.06 1587.53
  825.38 1587.09  829.31 1587.02  831.54 1586.74  838.34 1586.64   846.4 1586.87
  853.48 1587.51  874.93 1588.16  891.12 1588.36  921.92 1587.95  964.76  1589.3
  972.97 1588.96  974.76 1589.17  990.01 1589.46  996.95 1589.73  1004.9 1590.38
 1009.45 1590.56 1020.08 1590.02 1037.56 1591.15 1052.68 1591.02 1061.39 1591.22
 1069.43  1591.2  1084.7 1591.67  1099.3 1592.53 1111.53 1593.07 1127.25 1593.22
 1142.49 1593.14 1147.58 1593.39 1157.38 1593.47 1161.16 1593.62 1167.71 1593.62
 1173.37 1593.91 1210.44  1594.4 1237.86 1594.61 1255.66 1595.51 1271.77 1594.46
 1283.95 1595.09 1286.01 1594.86 1295.02  1594.9  1309.3 1595.36 1313.54 1595.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**************************************************
       0    .035  181.27    .035  231.81    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        181.27  231.81             149.5   149.5   149.5              .1       .3
Left Levee      Station=   63.44      Elevation= 1593.84
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.328

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1580.88   11.88 1585.17   34.89 1594.04   45.43 1594.01    50.9 1591.99
   61.73 1588.46   92.24 1578.73  104.08 1575.83   117.3 1574.12  138.39 1574.27
  142.04 1574.39  143.86 1574.27   156.9 1574.96  165.58 1572.01  169.34 1570.88
  177.52 1570.79  180.73 1570.67  193.46 1572.72  201.22 1574.56  203.33 1575.18
  208.02  1574.4  213.24 1574.29  249.86 1574.25  258.74 1574.07  288.81 1575.06
  294.14 1574.99  302.65 1575.52  315.91 1576.09  339.47 1576.15   342.9 1576.09
  346.19 1575.91  397.14 1576.49  415.54 1577.22  444.23 1578.22  447.36 1577.83
  454.32 1577.58  486.39 1577.92  496.34 1578.82  497.12 1578.95  537.22 1579.05
   577.1 1580.74  584.14  1581.9   590.4 1582.95  594.41 1583.14  646.51  1583.8
  658.12 1584.16   671.5  1584.3  690.14 1584.22  699.04 1584.44  712.48 1584.63
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  727.59 1584.68  732.26 1584.79  743.04 1585.28  749.69 1585.34  759.42 1585.79
  775.48 1585.97  787.22 1586.56  799.01 1586.82  802.07 1586.53  803.71 1586.71
  805.28 1586.76  813.88 1586.39  830.52 1587.07  854.39 1587.78  865.32 1587.78
   869.9 1587.88  874.57  1588.3   887.8 1588.25  920.17 1588.65  928.58 1589.09
  936.15 1589.61  967.16 1589.57  972.75 1589.96  977.16 1590.11  999.42 1590.49
 1016.65 1591.36  1043.3 1591.34 1045.69  1591.6 1057.57  1591.9  1064.1  1591.9
  1072.8 1592.03 1076.11    1592 1109.61  1593.2  1150.8 1594.22 1160.44 1594.05
 1165.83 1594.17 1171.07 1594.42 1177.03  1594.9 1184.29 1594.86  1220.3 1596.22
 1228.34 1596.21 1247.25 1596.43 1258.47 1596.77 1265.48 1596.84  1272.4 1596.79
  1277.9 1596.96 1301.96  1597.2  1307.6 1597.54 1313.54 1597.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035   156.9    .035  203.33    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         156.9  203.33             251.5   251.5   251.5             .1       .3
Left Levee      Station=   45.43      Elevation= 1594.01
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.281

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1577.92   34.74 1589.63   44.46 1593.32   46.03 1593.77   56.57 1593.86
   59.31  1593.1   68.23 1590.11   91.64 1581.85  113.09 1575.61  122.12 1574.25
  136.01 1574.11  150.26 1574.76  164.53 1570.61  175.98 1569.87   198.1 1572.84
  206.77 1573.55  212.15  1572.5  226.21 1572.27  234.92 1572.34  271.33 1573.16
  278.83  1573.1  280.64 1572.97   301.7 1574.27  320.93 1573.83  330.43 1574.05
  378.05 1574.04     391 1574.17  412.44 1574.85  415.81 1575.21  426.04 1575.03
  432.23 1575.17  435.58 1575.14  447.36 1575.67  474.49 1575.83  482.99 1575.67
  490.49 1575.89   507.2 1576.05  518.19 1576.25  563.18 1579.77  567.92 1579.97
  579.25 1581.51   583.3 1581.94  605.71 1582.42  605.74 1582.42  621.66 1582.74
   627.6 1582.75  652.96 1583.09  677.12 1584.12  704.85 1584.54  723.29 1584.01
  726.34 1584.19  728.13 1584.14  733.56 1584.25  737.92 1584.51  754.78 1584.99
   761.5 1585.07  774.25 1585.55  786.01 1585.26  804.01 1585.56  820.07 1586.77
  823.98 1587.72  826.95  1586.6  843.98 1586.47  848.19 1587.34  868.33  1587.7
  874.47 1587.71  876.87 1587.87  886.39 1586.69  888.54 1587.02  898.88 1587.77
  919.98 1587.99  924.29 1588.17  941.69 1588.33  952.06  1588.3  960.05 1588.58
  962.98 1588.79  974.65 1589.17 1019.34 1590.15 1026.14 1590.18 1036.94 1590.77
 1047.17 1590.92 1052.65 1591.14  1073.1 1591.25 1089.06 1591.47 1099.33 1591.13
 1105.47 1591.38 1118.73 1591.62 1129.51 1592.28 1147.98 1592.66 1169.84 1593.29
 1188.28 1593.38 1192.39 1593.58 1196.89 1593.58 1211.78 1594.44 1218.39 1594.72
 1222.85  1594.8 1226.86 1594.71 1239.76 1594.73 1249.58 1595.01 1260.12 1595.47

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  150.26    .035  206.77    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         150.26  206.77             400.9   400.9   400.9             .1       .3
Left Levee      Station=   56.57      Elevation= 1593.86
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.205

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.51    1.51 1574.77   41.64 1590.76   50.46 1593.59   62.38 1593.24
   74.23 1588.85    78.2 1587.66   92.96 1582.72  109.46 1578.64  121.76 1576.33
  130.53 1575.87     144 1576.29  156.15 1572.31  159.19 1571.07  160.65 1570.67
  172.12 1570.47  183.96 1573.34  185.15 1573.72  188.78 1573.05  196.53 1573.68
  217.07 1573.51  287.88 1574.45  299.73 1574.75  313.41 1574.56  325.68 1574.55
  329.53 1574.83  347.24 1574.88     350 1575.17  360.33 1576.67  378.07 1576.86
  383.47 1577.06  398.22 1575.95  425.07 1576.69  453.53 1576.69  465.12  1576.9
  472.16 1576.84  475.19 1577.03  495.13 1577.17  503.03 1577.41  513.84 1577.47
  523.99 1577.71  543.91  1578.8  543.93  1578.8     560 1580.99  570.54 1582.28
  574.22 1582.91  581.25 1583.71   591.4 1583.71  618.82 1584.42  623.91 1584.66
  642.61 1585.09  647.78 1583.83   656.2  1582.8  667.17  1585.5  682.77 1585.36
  697.91 1585.57  714.62 1585.63  722.49 1585.83   730.8 1585.74  761.55 1586.39
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   771.2    1587  802.88 1587.87  818.24 1588.08  831.09 1588.03  839.36 1588.18
  848.17 1588.65  866.85 1589.22   883.9 1588.67  898.09 1589.26  925.56 1589.42
  944.99 1589.74  956.92 1589.69  962.66 1590.17 1009.42 1591.54 1026.36 1591.72
 1047.51 1591.69  1060.6    1592 1070.44  1591.9 1078.77 1592.09 1089.76  1592.6
 1093.92 1592.95 1117.37 1593.51 1140.25 1593.47 1166.21 1593.78 1174.74 1594.02
 1181.64 1593.96 1190.29 1593.59 1196.06 1592.92 1203.06 1593.81 1210.86 1594.17
  1215.6 1594.52 1220.82 1594.49 1224.97 1594.69  1238.8  1594.4 1240.34 1594.01
 1245.35 1594.03 1246.27 1594.22  1252.7 1593.95 1269.09 1594.95 1279.19 1595.23

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035     144    .035  185.15    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           144  185.15            400.9   400.9   400.9             .1       .3
Left Levee      Station=   50.54      Elevation= 1593.59
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.129

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.71   21.42 1583.47   44.51 1592.72   47.61 1593.07   59.35 1593.43
   60.34 1593.06   69.03 1590.69   72.95 1589.49  107.36 1578.26  115.59 1576.25
  119.54 1575.82  132.38 1576.39  137.58 1576.53  145.13 1576.48  156.29 1576.05
  160.66 1576.16  168.71 1576.56  187.54 1570.82  190.66 1570.71  200.09 1570.63
  203.51 1571.12  207.76 1572.42  211.31 1573.09  214.96 1572.87  224.64 1573.22
  234.84 1573.41  265.49 1573.48  273.04 1573.63  293.15 1574.75   300.5 1574.57
  316.38    1575  318.71 1575.39  334.26 1577.03  344.88 1576.98  354.31  1577.3
  358.07 1576.78  362.97 1576.27  365.67 1575.84  369.49 1575.36  399.01 1576.15
   415.7 1576.22  440.25 1576.03  446.74 1576.17  486.81 1577.76  495.72 1577.06
  498.11 1577.23  521.22 1577.22   535.9 1577.11  540.53  1577.3  545.42 1577.81
  547.69 1577.83  547.75 1577.83  565.37 1578.02  579.56 1579.55  582.52 1579.93
  588.32 1580.37  606.17    1584  607.08 1583.91  637.72 1584.17  662.12 1584.76
  673.23 1584.76  692.73 1585.12  714.72 1585.89  718.82 1585.87  722.93 1586.03
  726.92 1585.93  742.04 1584.73  748.44 1585.51  753.93 1585.92  764.69 1586.21
  773.07 1586.27  786.78 1586.67  812.74 1587.82  823.87  1588.2  834.32 1588.36
  850.91 1588.75  853.57 1588.96  863.32 1589.39  869.87 1589.32  883.79 1589.34
  888.48 1589.45  898.63 1589.43  905.64 1589.64  918.64 1589.61  930.71 1589.73
  964.98 1590.95  985.76 1591.41  994.95 1591.46 1003.83 1591.36 1018.12 1591.53
 1023.34 1591.92 1050.99 1592.35 1071.88 1593.06 1083.14 1592.01 1102.09 1592.74
 1132.91 1594.62 1153.79  1594.7 1158.47 1594.61 1186.49 1595.26 1195.44 1595.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  168.71    .035  211.31    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        168.71  211.31            400.9   400.9   400.9             .1       .3
Left Levee      Station=   59.34      Elevation= 1593.43
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 2.053

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.43     .91 1574.52   13.24 1577.19   20.88 1579.64   41.61 1588.02
   56.92 1593.33    68.8 1593.46   71.33 1593.11   75.11 1592.79   78.74 1590.98
   82.73 1589.29  115.63 1578.37   129.5 1576.64  137.17  1576.3  149.63 1576.17
  165.06 1575.35  167.92 1575.35  173.72 1575.72  182.02 1575.86  185.37 1576.02
  203.71 1576.52  214.13 1576.35  219.52 1574.27  231.08 1570.99  245.58 1570.79
  249.64 1571.12  260.64 1573.77  266.63 1574.76  278.87 1577.74  313.99  1578.1
  355.56 1578.38  373.07 1578.66  388.19 1579.09  430.93 1579.44  450.26 1579.32
  462.51 1579.37  466.24 1579.57  481.16 1579.24  487.37 1579.23  497.24 1579.37
  503.73 1579.71  518.72    1580  528.09 1578.97  532.52 1578.82  541.69 1579.06
  548.98 1579.51  567.97 1578.95  583.35 1579.03  583.37 1579.03  591.84 1579.11
  606.26 1579.65   621.7 1582.58   633.4 1584.57  641.33 1584.52  663.16  1584.6
  681.82 1584.28  685.52  1584.3  705.31 1585.83  713.95 1585.49  737.41 1585.62
  755.96 1586.15  763.27 1585.63  769.97 1585.33  772.63 1585.55  776.63  1585.7
  778.72 1585.61  795.68 1585.99  805.99 1585.66  812.84 1585.98  819.74 1586.55
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   825.4 1586.91  832.35 1586.94  834.47  1587.2  839.92 1587.35  857.85  1588.5
  864.65 1587.55  866.74 1587.09  870.58  1587.5  879.74 1588.79  898.71 1589.25
  915.45 1589.03   923.7 1589.23  934.27 1589.22  942.77  1589.6  969.36 1591.14
   974.8 1591.27  981.38 1590.88  989.26 1590.66    1023  1591.4 1070.85 1593.14
 1080.33  1593.1 1092.67 1593.56 1131.87 1594.28 1140.57  1594.6 1144.99 1594.47
 1156.17  1594.6 1175.48  1595.5 1205.79 1595.78 1227.24 1596.54  1236.7 1596.67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  214.13    .035  278.87    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        214.13  278.87            400.9   400.9   400.9             .1       .3
Left Levee      Station=   68.76      Elevation= 1593.46
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.977

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.84    12.9 1578.17   49.99 1593.55   62.37  1593.5   70.04  1593.1
  100.91 1580.16  107.73 1578.27  129.15 1575.75  148.68 1575.65  152.19 1575.28
  156.07 1575.25  164.14 1575.55   175.2 1576.08  190.49    1576   199.5 1576.33
  213.35 1570.72  225.83 1570.52   228.2 1571.18  233.55 1573.51  240.66 1576.06
  246.52 1576.74  251.85 1576.06  263.86 1576.73  270.26 1576.55  287.67 1576.57
  307.41 1576.86  327.37 1577.47  336.77 1577.52  347.02 1577.25  351.42 1577.53
  361.77 1578.45  367.29 1579.19  373.61 1579.34  380.15 1579.24  401.98 1579.44
  402.88 1579.33  403.89 1579.36  417.38 1578.45  459.52 1578.26  475.32 1578.87
  489.78 1579.07  506.56 1578.94  508.63 1579.21   521.2 1579.42  526.78 1579.41
  544.86 1580.15  560.03 1579.98  560.06 1579.98  573.37 1580.19  576.11 1580.46
  603.73 1582.52  615.05 1583.97  628.79 1584.12  644.16 1583.99  668.68 1583.99
  684.01 1584.12  699.77 1584.88  710.32 1585.21  740.18 1585.56  760.67 1585.42
  765.91 1586.05  774.37 1585.89  787.93  1586.4  820.05  1587.4   826.9 1587.85
  870.54 1588.64  873.43 1588.41  884.71  1588.5  889.88 1588.44  903.55 1589.67
   905.1 1589.72  912.81    1589   919.6 1588.64  928.03 1589.08  937.99 1590.01
  940.57 1590.09  949.45 1589.81   968.3 1589.99 1044.44 1591.39 1062.65  1591.5
 1070.56 1591.82 1079.21 1592.47 1088.25 1592.56 1090.29 1592.46 1102.58 1592.54
 1113.96 1592.89 1123.86 1592.68 1127.83 1592.77 1156.59 1594.18  1161.5 1594.09
 1175.12  1594.3 1183.47 1594.29 1189.03 1594.08 1201.83    1594 1206.29 1593.86
 1211.67 1594.27 1219.33 1594.62 1221.01 1594.85 1246.28 1595.13 1268.83 1595.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035   199.5    .035  240.66    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         199.5  240.66            400.9   400.9   400.9             .1       .3
Left Levee      Station=    62.4      Elevation=  1593.5
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.901

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0  1575.6   16.21 1580.74   43.37 1591.56   47.18 1593.18   47.74 1593.36
    59.4 1592.92   73.47 1588.76  101.19 1579.59   109.8 1577.58  117.93 1576.58
  130.09 1576.08  132.97 1576.16  141.85 1576.11  144.07 1576.03  146.57 1575.04
  150.81 1573.83  160.39 1570.66  172.83 1570.66  182.94  1572.8  183.35 1572.96
  196.26 1572.24  207.16 1572.24  255.52 1573.23  303.43 1573.55  315.65 1574.68
  335.31 1574.58  355.05 1574.66     398 1576.16  407.26 1576.14  410.18  1576.3
  446.51 1577.68  456.62 1578.25  467.06 1579.04  470.12 1578.89  499.98 1579.75
  500.03 1579.75  509.39    1580   529.5 1580.31  533.27 1580.61  548.14  1582.2
  558.56 1583.14  575.63 1584.46   587.8 1584.36  592.27 1584.23  636.79 1585.05
  661.82 1585.36     667 1585.93  677.22 1586.36  681.15 1585.62  689.34 1585.48
  694.76 1585.98   715.3 1586.74  726.85 1587.04  731.94 1587.34   759.4 1588.04
  768.23 1587.87  773.99  1588.2  787.97 1588.75  797.03 1588.52  800.23 1588.56
  811.51 1588.47  812.98 1588.54  817.74 1589.13  822.08 1589.04  822.94 1588.96
  827.18 1589.01  845.46 1588.89  854.74 1589.51  861.43 1589.58  866.48 1589.78
  870.27 1589.76  876.12 1589.93  880.16 1590.33  904.94 1590.35   914.8 1590.76
  921.37 1590.45  956.33 1591.26  970.54 1591.67  987.28 1592.44 1001.56  1592.4
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  1012.7 1592.58 1015.26 1592.72 1018.34 1592.67 1026.17  1592.3 1031.32 1592.33
 1038.56 1592.09 1045.35 1592.26 1058.99 1593.08 1073.41 1593.23 1083.96 1593.44
 1095.47 1593.39 1121.37 1594.17 1127.03 1594.18 1141.56 1594.51 1162.69 1594.64
 1174.08 1594.99 1178.26 1594.93 1195.42 1595.28 1200.67 1595.24 1206.82 1595.43

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  141.85    .035  183.35    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        141.85  183.35            146.3   146.3   146.3              .1       .3
Left Levee      Station=   47.75      Elevation= 1593.36
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.874

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1572.61    5.83 1573.26   14.43 1573.91   18.73 1574.93   38.27 1581.94
   49.47 1586.33   52.53 1587.17   70.86 1593.08   81.81 1593.37   99.74 1588.36
  107.96 1584.91  135.94 1576.67  142.03 1575.93  147.25  1575.1  152.96 1575.18
  155.56  1575.4  170.05 1575.68  184.03 1570.86     197 1570.85  202.69 1572.31
  208.52 1574.17   227.4    1573  249.57 1573.43  265.77 1573.45  295.82 1573.76
  338.79 1573.88  381.92 1575.52   395.3 1575.59  427.17 1576.38  442.03 1577.12
  449.31 1577.96  482.85 1578.21  494.14 1579.04   499.9 1579.23   508.4 1579.26
  510.76 1579.47  538.78 1579.74  546.46  1579.8  548.19 1580.02  551.53 1579.95
  593.67 1580.43   609.8  1583.4  612.72 1583.67  618.51 1583.91  620.49 1584.12
   626.8 1584.34  640.33 1584.24  642.98 1584.32  651.72    1584  662.05 1584.24
  668.63 1584.03  678.72 1584.21  682.52 1584.57   690.1  1584.7  706.74 1584.71
  712.23 1584.95  726.56 1584.78  739.33 1585.62  743.42 1585.77  751.32 1585.75
  758.53 1585.93  769.05 1585.96  778.08 1585.73  782.47 1586.19  787.54 1586.51
   796.4 1586.77   817.7 1586.78  835.95 1587.34     839 1587.55  853.53 1587.83
  865.19 1586.74  883.85 1587.62  900.42 1588.98  916.57 1589.23  936.02 1589.17
  951.78 1589.48  959.19 1588.88  962.25 1588.92  985.36 1590.15  997.26 1590.52
  1015.8  1590.4  1022.6 1590.91 1038.46 1591.52 1059.82 1591.98 1064.18 1592.28
 1074.14  1592.4 1082.39 1593.05 1103.22 1593.16 1128.19 1593.54 1133.24 1593.81
 1144.91 1593.73 1152.95 1593.86 1162.82 1593.47 1167.57  1593.5 1170.28 1593.71
 1193.46 1593.69 1208.49 1594.16 1228.24 1594.52  1238.3 1594.97

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  170.05    .035  208.52    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        170.05  208.52              253     253     253              .1       .3
Left Levee      Station=   81.79      Elevation= 1593.37
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.826

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.18    9.13 1577.17   41.83 1588.95   50.16  1591.2    54.9 1592.99
      66 1593.57   70.32 1592.26    91.2 1584.24  109.48 1577.87  124.65 1574.79
  139.35 1574.62  155.64  1575.1  156.85 1575.29  168.32 1571.37   169.3  1570.9
  181.27 1570.91  198.35 1573.66  214.72  1573.9  219.26 1574.31  233.57 1574.53
  254.67 1574.29  260.74 1574.71  264.35 1574.76  277.33 1574.15  279.46 1574.54
   311.4 1574.64  318.27 1574.34  323.34 1574.42  338.14 1575.55  343.57 1575.41
  355.55 1574.72  373.03 1574.24  376.44 1574.69  393.73 1574.99  423.14 1575.11
  446.88 1576.34   459.7 1576.41  472.83  1575.9  499.61 1576.92  521.17 1577.19
  530.39 1577.55  558.87 1577.71  558.92 1577.71  571.89 1577.86  580.05 1578.43
  606.79 1582.88  619.05 1582.51  640.53 1583.17  653.36 1580.28  658.82 1581.68
   661.8 1582.25  667.33  1583.8     676 1583.69  726.42 1584.53   741.3 1584.43
  751.01 1585.05  773.44 1585.72  789.19 1585.64     825 1586.68  857.12 1587.17
  865.44 1587.51  874.38  1587.5   882.7 1586.45  890.92 1586.65  907.84 1587.75
  912.12 1587.66  930.28 1588.31  941.68 1588.29  948.67 1588.57  953.29 1588.48
  961.48 1588.65  980.53  1588.3  985.21 1588.38  999.78 1589.21 1015.31 1589.55
 1027.81 1589.39 1030.65 1589.18 1042.82 1589.82 1054.57 1590.12 1061.28 1590.75
 1101.38 1591.59 1135.29 1591.72 1139.98 1591.26 1142.56  1591.3 1147.69 1591.85
 1170.07 1592.21 1218.24 1594.01 1227.46 1594.54 1240.06  1594.5 1253.68 1595.35
```

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 1279.23 1595.52 1285.35 1595.79 1296.88 1595.84 1303.06 1595.47 1316.11  1595.1
 1326.03 1594.59 1333.58 1594.46 1365.59 1595.08 1382.15 1596.16 1386.09 1596.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  155.64    .035  198.35    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        155.64  198.35            367.1   367.1   367.1             .1        .3
Left Levee      Station=      66      Elevation= 1593.57
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.756

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1572.87   37.72  1589.1   44.79 1590.75   53.12 1592.98   63.77  1593.3
   72.88  1590.8  116.54 1576.61  122.58 1575.54  130.45 1573.81  141.93 1573.43
  148.65 1573.97  157.12  1574.3  167.88  1570.8  181.27 1570.56  199.02 1575.26
  203.18 1574.93  215.38 1575.49  234.24  1575.7  260.72  1575.5  263.14 1575.65
  269.73 1576.61  276.53 1576.83  280.76 1576.31  290.19 1576.53   297.2 1575.85
  305.04  1575.3  310.55 1576.11  316.02  1576.6  322.46 1576.66  329.66 1576.45
  341.24 1577.17  345.32 1577.15  352.59 1577.63  380.39 1578.24  395.67 1578.32
  404.73 1578.69  415.75  1578.9   431.3 1578.93  447.96 1579.72  473.14 1580.13
  484.26 1580.52  502.54 1580.73  513.76 1581.17  523.65 1581.04  563.28 1581.21
   563.3 1581.21  565.62 1581.24  575.66 1580.56  588.16  1580.4  601.31 1580.57
  604.64 1580.26  616.26 1580.59   664.1 1580.87  682.52 1580.72  695.12 1582.03
  715.77 1582.24  723.53  1581.7  730.49 1581.03  738.86    1581   740.7 1581.13
  766.18 1580.83  792.34 1581.29  798.77 1581.15   801.9 1581.58  814.78 1581.77
  821.58 1581.61  835.92 1581.68  846.91 1581.51  870.19 1581.47  887.76  1581.9
  896.96 1582.76  900.27 1583.22  907.85 1584.74  917.18 1586.82  950.31 1588.13
  952.35 1587.86  986.93 1589.78  998.31 1589.14 1016.92 1590.39 1032.09 1590.73
 1057.65 1590.87 1065.52 1590.79 1083.52 1589.64 1101.62 1590.92 1105.24 1590.95
 1124.34 1591.79 1140.01 1592.09 1155.01 1590.97 1161.62 1592.04 1163.92 1592.23
 1175.55 1592.12 1193.54 1592.61 1213.24 1592.49 1234.97 1592.72  1248.7 1593.26
 1258.75 1592.18 1267.31 1593.33  1317.8 1594.51  1328.5 1595.03 1339.28 1595.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  157.12    .035  199.02    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        157.12  199.02            525.9   525.9   525.9             .1        .3
Left Levee      Station=   63.76      Elevation=  1593.3
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.656

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.78   4.842 1593.77   8.844 1593.16  13.089 1593.05  24.951 1586.32
  35.079 1581.15  39.856 1580.86  45.609 1578.89   49.16 1577.88  57.714 1576.27
  68.656 1574.97  86.046 1574.53 114.951  1574.7 119.253 1574.34 128.686 1573.98
 134.657 1574.53 152.774 1574.29 160.448 1574.69 167.388 1575.58 178.096 1572.17
 180.743 1571.67 185.867 1570.09 193.848 1570.15 198.189 1571.96 208.898 1575.22
 220.639 1575.84 228.241 1574.85 240.127 1575.96 247.882 1576.38 265.676 1576.21
 286.188 1577.26 296.421 1576.73 308.049  1577.1 352.117 1577.48 371.613 1578.09
 382.693 1577.89 397.888 1578.33 436.049 1578.58 448.024 1579.19 462.114 1579.07
 493.642 1580.01 503.132  1580.7 503.164  1580.7 511.605 1580.94 522.757 1580.51
 539.986 1580.64  549.12 1579.65 562.823 1580.23 575.242 1581.43 591.244  1581.8
 604.502 1580.52 607.165 1581.02 610.377 1581.18 637.192 1581.25 653.283 1580.71
 672.609 1581.66 697.674 1581.69 704.872 1581.49 712.732 1581.61 722.246 1581.09
 755.355 1581.26 774.779 1581.69 812.141 1581.94 820.251 1582.19 832.129 1581.96
 861.938 1582.44 874.196  1582.9 906.676  1582.9 922.945 1582.68 934.654 1584.01
  945.58 1584.82 956.522 1586.57 978.972 1587.92 983.854 1588.92 998.533 1588.83
1004.044 1588.981013.494 1588.781026.655 1589.391028.745 1589.251045.054 1589.27
1089.227 1589.811093.964 1590.171110.918 1590.56 1117.18 1591.011139.081  1591.3
 1153.76 1591.131163.112 1590.411174.111 1591.771200.119 1592.071209.529 1592.37
1223.497 1591.421233.052 1592.761239.903 1593.12 1253.25 1592.94 1257.18 1593.19
1283.454 1593.431292.339 1593.751300.021 1592.39 1309.64  1593.71364.231 1595.33
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035 167.388    .035 208.898    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       167.388 208.898            261.4   261.4   261.4             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    4.81      Elevation= 1593.77
Skew Angle = 36.2
Sediment Elevation = 1577.2

CULVERT                 RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.632

INPUT
Description: McKellips Road
Distance from Upstream XS =     111
Deck/Roadway Width        =    39.4
Weir Coefficient          =    2.67
Upstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
       0 1594.01    1569   88.44 1592.78    1569  177.21  1589.5    1569
  264.84 1585.39    1569  353.85 1583.06    1569  440.92 1582.71    1569
  503.46 1582.54    1569   596.1 1582.56    1569  686.97 1583.57    1569
  777.51 1585.59    1569  866.76 1587.84    1569  956.65 1589.98    1569
    1048 1591.64    1569 1139.15 1593.16    1569 1232.03 1594.65    1569
 1308.69 1594.61    1569 1324.67 1594.96    1569

Upstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.78   4.842 1593.77   8.844 1593.16  13.089 1593.05  24.951 1586.32
  35.079 1581.15  39.856 1580.86  45.609 1578.89   49.16 1577.88  57.714 1576.27
  68.656 1574.97  86.046 1574.53 114.951  1574.7 119.253 1574.34 128.686 1573.98
 134.657 1574.53 152.774 1574.29 160.448 1574.69 167.388 1575.58 178.096 1572.17
 180.743 1571.67 185.867 1570.09 193.848 1570.15 198.189 1571.96 208.898 1575.22
 220.639 1575.84 228.241 1574.85 240.127 1575.96 247.882 1576.38 265.676 1576.21
 286.188 1577.26 296.421 1576.73 308.049  1577.1 352.117 1577.48 371.613 1578.09
 382.693 1577.89 397.888 1578.33 436.049 1578.58 448.024 1579.19 462.114 1579.07
 493.642 1580.01 503.132  1580.7 503.164  1580.7 511.605 1580.94 522.757 1580.51
 539.986 1580.64  549.12 1579.65 562.823 1580.23 575.242 1581.43 591.244  1581.8
 604.502 1580.52 607.165 1581.02 610.377 1581.18 637.192 1581.25 653.283 1580.71
 672.609 1581.66 697.674 1581.69 704.872 1581.49 712.732 1581.61 722.246 1581.09
 755.355 1581.26 774.779 1581.69 812.141 1581.94 820.251 1582.19 832.129 1581.96
 861.938 1582.44 874.196  1582.9 906.676  1582.9 922.945 1582.68 934.654 1584.01
  945.58 1584.82 956.522 1586.57 978.972 1587.92 983.854 1588.92 998.533 1588.83
1004.044 1588.981013.494 1588.781026.655 1589.391028.745 1589.251045.054 1589.27
1089.227 1589.811093.964 1590.171110.918 1590.56 1117.18 1591.011139.081  1591.3
 1153.76 1591.131163.112 1590.411174.111 1591.771200.119 1592.071209.529 1592.37
1223.497 1591.421233.052 1592.761239.903 1593.12 1253.25 1592.94 1257.18 1593.19
1283.454 1593.431292.339 1593.751300.021 1592.39 1309.64  1593.71364.231 1595.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035 167.388    .035 208.898    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       167.388 208.898             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    4.81      Elevation= 1593.77
Skew Angle = 36.2
Sediment Elevation = 1577.2

Downstream  Deck/Roadway Coordinates
    num=      17
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************************************
       0 1594.01    1569   88.44 1592.78    1569  177.21  1589.5    1569
```

```
  264.84 1585.39    1569  353.85 1583.06    1569  440.92 1582.71    1569
  503.46 1582.54    1569   596.1 1582.56    1569  686.97 1583.57    1569
  777.51 1585.59    1569  866.76 1587.84    1569  956.65 1589.98    1569
    1048 1591.64    1569 1139.15 1593.16    1569 1232.03 1594.65    1569
 1308.69 1594.61    1569 1324.67 1594.96    1569

Downstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1593.75   5.665 1593.91  16.833 1592.98  23.031 1592.85  45.513  1586.3
  49.612 1584.92  68.575 1577.42  77.557 1576.79   85.78 1577.17  96.416  1576.3
 116.364 1576.53 124.926 1576.14 132.608 1576.46 136.844 1576.87 144.373 1577.12
 154.194 1576.77 167.525 1577.29 181.631 1573.84 202.846 1570.39 214.466 1570.24
 222.422 1572.26 234.131 1578.14 236.133 1579.49 253.466 1579.27 266.692 1577.89
 273.987 1578.87 286.422 1579.71 302.433  1580.1 309.816 1579.34 335.114 1579.44
 345.573 1579.93 350.568 1579.34 361.672 1579.34 397.186 1580.14 397.242 1580.14
 407.023  1580.1 420.822  1580.8 445.418 1581.26 465.761 1581.16 468.699 1581.44
 524.637 1581.83 550.896 1581.46 580.503 1581.75 590.751 1581.55 608.053 1581.79
 618.882 1581.71 630.317 1582.04 632.423 1581.87  636.32 1582.19 658.625 1582.39
 665.226 1582.82 673.521 1582.05 683.778 1582.15 687.813 1582.93 689.023 1583.35
 690.984 1584.63 694.631 1585.67 696.762 1585.61 702.709 1583.93 710.424 1582.74
 717.638 1582.39 733.414 1582.64 739.281  1582.5 756.299 1583.14 765.499 1583.24
 778.822 1583.01 792.169 1583.06 813.392 1586.89  820.17 1587.86 854.095 1587.87
 876.585 1588.59 891.764 1588.72  897.84  1588.5 900.342 1588.67 908.661 1588.59
 929.772 1589.24 937.163 1588.81 942.352 1588.87 947.904 1590.08 969.216  1589.5
  991.73 1589.871016.205 1590.711027.285  1590.51030.964  1590.71036.323 1591.37
1055.795 1591.661062.985 1592.281091.204 1592.731114.388 1592.32 1161.66 1593.45
1165.864 1593.891170.512 1594.761174.361 1593.731184.803 1593.721195.544 1593.37
1203.089 1594.021224.498 1594.151240.032 1594.81 1247.73 1594.771257.704 1595.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035 167.525    .035 234.131    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       167.525 234.131             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    5.67      Elevation= 1593.91
Skew Angle = 36.2
Sediment Elevation = 1577.2

Upstream Embankment side slope              =       3 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 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 =  1

Culvert Name     Shape      Rise    Span
McKellips       Circular       9
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 2 - Mitered to conform to slope
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
               28.5     204       .024                   .5                1
Upstream   Elevation =  1569.6
           Centerline Station =  190
Downstream Elevation =  1569.6
           Centerline Station =  210

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.607

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1593.75   5.665 1593.91  16.833 1592.98  23.031 1592.85  45.513  1586.3
  49.612 1584.92  68.575 1577.42  77.557 1576.79   85.78 1577.17  96.416  1576.3
 116.364 1576.53 124.926 1576.14 132.608 1576.46 136.844 1576.87 144.373 1577.12
 154.194 1576.77 167.525 1577.29 181.631 1573.84 202.846 1570.39 214.466 1570.24
```

```
 222.422 1572.26 234.131 1578.14 236.133 1579.49 253.466 1579.27 266.692 1577.89
 273.987 1578.87 286.422 1579.71 302.433  1580.1 309.816 1579.34 335.114 1579.44
 345.573 1579.93 350.568 1579.34 361.672 1579.34 397.186 1580.14 397.242 1580.14
 407.023  1580.1 420.822  1580.8 445.418 1581.26 465.761 1581.16 468.699 1581.44
 524.637 1581.83 550.896 1581.46 580.503 1581.75 590.751 1581.55 608.053 1581.79
 618.882 1581.71 630.317 1582.04 632.423 1581.87  636.32 1582.19 658.625 1582.39
 665.226 1582.82 673.521 1582.05 683.778 1582.15 687.813 1582.93 689.023 1583.35
 690.984 1584.63 694.631 1585.67 696.762 1585.61 702.709 1583.93 710.424 1582.74
 717.638 1582.39 733.414 1582.64 739.281  1582.5 756.299 1583.14 765.499 1583.24
 778.822 1583.01 792.169 1583.06 813.392 1586.89  820.17 1587.86 854.095 1587.87
 876.585 1588.59 891.764 1588.72  897.84  1588.5 900.342 1588.67 908.661 1588.59
 929.772 1589.24 937.163 1588.81 942.352 1588.87 947.904 1590.08 969.216  1589.5
  991.73 1589.871016.205 1590.711027.285  1590.51030.964  1590.71036.323 1591.37
1055.795 1591.661062.985 1592.281091.204 1592.731114.388 1592.32 1161.66 1593.45
1165.864 1593.891170.512 1594.761174.361 1593.731184.803 1593.721195.544 1593.37
1203.089 1594.021224.498 1594.151240.032 1594.81 1247.73 1594.771257.704 1595.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035 167.525    .035 234.131    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        167.525 234.131            516.4   516.4   516.4             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888        F
888        F
Left Levee      Station=    5.67      Elevation= 1593.91
Skew Angle = 36.2
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.509

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 1573.91    14.4 1576.92   52.34 1590.88   57.46 1593.11   70.44    1593
  109.66 1579.17  123.34 1575.77  129.06 1574.92   136.1 1575.01   139.3 1574.57
  149.38 1573.49  154.84 1574.49   168.7 1574.78  181.23 1574.77  188.96 1574.62
  216.52 1576.03   222.9 1574.02  229.74 1571.56  231.88 1570.57  244.22 1570.85
  248.79  1571.7  260.26 1572.34  261.92 1572.54   276.2 1575.04  281.48 1575.07
  289.24 1575.84  294.38 1576.17  302.47 1576.18  310.34 1576.53  323.24 1574.86
  333.09 1575.06  342.46 1575.09  353.44 1575.97   358.5 1575.93  363.86 1575.68
  366.25 1576.05  392.22  1575.9   394.6 1575.74   409.7 1575.88  429.16 1576.54
  441.21 1577.13  458.79 1576.93  480.84 1577.23  492.95 1577.68  498.56 1577.71
  516.89 1578.32  540.41 1578.66  550.59 1579.36  555.48 1579.04   555.5 1579.04
  562.36 1578.64  582.98  1579.2  584.61 1579.35  598.14 1579.65  610.06 1580.35
  618.41 1580.58  622.19 1581.14  642.43 1580.69  661.08 1580.84  672.94 1581.13
  679.72 1581.44  694.91 1583.71  719.08 1583.65  741.68 1584.01  784.13 1585.16
  799.26  1585.8   806.2 1586.36   810.2  1585.9  819.01 1586.09  841.97 1585.53
  869.09 1586.59  874.59 1586.52  888.84 1584.98  895.22 1585.47  902.48  1585.8
  907.85 1585.84  914.46 1585.54  917.75  1585.9  919.63 1585.91  928.48 1586.68
  945.47 1587.68  955.69 1587.93  960.36  1588.2  962.45 1588.19  965.04 1587.98
  977.74 1588.56  997.46 1588.69 1007.73 1588.99 1010.03 1589.55 1011.99 1592.19
 1012.17 1592.59 1013.06 1592.48 1041.01 1591.89 1050.45 1592.06 1060.91  1592.5
 1065.69 1592.14 1113.29 1591.54 1125.01 1592.04 1135.17 1591.75 1153.45 1591.91

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035  216.52    .035  289.24    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        216.52  289.24              400     400     400             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888        F
Left Levee      Station=   70.44      Elevation=    1593
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.433

INPUT
Description:
Station Elevation Data    num=     100
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1571.02   17.74 1574.64   50.52 1585.86   60.94 1589.32      76 1593.43
   88.26 1593.59  109.85 1586.43   146.6  1575.1  155.55 1573.95  160.74 1572.67
  174.15 1571.68  187.58 1572.01  191.61 1572.37  207.82 1572.94  226.01 1572.43
  231.25 1572.73  234.04 1572.66  247.13 1573.82  255.04 1573.61  261.85  1573.8
   265.7 1573.57  277.72 1574.07  279.65 1573.08   285.3 1571.33  291.81 1570.45
  301.36 1569.98  303.73 1570.15  310.61 1571.96  314.44 1573.31  324.35 1572.98
  329.63 1573.35   364.6 1573.46   370.4 1573.73  385.37 1574.06  401.88 1574.76
  406.86 1573.53  407.95 1573.63  414.63 1574.88  446.44 1574.67  454.46 1574.47
  478.11 1574.55  482.45 1574.91  489.04 1575.09  503.44 1575.06  513.18 1575.33
  527.08 1576.42  530.25  1575.8  546.28 1575.95  564.87 1576.52  577.99 1576.29
  579.88 1576.35  582.27 1576.61   592.8 1576.65  602.88 1576.92  617.24 1576.49
   642.1 1576.79  647.28 1576.53  669.34 1576.55  693.53 1577.61  710.89 1578.18
   723.8 1578.25  734.46 1578.64  734.49 1578.64  745.12    1579  757.66 1578.92
  771.75 1579.54  808.65 1580.29  832.61 1583.17  844.45 1583.33  860.14 1583.98
  868.28 1583.79  888.84 1584.61  920.19 1585.42  941.54 1585.72  959.83 1586.14
  964.22    1586  968.99 1586.22  978.27 1586.35   982.8 1586.67 1009.65 1586.54
 1033.12 1586.98 1054.12 1587.08 1078.06 1588.15 1087.11 1588.35 1105.51 1588.41
 1109.43 1588.31 1114.03 1588.44 1141.89 1588.45 1156.55 1588.96 1161.27 1589.32
  1162.1 1590.85 1163.17 1593.23 1168.25 1593.34 1180.02 1592.99 1185.67 1593.34
 1209.13 1593.39  1227.4 1593.13 1228.78 1593.02 1252.34 1593.37 1269.15 1593.01

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  277.72    .035  314.44    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        277.72  314.44              400     400     400              .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888        F
Left Levee      Station=   88.25      Elevation= 1593.59
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.358

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1569.54    8.57 1570.96   12.29 1571.82   26.49  1576.2   39.72 1581.38
   57.69 1586.99   76.47 1593.11   88.08 1593.42   90.42 1592.65  112.35 1583.69
  118.54 1581.43  123.75 1580.33  151.14 1573.69  159.94 1572.49  166.15 1571.37
  195.63 1571.84  197.99 1572.05   215.8  1572.7  221.47 1573.07  229.66 1573.31
  234.49 1571.85   243.3    1570   257.8 1570.27  271.93 1571.06  287.71 1573.01
  288.85 1572.92  295.13 1573.24  301.86 1573.95  316.09 1573.38  327.37 1574.13
  338.05 1574.12  340.14 1573.85  356.93 1573.65  373.72 1574.34  399.09 1574.37
  401.42 1574.24  409.47 1574.35   415.8 1573.83  419.35 1574.21  419.45 1574.32
  436.56 1574.33  446.28 1574.63   461.2  1574.8  467.05 1574.49  474.55 1574.86
  506.01 1575.47  526.69 1576.09  543.03 1575.72   594.5 1576.96  602.69 1577.36
  617.78 1577.18  622.92 1577.53  641.27 1577.98  662.16 1578.07  675.59 1577.92
  712.63 1578.54  732.57 1579.08  753.14 1579.45  755.93  1579.5  762.01 1580.28
  781.04  1582.3  790.55 1583.08  794.64 1582.98  795.96 1582.77  800.23 1582.97
  807.11 1582.39  823.14 1582.52  831.68 1582.73  848.41 1583.64  849.04 1583.77
  856.18 1584.02     860 1583.89   892.1 1584.35  920.36 1585.23  938.62  1585.4
  965.67 1586.35  995.01 1586.62 1018.74 1587.18 1027.09 1587.12 1047.39 1587.86
 1058.04 1587.63 1061.39 1587.69 1065.85  1587.4 1080.86 1587.75 1099.81  1588.5
 1103.11 1588.82 1117.87 1588.85 1131.56 1589.16 1146.11  1589.7 1155.52 1589.46
 1166.49 1589.39 1195.53 1590.17 1210.07  1590.8 1219.19 1590.71 1225.28  1590.9
 1237.38 1591.01 1269.97  1591.8 1278.36 1591.83 1280.24 1594.76 1286.32 1594.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  229.66    .035  287.71    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        229.66  287.71            391.6   391.6   391.6              .1       .3
Left Levee      Station=   88.08      Elevation= 1593.42
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.283

INPUT
Description:
```

```
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1570.17   10.21 1570.47   20.92  1572.2   23.93 1572.49   33.53 1575.71
   60.29 1587.08    81.4 1593.34   83.67 1593.48    91.7 1593.65  100.09 1590.98
  108.02 1588.14  118.07 1584.23  151.19 1573.47     155 1572.91  160.01 1572.97
  169.04 1572.62  179.24 1572.08  188.52 1570.09  202.03 1569.85  223.58  1570.9
  229.76 1571.56  245.74 1573.69  256.27 1573.57  274.11 1574.92  278.06 1574.57
  280.27 1574.66  286.95 1575.28  302.76 1575.59  308.71 1575.54  310.48 1575.66
  334.31 1573.85  339.91 1573.32  343.23 1573.19  359.96 1573.31  364.45 1573.48
   378.5 1573.74  393.41 1573.72  405.46 1573.85  406.87 1574.08  414.19 1574.13
  420.19 1574.49  431.73 1574.75  444.91 1574.76  450.87 1574.67  455.91 1574.79
  468.77 1575.41  486.93 1575.25  525.22 1576.25   535.3 1576.61  539.25 1576.65
  547.07  1576.9  567.67 1576.98   578.3 1577.31  583.78 1577.29  618.85 1577.87
  651.22 1578.86  656.74 1578.51   660.8 1578.58  708.51 1581.52  709.12 1581.56
  727.74 1582.75  738.84 1583.66     742 1584.11  746.21 1584.35   761.4 1584.52
  776.14 1584.58   784.9 1584.75  799.29 1585.78  803.83 1585.89  816.43 1585.94
  820.79  1586.1  835.36 1586.31  838.28 1586.45  865.97 1586.99  907.36 1587.09
  933.15 1587.73  936.56 1587.17  942.96 1587.76  948.71 1588.63   951.4 1588.55
  976.04  1588.4  986.02 1588.53  986.83 1588.47  993.09 1588.67 1035.68  1589.5
 1068.37 1589.26 1071.89 1589.53 1077.05 1589.75 1084.69 1588.23 1091.45 1589.66
 1112.12 1589.65 1119.94 1589.76 1158.37 1590.86 1162.73 1589.96 1163.56 1589.97
 1166.13 1590.18 1204.08 1591.67 1213.26 1591.92 1226.27 1592.13 1244.75  1592.3

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  160.01    .035  245.74    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        160.01  245.74             416.3   386.1   361.6            .1        .3
Left Levee      Station=    91.7      Elevation= 1593.65
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.210

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
       0 1571.69    8.06 1572.75    25.6 1577.52   30.93 1578.88   36.07 1580.84
   45.27 1584.13    70.3 1593.39    83.3 1593.78   90.61 1591.31  110.96 1581.97
  145.87 1573.41  160.71 1572.89   172.3 1573.19  178.05 1571.36  183.13 1570.53
  187.74 1570.21  196.74 1570.03  211.89 1573.15  231.31 1573.87  233.48 1573.47
   242.2 1573.63  251.48  1573.5  251.77 1573.57  266.44 1573.58   278.2  1573.8
  293.75 1575.12  315.76 1576.53  319.87 1576.61  350.13 1578.07  365.87  1576.7
  391.87 1577.49  395.44 1577.52  418.83 1578.46   431.2 1578.85  435.91 1578.83
  452.51 1579.13  471.15 1579.22  483.17 1579.52  492.93 1578.98  522.07 1578.16
  538.84  1578.2  588.42 1578.95   593.8 1579.75  601.52 1580.56  603.23 1581.16
  612.85 1581.51  619.21  1581.6  631.06 1581.37  651.11 1582.01   662.3 1582.71
  662.34 1582.71   668.3 1583.08  675.55 1582.37  703.45 1583.25   719.8 1583.57
  744.62 1583.59  752.48 1583.19  789.74 1584.04  830.42 1584.13  831.85 1584.32
  839.62 1584.48  859.43 1585.17  873.27 1585.48  876.05 1585.74  890.27 1586.07
  897.32 1586.43     903 1587.53  908.64 1587.72  911.69 1587.68  921.45  1587.9
  926.13 1588.11  935.04 1588.17  939.76 1588.55  947.78 1588.85   951.2 1588.62
   959.3 1588.34  969.47 1589.48  981.99 1589.43  991.04 1588.85  999.83 1589.54
 1010.52 1589.83 1014.29 1590.02 1017.06 1590.44 1028.51 1590.61 1039.18 1590.28
 1056.24 1590.66 1071.28 1590.55 1105.03 1590.98 1112.53 1590.67 1116.56 1590.85
 1123.91 1591.39 1138.82 1591.97 1148.73 1592.21 1158.45 1592.04 1162.26 1592.17
 1163.59 1592.05 1171.45 1591.93 1187.15 1592.63 1196.21 1592.77 1221.51 1592.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035   172.3    .035  211.89    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         172.3  211.89             256.4   242.6   226.5            .1        .3
Left Levee      Station=    83.3      Elevation= 1593.78
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.164

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*******************************************************************************
       0 1574.05   12.52  1577.4   49.63 1591.98    54.5 1593.39   66.96 1593.47
   68.33 1592.85   76.75 1589.69   88.11  1584.7  112.97 1577.45  122.68  1574.3
  126.28 1573.52  130.13 1574.22  139.17 1573.76  152.82 1573.53  165.15 1570.35
  166.93 1570.04  178.86 1570.05  195.99 1573.05   207.6 1572.33   221.3 1573.08
  222.54 1573.02  239.02 1573.62  261.44 1574.31  272.88 1574.38  285.87 1574.35
  296.46 1574.56  306.02 1574.97  326.31 1574.97  338.71 1574.84  345.16 1574.65
  350.22 1574.66  364.24 1575.57  383.71 1576.39  386.21  1576.4  415.18 1577.78
  433.08 1576.83  441.78 1576.74  459.34 1577.74  478.34 1577.26  511.37 1577.91
  519.57 1577.89  535.86 1578.84  543.97 1578.88  559.04 1578.76  585.29 1579.82
  599.75 1581.04  610.59  1582.6  624.82 1582.45  624.87 1582.45  634.47  1582.5
  643.13  1583.1  675.82 1584.13  678.63 1584.14  680.63 1583.77   684.4 1583.97
  699.65  1583.7  709.65 1583.86  742.22 1584.95  753.03 1583.92  756.64 1584.43
  765.96 1584.87  792.88 1584.04  808.49 1584.44  820.69  1586.1  832.39 1584.63
  833.52 1584.77   837.7  1584.7  840.58 1584.75  853.73 1587.25  863.67 1586.92
   872.7 1587.29  875.83  1587.3  877.54 1587.47  890.73  1587.7  910.15 1587.41
  918.46 1587.55  945.25 1588.36  950.39 1588.21   965.5 1588.52  989.98 1588.74
  997.61 1588.89 1025.09 1589.65 1027.21  1589.8 1042.17  1589.7 1054.73 1589.92
  1072.1 1590.36 1088.85 1591.21 1097.41  1591.3 1105.22 1591.18 1121.99 1591.45
 1144.28 1591.69 1160.89 1592.47 1169.88 1593.38 1176.24 1593.78 1186.69 1594.14
 1199.24 1593.92 1203.64 1594.07 1206.93 1593.45 1212.64 1593.73  1215.6  1593.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  152.82    .035  195.99    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        152.82  195.99            157.6   157.6   157.6             .1        .3
Left Levee      Station=   66.96      Elevation= 1593.47
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.135

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.87    11.6 1577.53    47.5 1591.36   51.15 1593.16   61.72 1593.27
   70.47 1590.35  109.82 1576.68  114.94 1574.82  123.61 1574.08  129.77 1573.78
  155.29 1574.08  164.86 1571.34  169.88 1570.56  176.92  1570.7  178.59 1570.23
  181.53 1570.82  198.33 1573.42   206.5 1572.42  236.15 1573.38  250.47 1574.15
  254.16 1574.24  254.47 1574.37  276.62 1574.97  284.99 1574.45  300.88 1574.76
  302.89 1574.84  305.67 1574.79   323.7 1574.76  347.86 1576.13  362.45  1575.6
  375.55 1575.54   401.9 1576.05   412.2 1576.47  416.41  1576.7  430.22 1576.87
  449.22 1576.93  460.28 1577.53  468.01 1577.67  479.69 1578.08  496.29 1577.92
  505.07 1578.38   520.3 1577.48  530.69 1577.33  536.51 1577.62  551.67 1578.18
  576.58 1578.65  588.52 1578.63  591.83 1578.77  592.87 1578.88  596.74 1578.78
  597.83 1578.89  600.85 1579.22  633.86 1583.53  652.46 1584.96  669.83 1584.73
  675.62 1584.58  681.55 1584.63  708.22 1584.58  722.08 1585.14  739.04 1585.07
  756.42 1585.31  762.04 1584.82  773.01 1584.97  774.81 1585.05  778.73 1585.01
  804.65 1585.29  818.49 1585.62  830.52 1586.44  839.46 1586.68  864.93    1587
   872.3 1587.21  888.56 1587.53   892.1 1587.71  908.71 1587.85  909.79 1587.98
  927.02 1588.24  943.05 1588.62   948.3 1588.67  954.26 1589.02  974.65 1589.34
  982.71 1589.55  988.13 1589.13 1005.49 1589.74 1009.27 1589.95 1038.19 1590.48
 1059.42 1590.76 1065.49 1590.56 1076.93 1590.75 1087.45 1591.01 1103.54 1591.29
 1115.01 1591.69 1124.58 1591.66 1127.04 1591.51 1133.37 1591.82 1146.09 1592.16
 1151.37 1592.72 1181.84  1592.4 1190.34  1592.8  1215.6 1593.17

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  155.29    .035  198.33    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        155.29  198.33            402.1   402.1   402.1             .1        .3
Left Levee      Station=   61.72      Elevation= 1593.27
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 1.058

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1573.39   12.58 1574.91   48.65 1588.28   53.94 1590.36   63.77 1593.45
```

```
   75.16 1593.52    82.3  1590.3  124.41  1577.2  132.05 1576.18  143.85 1576.02
  154.59 1575.51  169.98 1570.83  184.28 1570.87   188.7 1571.53  195.65 1572.09
   198.3 1572.65  208.29 1575.58  210.64 1575.96  212.07  1576.4  213.85 1576.35
  232.32 1574.67  236.98  1574.4  241.54 1574.71  257.39 1574.66  270.95  1574.8
   278.6  1575.4  290.37 1575.17  320.32 1575.61  334.63 1576.26  368.45 1576.59
  395.24 1577.58  425.49 1578.27  431.37 1578.52  436.82 1578.29  444.11 1578.63
  448.62    1579  462.02 1578.72  478.58 1579.31  501.54  1579.8   534.3 1580.12
  534.34 1580.12  546.15 1579.94  555.68 1580.03  563.82 1580.88  586.53 1580.97
  593.61 1581.16   615.6 1581.21     625  1581.7   633.3 1581.91  642.75 1582.39
  669.33 1582.55   673.7 1582.79  690.67 1583.02  695.29 1582.92  709.96  1583.4
  727.02 1583.53  746.09 1584.03  759.94 1586.61  766.68 1585.99  774.57 1586.21
  779.13 1586.57  788.22 1585.92  814.21 1586.31  820.74 1587.21  829.41 1587.31
  833.04 1587.57  841.85 1587.81  857.57 1586.94  860.25  1587.4  866.87  1587.3
  875.59 1586.64  881.45 1586.71  884.14 1586.38  890.43 1586.94  894.47 1586.99
  895.33 1586.83  899.75 1586.75  902.29 1586.93  903.24 1587.22  906.12 1587.52
  910.81 1588.71  913.66 1588.66  917.51 1588.38  920.94 1588.95  923.01 1588.94
  929.29  1589.3  937.42 1588.97  944.87 1588.15  946.05 1587.91  954.04 1587.32
  956.45  1587.4  976.58 1589.91  978.84 1590.04   982.2 1589.97  983.98 1590.84
  985.56 1591.26  988.02 1591.35  998.67 1588.89 1001.05 1588.71 1001.38 1588.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  143.85    .035  212.07    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        143.85  212.07             400.1   400.1   400.1             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=   75.16      Elevation= 1593.52
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.983

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************************
       0 1573.09     .87  1573.1    1.06 1573.23   21.48 1579.66    32.1 1582.86
   63.03 1592.69   65.57 1592.66   78.42 1592.86   93.37 1586.57     115 1581.04
  119.18 1579.22  120.96 1578.97  129.23 1576.81  138.12 1575.95  142.46 1575.31
  154.84 1571.81  159.59 1570.55  161.22 1570.04  172.05 1569.94  176.59  1570.8
  195.04 1576.75  200.55 1576.51  207.55 1576.69  220.54 1576.67  233.06 1576.36
   233.2 1576.44  233.75 1576.51  234.36 1576.89  242.99 1576.31  256.45 1577.93
  269.36 1577.56  275.35 1577.81  286.32 1577.66  304.75 1577.98  312.68 1577.98
  318.07 1577.61  323.51 1578.01   329.7 1578.14  358.51    1578  425.71 1579.14
   457.7 1579.02  459.81 1579.08   469.7 1579.01  485.27 1579.11  485.31 1579.11
  499.01 1579.17  508.09  1579.5  512.12 1580.08  519.18 1580.23  538.21 1581.14
  551.76 1581.48  555.19 1581.65  566.33  1582.5  579.76 1582.73  581.03 1582.54
  594.63 1581.67  606.31 1581.75  620.95 1583.71  636.65 1584.11  639.54 1584.24
   645.2 1584.24  648.26 1584.41  670.22 1585.04  674.85 1584.93  685.37 1584.93
  695.64 1584.24  704.93  1584.1   712.3 1584.45  713.69 1584.34  721.48  1584.5
  731.33  1585.3  742.72 1585.89     754 1586.34  763.73 1584.86  764.94 1585.09
  772.11  1585.3  775.17 1585.02  779.39 1585.65  782.11 1585.83  785.54 1585.67
  790.32 1585.13  793.01 1586.23  794.02 1586.34  794.73 1586.61  807.21 1586.89
  816.22 1587.27   821.3 1587.35   840.7 1588.63   850.1 1588.48  852.33 1588.35
  852.77 1588.45  853.54 1588.41  863.02 1588.89  866.03 1588.84  894.15 1589.52
  896.95 1589.64  902.31 1589.63  922.02 1590.39  931.06 1588.52     944 1586.17

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  129.23    .035  195.04    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        129.23  195.04              402     402     402             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=   78.42      Elevation= 1592.86
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.906

INPUT
Description:
```

```
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0    1575    5.63 1575.55   54.35 1593.11   68.15 1592.91  117.91 1577.22
  119.97 1576.26  120.52 1576.16  130.33 1576.37  145.36 1576.17  148.89 1576.22
  155.53 1573.29  166.72 1569.83  179.05 1569.66  199.84 1574.69  217.68 1575.28
  222.82 1575.22  230.84 1574.92  233.47 1575.37  243.41 1575.85  250.87 1575.12
  258.13 1575.74  264.24 1576.02  273.27    1576  289.09 1576.34  293.35 1576.12
  308.55  1576.5  331.01 1576.74  343.53 1577.15  349.52 1577.05  362.03  1577.1
  364.81 1577.41  365.63 1577.39  369.47 1577.88  373.49 1577.74  380.03 1578.55
  388.62 1579.05  404.46 1578.89  415.25 1579.25  423.09 1578.73  435.15 1579.21
  451.86 1579.07  468.91 1579.47  480.19 1579.41     504 1579.93  514.89 1580.37
  514.93 1580.37  529.54  1580.7  535.02 1580.61  540.87 1581.19  551.88 1581.71
  558.99  1582.5  565.08 1582.99  586.35 1584.17  592.37 1584.22  595.97 1584.45
  608.45 1584.28  617.65  1584.9  618.22 1585.24  628.82 1584.56  646.27 1585.18
   680.8 1585.32  697.57 1585.88  717.55 1586.08  723.88 1586.33  736.93 1587.28
  740.14 1587.17  743.52 1586.63  747.82 1586.23  750.66 1586.14  753.68 1585.79
  764.58 1586.54  772.96 1586.84  782.04 1586.59  787.42 1586.61  792.83 1587.84
  794.55 1587.98  800.17 1586.93  811.72 1587.43  815.17 1587.76  824.16 1588.21
  827.31 1588.18  829.44 1587.82  832.03 1587.87  833.84 1588.17  843.31 1588.51
  844.97 1588.39  846.83 1588.56  857.41 1588.82  867.07 1588.56  874.08 1588.55
  897.43  1589.3  934.94 1589.71  948.65 1590.95  952.75 1591.46  955.34 1591.18
  959.31 1590.98  960.98 1591.11  961.89 1591.31     965 1591.66   968.2 1591.86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  148.89    .035  199.84    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        148.89  199.84             397.4   397.4   397.4            .1        .3
Left Levee      Station=   68.15      Elevation= 1592.91
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.831

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1573.07    9.81 1572.87   16.08 1573.24   23.02 1573.88   24.16 1574.78
   26.64 1575.11   36.27 1578.28    76.8 1593.71   86.51 1593.44   89.83 1593.45
   141.8 1577.23  163.77  1577.7  168.35 1576.25  187.64 1569.73  191.01 1569.68
  199.51 1569.31  200.29 1569.44  204.65  1570.7  224.41 1575.97  231.72 1575.27
  248.29 1575.87  259.01 1575.99  262.63 1575.94  271.98 1576.65  302.81 1576.58
   308.1 1576.77   316.8 1577.87  337.12 1578.65  348.22 1578.07  363.59 1578.43
  379.14    1579     388 1580.73  395.05 1579.56   411.1 1580.44  417.84 1580.34
  429.28 1580.64  431.63 1580.58  438.73  1580.7  443.25 1580.66  444.86 1580.78
  466.39 1581.38  477.09 1581.46  480.42 1581.36  493.65 1581.37  496.24 1581.51
  506.53 1582.55  514.72 1582.56  514.76 1582.56  525.78 1582.41  547.55 1582.71
  550.53 1583.21  555.28 1583.78  564.75 1583.41  581.16 1583.69  594.19 1584.65
  602.67 1584.26  610.81 1585.18  619.81 1585.95  626.03 1585.47  651.89 1585.65
  668.27  1586.7  679.26 1586.87  697.61 1587.59  708.55 1587.68  711.97 1587.99
  721.21  1587.9  725.45 1588.28  733.36 1588.22   736.6 1588.35  736.98 1588.07
  739.27 1588.68  742.38 1588.56  744.59 1588.31  755.47 1588.98  757.13 1589.19
  773.52 1588.61  776.45 1588.39  776.53 1588.63  787.23 1588.93  799.98 1588.73
  811.86 1589.25  821.08 1589.31  827.28  1589.5  831.55  1589.8  836.02 1589.51
  844.15 1589.27  848.91 1589.61  856.95 1589.92  861.11 1590.36  878.87 1590.28
  892.39 1590.64  895.35 1590.43  905.96 1590.85  910.96 1590.93  920.06 1590.77
     930 1590.91  934.54 1590.82  949.34 1591.79  956.15 1593.44   956.8 1593.07

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  168.35    .035  224.41    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        168.35  224.41             396.4   396.4   396.4            .1        .3
Left Levee      Station=   89.78      Elevation= 1593.45
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.756

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
*******************************************************************************
       0 1576.01   18.91 1581.93   41.75 1591.13    48.3 1593.92   59.34  1593.9
    92.4 1584.87   97.11 1583.47  112.09 1579.35  115.04 1579.13  121.72  1578.4
  140.24 1577.64  163.62 1570.22  174.93 1570.46  182.48 1572.69  204.14 1579.49
  209.52 1578.67  210.55 1578.41  211.79  1578.3  214.09 1577.87  217.69 1577.82
  226.58 1577.96  229.04 1578.51   235.9 1577.46  239.28 1578.05  241.42 1577.72
   249.5  1577.6  252.45 1577.82   259.1 1577.86  267.29  1578.5  276.92 1578.55
  278.82 1578.59  283.52  1578.7  291.13 1579.11     294 1579.37  297.16 1579.29
  316.34 1579.28   317.4 1579.37  323.94  1579.4  327.65  1579.8  335.98 1580.47
  351.08 1580.75  367.84 1581.24  380.28 1581.32  382.31 1581.45  385.93 1581.28
  393.49 1581.33   395.7 1581.26  404.57 1581.56  415.79  1582.2  425.19 1582.24
  430.03 1582.05  431.03 1581.89  433.56 1582.19  448.39 1582.67  461.58 1582.49
  466.68 1582.91  476.82  1583.5  491.86 1584.03  498.19 1583.32  499.23 1583.58
  500.93 1583.34  523.91 1583.55  538.97    1584  544.04 1584.48  547.29 1584.43
  576.82  1585.1  580.22 1584.72   589.4  1585.2   593.7 1585.52  608.43 1585.87
  624.55 1585.92  627.17 1586.16   633.1 1586.17  634.58 1586.28  642.41 1586.39
  643.96 1586.32  651.35 1586.86  662.06 1586.88  671.27 1587.22  684.23 1587.43
  708.76 1588.14  723.24 1588.19  731.91  1588.5  735.45 1588.51   740.6 1588.25
  761.21 1588.45  764.43 1588.35  767.28 1588.45   773.6 1588.88  784.63 1589.02
  791.89 1589.23  800.99 1589.28   819.5 1588.74  828.71 1588.89  832.32 1588.84
  840.04 1589.59  868.34 1590.44  881.64 1590.61  892.48 1589.01  893.94 1589.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  140.24    .035  204.14    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        140.24  204.14             401.3   401.3   401.3             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888        F
Left Levee      Station=   59.36      Elevation=  1593.9
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.680

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.88   22.81 1583.19   27.64 1584.86   45.51 1591.78   51.04 1593.75
   64.42 1593.76   83.93 1587.03   87.44 1585.94   89.82 1585.35   93.69 1584.24
  119.29 1576.15  126.44 1576.17  133.27 1575.92  144.61 1576.25  146.32  1576.4
  162.97 1576.44  181.48 1577.45  184.46 1576.39  201.63  1569.8  212.73 1570.03
  234.46 1577.71  242.74 1577.95  246.89 1577.21  251.79 1577.71  253.91 1578.01
  256.18 1577.47  268.74 1577.66  272.74 1578.01  275.76 1577.79  281.85 1577.76
  286.65    1578  289.33    1578  293.48 1578.22  300.34 1578.43  302.78  1578.5
  307.79 1578.56  321.82 1578.49  330.57 1578.81   337.8 1579.64  355.69 1581.17
  358.12 1581.11  385.07 1581.41   389.1 1581.68   404.7 1582.16  421.75 1582.22
  424.86 1581.96  433.12 1581.75  434.73 1582.02  435.76 1582.03  439.83 1582.41
  457.94 1582.94  460.54 1583.02  470.82 1582.75  479.72 1582.99  484.54 1583.26
  486.33 1583.26  490.47 1583.02  493.41  1583.3  501.67 1583.46  521.48  1583.6
  529.54 1583.91  531.38  1583.9  540.76 1584.33  555.49 1584.61  560.26 1584.83
  569.14 1584.91  577.63 1585.14  602.12 1586.19  640.49 1586.72   644.1 1586.87
  658.89 1587.84  673.47 1587.85  688.03 1588.93  694.51 1588.68  697.12 1588.69
  702.53 1588.39  705.31 1588.72  712.61 1589.23  715.81 1589.17   730.2  1588.4
  735.75 1588.42  739.56 1588.66  751.74 1588.79  754.05 1588.96  764.24 1589.33
  775.15 1589.43  788.84  1590.4  801.79 1590.34  803.96 1590.63  808.04 1590.59
  824.95 1591.22  830.91    1591   844.9 1591.19   873.8 1591.87  886.06 1591.99
  891.88 1591.69  898.45 1591.22  906.29 1592.14  910.43 1592.52  916.51  1592.6

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  181.48    .035  234.46    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        181.48  234.46             400.1   400.1   400.1             .1       .3
Left Levee      Station=   64.42      Elevation= 1593.76
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.604

INPUT
Description:
Station Elevation Data    num=     100
```

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1575.51    3.25 1574.86   10.09 1574.35   20.21 1576.75   61.41  1593.7
   75.28 1593.72  129.69 1575.57  139.14 1575.63  157.83 1576.38  160.63 1576.11
     185  1576.5  199.72 1575.91  220.03 1577.24  227.81 1575.07  244.66 1569.28
  256.28 1569.71  262.78 1571.28  265.12 1572.14  280.46 1579.27  288.09 1578.41
  298.47 1578.77  300.64 1578.41  300.88 1578.17  312.56 1578.14  336.62 1578.66
  348.19 1578.22  385.96 1580.38   402.6 1580.85  408.43 1580.44  417.11  1581.4
  427.25 1579.11   445.3 1579.16   452.2 1579.94  469.97 1579.46   478.4 1579.64
  488.05 1580.28  488.11 1580.28     499 1581.73  508.21 1582.55  525.46 1583.05
  533.33 1583.94  544.42 1584.42  553.63 1583.47  578.79 1584.14  587.82 1583.33
  593.65  1583.1  609.26 1584.53  618.06 1584.11  639.43 1584.19  646.79  1584.7
  654.25 1584.66  672.16 1585.24  682.99 1584.91  694.32 1586.37  696.23 1586.99
  699.88  1587.2  702.66 1585.15  709.67 1585.57  716.85  1586.5  732.46 1586.75
  741.49 1587.36  747.54 1587.08  773.54 1588.39  813.59    1589  825.66 1588.92
  832.02  1589.6  838.11 1589.88  851.29 1589.29  853.64 1588.96  862.41 1588.83
  932.13 1590.54  936.44 1591.41  959.35 1591.68  976.64 1592.59 1005.29 1592.98
 1043.29 1594.19 1094.54 1593.72 1123.46 1594.84 1143.96 1595.96 1153.29 1596.15
 1159.67 1595.87 1170.27 1596.24 1176.49 1596.85 1211.24 1596.86 1221.55 1597.18
 1263.69  1597.5 1267.85 1597.22 1270.89 1597.46 1273.41 1597.09 1287.64 1597.73
 1324.76 1598.34 1342.18 1598.36  1349.1 1600.26 1351.31  1599.3 1360.92 1599.68
 1361.31 1600.17 1362.39 1600.09 1366.18 1598.99 1394.47 1599.06 1431.25  1600.2

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  220.03    .035  280.46    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        220.03  280.46            376.2   376.2   376.2            .1        .3
Left Levee      Station=   75.27      Elevation= 1593.72
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.533

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1573.94   14.95 1574.94   37.84 1583.46   65.06 1593.78   78.59 1593.93
   97.04 1587.14  127.61 1576.54  169.99 1576.79  195.84 1577.54  201.49  1577.6
  205.89    1578  215.73 1574.83  227.86 1570.47  234.78 1569.32  250.43 1569.13
  252.12 1569.61  258.56 1571.99  268.62 1575.44   279.2 1579.33  293.76 1580.06
  329.69 1579.65  342.46 1579.71   343.3 1580.06  345.46 1580.58  347.83 1580.33
  349.13 1580.39  351.13 1580.26  354.39 1580.34  370.77 1580.38   374.6 1580.51
  378.32  1580.5  385.37 1580.84  388.48 1580.78  398.97 1580.84  415.36  1581.6
  421.18  1581.7   428.7 1581.67  428.76 1581.67  454.32 1581.26  458.56 1581.41
  512.44 1581.34  532.79 1582.24   540.8 1580.51  557.92 1580.97  565.59 1582.24
  589.17 1581.77  607.56 1582.06   615.1  1581.4  623.78 1581.69  630.44    1581
  678.17 1581.56  681.39  1581.7  687.15 1581.61  716.82 1581.92  718.68 1582.08
  727.18 1582.34  729.01 1582.47  731.36  1582.5  742.77 1582.09  765.62 1581.62
  779.76 1581.94  797.47 1587.81  812.69 1589.26  827.72 1588.97  865.22 1588.88
  899.56 1590.23  902.01  1590.4  914.06 1590.69  947.47 1591.13  962.64  1591.5
  971.93 1591.59  988.09 1591.95 1002.77 1592.35 1004.42  1592.3  1011.6 1592.58
 1025.58  1592.8 1027.6 1592.91  1043.6 1592.84 1076.61 1593.36 1088.56  1593.3
 1094.08  1593.4 1096.72 1593.75  1103.4 1593.73    1111 1593.52 1116.08 1593.59
 1134.02 1594.52 1157.77 1594.95 1166.62 1594.97 1176.18 1595.21 1178.58 1595.18
 1185.79 1595.46 1203.77 1595.68 1207.28 1595.54 1212.08 1595.14 1221.43 1594.64
 1230.07 1595.69 1238.95 1596.48 1252.18 1597.05 1260.09 1597.27 1264.77  1597.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  205.89    .035   279.2    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        205.89  279.2             361.9   361.9   361.9            .1        .3
Left Levee      Station=   78.59      Elevation= 1593.93
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.465

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
```

```
       0 1593.92    5.21 1593.92    6.94 1593.63   41.23 1580.87      44 1580.01
   46.24  1579.5   60.14 1579.37   74.15  1579.5   81.96 1579.42   95.95  1579.9
  110.82 1579.75  119.91 1579.51  136.24 1580.25  156.68 1580.55   158.9 1580.76
  164.03 1578.61  166.44 1577.82  181.96 1572.04  189.56 1569.49  191.78 1569.15
  196.51 1569.29  202.87 1570.93  202.91 1570.94  205.25 1571.67  206.43 1571.86
  230.96 1582.41  238.07 1582.09  250.19 1582.17  253.44 1581.63  261.92 1579.36
  267.23 1580.46  279.57 1582.04  288.01 1581.74  330.25 1582.03  334.03 1581.67
  336.86 1582.02  352.88 1581.91  365.78 1582.36   388.4 1581.86  412.84 1582.02
  417.74 1582.34  429.35 1582.01  454.78 1581.58  487.32  1581.8  497.79  1582.3
  516.61 1582.67  523.01 1582.53  534.77 1582.75  542.42 1582.63  570.79 1582.67
   571.7  1582.4   582.8 1581.93  602.93 1585.86  612.13 1586.09  626.89 1587.43
  642.43 1587.95  644.41  1587.9  672.74 1588.78  683.66 1588.68   695.4 1589.31
     699 1589.36  704.79 1589.95  717.15 1590.04  734.77 1590.89  744.23  1590.7
  746.36 1590.51  771.06 1591.29  771.16 1591.09  772.09 1590.63   776.7  1591.9
  779.86 1591.64  796.97 1592.29  798.33 1592.24  807.17 1592.65  816.09 1592.55
  816.96 1592.64   819.4 1593.76  851.88 1594.69   865.8 1594.89  870.45 1595.18
  882.87 1594.31  896.55 1594.71  910.17 1594.33  914.22 1594.49   922.3 1594.24
  927.79 1594.63  931.78 1594.62  933.57 1594.77  944.62 1594.81  952.09 1594.38
  955.06 1594.34     966 1594.76  974.88 1594.43   982.4 1594.96  999.32 1594.51
 1011.03 1594.88 1015.19 1594.88 1023.49 1595.37  1038.3 1595.84 1043.77  1595.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .035   158.9    .035  230.96    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         158.9  230.96             211.2   211.2   211.2              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    5.07      Elevation= 1593.92
Skew Angle = 20
Sediment Elevation = 1577.2

CULVERT                 RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.445

INPUT
Description: McDowell Road
Distance from Upstream XS =   73.45
Deck/Roadway Width        =    64.3
Weir Coefficient          =    2.67
Upstream  Deck/Roadway Coordinates
    num=      62
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************************************
       0 1594.17    1569  38.631  1593.5    1569  48.563 1593.24    1569
   92.87  1591.6    1569 101.196 1591.29    1569 111.147 1590.99    1569
 163.225 1589.14    1569 172.264 1588.62    1569 175.563 1588.45    1569
 175.591 1588.45    1569 179.105 1588.27    1569 214.645 1586.04    1569
 218.807 1585.81    1569 225.827  1585.5    1569 262.033 1584.16    1569
 268.395 1583.94    1569 307.477 1582.72    1569 314.947 1582.55    1569
 354.734 1582.27    1569 358.934 1582.24    1569 362.909 1582.22    1569
 397.847 1582.54    1569 397.932 1582.54    1569 480.521 1582.97    1569
 480.531 1582.97    1569 480.549 1582.97    1569 480.568 1582.97    1569
 480.578 1582.97    1569  482.26 1582.96    1569 483.171 1582.97    1569
  507.19 1583.29    1569 569.266 1584.06    1569 571.681 1584.14    1569
 594.421 1585.61    1569  595.37 1585.64    1569 596.667 1585.72    1569
 600.529 1585.69    1569 604.927 1585.81    1569 605.068 1586.07    1569
 605.181 1586.27    1569 605.839 1586.28    1569 606.168 1586.28    1569
  607.85 1586.31    1569 613.535  1586.6    1569 614.888 1586.64    1569
 624.463 1586.77    1569 627.264 1586.91    1569 654.252 1587.83    1569
  658.01 1587.89    1569 692.441 1589.02    1569 701.123 1589.33    1569
 792.828 1592.22    1569   800.9 1592.42    1569 892.041 1594.46    1569
  896.26 1594.55    1569 982.637 1596.36    1569 982.881 1596.36    1569
 982.937 1596.36    1569 983.022 1596.37    1569 996.149 1596.61    1569
1040.165 1597.44    15691050.792 1597.64    1569

Upstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.92    5.21 1593.92    6.94 1593.63   41.23 1580.87      44 1580.01
   46.24  1579.5   60.14 1579.37   74.15  1579.5   81.96 1579.42   95.95  1579.9
  110.82 1579.75  119.91 1579.51  136.24 1580.25  156.68 1580.55   158.9 1580.76
  164.03 1578.61  166.44 1577.82  181.96 1572.04  189.56 1569.49  191.78 1569.15
  196.51 1569.29  202.87 1570.93  202.91 1570.94  205.25 1571.67  206.43 1571.86
  230.96 1582.41  238.07 1582.09  250.19 1582.17  253.44 1581.63  261.92 1579.36
```

```
  267.23 1580.46  279.57 1582.04  288.01 1581.74  330.25 1582.03  334.03 1581.67
  336.86 1582.02  352.88 1581.91  365.78 1582.36   388.4 1581.86  412.84 1582.02
  417.74 1582.34  429.35 1582.01  454.78 1581.58  487.32  1581.8  497.79  1582.3
  516.61 1582.67  523.01 1582.53  534.77 1582.75  542.42 1582.63  570.79 1582.67
   571.7  1582.4   582.8 1581.93  602.93 1585.86  612.13 1586.09  626.89 1587.43
  642.43 1587.95  644.41  1587.9  672.74 1588.78  683.66 1588.68   695.4 1589.31
     699 1589.36  704.79 1589.95  717.15 1590.04  734.77 1590.89  744.23  1590.7
  746.36 1590.51  771.06 1591.29  771.16 1591.09  772.09 1590.63   776.7  1591.9
  779.86 1591.64  796.97 1592.29  798.33 1592.24  807.17 1592.65  816.09 1592.55
  816.96 1592.64   819.4 1593.76  851.88 1594.69   865.8 1594.89  870.45 1595.18
  882.87 1594.31  896.55 1594.71  910.17 1594.33  914.22 1594.49   922.3 1594.24
  927.79 1594.63  931.78 1594.62  933.57 1594.77  944.62 1594.81  952.09 1594.38
  955.06 1594.34     966 1594.76  974.88 1594.43   982.4 1594.96  999.32 1594.51
 1011.03 1594.88 1015.19 1594.88 1023.49 1595.37  1038.3 1595.84 1043.77  1595.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035   158.9    .035  230.96    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
         158.9  230.96             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    5.07      Elevation= 1593.92
Skew Angle = 20
Sediment Elevation = 1577.2

Downstream  Deck/Roadway Coordinates
    num=      62
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***********************************************************************
       0 1594.17    1569  38.631  1593.5    1569  48.563 1593.24    1569
   92.87  1591.6    1569 101.196 1591.29    1569 111.147 1590.99    1569
 163.225 1589.14    1569 172.264 1588.62    1569 175.563 1588.45    1569
 175.591 1588.45    1569 179.105 1588.27    1569 214.645 1586.04    1569
 218.807 1585.81    1569 225.827  1585.5    1569 262.033 1584.16    1569
 268.395 1583.94    1569 307.477 1582.72    1569 314.947 1582.55    1569
 354.734 1582.27    1569 358.934 1582.24    1569 362.909 1582.22    1569
 397.847 1582.54    1569 397.932 1582.54    1569 480.521 1582.97    1569
 480.531 1582.97    1569 480.549 1582.97    1569 480.568 1582.97    1569
 480.578 1582.97    1569  482.26 1582.96    1569 483.171 1582.97    1569
  507.19 1583.29    1569 569.266 1584.06    1569 571.681 1584.14    1569
 594.421 1585.61    1569  595.37 1585.64    1569 596.667 1585.72    1569
 600.529 1585.69    1569 604.927 1585.81    1569 605.068 1586.07    1569
 605.181 1586.27    1569 605.839 1586.28    1569 606.168 1586.28    1569
  607.85 1586.31    1569 613.535  1586.6    1569 614.888 1586.64    1569
 624.463 1586.77    1569 627.264 1586.91    1569 654.252 1587.83    1569
  658.01 1587.89    1569 692.441 1589.02    1569 701.123 1589.33    1569
 792.828 1592.22    1569   800.9 1592.42    1569 892.041 1594.46    1569
  896.26 1594.55    1569 982.637 1596.36    1569 982.881 1596.36    1569
 982.937 1596.36    1569 983.022 1596.37    1569 996.149 1596.61    1569
1040.165 1597.44    15691050.792 1597.64    1569

Downstream Bridge Cross Section Data
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.43   6.305 1593.44  26.499  1590.9  50.311 1583.56  77.703  1577.2
  83.952  1577.2  98.207 1577.89 109.944  1578.1 128.024 1579.18  131.66 1579.07
 156.431 1579.29 156.468 1579.29 165.696 1579.27 170.629 1578.01 193.567 1570.72
 198.783 1568.88 219.362 1569.01 230.976 1572.46 241.426    1575 247.524 1575.08
 249.554 1575.35 267.549 1575.42 272.163 1575.67 289.529 1575.94 301.566 1575.85
 319.458 1576.07 346.784  1575.9  369.44 1575.98 396.362 1577.21 405.327 1577.45
  409.65 1578.91 415.908  1579.4  418.52 1578.96 420.212 1579.32  432.08 1579.16
 441.524 1579.57 460.628 1581.06 475.644 1581.79 504.258 1583.84 506.983 1584.23
 519.612 1584.69 529.235 1585.81  534.46 1586.82 541.376 1586.61 552.661 1586.93
 558.863 1587.38 574.772 1588.04 581.097 1588.72  599.58 1589.25 614.841 1589.14
 620.705 1589.69 635.796 1589.68 648.021 1590.42 655.595 1590.54 658.339 1590.17
 665.002 1590.37 681.879 1589.84 691.285 1590.12  704.13 1591.04 713.565 1591.04
 719.842 1590.63 724.146 1590.61 733.346 1591.47 741.023 1591.86 749.536 1591.99
 752.506  1591.8 758.022 1592.26 769.702 1591.41 775.998  1590.4 793.599 1588.55
 808.342 1588.28 811.904 1587.88 818.801 1587.76 834.456 1586.58 850.309 1585.65
 867.853 1585.53 871.471 1585.31 882.381 1585.18 889.165 1585.56 916.069 1585.89
 927.862 1585.09 933.058 1585.09 942.211 1585.65 949.324 1585.72 954.906 1585.59
 984.629 1586.59 996.939 1586.34  998.64 1586.431002.812    15861003.968 1586.19
1004.945    15871007.238 1588.351020.976 1588.621028.757 1589.15 1039.77 1590.22
1046.348  1591.21056.224 1592.271060.218 1593.241062.933 1593.691074.623 1594.37
```

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035 165.696    .035 241.426    .035

Bank Sta: Left   Right    Coeff Contr.   Expan.
       165.696 241.426             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
888       F
888       F
Left Levee      Station=    6.11      Elevation= 1593.44
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
     7561074.623    1592
Skew Angle = 20
Sediment Elevation = 1577.2

Upstream Embankment side slope              =       3 horiz. to 1.0 vertical
Downstream Embankment side slope            =       3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         = 1582.22
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
McDowell        Circular       9
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 2 - Mitered to conform to slope
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
              12.65     186       .024                   .5                1
Upstream   Elevation =  1568.38
           Centerline Station =  195
Downstream Elevation =  1568.38
           Centerline Station =  210

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.425

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1593.43   6.305 1593.44  26.499  1590.9  50.311 1583.56  77.703  1577.2
  83.952  1577.2  98.207 1577.89 109.944  1578.1 128.024 1579.18  131.66 1579.07
 156.431 1579.29 156.468 1579.29 165.696 1579.27 170.629 1578.01 193.567 1570.72
 198.783 1568.88 219.362 1569.01 230.976 1572.46 241.426    1575 247.524 1575.08
 249.554 1575.35 267.549 1575.42 272.163 1575.67 289.529 1575.94 301.566 1575.85
 319.458 1576.07 346.784  1575.9  369.44 1575.98 396.362 1577.21 405.327 1577.45
  409.65 1578.91 415.908  1579.4  418.52 1578.96 420.212 1579.32  432.08 1579.16
 441.524 1579.57 460.628 1581.06 475.644 1581.79 504.258 1583.84 506.983 1584.23
 519.612 1584.69 529.235 1585.81  534.46 1586.82 541.376 1586.61 552.661 1586.93
 558.863 1587.38 574.772 1588.04 581.097 1588.72  599.58 1589.25 614.841 1589.14
 620.705 1589.69 635.796 1589.68 648.021 1590.42 655.595 1590.54 658.339 1590.17
 665.002 1590.37 681.879 1589.84 691.285 1590.12  704.13 1591.04 713.565 1591.04
 719.842 1590.63 724.146 1590.61 733.346 1591.47 741.023 1591.86 749.536 1591.99
 752.506  1591.8 758.022 1592.26 769.702 1591.41 775.998  1590.4 793.599 1588.55
 808.342 1588.28 811.904 1587.88 818.801 1587.76 834.456 1586.58 850.309 1585.65
 867.853 1585.53 871.471 1585.31 882.381 1585.18 889.165 1585.56 916.069 1585.89
 927.862 1585.09 933.058 1585.09 942.211 1585.65 949.324 1585.72 954.906 1585.59
 984.629 1586.59 996.939 1586.34  998.64 1586.431002.812    15861003.968 1586.19
1004.945    15871007.238 1588.351020.976 1588.621028.757 1589.15 1039.77 1590.22
1046.348  1591.21056.224 1592.271060.218 1593.241062.933 1593.691074.623 1594.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035 165.696    .035 241.426    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       165.696 241.426             465.5   465.5   465.5             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
```

```
888        F
888        F
Left Levee       Station=    6.11       Elevation= 1593.44
Blocked Obstructions      num=        1
   Sta L   Sta R    Elev
************************
     7561074.623    1592
Skew Angle = 20
Sediment Elevation = 1577.2

CROSS SECTION           RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa       RS: 0.336

INPUT
Description:
Station Elevation Data     num=     100
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*******************************************************************************
       0 1572.48     5.91 1571.85    12.91 1572.73    43.13 1582.22    53.64 1585.11
   76.83 1593.72    88.98 1593.83    98.89 1591.53   103.06 1591.02   130.23 1580.88
   144.6 1576.97   149.55 1576.14   180.16 1576.23   204.63 1569.34   214.74 1569.74
  239.31 1576.83   256.78 1577.35   262.46 1577.22   274.37 1577.92    288.5 1578.22
  296.55 1578.71   304.77 1578.93   312.21 1579.42   335.94  1578.8   345.66 1579.09
  352.31 1578.95   360.83 1579.29   385.76 1579.48   393.25 1579.34    402.3  1580.1
  416.83 1580.02   421.03 1580.28   427.23 1580.13   433.65 1579.97   451.63 1580.36
  461.57 1580.99   471.79 1581.13   494.59 1582.27   516.96 1581.43    526.8 1580.44
  546.67 1581.67   562.63 1581.43   601.12 1583.32   621.52 1582.75   626.72 1584.55
  636.95  1584.3   660.53 1584.43   665.65 1584.64   671.11 1584.44   672.48 1584.25
  676.74 1584.18   695.18 1585.07   696.87 1585.32   700.57 1585.25   713.89 1586.06
  740.52 1586.41   751.06 1586.83   771.31 1586.48   779.99 1586.78   791.59 1587.46
  801.41 1587.34   805.94 1587.99   811.62 1588.35   818.41 1588.16   839.18 1588.95
  846.46 1587.21   857.04 1587.19   866.15 1588.52   868.59 1588.52   869.99 1588.84
   883.7 1588.86   889.89 1589.26    904.6 1589.71   907.06 1589.93   923.45 1589.96
  937.71 1590.99   946.04 1591.11   958.28 1590.79   966.64 1591.31   973.56 1591.29
  979.21 1591.54      995 1591.57 1016.36 1592.14 1022.75 1591.72 1047.28 1592.09
 1054.46 1591.66 1060.71  1591.6 1066.14 1591.76 1073.42 1592.33 1093.45 1592.81
 1098.29 1593.94 1108.22 1594.54 1109.96 1594.38 1114.07 1594.63 1124.99 1594.73
 1136.13 1594.29 1149.47 1595.63 1157.39 1595.88 1166.03 1594.99 1171.45 1595.11

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
************************************************
       0    .035   180.16    .035   239.31    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        180.16  239.31             398.7   398.7   398.7              .1       .3
Left Levee       Station=   88.99       Elevation= 1593.83
Sediment Elevation = 1577.2

CROSS SECTION           RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa       RS: 0.261

INPUT
Description:
Station Elevation Data     num=     100
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
*******************************************************************************
       0 1572.31      3.8 1572.14    13.91 1572.66    31.59 1578.81     39.7 1581.27
   74.08 1593.65    86.88 1593.68   106.39 1588.59   131.42 1579.35   145.85 1574.42
  168.64 1575.36   182.95 1570.79   188.52  1569.2   199.01 1569.46   220.64 1576.27
  223.94 1575.93   246.13 1575.86   253.36 1576.56   271.09 1576.43   287.01 1576.59
  326.89 1577.79   334.58 1578.39   345.77 1578.15   359.34 1578.72   367.87 1578.68
  376.66 1578.91   389.26 1578.89   409.86 1579.83   444.46  1579.3   452.87 1580.45
  453.84 1580.58   458.11 1580.67   482.36 1581.37    487.2 1581.05   507.08 1581.39
  520.98 1581.17   525.72 1581.82   533.34 1581.87   538.87 1581.56   549.61  1582.1
  566.43 1582.61   574.34 1581.92   593.42 1582.97    603.7 1582.56   611.86 1582.83
  630.85 1582.86    636.1 1583.21   647.15 1584.55   666.87 1584.78   669.97 1585.25
  674.09 1585.35   694.63 1584.71   708.76 1585.15   717.54 1585.08   726.53 1585.37
  739.42 1586.54   752.26 1586.47   766.23 1587.13    772.3 1586.28   783.41 1586.67
  788.64 1586.65   793.04 1587.21   797.65 1587.26    813.3 1588.66   821.85 1588.89
   825.4  1589.2   874.25 1589.43   882.24 1590.16   886.75 1590.28   890.16 1589.09
  895.63 1588.86   906.15 1590.46   914.44 1591.16   946.65 1591.42   956.24 1592.11
  959.05     1592  974.04 1592.52    975.5 1592.27   989.63  1592.2   993.98 1592.46
  998.95 1593.16 1002.33 1593.44 1009.02 1592.86 1017.13 1593.34  1026.7 1593.05
 1038.16 1593.24 1047.03 1593.64 1056.41 1593.24 1083.35 1594.86 1087.92 1594.79
 1092.91 1594.42 1098.62 1594.97 1104.81 1595.11 1118.94 1594.62  1130.7 1594.95
 1135.73 1595.87 1140.27 1596.11 1159.37 1595.67 1173.11 1595.71  1205.4 1596.55

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
```

```
************************************************
       0    .035  168.64    .035  220.64    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        168.64  220.64              400     400     400            .1        .3
Left Levee      Station=   86.85      Elevation= 1593.68
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.185

INPUT
Description:
Station Elevation Data    num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1572.08    9.04 1572.95   38.57 1583.49   66.02 1593.95   77.97 1594.06
   90.19 1590.48  121.05 1578.79  126.96 1578.11  129.48 1577.21  134.17 1574.69
  146.25  1575.3  154.37 1574.89  160.24 1575.85  177.95 1569.82   188.8 1569.58
  210.15 1577.25  218.16 1577.63  234.73 1577.49  244.93 1578.15  269.15 1578.31
  281.35    1579  290.73 1579.19  298.81 1578.96  323.63 1578.86  327.24 1579.47
  340.09  1578.7  348.18 1578.88  358.74 1579.05  367.94 1579.63  398.21 1580.89
  407.39 1580.79  418.73 1581.14  432.95 1580.85  442.58 1580.27  455.43 1580.93
  466.73 1580.71  477.28 1581.14  510.02 1580.92  534.41 1581.24  545.51 1581.84
  554.02 1582.01  569.38 1582.83  581.41 1584.65  585.43 1585.02  608.42 1584.93
  612.03  1584.7  615.74 1585.19  632.04 1585.86  646.96 1586.04   659.2 1586.61
  669.92 1586.25  675.67 1585.53  677.55 1585.47  686.47 1586.84  698.55 1586.88
  701.63 1586.72  710.33 1587.79  721.34 1586.95  743.64 1587.61  761.14 1588.64
  763.59  1588.4  769.15 1588.51   772.5 1588.85   786.6 1589.03  787.63 1588.78
  791.37 1588.91  807.82 1588.63  815.47 1588.94  822.58 1588.88  845.27 1589.96
  848.31  1589.7  857.76 1590.95  877.11 1590.17  880.37 1590.21  883.61 1591.19
  890.18 1592.76  894.28  1591.4  898.86 1591.42  901.87 1591.67  904.03  1592.3
  906.51 1593.32  909.36 1592.66  914.01 1591.24  920.03 1591.25  926.51 1591.81
  932.65 1591.88   938.2 1592.24  951.25 1592.16  953.68 1592.33  961.99 1592.34
  971.84 1592.81  976.82 1593.24  987.02 1593.29  996.13  1593.1 1012.62 1594.03
 1031.62 1595.72 1044.81 1595.98 1062.08 1595.96 1070.67  1596.4

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  160.24    .035  210.15    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        160.24  210.15             401.3   401.3   401.3            .1        .3
Left Levee      Station=   77.76      Elevation= 1594.06
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.109

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1572.14   27.79 1574.26   42.27 1579.38   46.84  1580.7   73.92 1590.84
   79.78 1593.38   92.41 1593.75  106.93 1588.58  140.45 1578.05  146.08 1576.06
  155.09 1575.04  171.05 1575.15  176.43 1574.85  184.24 1576.02  204.71 1569.35
  216.24 1569.32  240.86  1578.1   244.1 1577.07   248.1 1576.58  253.46 1577.86
  254.79 1577.92  264.75 1577.29  280.38 1578.22  282.75 1578.73  292.41 1579.54
  299.19 1579.49  302.37 1579.78  306.59 1579.89   310.2 1578.91  312.38  1578.8
  326.59 1579.83  328.82 1579.76  343.89 1580.58  345.79 1580.96  345.83 1580.97
  350.53 1581.75  355.02 1581.96  362.17 1581.99  372.07 1582.33  377.86 1581.57
  394.31 1581.64  397.16 1582.73  400.19 1582.65  416.86 1583.89  433.33 1583.74
  433.68 1583.89  437.37 1584.02  455.66 1583.47  493.98 1584.14  521.31 1585.68
  530.15 1584.47   543.5 1585.12  549.65 1585.17  561.21 1585.88  567.41 1585.04
  583.48 1586.14  583.63 1585.95  608.12 1586.88  631.84 1587.26  659.66 1588.08
  680.88 1588.15  684.09 1588.69   688.7 1589.15  698.25 1588.19  709.52 1588.13
  712.99 1588.36  738.87 1587.15  742.56 1587.74     755 1588.04  759.43 1587.87
  763.68 1587.23  774.67 1587.66   783.1  1588.7  785.34 1589.21     788 1588.96
  789.87 1588.99  794.25 1590.97  807.42 1591.14     813 1590.27  819.82 1590.77
  838.28 1591.32  849.91 1591.47  851.73 1591.22  853.15 1591.26  857.85 1592.64
  862.06 1592.35  864.08 1591.89  873.75 1592.51  884.95 1592.51  895.46 1591.96
  913.94 1592.89  919.03 1593.33  922.64 1593.91  930.57 1594.25  933.31 1593.47
  934.69 1592.72  937.42 1592.82  942.07 1593.37  947.72 1593.54  966.56 1592.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
       0    .035  184.24    .035  240.86    .035
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        184.24  240.86             219.6   219.6   219.6              .1       .3
Left Levee      Station=   92.17      Elevation= 1593.75
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.068

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1584.46   16.38 1585.71   21.54 1586.64   24.68 1585.98   45.56 1580.09
   47.01 1580.09   64.62 1578.64   66.22 1578.17   66.87 1578.33      67 1578.05
    67.4 1578.17   70.18 1580.06    71.3 1580.57   72.67 1581.81   73.88 1581.74
   74.26 1582.25   74.52 1582.21   83.17 1586.93   91.22 1592.14  107.06  1591.7
  107.45 1591.54  120.16 1591.22   124.2 1589.93  125.86 1587.75  127.45 1586.96
  149.04 1579.57  157.29 1577.18  166.12 1576.27  204.46 1576.22  222.32 1569.61
  233.66 1569.32  265.22 1580.08  278.18 1580.58   282.9 1580.11  287.34 1580.47
  291.66 1581.09  292.68 1580.63  293.82 1580.34  309.87 1580.15     314 1581.92
  317.68 1581.63  321.57 1581.61   321.6 1581.61  327.58  1581.6  332.39 1581.83
  343.56 1581.79  354.44 1581.19  369.83 1582.73  374.19 1582.97  395.15 1582.39
  405.75 1583.24  419.28 1583.82  429.28 1583.51  462.13 1584.12  471.05 1584.82
  472.65 1584.71   478.9 1585.52  485.19 1583.53  493.99 1584.36  501.66 1586.27
   504.6 1585.79  512.35 1585.59  525.69 1586.24  529.99 1586.66  532.39  1586.5
  549.86  1586.4  604.09 1587.37   612.4 1586.95  634.49 1587.64  639.46 1587.98
  656.13 1588.28  695.07 1590.64  698.93 1590.61  706.28 1589.67   711.5 1589.98
     715 1590.98  723.75 1589.91  725.85 1590.51  727.95 1590.77   742.4 1590.44
  746.34 1590.21  753.33 1590.26  764.58 1591.25  771.91 1593.76  777.51 1590.68
  779.01 1591.19     783 1591.48  791.57 1590.81   795.9 1591.43  812.18 1591.46
  820.74 1591.23   825.9 1590.91  830.62 1590.37  843.19 1591.58  849.77 1591.88
  861.37 1591.85  872.69 1591.45  877.74 1591.62  879.53 1591.95  891.27 1593.05

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  204.46    .035  265.22    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        204.46  265.22             22.1    22.1    22.1              .1       .3
Left Levee      Station=   91.24      Elevation= 1592.15
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.063

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1582.24    8.77 1580.22   15.92 1579.05   31.61 1575.76   39.39  1573.2
   47.25 1572.64   69.28 1572.36   69.73 1572.74   69.89 1573.35   70.16 1573.86
    72.2  1570.5   72.69  1570.5   73.46 1569.94  101.53 1569.84  101.61 1570.37
  105.26 1584.05  119.04  1584.3  136.12 1584.11  143.21 1581.15  149.37 1579.28
  156.96 1577.55  191.11 1576.34  207.03 1576.27   225.3 1569.47  236.81 1569.37
  272.97 1580.86  278.89 1581.18  285.79 1581.08  291.26 1581.81  292.99  1580.9
  294.61  1580.5   310.4 1580.43  312.09 1581.23  320.15 1581.75  320.16 1581.75
  323.67 1581.82  330.26 1581.23  351.05 1583.02  366.71 1582.41  370.74 1582.56
  375.17 1583.32  382.12 1583.12  383.81 1582.74  387.15 1583.13  392.69 1583.36
  399.82 1583.34  417.66 1584.18  431.74 1583.23  435.59 1583.77  452.62 1583.63
  472.67  1585.1  477.37 1583.45  486.86 1584.24  498.57  1585.6  512.14 1585.92
  516.99 1586.62  524.76 1586.31  529.56 1586.89  538.24    1587  544.59  1586.8
     546 1586.99  562.94 1586.94  573.13 1587.39  577.17 1587.86  592.74 1587.68
  612.65 1588.66  620.89 1588.19  630.86  1588.1  641.18 1589.03  656.95 1587.85
  662.73 1588.85  669.25  1589.3  671.83 1589.18  674.14 1589.59  694.06 1589.51
  706.68  1591.2     711 1590.98   713.3 1590.57  723.31 1591.19  744.88 1590.85
  752.55 1591.14  756.13 1591.57  760.83 1591.51  765.98 1593.24   769.4 1592.11
  773.24 1591.29  777.82 1594.01  784.34 1591.96  788.54 1592.42  793.84 1592.26
  814.38 1592.66  819.76 1592.53  826.78 1592.68   843.1 1592.41  853.78 1593.54
  859.88 1592.19  862.82 1592.22  872.68 1593.39  882.13 1593.56  891.27  1593.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .035  207.03    .035  272.97    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
```

```
        207.03  272.97            232.4   232.4   232.4              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=  136.12      Elevation= 1584.11
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.019

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1572.35   28.21 1572.67   54.43 1572.35   57.97  1572.5   69.92 1572.51
   75.04 1571.86   80.89 1571.66    95.5 1571.49      99 1569.74  117.36 1569.81
  124.83 1569.69  131.36 1583.99  151.59 1584.21  159.07 1584.46  160.46 1584.02
  175.89 1578.41  179.94 1577.16  229.18 1576.37  249.87 1569.18   260.3 1568.71
  274.64 1573.31  297.48 1582.46  303.34 1582.25  303.49 1582.24  311.63  1582.3
  332.53 1582.62  340.89 1582.67  353.37 1582.93  360.89 1582.76   375.3 1583.18
  382.36 1584.01  394.88 1584.31   399.7 1584.74  406.33 1585.06  421.74  1585.1
  423.15 1584.95  424.09 1584.98  425.87 1584.87  441.19 1585.22  456.94 1585.29
  459.56 1585.58   464.5 1585.66   468.2 1585.97  472.25 1586.16  483.12 1586.18
  492.29 1586.69   497.8 1586.69  505.54 1586.97  513.35 1586.75  515.54 1586.94
  518.75 1587.06  520.25 1587.35  524.71 1587.68  536.15 1587.52  555.62 1587.96
  578.03 1588.63  580.88 1588.56   589.8 1588.84  592.01 1588.84  596.72 1588.65
   600.3 1588.79   606.8 1588.65  612.62 1589.02   616.3 1589.15  629.88 1589.33
   653.2 1589.99  659.84 1590.57  672.62  1590.8  695.36 1591.63  700.63 1591.53
  705.45 1591.25  712.23 1591.96  715.44 1592.18  728.43 1591.98  731.18 1592.04
  735.11 1592.33  743.42 1592.66  759.07  1592.2  770.88 1593.43   771.5 1593.64
  772.52 1593.44  776.69 1593.12  789.14 1593.27  793.82 1593.49  796.71  1593.9
  801.28 1593.93  810.35 1593.47  817.98 1593.21  821.96 1593.19  823.92 1593.36
  829.37 1593.42  831.98 1593.71  844.67 1593.77   858.8 1594.27  859.39 1594.39
  864.16 1594.77  869.31  1594.9  872.85 1595.22  876.03 1595.31  879.49 1595.51

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .035  229.18    .035  297.48    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        229.18  297.48             15.5    15.5    15.5              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
888       F
Left Levee      Station=  159.08      Elevation= 1584.46
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.016

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1574.96    6.46 1574.21   17.34 1573.32   22.88 1572.73   66.73 1572.31
    70.8 1571.65    86.7 1572.19   87.46 1572.86   87.52 1573.06   89.54 1574.72
   90.16 1574.95   93.96 1577.84   96.31 1579.19   97.13 1580.04   99.45 1581.16
  101.18 1581.84  102.62 1582.83   103.2 1582.91  105.72 1585.39   106.5 1586.41
  108.27 1587.46  109.15 1587.83  110.96 1588.28  111.34 1589.47   114.6 1591.73
  124.44 1591.92  127.77  1586.9  130.38 1587.03  131.32 1586.82  142.03  1586.4
  143.51 1586.65  145.28 1586.75  147.88 1587.61  149.12 1587.21  154.44 1584.29
  158.22 1582.91   171.1 1578.93  177.32  1577.5  185.06 1577.08  222.66 1576.46
  244.69 1569.24   254.9 1568.89  276.52 1575.93  293.29 1582.32  295.06 1582.34
  305.03 1582.44  332.41 1582.84  350.56 1583.28  354.53 1583.17  363.65 1584.07
  368.07 1583.96  375.29 1584.01  380.78 1584.34  389.54 1584.56  402.64 1584.61
  412.31 1585.04  414.83 1584.81   426.4 1584.93  433.56 1585.29  439.06 1585.01
  455.39 1585.39   461.6 1585.84  478.65 1585.77  486.94 1587.23  494.74 1587.07
  505.66 1587.38  514.97 1587.21  522.04 1587.85  545.11 1588.02   562.1 1588.45
  580.25 1589.15  586.56 1589.54  606.52 1588.92  611.68 1589.33  620.66 1589.27
  627.11 1590.01  658.33 1590.36   667.3 1590.89  679.75 1590.67  690.24 1591.87
  700.24 1591.44  708.59 1591.81  725.88 1591.85  749.05  1592.1  755.28 1592.32
   765.6 1593.93  771.82 1593.51  783.84 1593.94   789.1 1593.73   789.8 1594.06
   796.7 1594.03  802.44 1594.37  813.17 1594.27  818.37 1594.55  825.77 1594.47
  839.07 1594.53  851.51 1594.92  859.06 1594.39  864.34  1594.9     874 1595.45

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

```
**********************************************
       0    .035  222.66    .035  293.29    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        222.66  293.29             86.6    86.6    86.6            .1       .3
Left Levee      Station=     124      Elevation= 1591.92
Sediment Elevation = 1577.2

CROSS SECTION          RIVER: Spook Hill FRS
REACH: Buckhorn-Mesa      RS: 0.000

INPUT
Description:
Station Elevation Data    num=     100
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 1581.17    3.98 1581.42    13.5 1582.45   20.18  1582.7      30 1583.29
   58.09 1585.95   75.32 1587.16   76.77 1587.16   90.22 1588.64   94.65 1589.01
   100.9 1589.08  102.51 1589.23  108.19 1589.21  110.14 1589.41  112.61 1589.37
  127.63 1590.58  134.82 1591.39  136.74 1591.79  149.95 1593.06  162.34 1593.38
  208.58 1580.16  219.23 1580.58  239.71 1581.01  251.61 1575.98  262.55 1572.39
   274.9  1569.1  286.63 1568.99  323.28 1583.79  324.69 1583.76  325.71 1583.73
  333.47 1583.55  341.42 1583.18  347.31 1583.53     363 1584.04  395.81 1584.62
  400.21 1585.09  409.51 1585.24  422.75 1585.71  424.36 1586.04  439.12 1586.08
  448.54 1586.49  461.51 1586.36  465.06 1586.46  481.03 1586.21  484.47 1585.98
  487.11 1586.05  490.09  1587.1  491.99 1587.55  495.76 1587.67  498.84 1587.54
  502.01 1587.84   512.4 1588.01  521.92  1587.6  529.64 1587.45  539.37 1587.71
  543.51  1588.3  556.29 1588.14  562.92 1588.63  571.04  1588.9  578.97  1588.6
  585.12    1589  590.51 1589.58  593.53 1589.74  599.02 1589.45  609.86 1589.71
  614.92 1590.17  644.36 1590.85  645.88 1591.08  658.34 1591.54  667.29 1591.28
  669.62 1591.07  674.03 1590.91  681.83 1590.93  692.94 1591.27   707.4  1591.4
  715.09 1591.76  722.24  1591.8  735.74 1592.13  737.84 1592.44  742.31 1592.81
  749.32 1592.76  756.98 1594.93  763.11 1593.47  767.32 1595.39  768.32 1594.91
  784.58 1595.26  786.52 1594.33  799.56 1593.83  804.44 1594.12  823.71 1594.45
  830.78 1594.33  835.53 1594.63  841.76  1594.7  852.19 1595.25  852.43 1595.35
  856.61 1595.46  874.56 1595.31  893.01 1596.18  897.95 1596.29  900.66 1596.12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
**********************************************
       0    .035  239.71    .035  323.28    .035

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        239.71  323.28               0       0       0            .1       .3
Left Levee      Station=  162.33      Elevation= 1593.38
Sediment Elevation = 1577.2

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

SUMMARY OF MANNING'S N VALUES

River:Spook Hill FRS
*****************************************************************
*     Reach       *   River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*Buckhorn-Mesa    *     3.852      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.824      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.749      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.645      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.545      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.500      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.424      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.349      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.285      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.138      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     3.117      *Culvert  *       *         *
*Buckhorn-Mesa    *     3.096      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.966      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.891      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.871      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.815      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.736      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.662      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.585      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.509      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.433      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.357      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.328      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.281      *     .035*     .035*     .035*
*Buckhorn-Mesa    *     2.205      *     .035*     .035*     .035*
```

*Buckhorn-Mesa	* 2.129	* .035*	.035*	.035*
*Buckhorn-Mesa	* 2.053	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.977	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.901	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.874	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.826	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.756	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.656	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.632	*Culvert *	*	*
*Buckhorn-Mesa	* 1.607	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.509	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.433	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.358	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.283	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.210	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.164	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.135	* .035*	.035*	.035*
*Buckhorn-Mesa	* 1.058	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.983	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.906	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.831	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.756	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.680	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.604	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.533	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.465	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.445	*Culvert *	*	*
*Buckhorn-Mesa	* 0.425	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.336	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.261	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.185	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.109	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.068	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.063	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.019	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.016	* .035*	.035*	.035*
*Buckhorn-Mesa	* 0.000	* .035*	.035*	.035*

****

SUMMARY OF REACH LENGTHS

River: Spook Hill FRS

Reach	River Sta.	Left	Channel	Right
*Buckhorn-Mesa	* 3.852	* 147.5*	147.5*	147.5*
*Buckhorn-Mesa	* 3.824	* 392.3*	392.3*	392.3*
*Buckhorn-Mesa	* 3.749	* 550.4*	550.4*	550.4*
*Buckhorn-Mesa	* 3.645	* 526.7*	526.7*	526.7*
*Buckhorn-Mesa	* 3.545	* 238.9*	238.9*	238.9*
*Buckhorn-Mesa	* 3.500	* 400*	400*	400*
*Buckhorn-Mesa	* 3.424	* 400.3*	400.3*	400.3*
*Buckhorn-Mesa	* 3.349	* 333.7*	333.7*	333.7*
*Buckhorn-Mesa	* 3.285	* 778.7*	778.7*	778.7*
*Buckhorn-Mesa	* 3.138	* 220.7*	220.7*	220.7*
*Buckhorn-Mesa	* 3.117	*Culvert *	*	*
*Buckhorn-Mesa	* 3.096	* 684.7*	684.7*	684.7*
*Buckhorn-Mesa	* 2.966	* 400*	400*	400*
*Buckhorn-Mesa	* 2.891	* 102*	102*	102*
*Buckhorn-Mesa	* 2.871	* 294.9*	294.9*	294.9*
*Buckhorn-Mesa	* 2.815	* 417.3*	417.3*	417.3*
*Buckhorn-Mesa	* 2.736	* 414.3*	395*	381.7*
*Buckhorn-Mesa	* 2.662	* 402.4*	402.4*	402.4*
*Buckhorn-Mesa	* 2.585	* 402.4*	402.4*	402.4*
*Buckhorn-Mesa	* 2.509	* 402.4*	402.4*	402.4*
*Buckhorn-Mesa	* 2.433	* 402.4*	402.4*	402.4*
*Buckhorn-Mesa	* 2.357	* 149.5*	149.5*	149.5*
*Buckhorn-Mesa	* 2.328	* 251.5*	251.5*	251.5*
*Buckhorn-Mesa	* 2.281	* 400.9*	400.9*	400.9*
*Buckhorn-Mesa	* 2.205	* 400.9*	400.9*	400.9*
*Buckhorn-Mesa	* 2.129	* 400.9*	400.9*	400.9*
*Buckhorn-Mesa	* 2.053	* 400.9*	400.9*	400.9*
*Buckhorn-Mesa	* 1.977	* 400.9*	400.9*	400.9*
*Buckhorn-Mesa	* 1.901	* 146.3*	146.3*	146.3*
*Buckhorn-Mesa	* 1.874	* 253*	253*	253*
*Buckhorn-Mesa	* 1.826	* 367.1*	367.1*	367.1*
*Buckhorn-Mesa	* 1.756	* 525.9*	525.9*	525.9*
*Buckhorn-Mesa	* 1.656	* 261.4*	261.4*	261.4*

*Buckhorn-Mesa	*	1.632	*Culvert *	*	*
*Buckhorn-Mesa	*	1.607	* 516.4*	516.4*	516.4*
*Buckhorn-Mesa	*	1.509	* 400*	400*	400*
*Buckhorn-Mesa	*	1.433	* 400*	400*	400*
*Buckhorn-Mesa	*	1.358	* 391.6*	391.6*	391.6*
*Buckhorn-Mesa	*	1.283	* 416.3*	386.1*	361.6*
*Buckhorn-Mesa	*	1.210	* 256.4*	242.6*	226.5*
*Buckhorn-Mesa	*	1.164	* 157.6*	157.6*	157.6*
*Buckhorn-Mesa	*	1.135	* 402.1*	402.1*	402.1*
*Buckhorn-Mesa	*	1.058	* 400.1*	400.1*	400.1*
*Buckhorn-Mesa	*	0.983	* 402*	402*	402*
*Buckhorn-Mesa	*	0.906	* 397.4*	397.4*	397.4*
*Buckhorn-Mesa	*	0.831	* 396.4*	396.4*	396.4*
*Buckhorn-Mesa	*	0.756	* 401.3*	401.3*	401.3*
*Buckhorn-Mesa	*	0.680	* 400.1*	400.1*	400.1*
*Buckhorn-Mesa	*	0.604	* 376.2*	376.2*	376.2*
*Buckhorn-Mesa	*	0.533	* 361.9*	361.9*	361.9*
*Buckhorn-Mesa	*	0.465	* 211.2*	211.2*	211.2*
*Buckhorn-Mesa	*	0.445	*Culvert *	*	*
*Buckhorn-Mesa	*	0.425	* 465.5*	465.5*	465.5*
*Buckhorn-Mesa	*	0.336	* 398.7*	398.7*	398.7*
*Buckhorn-Mesa	*	0.261	* 400*	400*	400*
*Buckhorn-Mesa	*	0.185	* 401.3*	401.3*	401.3*
*Buckhorn-Mesa	*	0.109	* 219.6*	219.6*	219.6*
*Buckhorn-Mesa	*	0.068	* 22.1*	22.1*	22.1*
*Buckhorn-Mesa	*	0.063	* 232.4*	232.4*	232.4*
*Buckhorn-Mesa	*	0.019	* 15.5*	15.5*	15.5*
*Buckhorn-Mesa	*	0.016	* 86.6*	86.6*	86.6*
*Buckhorn-Mesa	*	0.000	* 0*	0*	0*

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Spook Hill FRS

Reach	River Sta.	Contr.	Expan.
*Buckhorn-Mesa	* 3.852	* .1*	.3*
*Buckhorn-Mesa	* 3.824	* .1*	.3*
*Buckhorn-Mesa	* 3.749	* .1*	.3*
*Buckhorn-Mesa	* 3.645	* .1*	.3*
*Buckhorn-Mesa	* 3.545	* .1*	.3*
*Buckhorn-Mesa	* 3.500	* .1*	.3*
*Buckhorn-Mesa	* 3.424	* .1*	.3*
*Buckhorn-Mesa	* 3.349	* .1*	.3*
*Buckhorn-Mesa	* 3.285	* .1*	.3*
*Buckhorn-Mesa	* 3.138	* .3*	.5*
*Buckhorn-Mesa	* 3.117	*Culvert *	*
*Buckhorn-Mesa	* 3.096	* .3*	.5*
*Buckhorn-Mesa	* 2.966	* .3*	.5*
*Buckhorn-Mesa	* 2.891	* .1*	.3*
*Buckhorn-Mesa	* 2.871	* .1*	.3*
*Buckhorn-Mesa	* 2.815	* .1*	.3*
*Buckhorn-Mesa	* 2.736	* .1*	.3*
*Buckhorn-Mesa	* 2.662	* .1*	.3*
*Buckhorn-Mesa	* 2.585	* .1*	.3*
*Buckhorn-Mesa	* 2.509	* .1*	.3*
*Buckhorn-Mesa	* 2.433	* .1*	.3*
*Buckhorn-Mesa	* 2.357	* .1*	.3*
*Buckhorn-Mesa	* 2.328	* .1*	.3*
*Buckhorn-Mesa	* 2.281	* .1*	.3*
*Buckhorn-Mesa	* 2.205	* .1*	.3*
*Buckhorn-Mesa	* 2.129	* .1*	.3*
*Buckhorn-Mesa	* 2.053	* .1*	.3*
*Buckhorn-Mesa	* 1.977	* .1*	.3*
*Buckhorn-Mesa	* 1.901	* .1*	.3*
*Buckhorn-Mesa	* 1.874	* .1*	.3*
*Buckhorn-Mesa	* 1.826	* .1*	.3*
*Buckhorn-Mesa	* 1.756	* .1*	.3*
*Buckhorn-Mesa	* 1.656	* .3*	.5*
*Buckhorn-Mesa	* 1.632	*Culvert *	*
*Buckhorn-Mesa	* 1.607	* .3*	.5*
*Buckhorn-Mesa	* 1.509	* .3*	.5*
*Buckhorn-Mesa	* 1.433	* .3*	.5*
*Buckhorn-Mesa	* 1.358	* .1*	.3*
*Buckhorn-Mesa	* 1.283	* .1*	.3*
*Buckhorn-Mesa	* 1.210	* .1*	.3*
*Buckhorn-Mesa	* 1.164	* .1*	.3*

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*Buckhorn-Mesa   *    1.135   *        .1*        .3*
*Buckhorn-Mesa   *    1.058   *        .1*        .3*
*Buckhorn-Mesa   *    0.983   *        .1*        .3*
*Buckhorn-Mesa   *    0.906   *        .1*        .3*
*Buckhorn-Mesa   *    0.831   *        .1*        .3*
*Buckhorn-Mesa   *    0.756   *        .1*        .3*
*Buckhorn-Mesa   *    0.680   *        .1*        .3*
*Buckhorn-Mesa   *    0.604   *        .1*        .3*
*Buckhorn-Mesa   *    0.533   *        .1*        .3*
*Buckhorn-Mesa   *    0.465   *        .3*        .5*
*Buckhorn-Mesa   *    0.445   *Culvert  *          *
*Buckhorn-Mesa   *    0.425   *        .3*        .5*
*Buckhorn-Mesa   *    0.336   *        .1*        .3*
*Buckhorn-Mesa   *    0.261   *        .1*        .3*
*Buckhorn-Mesa   *    0.185   *        .1*        .3*
*Buckhorn-Mesa   *    0.109   *        .1*        .3*
*Buckhorn-Mesa   *    0.068   *        .1*        .3*
*Buckhorn-Mesa   *    0.063   *        .1*        .3*
*Buckhorn-Mesa   *    0.019   *        .1*        .3*
*Buckhorn-Mesa   *    0.016   *        .1*        .3*
*Buckhorn-Mesa   *    0.000   *        .1*        .3*
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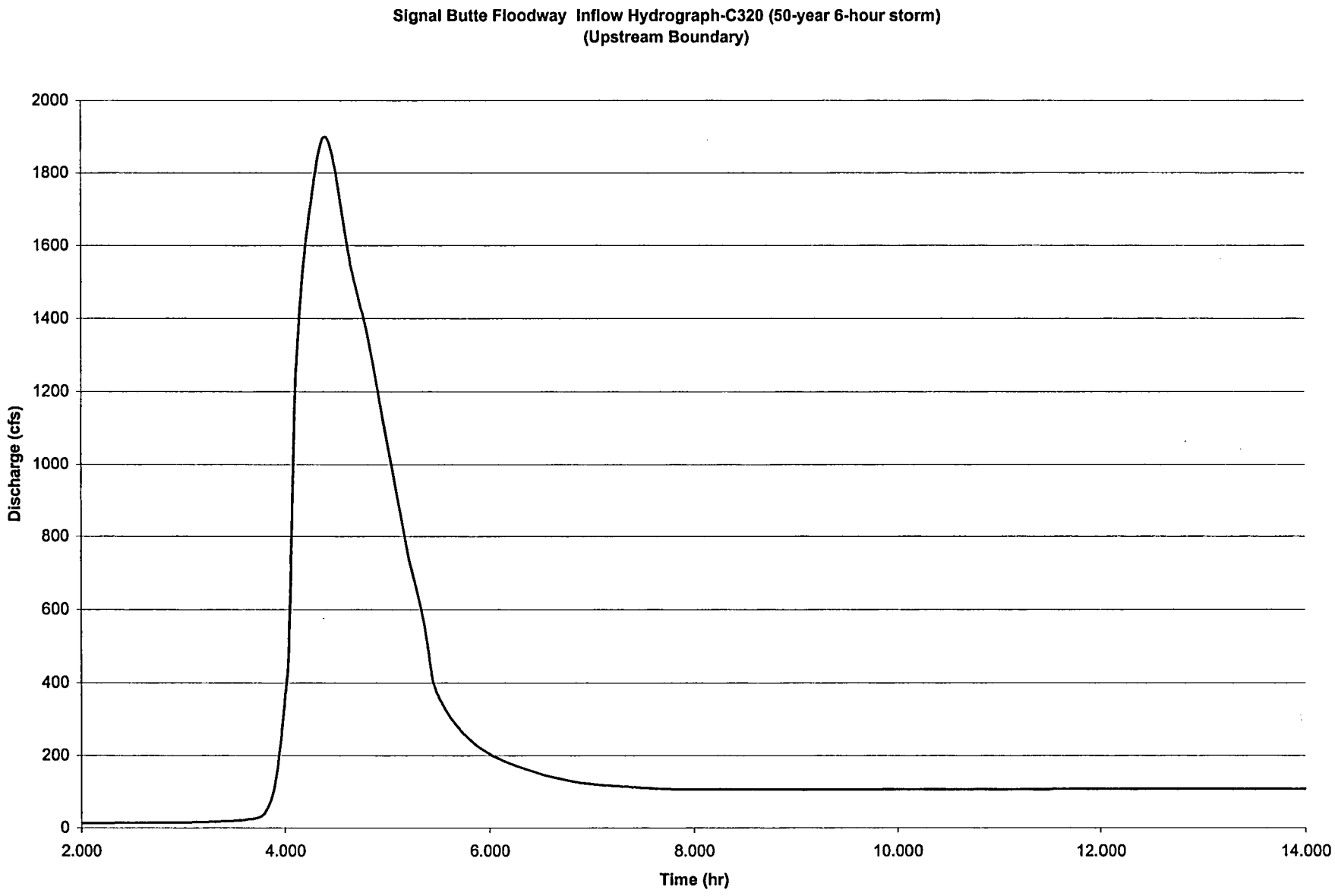
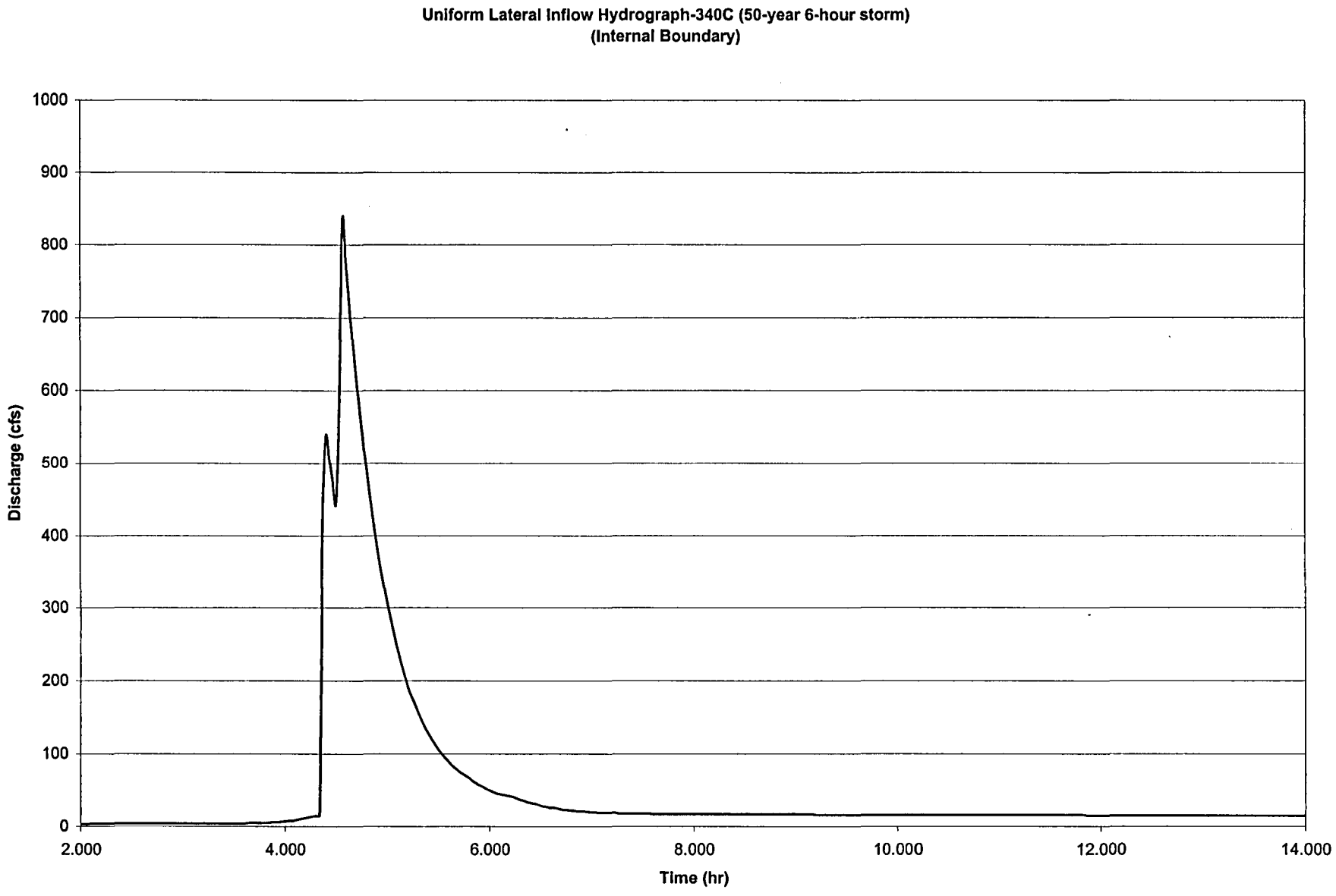
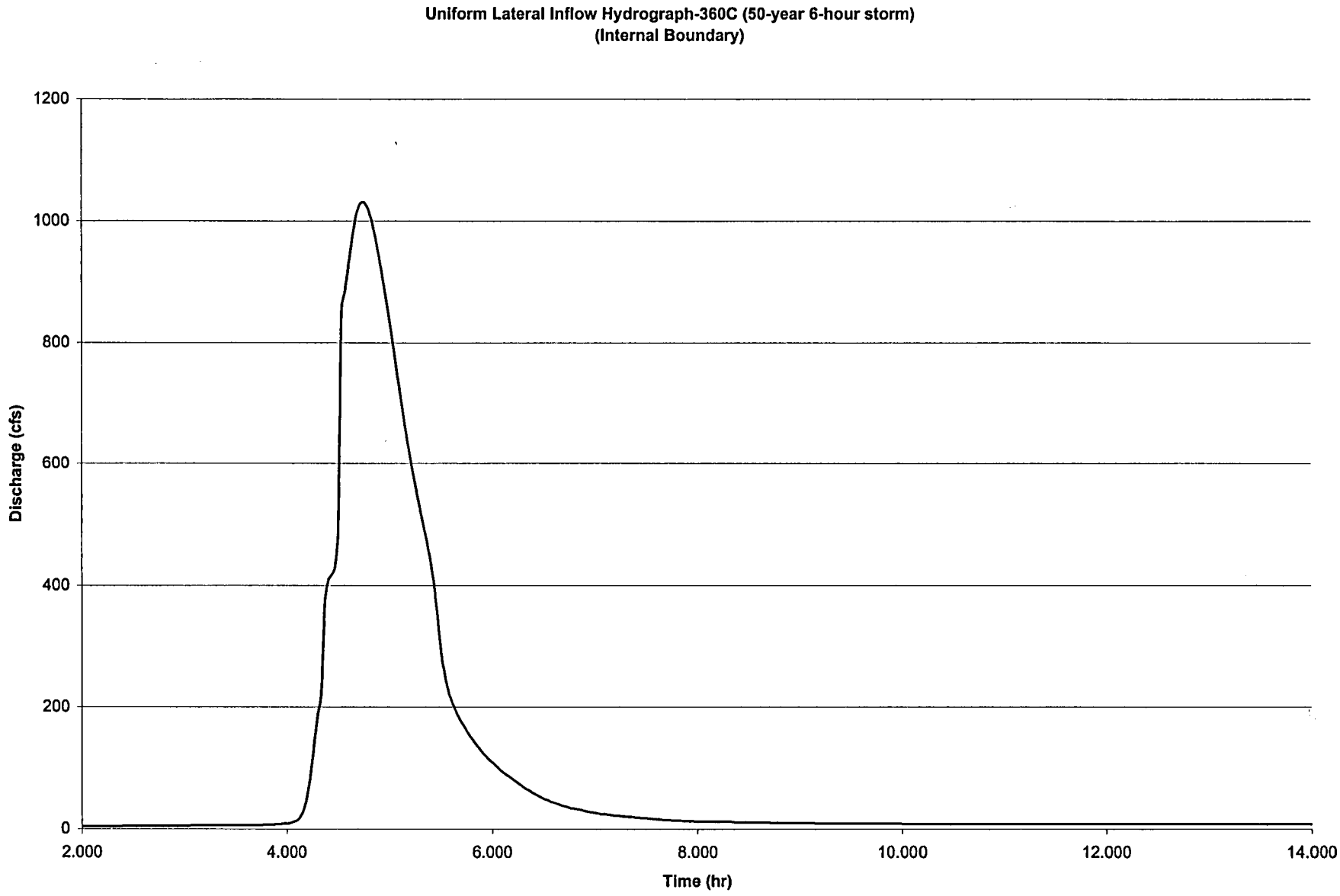
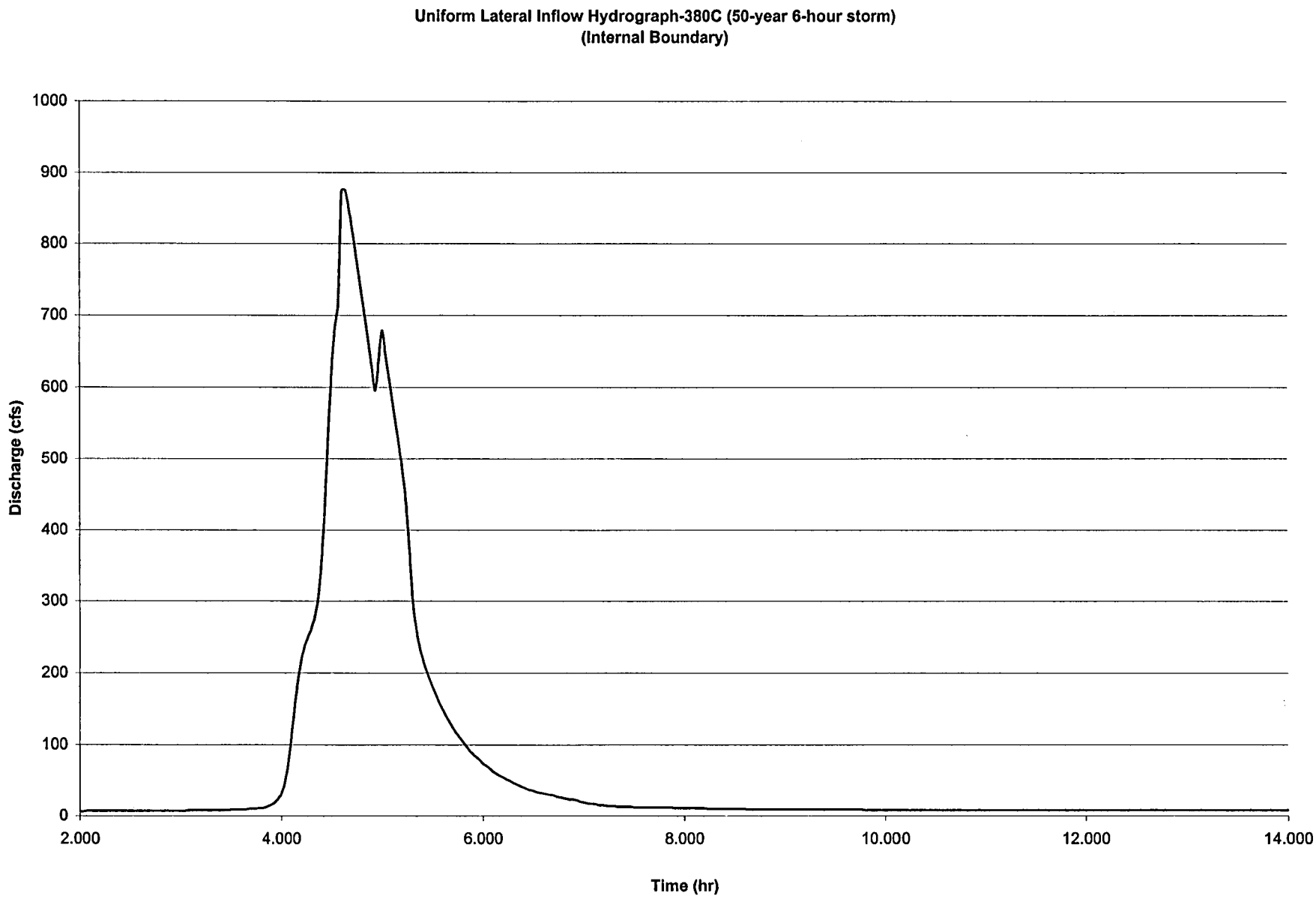
APPENDIX C

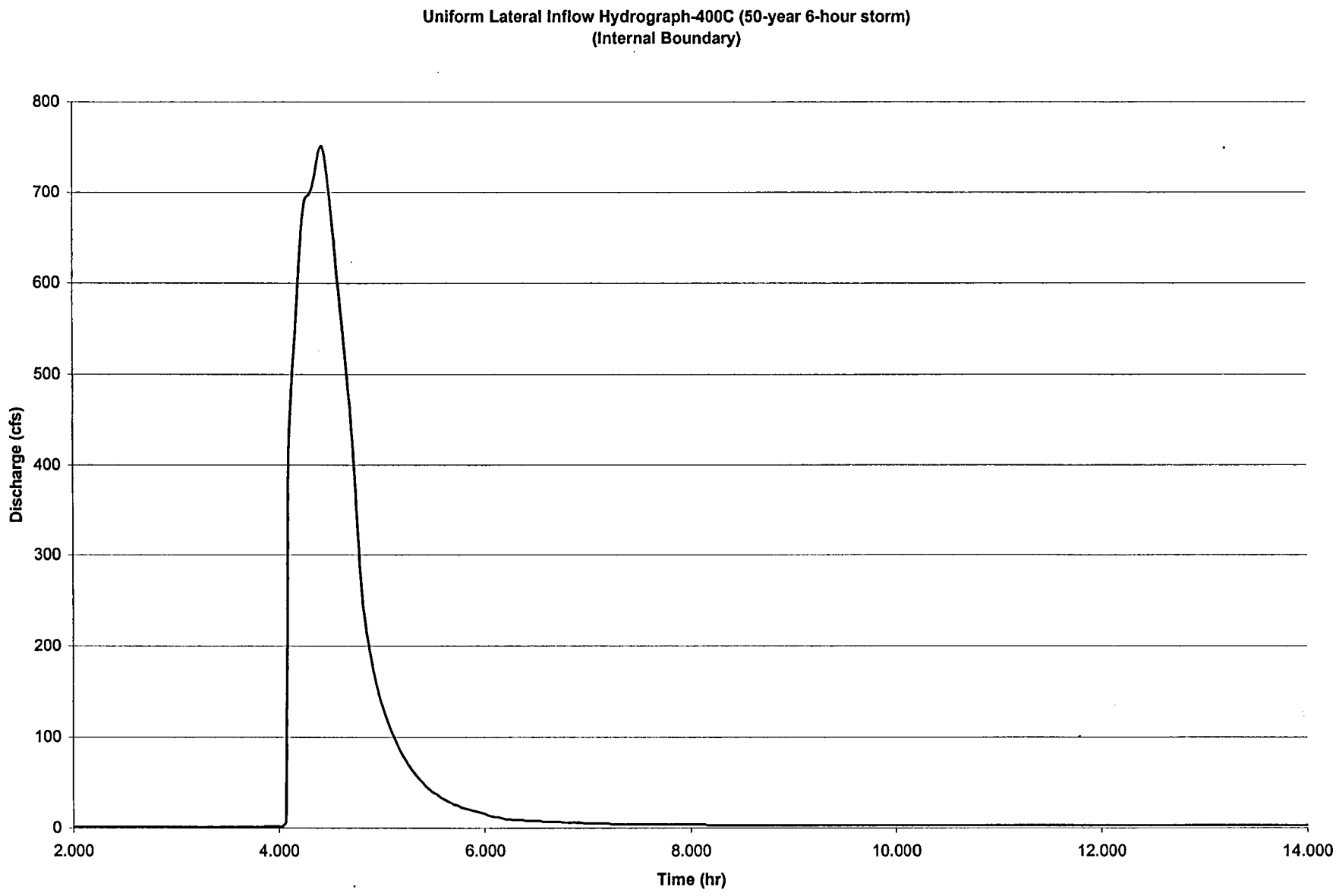
SUPPORTING DOCUMENTATION

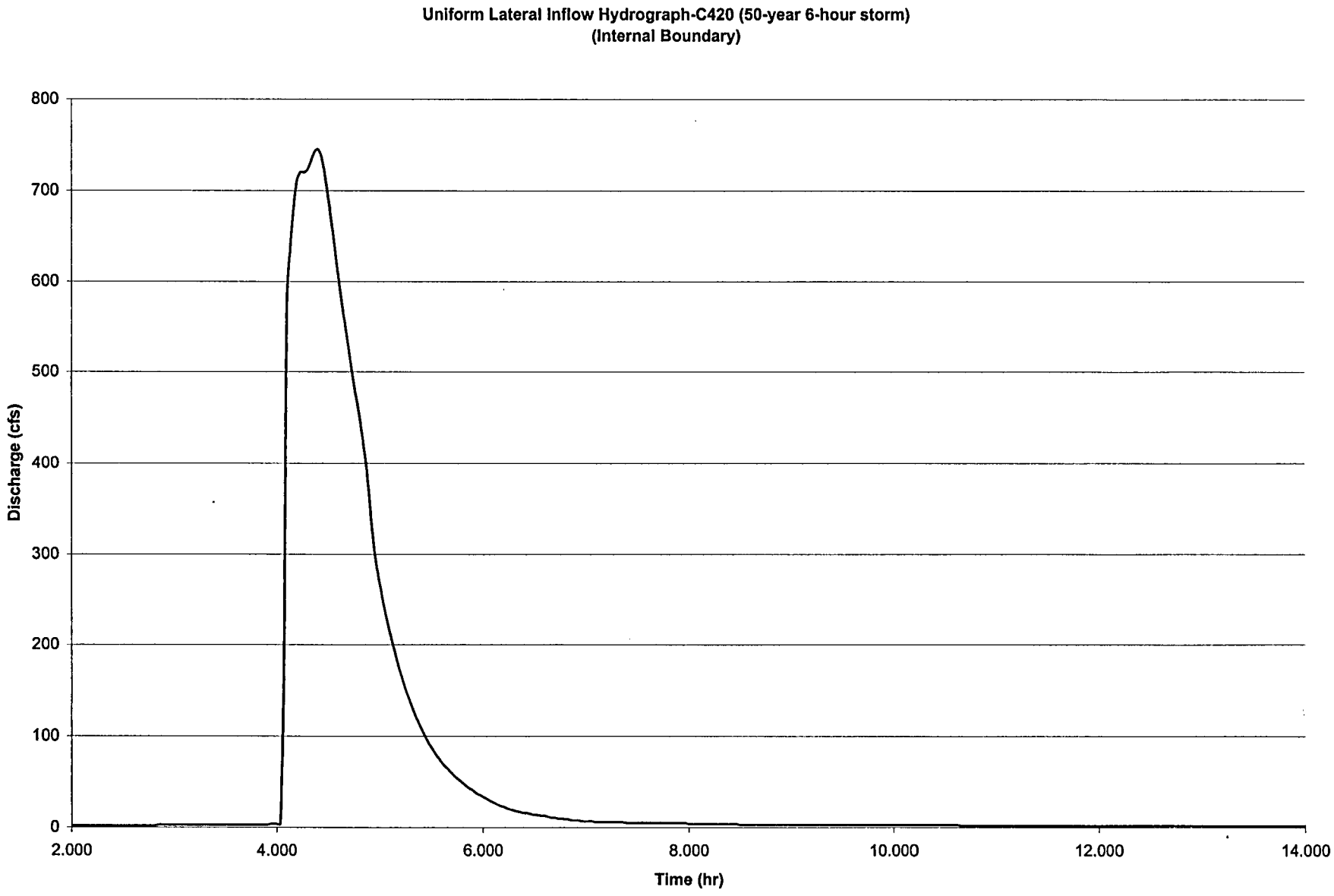

Signal Butte Floodway Inflow Hydrograph-C320 (50-year 6-hour storm)
(Upstream Boundary)
Discharge (cfs)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

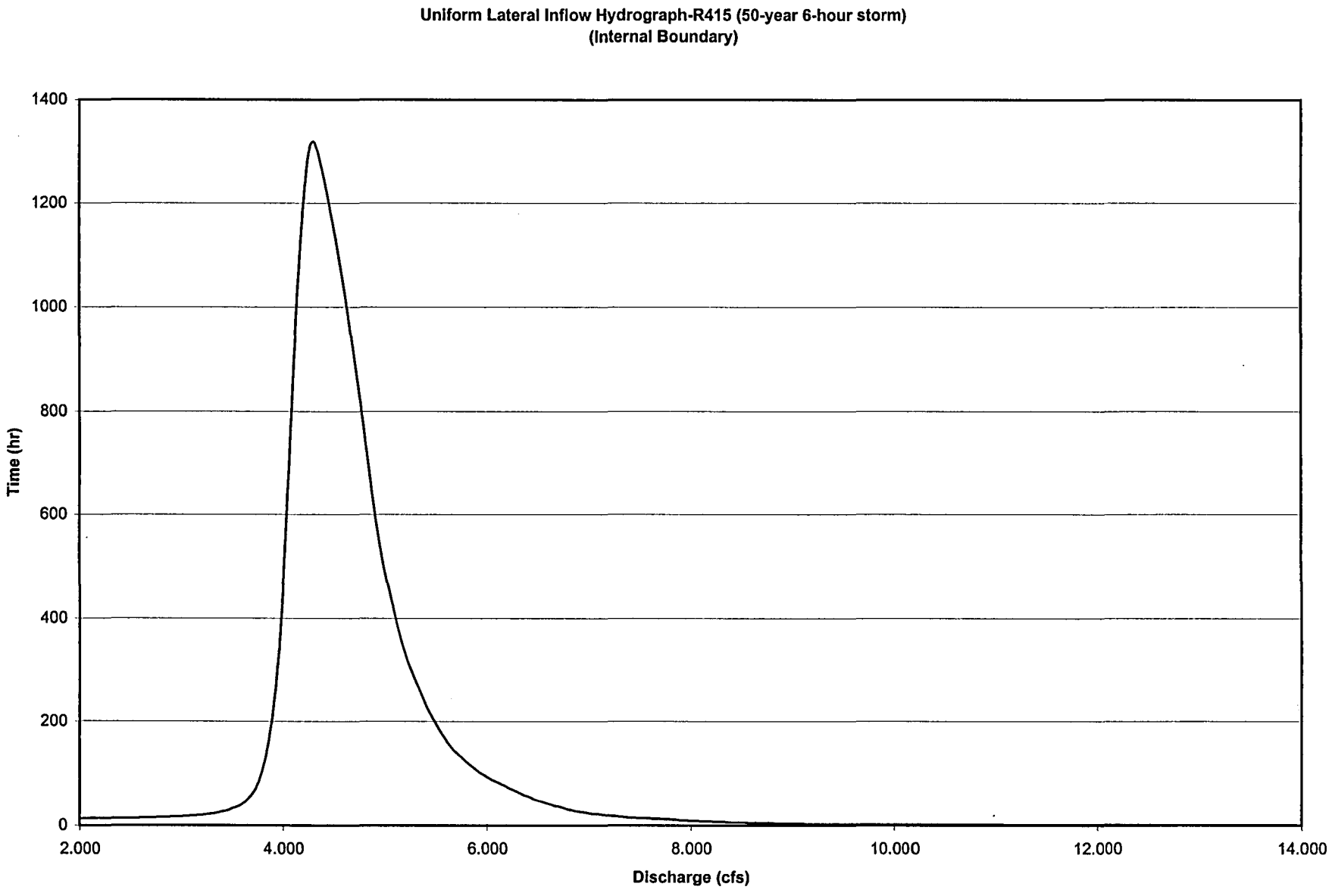

Uniform Lateral Inflow Hydrograph-340C (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
1000
900
800
700
600
500
400
300
200
100
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

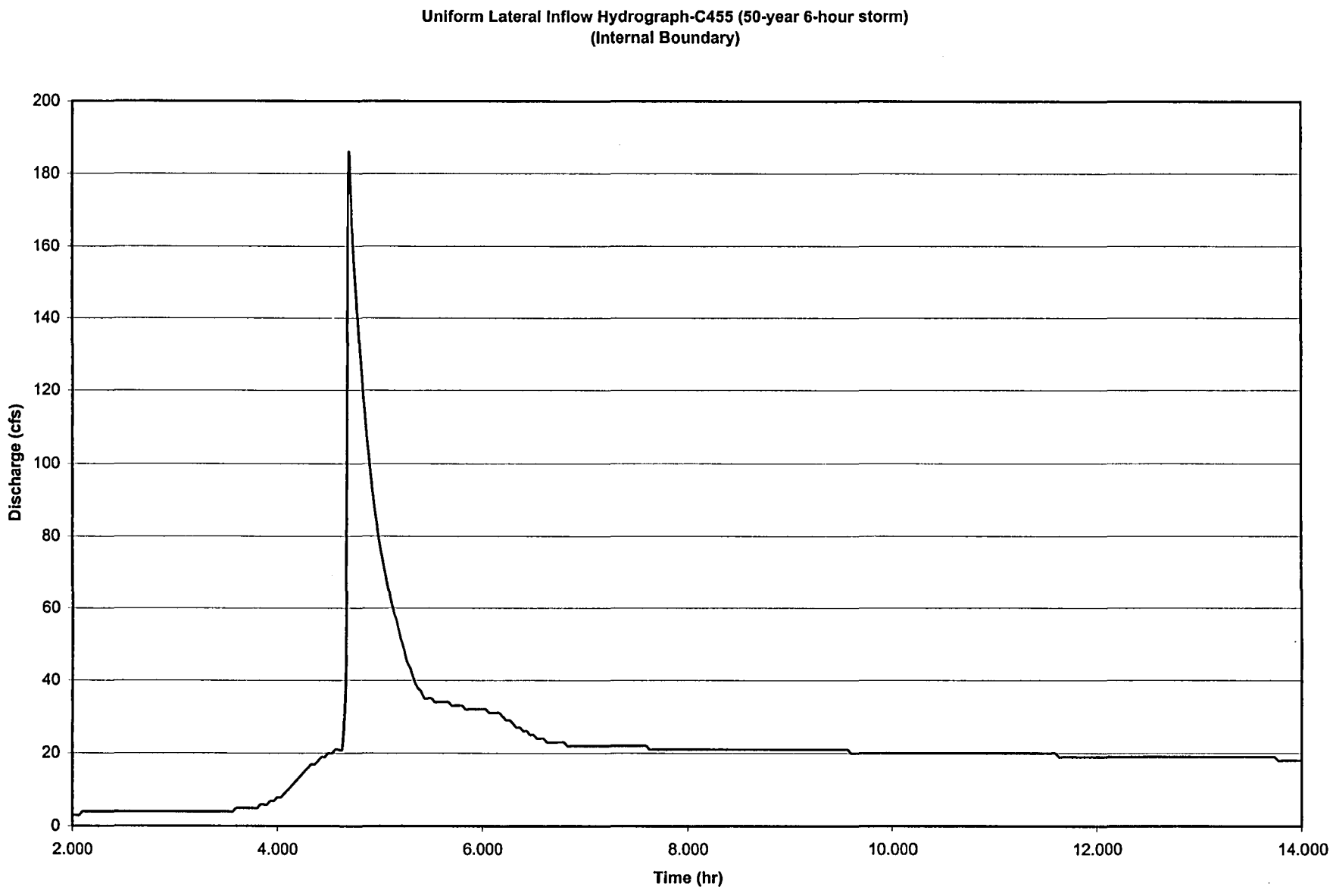

Uniform Lateral Inflow Hydrograph-360C (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
1200
1000
800
600
400
200
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

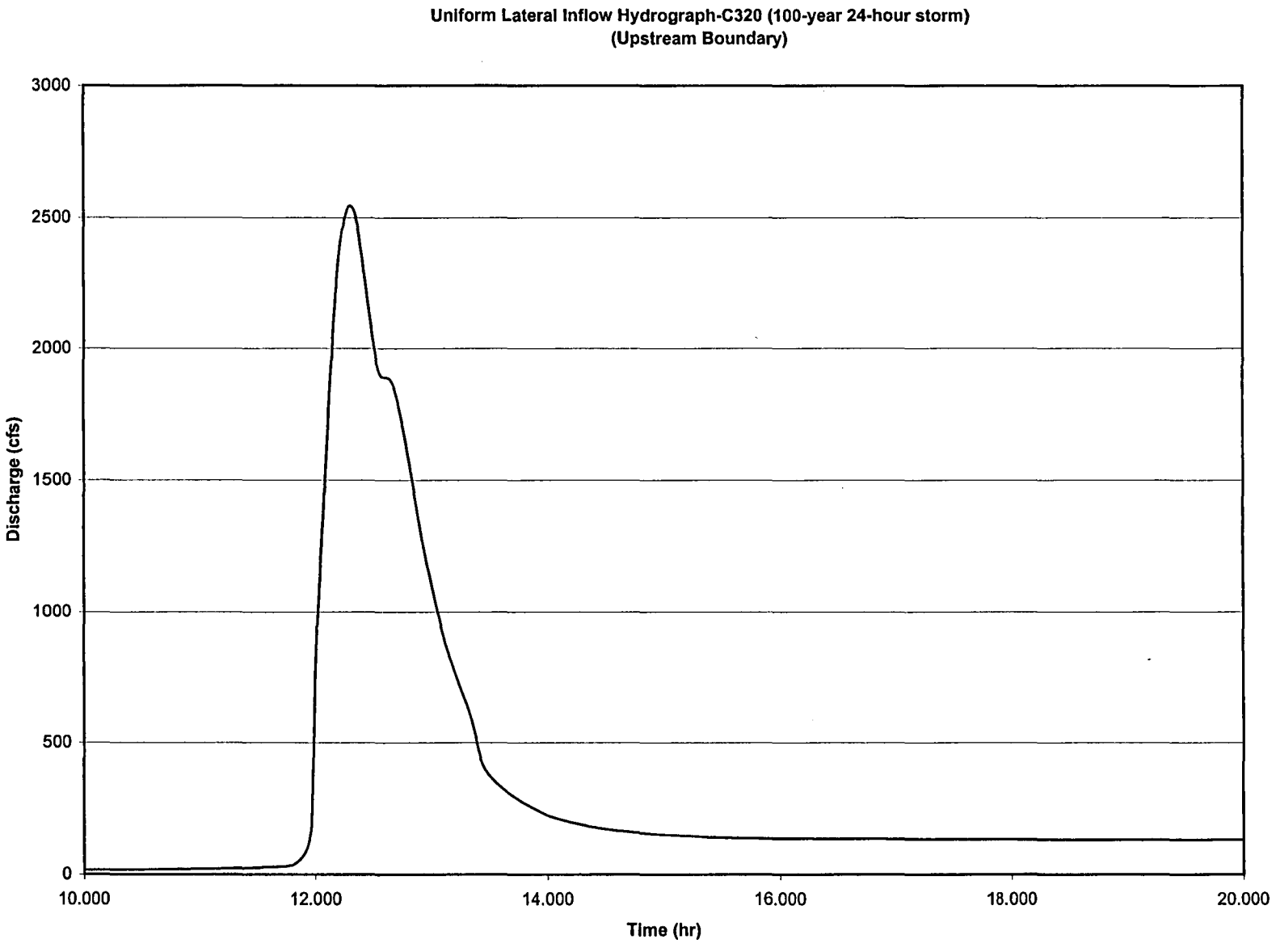

Uniform Lateral Inflow Hydrograph-380C (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
1000
900
800
700
600
500
400
300
200
100
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

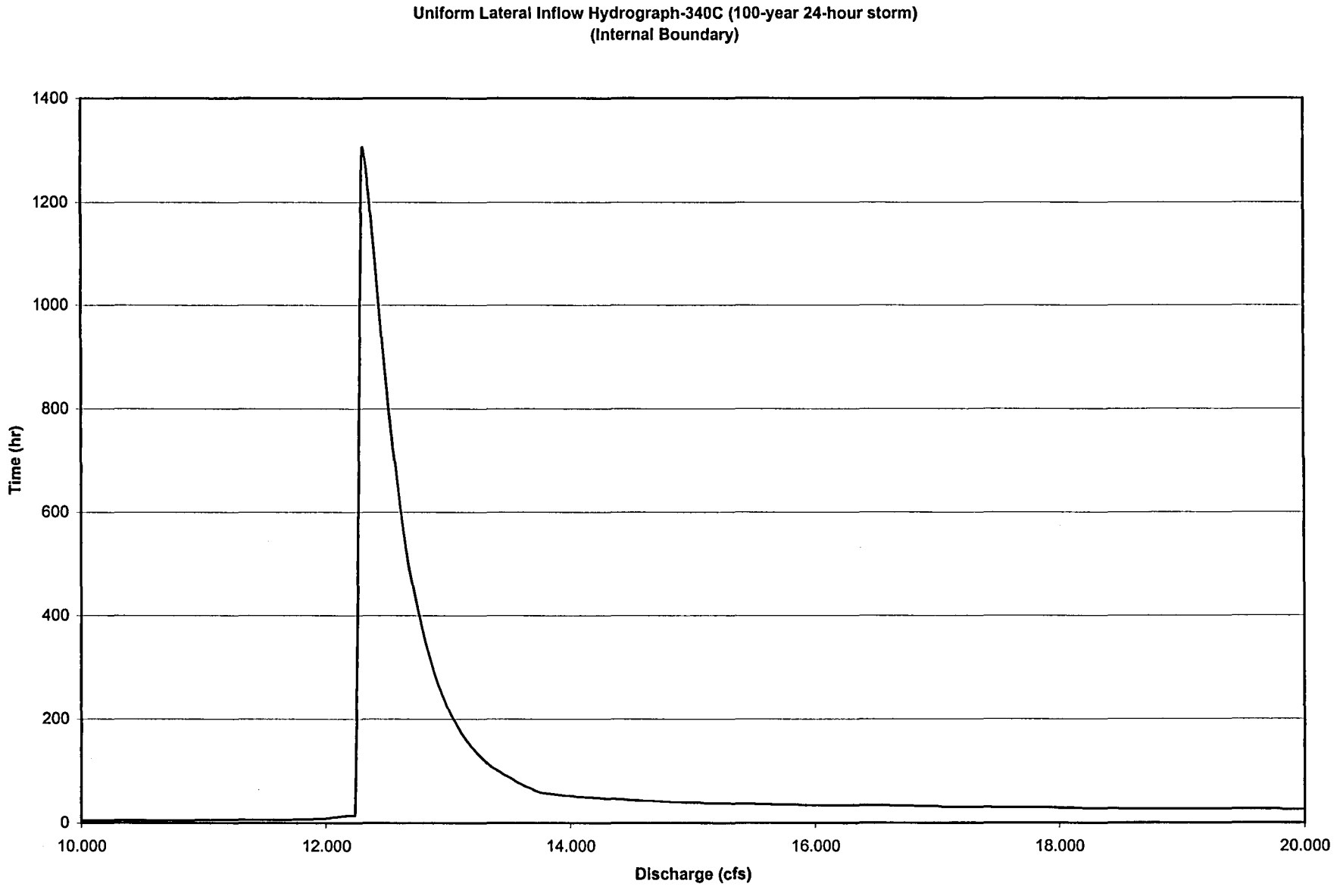

Uniform Lateral Inflow Hydrograph-400C (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
800
700
600
500
400
300
200
100
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

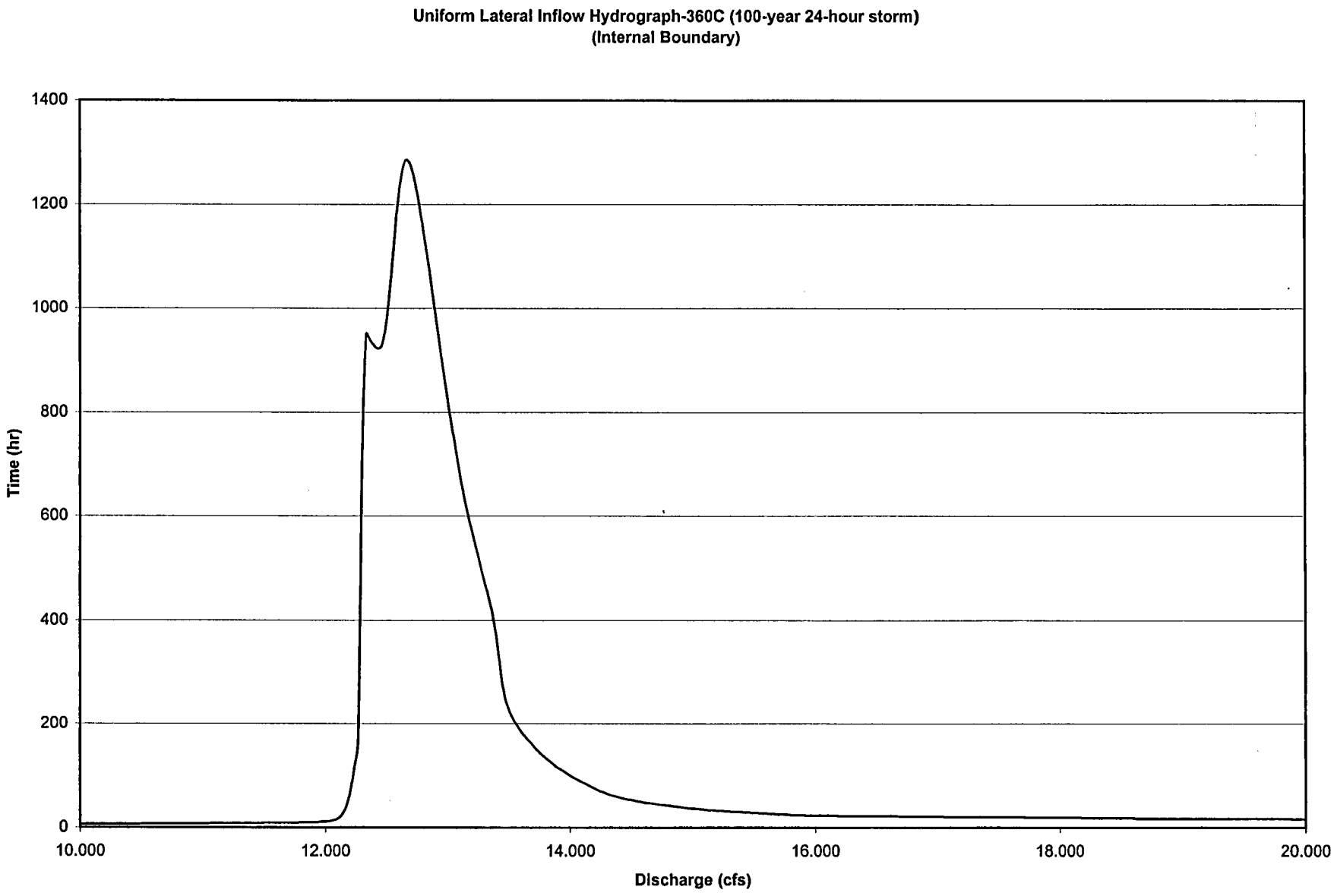

Uniform Lateral Inflow Hydrograph-C420 (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
800
700
600
500
400
300
200
100
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

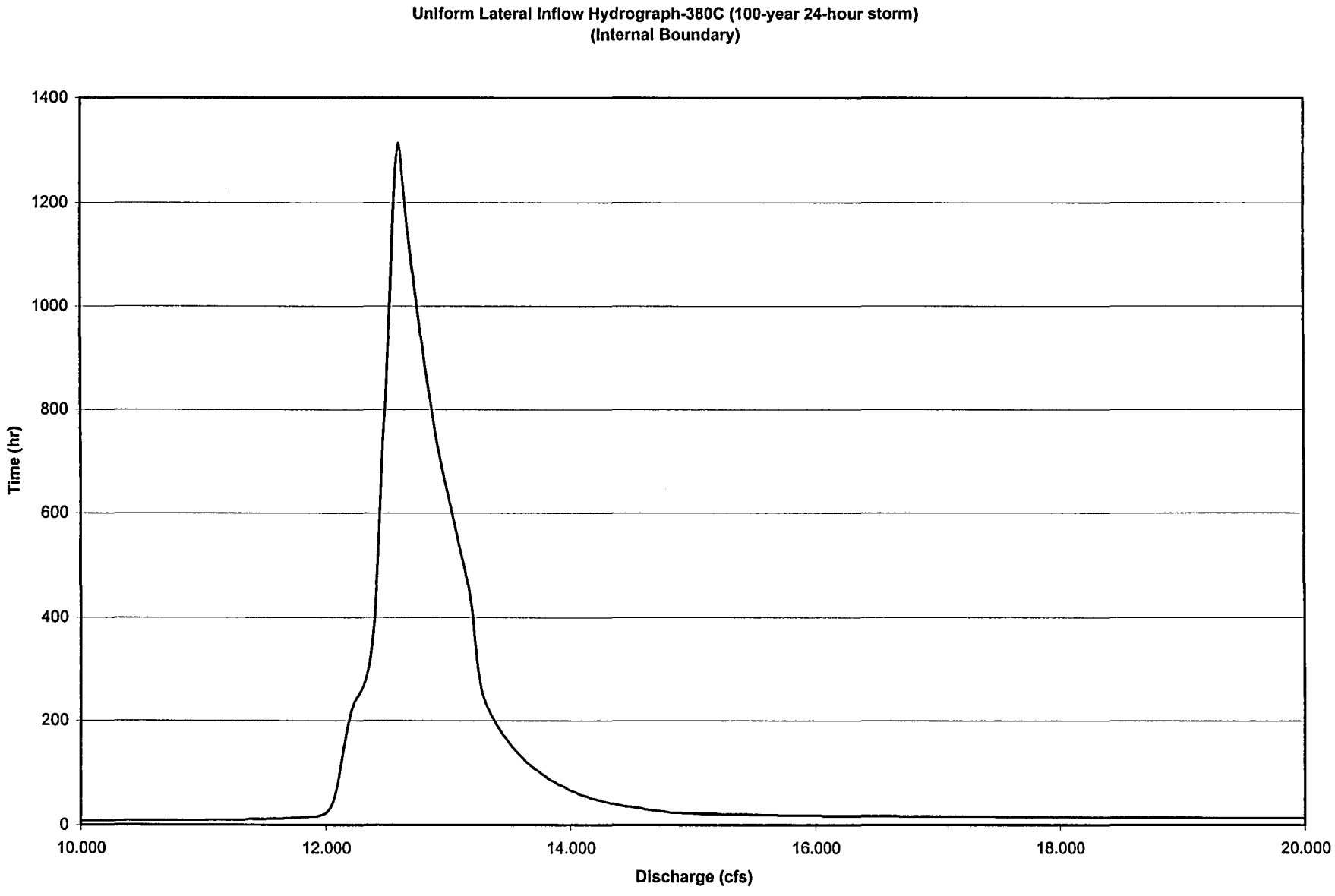

Uniform Lateral Inflow Hydrograph-R415 (50-year 6-hour storm)
(Internal Boundary)
Time (hr)
1400
1200
1000
800
600
400
200
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Discharge (cfs)


Uniform Lateral Inflow Hydrograph-C455 (50-year 6-hour storm)
(Internal Boundary)
Discharge (cfs)
200
180
160
140
120
100
80
60
40
20
0
2.000
4.000
6.000
8.000
10.000
12.000
14.000
Time (hr)

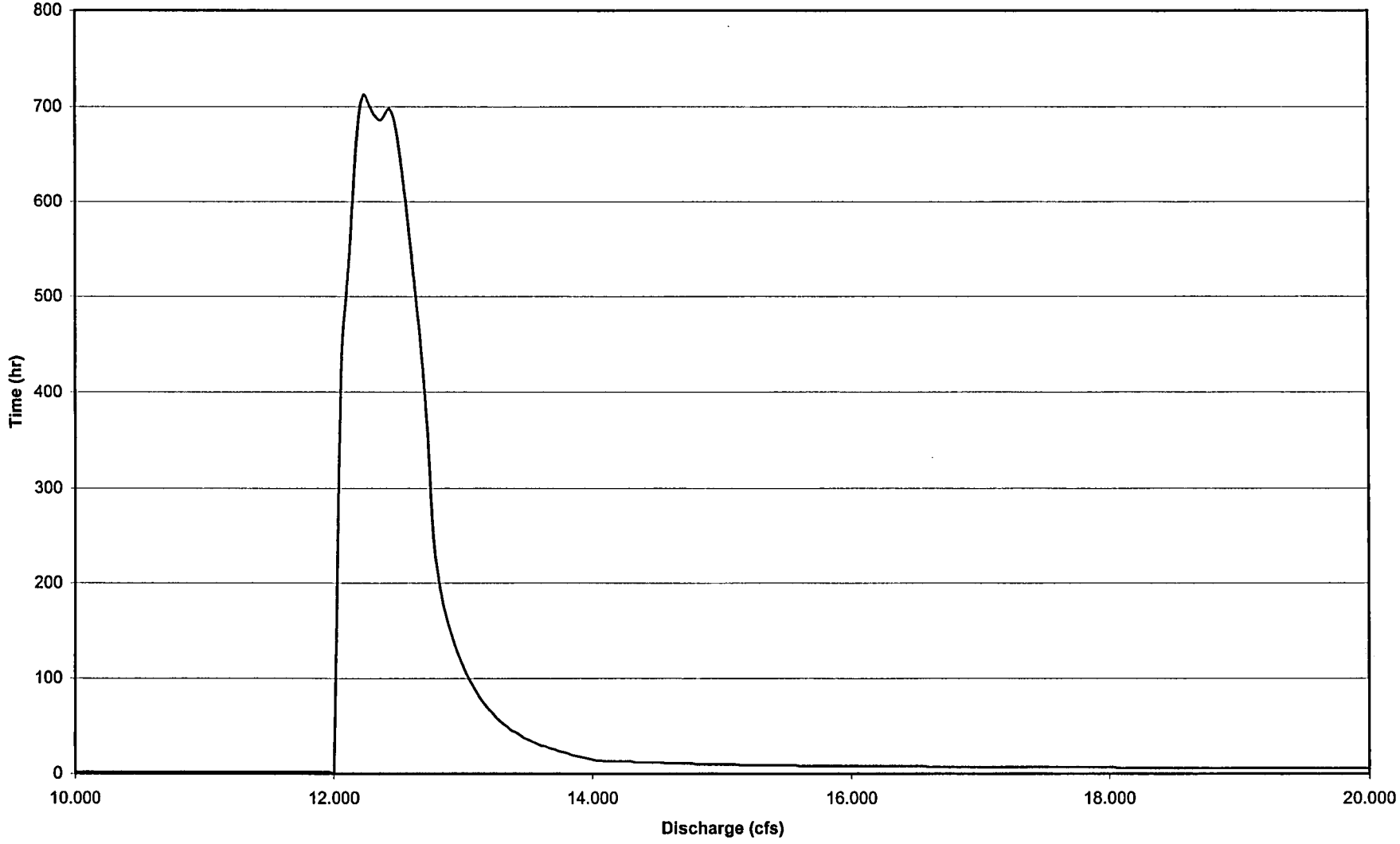

Uniform Lateral Inflow Hydrograph-C320 (100-year 24-hour storm)
(Upstream Boundary)
Discharge (cfs)
3000
2500
2000
1500
1000
500
0
10.000
12.000
14.000
16.000
18.000
20.000
Time (hr)

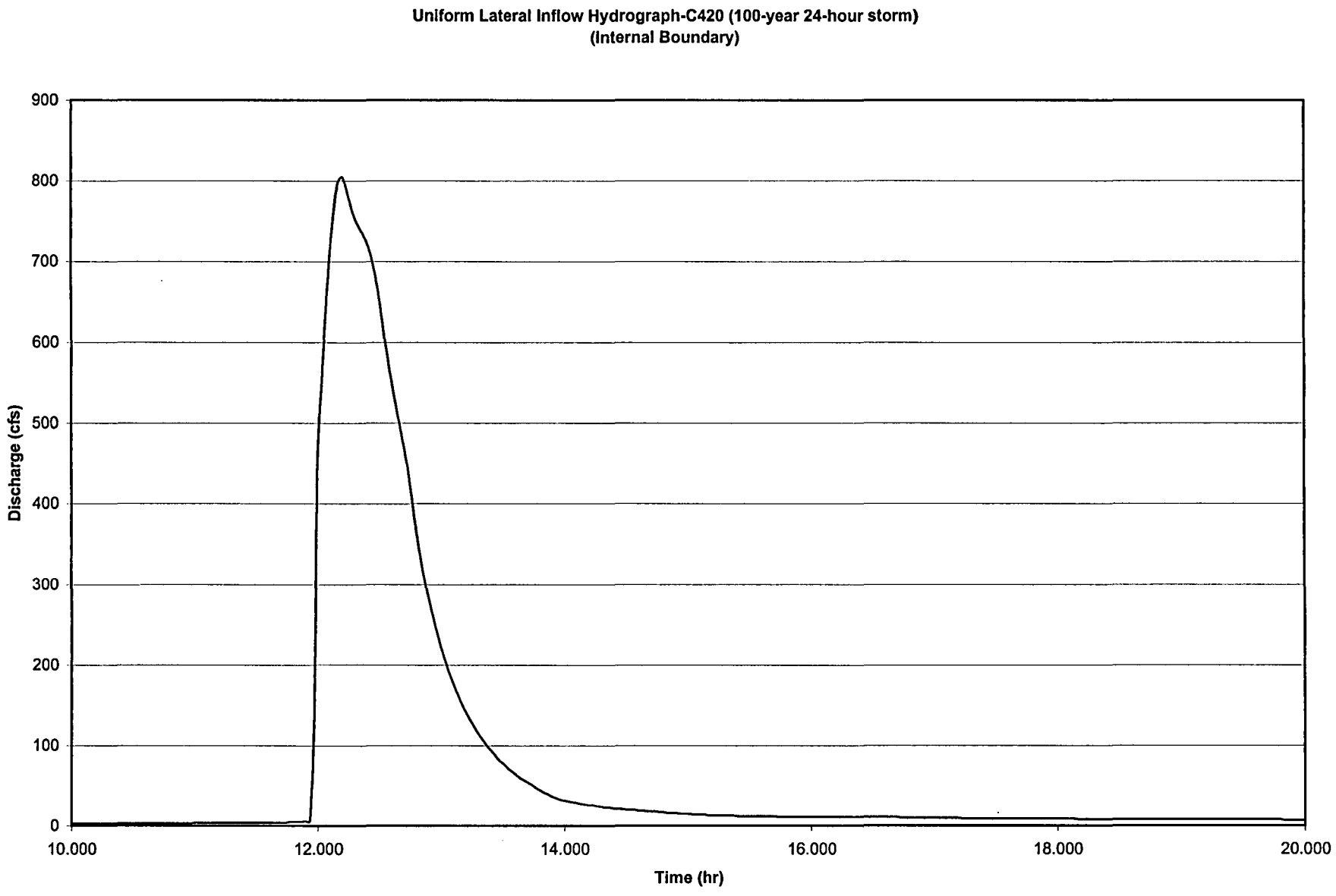

Uniform Lateral Inflow Hydrograph-340C (100-year 24-hour storm)
(Internal Boundary)
1400
1200
1000
800
600
400
200
0
Time (hr)
10.000
12.000
14.000
16.000
18.000
20.000
Discharge (cfs)

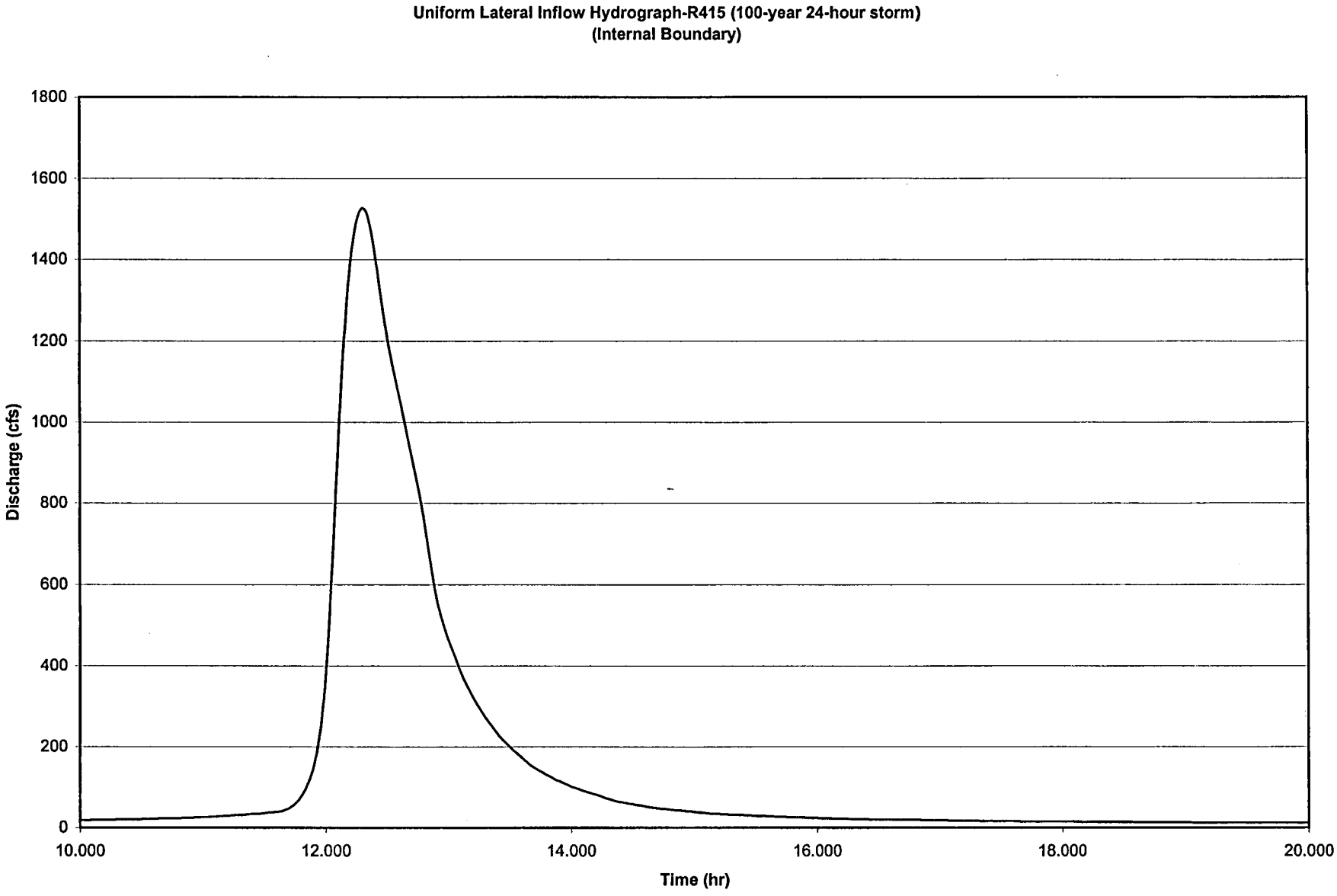

Uniform Lateral Inflow Hydrograph-360C (100-year 24-hour storm)
(Internal Boundary)
1400
1200
1000
800
600
400
200
0
Time (hr)
10.000
12.000
14.000
16.000
18.000
20.000
Discharge (cfs)

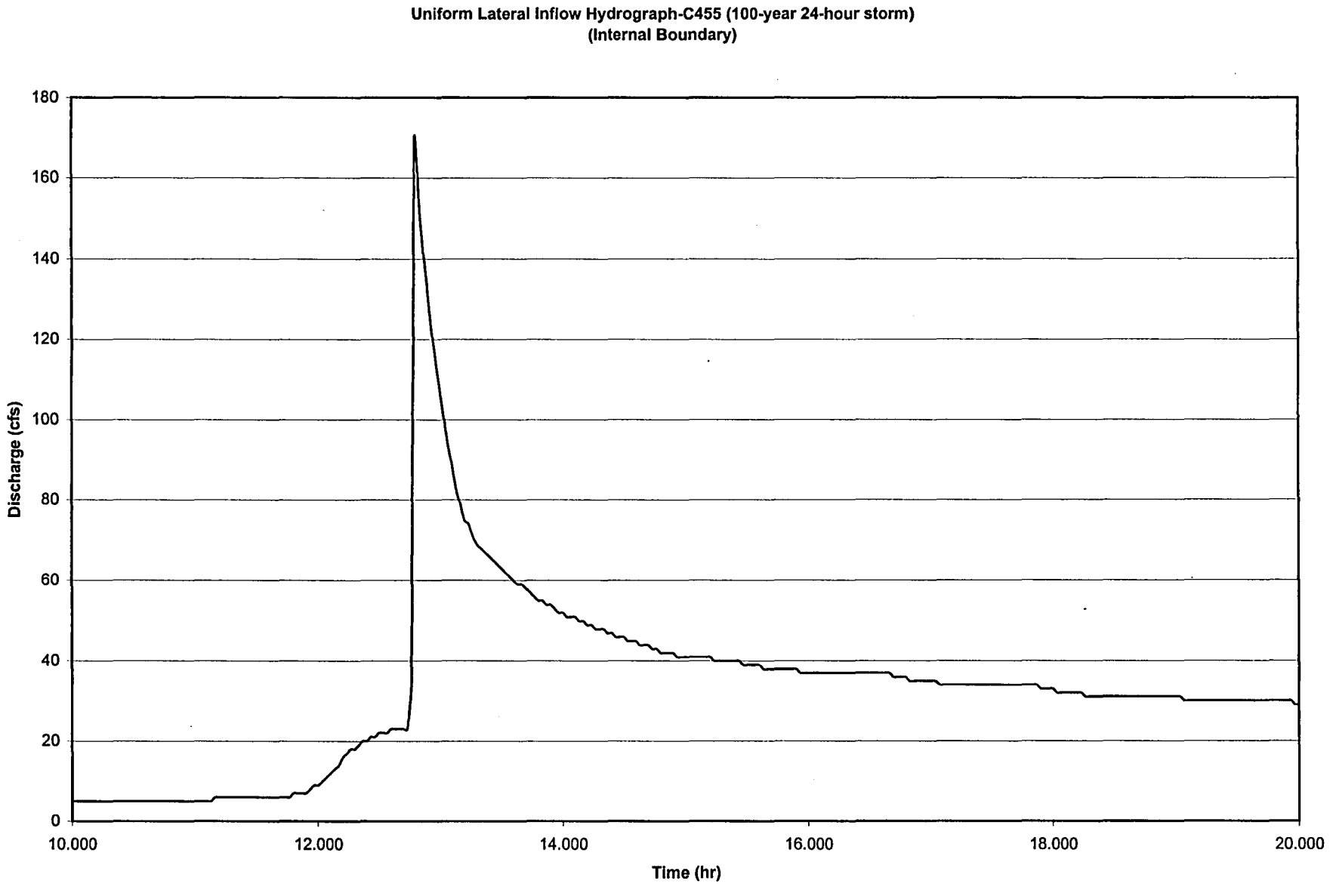

Uniform Lateral Inflow Hydrograph-380C (100-year 24-hour storm)
(Internal Boundary)
Time (hr)
1400
1200
1000
800
600
400
200
0
10.000
12.000
14.000
16.000
18.000
20.000
Discharge (cfs)

Uniform Lateral Inflow Hydrograph-400C (100-year 24-hour storm)
(Internal Boundary)

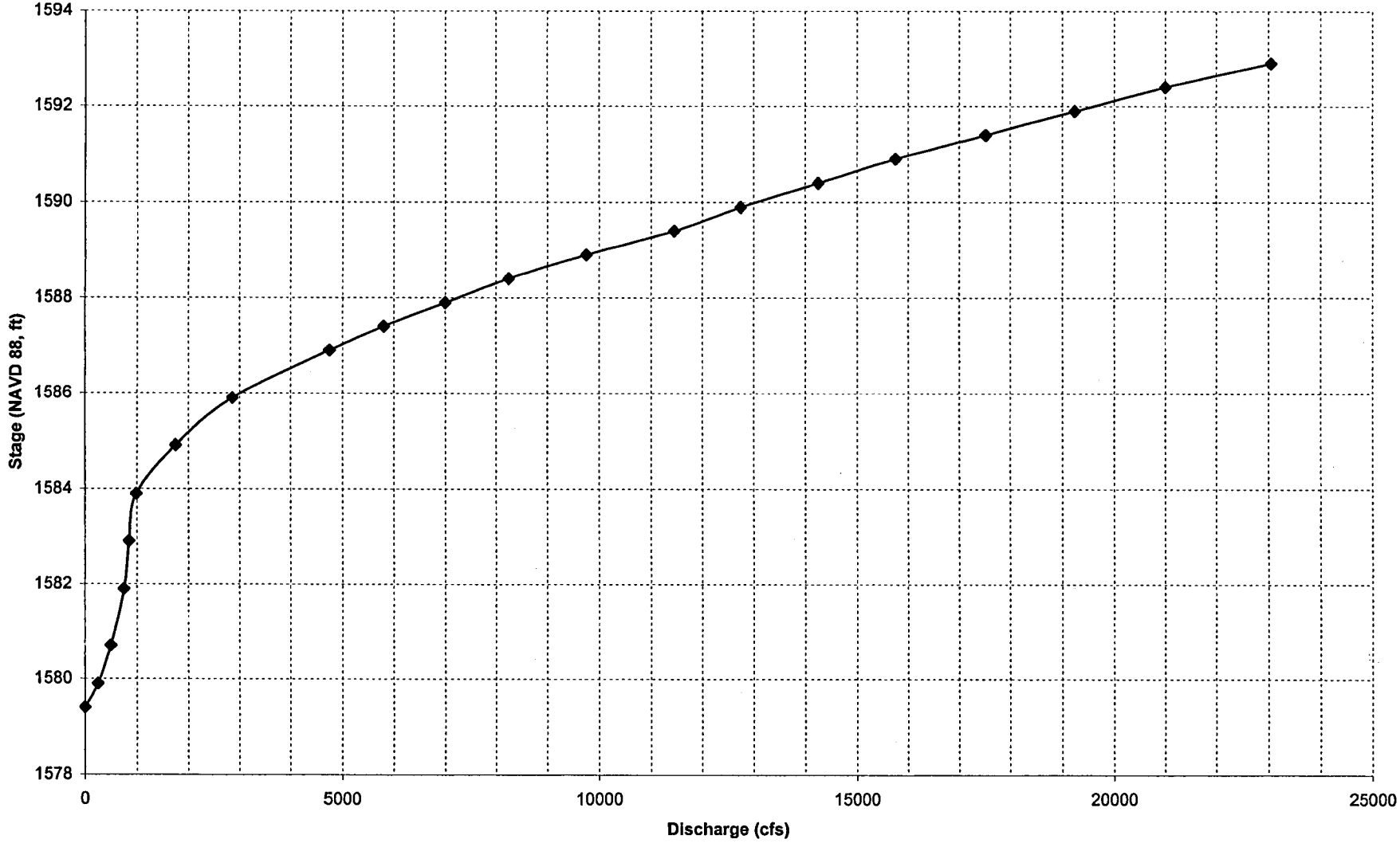



Uniform Lateral Inflow Hydrograph-C420 (100-year 24-hour storm)
(Internal Boundary)
Discharge (cfs)
900
800
700
600
500
400
300
200
100
0
10.000
12.000
14.000
16.000
18.000
20.000
Time (hr)


Uniform Lateral Inflow Hydrograph-R415 (100-year 24-hour storm)
(Internal Boundary)
Discharge (cfs)
1800
1600
1400
1200
1000
800
600
400
200
0
10.000
12.000
14.000
16.000
18.000
20.000
Time (hr)


Uniform Lateral Inflow Hydrograph-C455 (100-year 24-hour storm)
(Internal Boundary)
Discharge (cfs)
180
160
140
120
100
80
60
40
20
0
10.000
12.000
14.000
16.000
18.000
20.000
Time (hr)

Spook Hill Emergency Spillway Stage-Discharge Function
(Downstream Boundary)



j:\rm06\design\drn\hydraulics\report\boundary-100_24.xls(ds boundary)

DMJM+HARRIS