ABBOTT AND PULSIPHER WASHES
LETTER OF MAP REVISION (LOMR)

550-048

September 2011

Prepared for:

Clark County Regional Flood Control District
600 S. Grand Central Parkway, Suite #300
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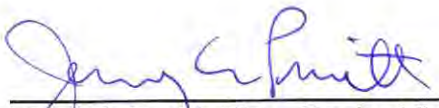
G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

ABBOTT AND PULSIPHER WASHES LOMR
CERTIFICATION

This is to certify that all work accomplished in the conduct of this LOMR was done in accordance with the Statement of Work and General Provisions of Contract 550.048, and all amendments thereto, together with all such modifications, either written or oral, as the Regional PO and/or the Contracting Officer or their representatives have directed, such as modifications affecting this contract, and that all such work has been accomplished in accordance with sound and accepted engineering practices within the contract provisions for respective phases of work. Topographic data on base maps, work maps, cross section maps, and exhibits is certified to represent existing conditions and to be accurate to the best of my knowledge as per Volume 2, Section 2.1.5 Guidelines and Specifications for Flood Hazard Mapping Partners, FEMA, April 2003.



Jerry E. Pruitt, PE – Senior Vice President
G. C. WALLACE, INC.

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G. C. WALLACE, INC.

Writer's Contact Information:

550-048

September 2, 2011

LOMC Clearinghouse
7390 Coca Cola Drive, Suite 204
Hanover, Maryland 21076

Subject: LOMR for Abbott and Pulsipher Washes

Attention: LOMC Manager

G. C. Wallace, Inc. (GCW) has been contracted by Clark County Regional Flood Control District (CCRFCD) to complete a Letter of Map Revision (LOMR) for a portion of the Abbott and Pulsipher Washes located within the City of Mesquite (COM), Clark County, Nevada. The project encompasses the reach of the Pulsipher Wash between Hardy Way and the Virgin River tie in and the reach of the Abbott Wash from approximately 1,000 feet north of Horizon Boulevard (Abbott Wash Detention Basin) to the downstream end of the Hardy Way Bridge tying into the existing Mesquite Vistas Channel. The LOMR methodology is in accordance with *Guidelines and Specifications for Flood Hazard Mapping Partners* (Reference 1).

The purpose of this LOMR is to revise the Effective Flood Insurance Rate Map (FIRM) Community Panels to reflect the previously constructed flood control improvements within the limits of the study. The current FIRM panels indicate the subject reaches of the Abbott and Pulsipher Washes are located within a Zone A and Zone AE Special Flood Hazard Area (SFHA). Zone A SFHA's are floodplains determined by approximate methods and which do not have base flood elevations (BFE) determined; while Zone AE SFHA has BFE determined. The affected Community Panels are Map Numbers 32003C0378F, 32003C0379F, and 32003C0386F dated December 4, 2007. See Figures 1 and 2 for the project vicinity and location. The Effective FIRM is shown on Figure 3.

There have been several flood control improvements on the Abbott and Pulsipher Washes since the effective FIS and last LOMR for the washes were completed and are therefore not reflected in the effective mapping. The constructed Abbott Wash improvements include a 279 acre-feet detention basin and 72-inch RCP outlet. The constructed Pulsipher Wash improvements include a 160 acre-feet detention basin and 48-inch RCP outlet. The construction of these detention basins have resulted in lower flows in the washes downstream. In addition to detention basins, other downstream improvements are also included in this LOMR. The downstream improvements include culvert crossings at Horizon Boulevard and Hardy Way within the Abbott Wash, and approximately 1,300 feet of storm drain between Bertha Howe Avenue and Pioneer Boulevard within the Pulsipher Wash. The following information is enclosed supporting this request for a LOMR.

- Figure 1 - Vicinity Map.
- Figure 2 - Location Map.
- Figure 3 - Effective FIRM.
- Figure 4 – Work Map: Abbott Wash.
- Figure 5 – Work Map: Pulsipher Wash.
- Figure 6 – Revised FIRM Map.

- Figure 7 – Annotated FIRM Map.
- FEMA Forms.
- No check is being submitted. Please refer to the attached cover letter from CCRFCD on behalf of COM.
- Hydrologic Modeling Computations.
- Hydraulic Modeling Computations.
- Site Photographs.
- Field Survey Information.
- Operation and Maintenance Plan.
- References.
- As-Built Plans.
  - Hardy Way Extension, Christopher L. Thompson, 4/3/08
  - Pulsipher Wash Improvements, Travis H, Anderson, 11/14/07
  - Pulsipher Wash Improvements, Greg L. Bulloch, 10/18/02
  - Mesquite Water Reuse System and Storm Detention Project, Jason T. Broome, 1/21/09
  - Detention Basins Additional Grading Plan, Jerry Pruitt, 8/16/11
- Certification of each plan set specifically for substantial conformance.
- Electronic Files on disk (Aerial topography, Survey data, GIS Files and HEC-RAS Models).

Previous Studies

Effective FIS

The Abbott and Pulsipher Washes were previously analyzed in the *Abbott and Pulsipher Washes FIS Restudy, and Pulsipher Washes FIS Restudy Supplement* (Reference 2, hereinafter referred to as the 1998 FIS Study). The 1998 FIS Study was submitted to Clark County Regional Flood Control District in October of 1998 and submitted and accepted by FEMA in September 10, 2001. The 1998 FIS Study includes reaches of the "effective" Hydraulic Models for the Abbott and Pulsipher Washes which are referenced for the purpose of this LOMR. These reaches are downstream of I-15 to Virgin River Tie-in for Pulsipher Wash and Upstream of Hardy Way for Abbott Wash. As-built information for the existing 12-foot wide by 10-foot high RCB I-15 culvert crossing have been referenced from the 1998 FIS Study and converted to NAVD 88 Datum for the purpose of this LOMR. The datum conversion factor is 2.29 feet as referenced from the FIS Study.

Pulsipher Wash Referenced Studies

The *Request for LOMR, Pulsipher Wash Adjacent to Falcon Ridge Parkway* (FEMA Case No. 06-09-B05P) (Reference 3, hereinafter referred to as the Falcon Ridge Parkway LOMR) analyzed and incorporated several Pulsipher Wash channel improvements that have been constructed since the submittal of the 1998 FIS Study, including a concrete-lined channel between Birdie Lane and Bertha Howe Avenue, a dual 12-foot wide by 8-foot high RCB culvert crossing at Bertha Howe Avenue, a quintuple 12-foot wide by 10-foot high RCB at Pioneer Boulevard, and a rough graded channel between Pioneer Boulevard and I-15. As-built information for these channel improvements have been referenced from the Falcon Ridge Parkway LOMR and converted to NAVD 88 Datum for the purpose of this LOMR.

The *Conditional Letter of Map Revision for Pulsipher Wash Channel Improvements* (Reference 4, hereinafter referred to as the Pulsipher Wash CLOMR) analyzed the dual 14-foot wide by 10-foot high RCB storm drain between Bertha Howe Avenue and Pioneer Boulevard. This storm drain was constructed after the Falcon Ridge Parkway LOMR was submitted to FEMA. The hydraulic model from the Falcon Ridge Parkway LOMR was revised to include the RCB storm drain between Bertha Howe Avenue and Pioneer Boulevard. Additionally, the Pulsipher Wash CLOMR referenced the flow rates shown in the *2001 City of Mesquite Flood Control Master Plan Update* (Reference 5, hereinafter referred to as the 2001 MPU). As-built information for the RCB storm drain between Bertha Howe Avenue and Pioneer Boulevard have been referenced from the Pulsipher Wash CLOMR and converted to NAVD 88 Datum for the purpose of this LOMR. The datum conversion factor is 2.84 feet as referenced from the LOMR Study.

Survey shots were taken at the start of the concrete-lined channel at approximately 785 feet upstream of Bertha Howe Avenue and at the end of the box culvert just downstream of Pioneer Boulevard. Based on these surveyed elevations, an adjustment factor of 3.10 feet was calculated to convert the as-built information referenced from Pulsipher Wash reference studies to NAVD 88 Datum for the purpose of this LOMR.

Abbott Wash Referenced Studies

The Abbott Wash downstream tie-in has been referenced from the *Abbott Wash at Mesquite Vistas Letter of Map Revision* (Reference 6, hereinafter referred to as the Abbott Wash LOMR). The tie-in section is approximately 280 feet south of Hardy Way. The tie-in cross section from Abbott Wash LOMR is River Station 5618.

Survey shots were taken at Horizon Boulevard Culvert and Hardy Way Bridge for this project.

Abbott and Pulsipher Wash Detention Basins

The City of Mesquite has constructed the Abbott Wash and Pulsipher Wash Detention Basins since the submittal of the above reference studies. The Abbott and Pulsipher Washes Detention Basins were designed in the *Phase 2B and Phase 3: Pulsipher Wash Detention Basin and Pulsipher Reuse Water Storage Pond, Abbott Wash Detention Basin and Abbott Reuse Water Storage Pond, Abbott Wash Detention 100% Design Document* Report (Reference 7, hereinafter referred to as the Detention Basins Study). The Detention Basins Study references the 2001 MPU flow rates. The detention basins have been sized to attenuate the 100-year storm flows impacting the Abbott and Pulsipher Washes within the limits of this project. The Abbott and Pulsipher Washes Detention Basin facilities have been surveyed for the purpose of this LOMR in order to determine the storm drain outfall flow rates for the 100-year storm event. The surveyed data includes invert, embankment, and spillway crest elevation shots. Additionally, sizes of the outfall storm drains have been field verified. The hydrologic calculations for the Abbott Wash and Pulsipher Wash detention basins have been performed using survey data based on NAVD 88 datum. The design drawings for the detention basins were based on NGVD 29 datum. Comparison of the elevations between the recent survey data and as-built drawings prepared by Forsgren Associates Inc. show the difference

in elevations for Abbott Wash and Pulsipher Wash detention basins are 3.4 feet and 3.0 feet, respectively.

Aerial Topography and Survey Data

Topographic mapping with a contour interval of 1-foot was generated by AeroTech Mapping (flight date January 27, 2011). The vertical control is based on North American Vertical Datum of 1988 (NAVD 1988), and horizontal control is based on Nevada State Plane Coordinate System (NAD 1983). In addition to topographic mapping, field surveys were performed to obtain as-built information for the Detention Basins, Spillway, Outlet Pipes, Bridge and Culverts built since the last mapping for the Abbott and Pulsipher Washes.

Hydrologic Modeling

This LOMR references and updates the hydrologic models provided in the *2007 City of Mesquite Flood Control Master Plan Update* (Reference 8, hereinafter referred to as the 2007 MPU). The 2007 MPU revised and updated the hydrologic models presented in the 2001 MPU to include the most current hydrologic condition in the area. The 2007 MPU referenced the design detention basin parameters presented in the Abbott and Pulsipher Washes Detention Basin Study. However, the detention basin parameters have been revised in the hydrologic models prepared for this LOMR to include current topographic and survey data based on the NAVD 88 Datum. Table 1 includes a comparison of flow rates at key locations along the Abbott and Pulsipher Washes determined in this LOMR with the flow rates determined in the previously approved hydrologic models. The 2007 MPU hydrologic models were revised to include the surveyed detention basins information and the existing routing parameters. The downstream flow rates at concentration points are used for the upstream facility reaches to be conservative. The HEC-1 (Reference 9) models for the washes are provided in the attached supporting documentation.

Table 1-COMPARISON OF CURRENT FLOWRATES TO FLOWRATES FROM PREVIOUS STUDIES

Location	1998 FIS	2001 MPU	2005 DB Study	2007 MPU	2011 LOMR*	Note
Pulsipher Wash						
Upstream of DB	2318	2135	1505	1968	**1912**	
Downstream of DB	N/A	N/A	N/A	148	**148**	
Downstream of DB Channel	N/A	N/A	N/A	909	**867**	
Pioneer Blvd	3474	3099	NA	1808	**1723**	
I-15	3478	3099	1500	2105	**1972**	474 CFS breaks out at I-15, flow in Wash = 1972 (upstream)-474 = **1498** CFS (downstream)
Hafen Ln	N/A	3215	1500	2218	**1595**	474 CFS breaks out at I-15, flow in Wash = 2069-474 = **1595** CFS
Virgin River	3549	3215	1500	2218	**1595**	474 CFS breaks out at I-15, flow in Wash = 2069-474 = **1595** CFS
Abbott Wash						
Upstream of DB	3156	1471	2270	3082	**3082**	
Downstream of DB	3156	1471	331	334	**343**	
Downstream of DB Channel	N/A	N/A	N/A	992	**992**	
Horizon Blvd	3156	1471	N/A	992	**992**	
Hardy Way	3156	2747	N/A	1820	**1820**	

N/A: Not Applicable.
*Flow rates used in the hydraulic models are shown in bold.

Hydraulic Modeling

Cross sections were located at the 1998 FIS locations and aligned normal to the expected direction of flow. Cross sections were then further refined based on preliminary HEC-RAS models which showed major conveyance changes and ineffective flow areas. Additional cross sections were located to reduce variations to topwidth, friction slope, and conveyance between cross sections. All cross sections are oriented left to right facing downstream. The cross section data was derived from the topographic mapping and field survey. Bridge modeling was based on field survey data and topographic mapping. Bridge open areas were normalized to the direction of flow. The cross sections are shown in Figure 4 and Figure 5. The HEC-RAS (Reference 10) and CHECK-RAS (Reference 11) models output are provided in the attached supporting documentation 3.1.

Manning's "n" Values and Losses

Manning's "*n*" roughness coefficients were referenced from the 1998 FIS Study where applicable. Manning's "*n*" values were calculated based on aerial photographs and field visits for areas where surface conditions have changed.

The expansion and contraction loss coefficients used in the HEC-RAS modeling are 0.3 and 0.1, respectively, for the typical wash sections with gradual changes. For typical bridge sections, 0.5 and 0.3 values were used as expansion and contraction loss coefficients, respectively.

Boundary Condition and Floodplain Tie-in Locations

Pulsipher Wash

Downstream: Set at critical depth at River Station 200 in conformance with the 1998 FIS Study. The tie-in location for the floodplain is just downstream of River Station 200.

Upstream: The model utilizes a steady flow subcritical analysis; hence an upstream boundary condition is not required. The floodplain tie-in location is at the upstream end of the Hardy Way Bridge.

Abbott Wash

Downstream: Set at known WSE 1645.86 feet at River Station 1090. This cross section is approximately at the same location of River Station 6100 from Abbott Wash LOMR. Note that even though a known WSE has been used at River Station 1090, the model defaults to the critical WSE of 1646.00 feet as the starting WSE. The tie-in location for the floodplain is at the downstream end of the Hardy Way Bridge.

Upstream: The model utilizes a steady flow subcritical analysis; hence an upstream boundary is not required. The floodplain delineation for this analysis extends beyond the effective floodplain mapping; hence there is no upstream tie-in location.

Pulsipher Wash Hydraulic Conditions

Falcon Ridge Breakout

The hydraulic analysis results show that the 12-foot wide by 4-foot high RCB culvert under the access road crossing the Pulsipher Wash at River Station 3660 does not have the capacity to convey the entire 100-year flow. This condition creates a backup and water flows into the adjacent Falcon Ridge Parkway and spills back into the downstream wash due to insufficient capacity of the parkway. It was decided to not include Falcon Ridge Parkway in the SFHA; as assuming all flow in the wash will result in a more conservative floodplain for the wash and future development to the south. The cross sections were extended vertically to confine flow in the Wash.

I-15 Breakout

The hydraulic analysis results show that the 12-foot wide by 10-foot high RCB culvert under I-15 at River Station 2000 does not have enough capacity to convey the entire 100-year flow; thus, there is flow breaking out at this location. Weir calculations show that the amount of breakout flow discharging south along I-15 is 474 cfs which is less than the effective model breakout flow of 1,340 cfs. The effective

floodplain created due to the higher breakout flow has not been changed as a conservative approach. The effective floodplain is inside Nevada Department of Transportation (NDOT) Right of Way (ROW), and therefore, future development cannot encroach upon the NDOT ROW.

Hafen Lane Breakout

The hydraulic analysis results show that the triple 12-foot wide by 4-foot high RCB culverts under Hafen Lane at River Station 580 does not have enough capacity to convey the entire 100-year flow of 1,595 cfs. The culverts can convey 1,258 cfs of the total flow at this location and 337 cfs overtops the roadway. This overtopping flow results in a floodplain wider than the model results show. Hence, the mapped topwidth of floodplain at River Stations 580 and 500 on Hafen Lane and downstream will not match the modeling results.

Due to cross section changes resulting for channel/culvert improvements that have been constructed since the effective FIS, the BFEs have increased in some locations upstream of I-15 for Pulsipher Wash. Similarly, due to the change in topography resulting in well defined nature of the Wash, the BFE has increased at some cross sections downstream of I-15 in Pulsipher Wash from the effective FIS. There is no longer an opportunity for flow to breakout in a channel alongside the main wash which previously resulted in the much wider, shallower floodplain in the effective FIS. A summary table (Table 2) with BFE comparison has been provided in the attached supporting documentation 3.2.

Tables summarizing the floodplain results (Tables 3 and 4) are provided in the attached supporting documentation 3.2.

Floodway Results

Preliminary modeling results created the following guidelines for the Abbott Wash and Pulsipher Wash floodway determination:

- The maximum allowed increase in WSE is 0.99 feet.
- No floodway encroachment where floodplain is already confined to established concrete channel banks or storm drains.
- Negative surcharges and drawdowns are not allowed.

Further modeling included, further refinements of the floodway, taking into consideration the ground condition in the washes. Tables summarizing the floodway results (Tables 3 and 4) are provided in the attached supporting documentation 3.2.

Mapping

The 100-year floodplain, floodway, and base flood elevations (BFE) are based on HEC-RAS modeling for subcritical flow. The floodplain, floodway, and BFE were delineated on topographic maps by interpolating between cross sections using engineering judgment in conjunction with the BOSS RiverCAD XP software capabilities (Reference 12).

The topwidths calculated in the HEC-RAS match well with topwidths with the exception of several locations where the mapped floodplain topwidths are wider than the results from the HEC-RAS model. The reasons for these differences are explained below:

Pulsipher Wash
RS 3640: Flow overtopping the culvert.
RS 2000: Tie-In to the existing floodplain.
RS 580, 500, 400, 300 and 200: The flow overtopping Hafen Lane (RS 580) will not get back into the channel immediately downstream of Hafen Lane culvert even though the channel has capacity at RS 300. The model shows the smaller top width at RS 300, even though the flow spread and the top width will be wider than what the model calculates immediately downstream of the Hafen Lane culverts. To be conservative, a wider spread from the overtopping analysis has been used to map the floodplain.

Abbott Wash
RS 1098, 1095 and 1090: Tie-in to the existing floodplain.

The proposed FIRM revisions are shown on Figure 6 and annotated FIRM Map is shown in Figure 7.

GCW trusts that this submittal will provide the required information needed to support a LOMR for the subject project.

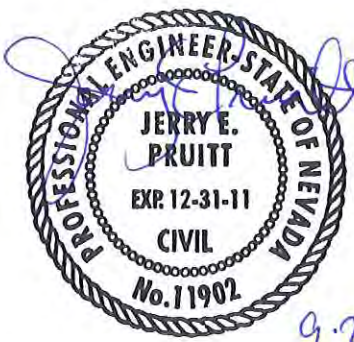
If you have any questions or require additional information, please do not hesitate to call us at (702) 804-2000.

Cordially,
G. C. WALLACE, INC.

Brajesh Gautam, P.E., CFM
Project Engineer
Flood Control Division

Jerry E. Pruitt, P.E.
Senior Vice President
Flood Control Division

Encl.
cc: Kevin Eubanks, CCRFCD
Andrew Trelease, CCRFCD
Bill Tanner, City of Mesquite
Lance Newlin, City of Mesquite
Calvin Black, GCW
James Monroe, GCW



9.2.11

REFERENCES

1. Federal Emergency Management Agency. *Guidelines and Specifications for Flood Hazard Mapping Partners.* April 2003.
2. G.C. Wallace, Inc. *Abbott and Pulsipher Washes FIS Restudy.* October 1998; *Abbott and Pulsipher Washes FIS Restudy Supplement.* November 2000.
3. Bulloch Brothers Engineering Inc. *Request for LOMR, Pulsipher Wash Adjacent to Falcon Ridge Parkway.* February 2006.
4. Bulloch Brothers Engineering Inc. *Conditional Letter of Map Revision for Pulsipher Wash Channel Improvements.* March 2006.
5. Pentacore. *The City of Mesquite Flood Control Master Plan Update 2001.* September 2001.
6. G.C. Wallace, Inc. *Abbott Wash at Mesquite Vistas Letter of Map Revision.* November 2002.
7. Stantec Consulting Inc. *Phase 2B and Phase 3: Pulsipher Wash Detention Basin and Pulsipher Reuse Water Storage Pond, Abbott Wash Detention Basin and Abbott Reuse Water Storage Pond, Abbott Wash Detention 100% Design Document Report.* November 2005.
8. PBS&J Inc. *2007 City of Mesquite Flood Control Master Plan Update.* July 2007.
9. U.S. Army Corps of Engineers. *HEC-1 Flood Hydrograph Package.* June 1998.
10. U.S. Army Corps of Engineers. *HEC-RAS Version 4.0.0.* March 2008.
11. Federal Emergency Management Agency. *CHECK-RAS Version 1.4.* March 2005.
12. Boss International. *RiverCAD XP for AutoCAD Version 7.2.9.7873.* April 2007.

SUPPORTING DOCUMENTATION FOR LOMR (PAGE 1 of 2)

1. FIGURES AND AFFECTED FIRM PANELS

- Figure 1 - Vicinity Map
- Figure 2 - Location Map
- Figure 3 - Effective FIRM
- Figure 4 - Abbott Wash Cross Section Exhibit
- Figure 5 - Pulsipher Wash Cross Section Exhibit
- Figure 6 - Revised FIRM Map
- Figure 7 - Annotated FIRM Map

2. FEMA FORMS

- MT-2 Form 1: Overview & Concurrence Form
- MT-2 Form 2: Riverine Hydrology & Hydraulics Form
- MT-2 Form 3: Riverine Structures Form

3. ENGINEERING ANALYSIS

3.1 HYDROLOGIC MODELING COMPUTATIONS

- Stage-Storage-Discharge Tables: Abbott Wash Detention Basin
- HEC-1 Model: Abbott Wash
- Stage-Storage-Discharge Tables: Pulsipher Wash Detention Basin
- HEC-1 Model: Pulsipher Wash

3.2 HYDRAULIC MODELING COMPUTATIONS

- HEC-RAS Model: Abbott Wash
- CHECK-RAS Analysis of Abbott Wash HEC-RAS Model
- HEC-RAS Model: Pulsipher Wash
- CHECK-RAS Analysis of Pulsipher Wash HEC-RAS
- Pulsipher Wash Calculations : Hardy Way, Falcon Ridge, I-15 Breakout
- Pulsipher Wash Zone AE BFE Comparison Table 2
- Hydraulic Modeling Summary: Table 3, Abbott Wash
- Hydraulic Modeling Summary: Table 4, Pulsipher Wash

3.3 ADDITIONAL GRADING FOR SEDIMENT VOLUME

- Text
- Calculation

4. SUPPORTING INFORMATION

- Site Investigation Photographs
- Field Survey
- Operation and Maintenance Plan

5. REFERENCE MATERIALS

- Excerpts from Abbott and Pulsipher Washes FIS Restudy and Supplement (1998, 2000): Flow Rate Tables, Hydraulic Summary Tables, Manning's 'n', I-15 Breakout, I-15 Culvert Survey Information
- Excerpts from Abbott Wash at Mesquite Vistas LOMR: Hydraulic Summary Table

SUPPORTING DOCUMENTATION FOR LOMR (PAGE 2 of 2)

- Excerpts from Amendment No. 1 to the Final Report for Request for LOMR Pulsipher Wash Adjacent to Falcon Ridge Parkway: Annotated Flood Zone Map
- Excerpts from 2007 City of Mesquite Flood Control Master Plan Update: Hydrologic Parameters, HEC-1 Output

5. REFERENCE MATERIALS

- Excerpts from 2001 City of Mesquite Flood Control Master Plan Update: Hydrologic Summary Tables, Sediment Transport Calculations
- Excerpts from Water Reuse System and Storm Detention Project Phase 2B and Phase 3: Hydrologic Summary Tables

6. IMPROVEMENT PLANS / AS-BUILTS FOR EXISTING FACILITIES

7. ELECTRONIC FILES

- Report PDF
- Topo/Survey Files
- Detention Basin Calculations/HEC-1 Models
- Work Maps
- HEC-RAS Models
- GIS Shape Files

1. FIGURES AND AFFECTED FIRM PANELS

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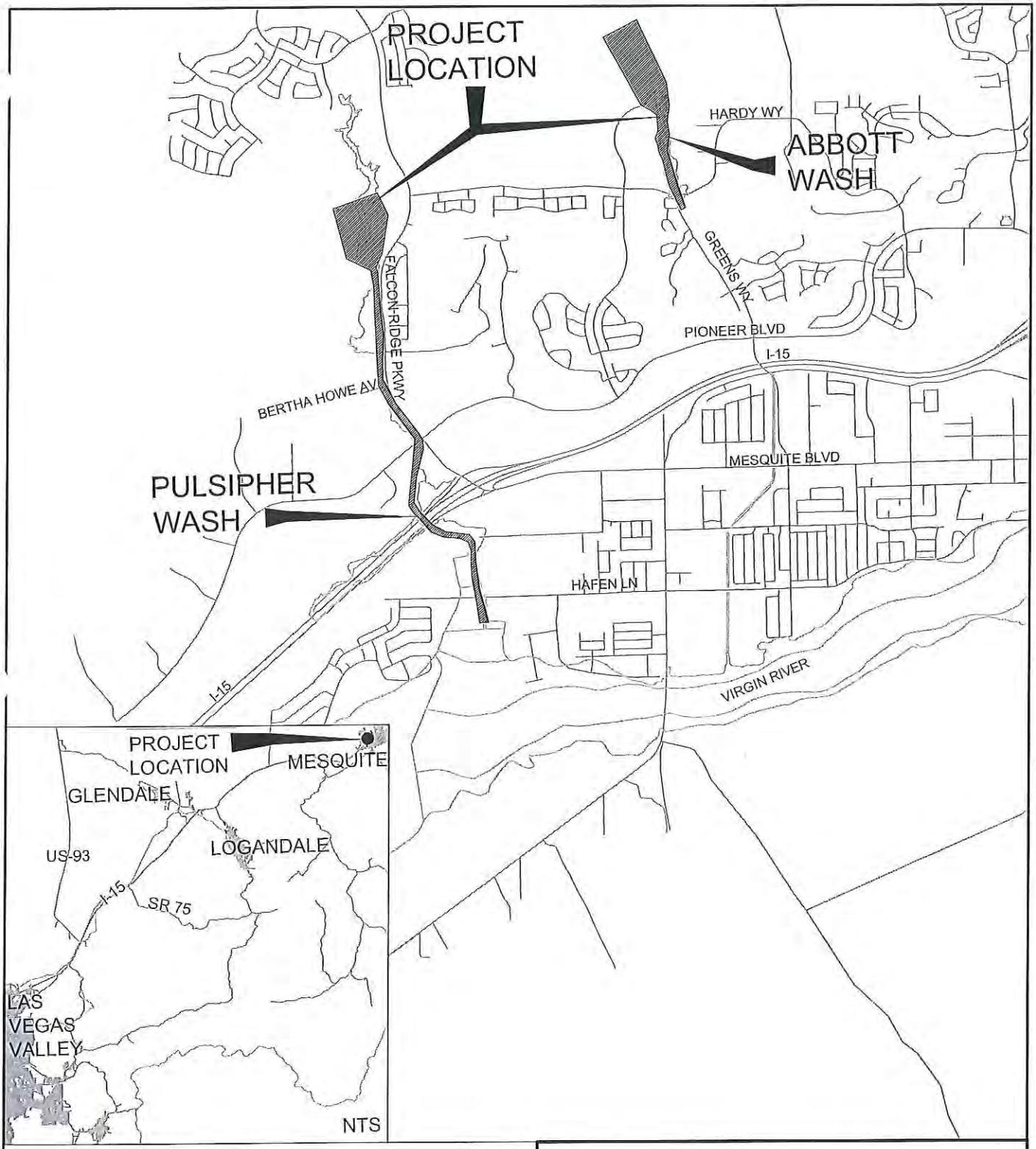

NORTH

GRAPHIC SCALE

3000 0 1500 3000

(IN FEET)

1 inch = 3000 ft.

FIGURE 1
VICINITY MAP

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

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PROJECT SITE

ABBOTT WASH

PULSIPHER WASH

NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 2

LOCATION MAP

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PROJECT LIMIT

ABBOTT WASH

PROJECT SITE

PROJECT LIMIT

PROJECT LIMIT

PULSIPHER WASH

PROJECT LIMIT

CITY OF MESQUITE
320035

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 70 EAST AND TOWNSHIP 13 SOUTH, RANGE 71 EAST.

CITY OF MESQUITE
320035

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

JOINS PANEL 0378

JOINS PANEL 0388

JOINS PANEL 0387

JOINS PANEL 0377

JOINS PANEL 0386

JOINS PANEL 0387

JOINS PANEL 0377

JOINS PANEL 0386

ZONE X

ZONE A

ZONE AE

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

FLOODWAY AREA IN ZONE AE

1% ANNUAL CHANCE FLOOD CONVEYANCE MUST BE MAINTAINED

Pulsipher Wash

Pulsipher Wash Overflow

Abbott Wash

HARDY WY

PALISADE WAY

CALAIS DR

SUNSET GREEN WAY

FALCON RIDGE PKWY

V PIONEER BLVD

REED HILLS PKWY

TURTLEBACK RD

MESQUITE HEIGHTS RD

V OLD MILL RD

N GREENLANE RD

S GREENLANE RD

DESERT ROSE WY

S ARROWHEAD N ARROWHEAD LA

V MESQUITE BLVD

SECOND SOUTH ST

V HAFEN LA

LEAMITT LA

RIVERSHIRE RD

JENSEN DR

HIGHLAND BLVD

BIG MESA DR

S I 15

N I 15

PANEL 0378F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 378 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0378	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0378F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

PANEL 0388F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 388 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	0388	F
MESQUITE, CITY OF	320035	0388	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0388F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

PANEL 0379F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 379 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0379	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0379F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 3

EFFECTIVE F.I.R.M.

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6655 S. CIMARRON ROAD · LAS VEGAS, NV 89113
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

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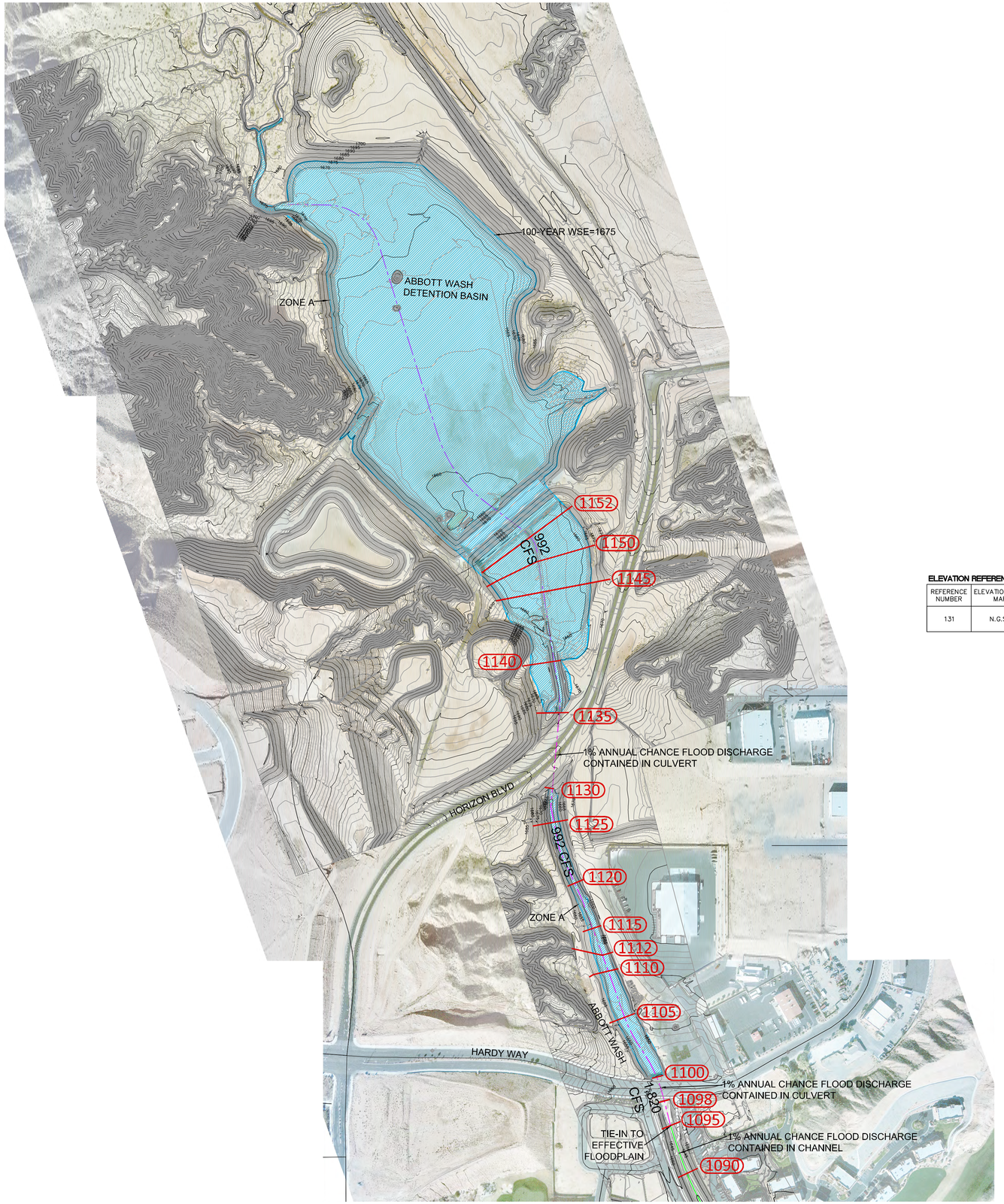

200 0 200 400
SCALE FEET

NORTH
SCALE 1" = 200'

LEGEND

- FLOODPLAIN
- 3800 — HEC-RAS CROSS SECTION
- 1650 — BFE (BASE FLOOD ELEVATION)
- WASH CENTERLINE
- 867 CFS — 100-YEAR FLOW
- EFFECTIVE FLOODPLAIN

NOTES:

FLOODING SOURCE: ABBOTT WASH
CLARK COUNTY, NEVADA

TOPOGRAPHIC MAPPING
CONTOUR INTERVAL= 1 FOOT
FLIGHT DATE: JANUARY 2011
BY AEROTECH MAPPING

FIRM PANELS AFFECTED:
32003C0378F – DATED: DECEMBER 4, 2007
32003C0379F – DATED: DECEMBER 4, 2007

ELEVATION REFERENCE MARKERS (ERM)

REFERENCE NUMBER	ELEVATION REFERENCE MARKER ID	ELEVATION (FT, NAVD 88)	LOCATION DESCRIPTION
131	N.G.S. Z 405	1598.49	BENCHMARK IS LOCATED APPROXIMATELY 200 FEET WEST OF DESERT DRIVE AND 25 FEET NORTH OF MESQUITE BLVD.

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 09-02-11
PLOT TIME: 11:44:33

REV	DATE	DESCRIPTION	DATE AGENL APP	DATE CCW APP	DATE:

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T 702.804.2000 F 702.804.2099 GCWALLACE.COM

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CLARK COUNTY, NEVADA
REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

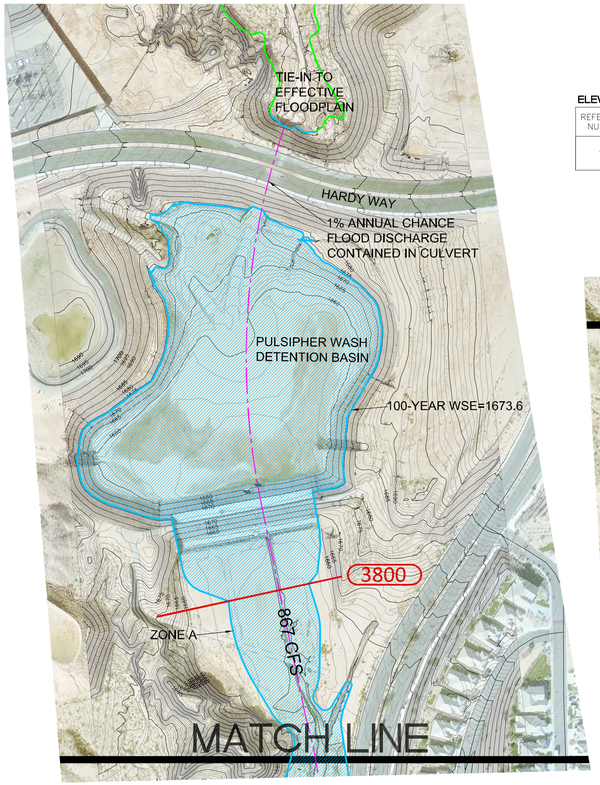
ABBOTT WASH CROSS SECTION EXHIBIT
FIGURE 4

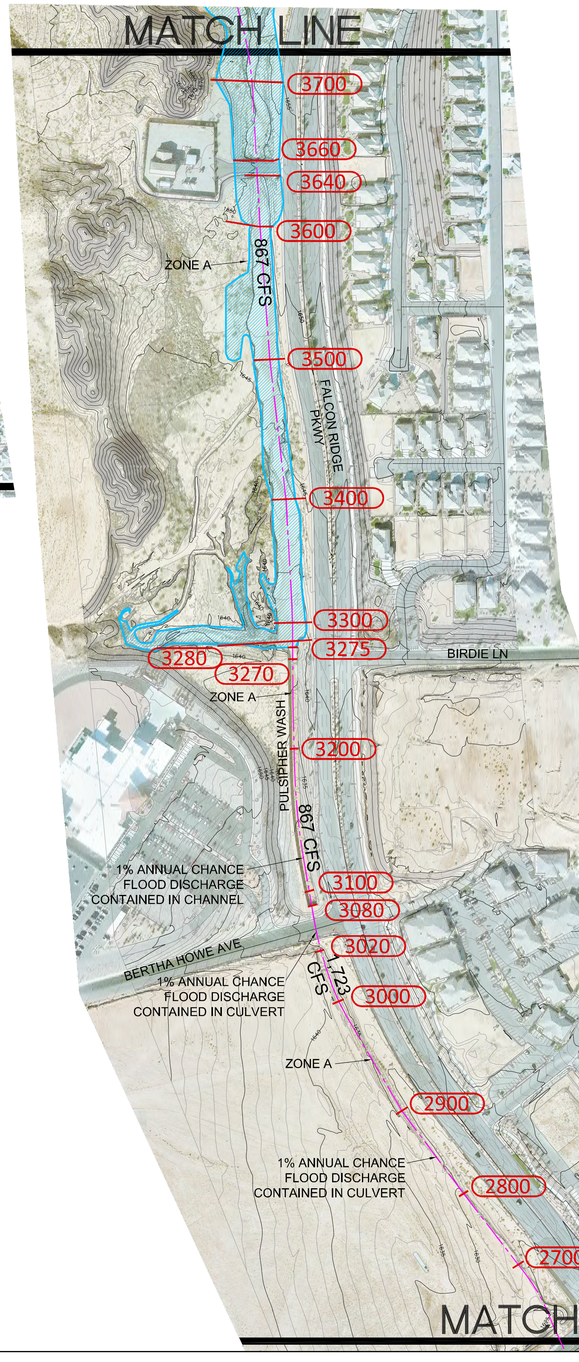
DRAWING
FIG 4
OF SHTS

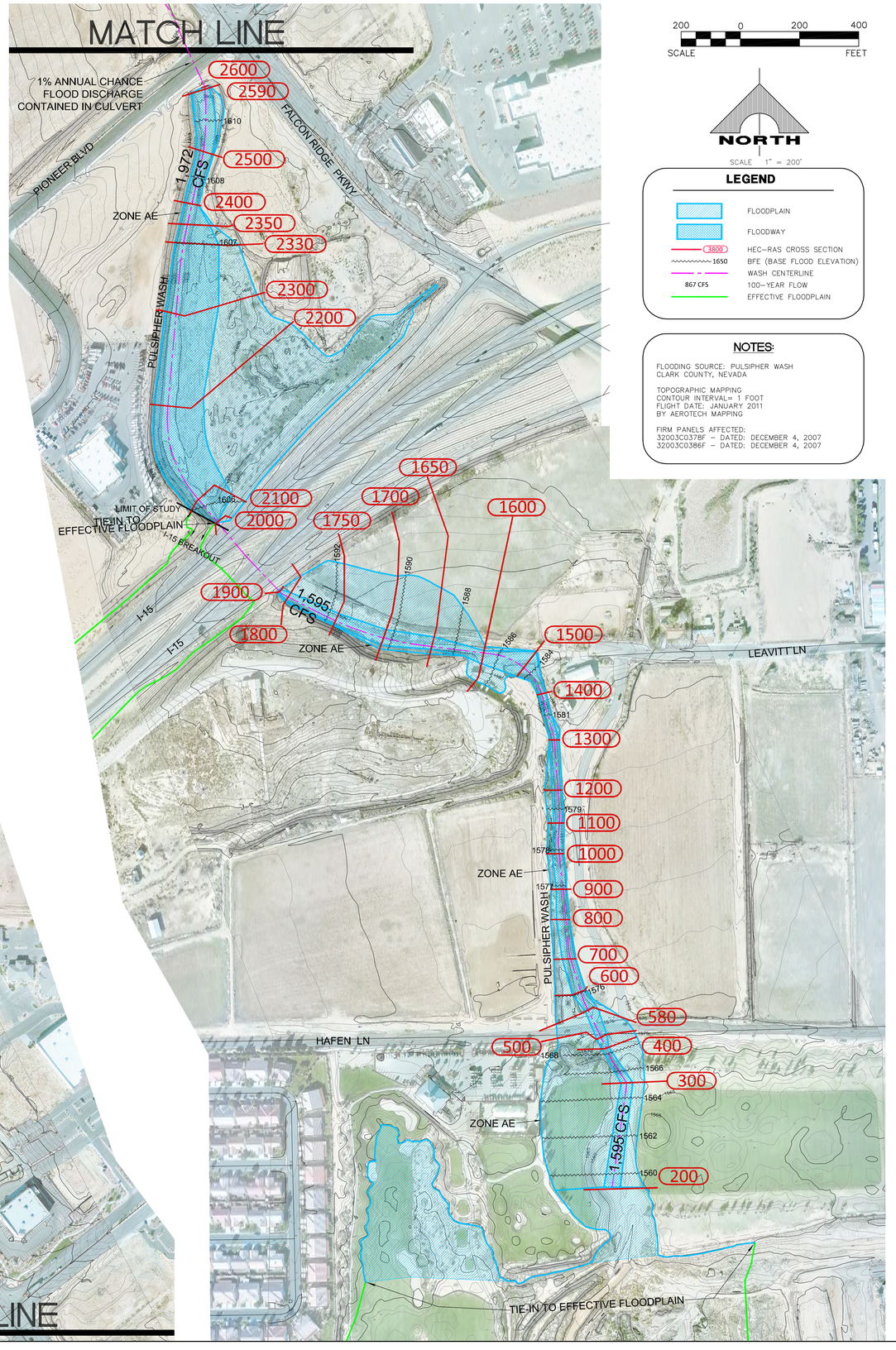
gcx24.58_dwg_060117.pv

ELEVATION REFERENCE MARKERS (ERM)

REFERENCE NUMBER	ELEVATION REFERENCE MARKER ID	ELEVATION (FT, NAVD 88)	LOCATION DESCRIPTION
131	N.G.S. Z 405	1598.49	BENCHMARK IS LOCATED APPROXIMATELY 200 FEET WEST OF DESERT DRIVE AND 25 FEET NORTH OF MESQUITE BLVD.







200 0 200 400
SCALE FEET

NORTH
SCALE 1" = 200'

LEGEND

- FLOODPLAIN
- FLOODWAY
- 3800 — HEC-RAS CROSS SECTION
- 1650 — BFE (BASE FLOOD ELEVATION)
- WASH CENTERLINE
- 867 CFS — 100-YEAR FLOW
- EFFECTIVE FLOODPLAIN

NOTES:

FLOODING SOURCE: PULSIPHER WASH
CLARK COUNTY, NEVADA

TOPOGRAPHIC MAPPING
CONTOUR INTERVAL= 1 FOOT
FLIGHT DATE: JANUARY 2011
BY AEROTECH MAPPING

FIRM PANELS AFFECTED:
32003C0378F – DATED: DECEMBER 4, 2007
32003C0386F – DATED: DECEMBER 4, 2007

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GCW. APP	DATE

DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 09-02-11
PLOT TIME: 11:51:58

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CLARK COUNTY, NEVADA
REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

PULSIPHER WASH CROSS SECTION EXHIBIT
FIGURE 5

DRAWING
FIG 5
OF SHTS

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REVISED AREA

ABBOTT WASH

REVISED AREA

TIE-IN

PULSIPHER WASH

TIE-IN

TIE-IN

CITY OF MESQUITE 320035

CITY OF MESQUITE 320035

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 70 EAST AND TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 70 EAST AND TOWNSHIP 13 SOUTH, RANGE 71 EAST.

HARDY W

V PIONEER BLVD

V MESQUITE BLVD

V HAFEN LA

LEAVITT LA

SECOND SOUTH ST

V OLD HILL RD

PALMER LA

TURTLEBACK RD

REED HILLS PKWY

FALCON RIDGE PKWY

MESQUITE HEIGHTS RD

HORLTON BLVD

CALAIS DR

PULSIPHER LA

RIVERSIDE RD

N GREENLAKE RD

S GREENLAKE RD

DESERT RIDGE LA

S ARROWHEAD N ARROWHEAD LA

SUNSET GREENS WAY

JENSEN DR

FIRST DR

OASIS BLVD

S I 15
N I 15

PANEL 0378F

NFIP NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 378 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0378	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0378F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

PANEL 0386F

NFIP NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 386 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	0386	F
MESQUITE, CITY OF	320035	0386	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0386F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

PANEL 0379F

NFIP NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 379 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0379	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0379F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 6

REVISED F.I.R.M.

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LIMIT OF STUDY

ZONE A

REVISED AREA

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ABBOTT WASH

ZONE A

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

REVISED AREA

TIE-IN

TIE-IN

ZONE A

PULSIPHER WASH

ZONE A

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ZONE AE

LIMIT OF STUDY

ZONE AE

TIE-IN

CITY OF MESQUITE 320035

CITY OF MESQUITE 320035

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

HARDY WY

HORIZON BLVD

FALCON RIDGE PKWY

CALAIS DR

V PIONEER BLVD

REDD HILLS PKWY

TURTLEBACK RD

MESQUITE HEIGHTS RD

PALMER LA

DAISY BLVD

V OLD MILL RD

DESERT ROSE WY

N GRAPEVINE RD

S ARROWHEAD N ARROWHEAD LA

V MESQUITE BLVD

PULSIPHER LA

LEAVITT LA

SECOND SOUTH ST

V HAFEN LA

SAGE GREENE WY

JENSEN DR

RIVERSIDE RD

EAST DE RD

S I 15
N I 15

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0378F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 378 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0378	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C0378F

MAP REVISED DECEMBER 4, 2007

Federal Emergency Management Agency

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0386F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 386 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320003	0386	F
MESQUITE, CITY OF	320035	0386	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C0386F

MAP REVISED DECEMBER 4, 2007

Federal Emergency Management Agency

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0379F

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 379 OF 4000

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0379	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 32003C0379F

MAP REVISED DECEMBER 4, 2007

Federal Emergency Management Agency

NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIIOANL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 7

ANNOTATED FIRM

G. C. WALLACE COMPANIES
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1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146
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2. FEMA FORMS

MT-2 Form 1: Overview & Concurrence Form
MT-2 Form 2: Riverine Hydrology & Hydraulics Form
MT-2 Form 3: Riverine Structures Form

ABBOTT WASH

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
320035	City of Mesquite	NV	32003C	0378F	12/04/07
320035	City of Mesquite	NV	32003C	0379F	12/04/07

2. a. Flooding Source: Abbott Wash

   b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Abbott and Pulsipher Washes LOMR

4. FEMA zone designations affected: A, AE, X (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☒ Physical Change ☒ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes

   ☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections

   ☒ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☒ Natural Changes

   ☒ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

   b. The area of revision encompasses the following structures (check all that apply)

   Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

   ☒ Dam ☐ Fill ☐ Other (Attach Description)

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $_____

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jerry E. Pruitt, PE	Company: G.C. Wallace Inc.	
Mailing Address: 1555 South Rainbow Boulevard Las Vegas, NV 89146	Daytime Telephone No.: 702-804-2000	Fax No.: 702-804-2299
	E-Mail Address: jpruitt@gcwallace.com	
Signature of Requester (required):	Date: September 2, 2011	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Bill Tanner - Public Works Director	Community Name: City of Mesquite	
Mailing Address: 10 East Mesquite Boulevard Mesquite, NV	Daytime Telephone No.: 702-346-5237	Fax No.: 702-346-5382
	E-Mail Address: btanner@mesquitenv.gov	
Community Official's Signature (required):	Date:	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting data. All documents submitted in support of this request are correct to the best of my knowledge. All analyses have been performed correctly and in accordance with sound engineering practices. All project works are designed in accordance with sound engineering practices to provide protection from the 1% annual chance flood. If "as-built" conditions data/plan provided, then the structure(s) has been built according to the plans being certified, is in place, and is fully functioning. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Jerry E. Pruitt, PE	License No 11902	Expiration Date: 12/31/11
Company Name: G.C. Wallace, Inc.	Telephone No.: 702-804-2000	Fax No.: 702-804-2299
Signature:		Date: September 2, 2011

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if ...
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Abbott Wash
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section B) ☐ No existing analysis ☒ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☒ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
Detention Basin Inflow	4.71	3156	3082
Horizon Blvd	5.42	3156	992
Hardy Way	6.24	3156	1820

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	Hardy Way	1090	1645.9	1646.0
Upstream Limit	Abbott Wash Detention Basin	1152	N/A	1664.7

2. Hydraulic Method/Model Used

HEC-RAS

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs may help verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. **These tools do not replace engineering judgment.** CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. Review of your submittal and resolution of valid modeling discrepancies may result in reduced review time.

4. Models Submitted

	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Corrected Effective Model*	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Existing or Pre-Project Conditions Model	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Revised or Post-Project Conditions Model	File Name: Abbottwash	Plan Name: LOMR	File Name: Abbottwash	Plan Name: LOMR	NAVD88
Other - (attach description)	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM,** annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:
      - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
      - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot.

   b. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☒ No
      If Yes, please attach **proof of property owner notification and acceptance (if available).** Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For LOMR/CLOMR requests, does this request have the potential to impact an endangered species? ☐ Yes ☒ No

   If Yes, please submit documentation to the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the ESA.

   For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA.

*** Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.**

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Abbott Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Abbott Wash Detention Basin**

   Type (check one): ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☒ Dam/Basin

   Location of Structure: 800 feet north of the Horizon Boulevard Culvert Crossing

   Downstream Limit/Cross Section: 1152

   Upstream Limit/Cross Section: N/A

2. **Name of Structure: Abbott Wash Unlined Channel, Abbott Wash DB Outfall to Horizon Boulevard**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Abbott Wash Detention Basin and Horizon Boulevard

   Downstream Limit/Cross Section: 1135

   Upstream Limit/Cross Section: 1152

3. **Name of Structure: 9' X 8' Reinforced Concrete Box at Horizon Boulevard**

   Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Horizon Boulevard

   Downstream Limit/Cross Section: 1130

   Upstream Limit/Cross Section: 1135

NOTE: For more structures, attach additional pages as needed. (See attached additional pages for more structures)

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B No. 1660-0016
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Flooding Source: Abbott Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Abbott Wash Unlined Channel, Horizon Boulevard to Hardy Way**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Horizon Boulevard and Hardy Way

Downstream Limit/Cross Section: 1100

   Upstream Limit/Cross Section: 1130

2. **Name of Structure: (3) 14' X 6.5' Reinforced Concrete Box at Hardy Way**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Hardy

Downstream Limit/Cross Section: 1098

   Upstream Limit/Cross Section: 1100

3. **Name of Structure:**

   Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure:

Downstream Limit/Cross Section:

   Upstream Limit/Cross Section:

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: Abbott Wash

Name of Structure: Abbott Wash Unlined Channel, Abbott Wash DB Outfall to Horizon Boulevard

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 992 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **N/A**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT

Flooding Source: Abbott Wash

Name of Structure: 9' X 8' Reinforced Concrete Box at Horizon Boulevard

1. This revision reflects (check one):

- ☒ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification. N/A

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. CHANNELIZATION

Flooding Source: Abbott Wash

Name of Structure: Abbott Wash Unlined Channel, Horizon Boulevard to Hardy Way

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 992 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **See attachment at end of forms.**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☒ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT

Flooding Source: Abbott Wash

Name of Structure: (3) 14' X 6.5' Reinforced Concrete Box at Hardy Way

1. This revision reflects (check one):

- ☒ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification. N/A

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

D. DAM/BASIN

Flooding Source: Abbott Wash

Name of Structure: Abbott Wash Detention Basin

1. This request is for (check one): ☐ Existing dam ☒ New dam ☐ Modification of existing dam

2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency ☒ Private organization

   Name of the agency or organization: Stantec Consulting Inc.

3. The Dam was permitted as (check one):

   a. ☐ Federal Dam ☒ State Dam

      Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

      Permit or ID number J-582 Permitting Agency or Organization State of Nevada Division of Water Resources

   b. ☐ Local Government Dam ☐ Private Dam

      Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☒ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm?

   ☒ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☒ Yes ☐ No **Calculated expected sediment volume only.**

   If yes, then fill out Section F (Sediment Transport).
   If No, then attach your explanation for why debris/sediment analysis was not considered.

6. Does the Base Flood Elevation behind the dam or downstream of the dam change?

   ☒ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

   Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)	N/A	N/A
50-year (2%)	N/A	N/A
100-year (1%)	N/A	1675.0
500-year (0.2%)	N/A	N/A
Normal Pool Elevation	N/A	N/A

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL (CONTINUED) N/A

10. Operational Plan And Criteria

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

    b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

    c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

    If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
    If No, please attach supporting documentation.

12. Operations and Maintenance Plan

    Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source: Abbott Wash

Name of Structure: Abbott Wash Detention Basin

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume 19.2 acre-feet

Debris load associated with the base flood discharge: Volume N/A acre-feet

Sediment transport rate **N/A** (percent concentration by volume)

Method used to estimate sediment transport: Universal Soil Loss Equation and Meyer-Peter Formula

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method. **See attached referenced materials from the USDA SCS National Engineering Handbook.**

Method used to estimate scour and/or deposition: **N/A**

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:
Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided. **See attachment at end of forms.**

Abbott Wash Additional Explanations

1) In response to MT-2 Form 2 Page 1 of 2, A.5.; MT-2 Form 3 Page 2 0f 10, B.4. & C.4. for each facility; and MT-2 Form 3 Page 10 of 10, F on the explanation of not performing a sediment transport analysis:
   - The majority of the Abbott Wash watershed is upstream of the detention basin and the detention basin was designed to capture the 100-year storm event sediment volume. In addition, the limit of study does not include much of the downstream wash; although a large portion of the wash downstream of the detention basin is improved. The detention basin, channel/culvert improvements, and wash are maintained yearly and after any significant storm event by the City of Mesquite.

2) In response to MT-2 Form 3 Page 2 of 10, B.3 on the explanation for hydraulic jump:
   - The HEC-RAS model was run using a mixed flow regime to identify hydraulic jump locations. The floodplain has been mapped basin on a subcritical flow regime, which results in higher flow depth than the mixed flow regime model. Therefore, the floodplain presented in this LOMR is conservative.

PULSIPHER WASH

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
320035	City of Mesquite	NV	32003C	0378F	12/04/07
320035	City of Mesquite	NV	32003C	0386F	12/04/07

2. a. Flooding Source: Pulsipher Wash

b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Abbott and Pulsipher Washes LOMR

4. FEMA zone designations affected: A, AE, X (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change ☒ Improved Methodology/Data ☒ Regulatory Floodway Revision ☐ Base Map Changes

☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections

☒ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☒ Natural Changes

☒ New Topographic Data ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☒ Dam ☐ Fill ☐ Other (Attach Description)

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $_____

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Jerry E. Pruitt, PE	Company: G.C. Wallace Inc.	
Mailing Address: 1555 South Rainbow Boulevard Las Vegas, NV 89146	Daytime Telephone No.: 702-804-2000	Fax No.: 702-804-2299
	E-Mail Address: jpruitt@gcwallace.com	
Signature of Requester (required):	Date: September 2, 2011	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Bill Tanner - Public Works Director	Community Name: City of Mesquite	
Mailing Address: 10 East Mesquite Boulevard Mesquite, NV	Daytime Telephone No.: 702-346-5237	Fax No.: 702-346-5382
	E-Mail Address: btanner@mesquitenv.gov	
Community Official's Signature (required):	Date:	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting data. All documents submitted in support of this request are correct to the best of my knowledge. All analyses have been performed correctly and in accordance with sound engineering practices. All project works are designed in accordance with sound engineering practices to provide protection from the 1% annual chance flood. If "as-built" conditions data/plan provided, then the structure(s) has been built according to the plans being certified, is in place, and is fully functioning. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Jerry E. Pruitt, PE	License No.: 11902	Expiration Date: 12/31/11
Company Name: G.C. Wallace, Inc.	Telephone No.: 702-804-2000	Fax No.: 702-804-2299
Signature:		Date: September 2, 2011

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if ...
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Pulsipher Wash
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section B) ☐ No existing analysis ☒ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☒ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
Detention Basin Inflow	2.28	2135	1912
Pioneer Blvd SD Exit	4.46	1808	1723
I-15	4.75	3099	1723
Virgin River	4.88	3549	2069

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	Virgin River	200	1556.6	1559.2
Upstream Limit	Pulsipher Wash Detention Basin	3800	1659.1	1656.3

2. Hydraulic Method/Model Used

HEC-RAS

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs may help verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. **These tools do not replace engineering judgment.** CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. Review of your submittal and resolution of valid modeling discrepancies may result in reduced review time.

4. Models Submitted

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Corrected Effective Model*	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Existing or Pre-Project Conditions Model	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A
Revised or Post-Project Conditions Model	File Name: PULSWASH	Plan Name: LOMR	File Name: PULSWASH	Plan Name: LOMR	NAVD88
Other - (attach description)	File Name: N/A	Plan Name: N/A	File Name: N/A	Plan Name: N/A	N/A

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM,** annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☒ Yes ☐ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:
      - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
      - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot.

   b. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☒ Yes ☐ No
      If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☒ Yes ☐ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For LOMR/CLOMR requests, does this request have the potential to impact an endangered species? ☐ Yes ☒ No

   If Yes, please submit documentation to the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the ESA.

   For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA.

*** Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.**

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Pulsipher Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Pulsipher Wash Detention Basin**

   Type (check one): ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☒ Dam/Basin

   Location of Structure: Southwest quadrant of of Falcon Ridge Parkway and Hardy Way Intersection

   Downstream Limit/Cross Section: 3800

   Upstream Limit/Cross Section: N/A

2. **Name of Structure: Pulsipher Wash Unlined Channel, Pulsipher Wash DB Outfall to Access Road**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Pulsipher Wash Detention Basin and Water District Facility Access Road

   Downstream Limit/Cross Section: 3660

   Upstream Limit/Cross Section: 3800

3. **Name of Structure: 12' X 4' Reinforced Concrete Box at Access Road**

   Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Water District Facility Access Road

   Downstream Limit/Cross Section: 3640

   Upstream Limit/Cross Section: 3660

NOTE: For more structures, attach additional pages as needed. (See attached additional pages for more structures)

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

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Flooding Source: Pulsipher Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Pulsipher Wash Unlined Channel, Access Road to Birdie Lane**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Waster District Facility Access Road and Birdie Lane

Downstream Limit/Cross Section: 3280

Upstream Limit/Cross Section: 3640

2. **Name of Structure: 25' Bottom Width Concrete-lined Rectangular Channel, Birdie Lane to Bertha Howe Avenue**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Birdie Lane and Bertha Howe Avenue

Downstream Limit/Cross Section: 3080

Upstream Limit/Cross Section: 3280

3. **Name of Structure: (2) 12' X 8' Reinforced Concrete Box Storm Drain, Bertha Howe Avenue to Pioneer Boulevard**

   Type (check one) ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Bertha Howe Avenue and Pioneer Boulevard

Downstream Limit/Cross Section: 2600

Upstream Limit/Cross Section: 3080

NOTE: For more structures, attach additional pages as needed.

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

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Flooding Source: Pulsipher Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: Pulsipher Wash Unlined Channel, Pioneer Boulevard to I-15**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between Pioneer Boulevard and I-15

Downstream Limit/Cross Section: 2000

   Upstream Limit/Cross Section: 2600

2. **Name of Structure: 12' X 10' Reinforced Concrete Box at I-15**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: I-15

Downstream Limit/Cross Section: 1900

   Upstream Limit/Cross Section: 2000

3. **Name of Structure: Pulsipher Wash Unlined Channel, I-15 to Hafen Lane**

   Type (check one) ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

   Location of Structure: Between I-15 and Hafen Lane

Downstream Limit/Cross Section: 580

   Upstream Limit/Cross Section: 1900

NOTE: For more structures, attach additional pages as needed.

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

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Flooding Source: Pulsipher Wash
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization ..... complete Section B
Bridge/Culvert ..... complete Section C
Dam/Basin ..... complete Section D
Levee/Floodwall ..... complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. **Name of Structure: (3) 12' X 4' Reinforced Concrete Box at Hafen Lane**

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Hafen Lane

Downstream Limit/Cross Section: 500

Upstream Limit/Cross Section: 580

2. **Name of Structure: Pulsipher Wash Unlined Channel, Hafen Lane to Virgin River**

Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Between I-15 and Virgin River

Downstream Limit/Cross Section: 200

Upstream Limit/Cross Section: 500

3. **Name of Structure:**

Type (check one) ☐ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure:

Downstream Limit/Cross Section:

Upstream Limit/Cross Section:

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Unlined Channel, Pulsipher Wash DB Outfall to Access Road

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 867 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **N/A**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT

Flooding Source: Pulsipher Wash

Name of Structure: 12' X 4' Reinforced Concrete Box at Access Road

1. This revision reflects (check one):

☒ Bridge/culvert not modeled in the FIS
☐ Modified bridge/culvert previously modeled in the FIS
☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Unlined Channel, Access Road to Birdie Lane

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 867 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **N/A**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT N/A

Flooding Source:

Name of Structure:

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☐ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: 25' Bottom Width Concrete-lined Rectangular Channel, Birdie Lane to Bertha Howe

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Concrete-lined Rectangular Channel
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 867 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **See attachment at end of forms.**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☒ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT N/A

Flooding Source:

Name of Structure:

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☐ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: (2) 12' X 8' Reinforced Concrete Box Storm Drain, Bertha Howe Avenue to Pioneer Boulevard

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): RCB Storm Drain
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1,723 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **See attachment at end of forms.**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☒ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT N/A

Flooding Source:

Name of Structure:

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☐ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Unlined Channel, Pioneer Boulevard to I-15

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1,972 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **N/A**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT

Flooding Source: Pulsipher Wash

Name of Structure: 12' X 10' Reinforced Concrete Box at I-15

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☒ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS / attached weir calc
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Unlined Channel, I-15 to Hafen Lane

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1,595 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **See attachment at end of forms.**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☒ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT

Flooding Source: Pulsipher Wash

Name of Structure: (3) 12' X 4' Reinforced Concrete Box at Hafen Lane

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☒ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification. N/A

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☐ Beveling or Rounding
- ☒ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☒ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☒ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

B. CHANNELIZATION

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Unlined Channel, Hafen Lane to Virgin River

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)]
- ☒ Other (Describe): Unlined Channel
- ☐ Drop structures
- ☒ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1,595 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel. **N/A**

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered. **See attachment at end of forms.**

C. BRIDGE/CULVERT N/A

Flooding Source:

Name of Structure:

1. This revision reflects (check one):

- ☐ Bridge/culvert not modeled in the FIS
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8):
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☐ Dimensions (height, width, span, radius, length)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ Low Chord Elevations – Upstream and Downstream
- ☐ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☐ Stream Invert Elevations – Upstream and Downstream
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Detention Basin

1. This request is for (check one): ☐ Existing dam ☒ New dam ☐ Modification of existing dam

2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency ☒ Private organization

   Name of the agency or organization: Stantec Consulting Inc.

3. The Dam was permitted as (check one):

   a. ☐ Federal Dam ☒ State Dam

      Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

      Permit or ID number J-583 Permitting Agency or Organization State of Nevada Division of Water Resources

   b. ☐ Local Government Dam ☐ Private Dam

      Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☒ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm?

   ☒ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☒ Yes ☐ No **Calculated expected sediment volume only.**

   If yes, then fill out Section F (Sediment Transport).
   If No, then attach your explanation for why debris/sediment analysis was not considered.

6. Does the Base Flood Elevation behind the dam or downstream of the dam change?

   ☐ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)	N/A	N/A
50-year (2%)	N/A	N/A
100-year (1%)	N/A	1673.6
500-year (0.2%)	N/A	N/A
Normal Pool Elevation	N/A	N/A

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL (CONTINUED) N/A

10. Operational Plan And Criteria

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

    b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

    c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

    If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
    If No, please attach supporting documentation.

12. Operations and Maintenance Plan

    Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source: Pulsipher Wash

Name of Structure: Pulsipher Wash Detention Basin

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume 10.2 acre-feet

Debris load associated with the base flood discharge: Volume N/A acre-feet

Sediment transport rate **N/A** (percent concentration by volume)

Method used to estimate sediment transport: Universal Soil Loss Equation and Meyer-Peter Formula

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method. **See attached referenced materials from the USDA SCS National Engineering Handbook.**

Method used to estimate scour and/or deposition: **N/A**

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:
Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows (See attached)

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided. **See attachment at end of forms.**

Pulsipher Wash Additional Explanations

1) In response to MT-2 Form 2 Page 1 of 2, A.5.; MT-2 Form 3 Page 2 0f 10, B.4. & C.4. for each facility; and MT-2 Form 3 Page 10 of 10, F on the explanation of not performing a sediment transport analysis:
   - The majority of the Abbott Wash watershed is upstream of the detention basin and the detention basin was designed to capture the 100-year storm event sediment volume. In addition, the limit of study does not include much of the downstream wash; although a large portion of the wash downstream of the detention basin is improved. The detention basin, channel/culvert improvements, and wash are maintained yearly and after any significant storm event by the City of Mesquite.

2) In response to MT-2 Form 3 Page 2 of 10, B.3 on the explanation for hydraulic jump:
   - The HEC-RAS model was run using a mixed flow regime to identify hydraulic jump locations. The floodplain has been mapped basin on a subcritical flow regime, which results in higher flow depth than the mixed flow regime model. Therefore, the floodplain presented in this LOMR is conservative.

3.1 HYDROLOGIC MODELING COMPUTATIONS

Stage-Storage-Discharge Tables: Abbott Wash Detention Basin
HEC-1 Model: Abbott Wash
Stage-Storage-Discharge Tables: Pulsipher Wash Detention Basin
HEC-1 Model: Pulsipher Wash

ABBOTT WASH

Job Title **Mesquite LOMR**
Job Number **550-048**
Date **March 31,2011**
For 100-Year, 6-Hour Storm Event
Detention Basin

Abbott Wash Detention Basin Stage Storage Calculation					
Stage Elevation (feet)	*Area[1] (ft)*	*Area (acres)*	*Volume (acre-feet)*	*Storage Volume Sum (acre-feet)*	contour
0.00	0	0.00	0.00	0.00	1659
1.00	37096	0.85	0.43	0.43	1660
2.00	172578	3.96	2.41	2.83	1661
3.00	289392	6.64	5.30	8.14	1662
4.00	424265	9.74	8.19	16.33	1663
5.00	525387	12.06	10.90	27.23	1664
6.00	604646	13.88	12.97	40.20	1665
7.00	666989	15.31	14.60	54.79	1666
8.00	724055	16.62	15.97	70.76	1667
9.00	766287	17.59	17.11	87.87	1668
10.00	807032	18.53	18.06	105.93	1669
11.00	832110	19.10	18.81	124.74	1670
12.00	853368	19.59	19.35	144.09	1671
13.00	872090	20.02	19.81	163.89	1672
14.00	905089	20.78	20.40	184.29	1673
15.00	922898	21.19	20.98	205.28	1674
16.00	941080	21.60	21.40	226.67	1675
16.40	948531	21.78	8.68	235.35	1675.4 Spillway Crest
17.00	959708	22.03	13.14	248.49	1676
18.00	980434	22.51	22.27	270.76	1677
19.00	1002827	23.02	22.76	293.52	1678
20.00	1034223	23.74	23.38	316.91	1679
21.00	1063967	24.43	24.08	340.99	1680
22.00	1103783	25.34	24.88	365.87	1681
23.00	1155287	26.52	25.93	391.80	1682

[1]Area determined from existing topography

Storage Discharge
Abbott Detention Basin

Outlet Pipes	Low Flow	Silt
Pipe Diameter (in)	72	36
Pipe Invert El	1661.2	1656.0
Orifice Diameter (in)	60	36
Orifice Invelt El	1661.2	1656.0
Orifice Centerline El	1663.7	1657.5
Orifice Top El	1666.2	1659.0
Orifice Coefficient	0.65	0.65

$Q=CA(2gh)^{1/2}$

Emergency Spillway Data

Weir Length (ft)	380
Weir Crest Elevation	1675.4
P	3

Q = CLH^(3/2)

	Stage Elevation (ft)	P/H_0	Weir Coeff	Low Flow Orifice (cfs)	Silt Pipe Orifice (cfs)	Spillway (cfs)	Total (cfs)
	1656.0				0		0
	1657.0				6		0
	1658.0				25		0
	1659.0				45		0
	1660.0				58		0
	1661.0			0	69		0
	1662.0			7	78		7
	1663.0			31	86		31
	1664.0			55	94		55
	1665.0			116	101		116
	1666.0			155	107		155
	1667.0			186	113		186
	1668.0			212	119		212
	1669.0			236	125		236
	1670.0			257	130		257
	1671.0			277	135		277
	1672.0			295	140		295
	1673.0			312	145		312
	1674.0			329	150		329
	1675.0			344	154		344
Spillway Crest	**1675.4**	0.0	0	350	156	0	350
	1676.0	4.9	3.95	359	158	715	1074
	1677.0	1.9	3.92	373	163	3043	3416
	1678.0	1.1	3.88	387	167	6217	6604
	1679.0	0.8	3.86	400	171	10061	10461
	1680.0	0.7	3.85	413	175	14481	14894
	1681.0	0.5	3.80	426	179	19187	19613
	1682.0	0.5	3.80	438	182	24540	24978
	1683.0	0.4	3.75	450	186	29915	30365
	1684.0	0.3	3.69	461	190	35425	35887

Orifice Equation: $Q=CA(2gh)^{1/2}$

Where:
- Q = discharge in cfs
- A = Cross sectional area (ft^2)
- g = Gravitational Constant (ft/sec^2)
- h = Head, (ft) above centerline of orifice opening
- C = Orifice Coefficient

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN   1998                *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   09JUN11  TIME  16:00:24   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    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
              *
              *DIAGRAM
    1         ID   ********************************************************************
    2         ID   * ..................................................................  *
    3         ID   * :                                                                :  *
    4         ID   * :              ABBOTT AND PULSIPHER WASHES LOMR                  :  *
    5         ID   * :              ABBOTT WASH HYDROLOGIC MODEL                      :  *
    6         ID   * :              EXISTING CONDITIONS                               :  *
    7         ID   * :................................................................:  *
    8         ID   * :              RETURN PERIOD_ _ _ _100-YEAR                      :  *
    9         ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3 SERIES B          :  *
   10         ID   * :              PROJECT NO_ _ _ _ _ 550.048                       :  *
   11         ID   * :              FILENAME_ _ _ _ _ _ ABWA_SDN3b.DAT                :  *
   12         ID   * :              DATE MODELED_ _ _ _ 03/31/11                      :  *
   13         ID   * :              MODELED BY_ _ _ _ _ PK/BG                         :  *
   14         ID   * :................................................................:  *
   15         ID   * :                                                                :  *
   16         ID   * :................................................................:  *
   17         ID   ********************************************************************
   18         ID    REFERENCED FROM CCRFCD CITY OF MESQUITE 2007 MPU
   19         ID    USED ABBOTT WASH DETENTION BASIN AS BUILT SURVEY INFORMATION
   20         ID
   21         ID     JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
   22         ID       AREA       DARF
   23         ID       (SQ MI)    (100-YR)
   24         ID       6-8        0.89
   25         ID       4-6        0.905
   26         ID       2-4        0.92
   27         ID       1.5-2      0.94
   28         ID       1-1.5      0.96
   29         ID       0.5-1      0.975
   30         ID       0-0.5      0.99
   31         ID
   32         IT       5       0       0     300
   33         IO       5
   34         IN       5       0       0
   35         JR    PREC     .89    .905     .92     .94     .96    .975     .99
              *
   36         KK      A1
   37         BA    1.15
   38         PB   3.150
   39         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   40         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   41         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   42         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   43         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   44         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   45         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   46         PC   0.998   0.999       1
   47         LG    0.15     .35    4.61     .29       0
   48         UD     .33
              *
```



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

   49         KK   A1-10   CNAME
   50         KM   ROUTE SUBBASIN A1 THROUGH SUBBASIN A2
   51         RM       4     .34     .15
              *

   52         KK      A2
   53         BA    0.78
   54         LG    0.15     .36    4.93     .23       0
   55         UD     .44
              *
```

```
 56          KK     10A   CNAME       20
 57          KM   COMBINE ROUTE A1-10 AND SUBBASIN A2
 58          HC        2
             *

 59          KK  10A-20
 60          KM   ROUTE COMBINATION POINT 10A THROUGH SUBBASIN A3
 61          RM        2      .19      .15
             *

 62          KK      A3
 63          BA    0.55
 64          LG    0.15      .36      4.9      .24        1
 65          UD     .45
             *

 66          KK      A4
 67          BA    0.31
 68          LG    0.15      .36     4.95      .24        6
 69          UD     .48
             *

 70          KK     20A   CNAME       40
 71          KM   COMBINE ROUTE 10A-20, SUBBASIN A3, AND SUBBASIN A4
 72          HC        3
             *

 73          KK  20A-40
 74          KM   ROUTE COMBINATION POINT 20A THROUGH SUBBASIN A5
 75          RK    6119    .010    .040            TRAP       25        4
             *

 76          KK      A5
 77          BA    0.51
 78          LG    0.12      .29     4.87      .31       39
 79          UD     .26
             *
```



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

 80          KK    40A5
 81          KM   COMBINE ROUTE 20A-40 AND SUBBASIN A5
 82          HC        2
             *

 83          KK      A6
 84          BA    0.66
 85          LG    0.15      .36     4.94      .23        0
 86          UD     .37
             *

 87          KK      A7
 88          BA    0.28
 89          LG    0.15      .36     4.94      .23        0
 90          UD     .27
             *

 91          KK     30A   CNAME       40
 92          KM   COMBINE SUBBASIN A6 AND SUBBASIN A7
 93          HC        2
             *

 94          KK  30A-40
 95          KM   ROUTE COMBINATION POINT 30A THROUGH SUBBASIN A8
 96          RK   10640    .011    .040            TRAP       23        4
             *

 97          KK      A8
 98          BA    0.47
 99          LG    0.13      .29     4.92      .32       30
100          UD     .57
             *

101          KK     40A   CNAME       50
102          KM   COMBINE COMBINATION POINT 40A5, ROUTE 30A-40, AND SUBBASIN A8
103          KO        1
104          HC        3
             *

105          KK    AWDB
106          KM    Abbott Wash DB - Survey Information
107          KO       1
108          RS       1    ELEV  1659.0
109          SV       0    0.43    2.83    8.14   16.33   27.23   40.20   54.79   70.76   87.87
110          SV  105.93  124.74  144.09  163.89  184.29  205.28  226.67  235.35  248.49  270.76
111          SE  1659.0    1660    1661    1662    1663    1664    1665    1666    1667    1668
112          SE    1669    1670    1671    1672    1673    1674    1675  1675.4    1676    1677
113          SQ       0       0       0       7      31      55     116     155     186     212
114          SQ     236     257     277     295     312     329     344     350    1074    3416
             *
```



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

115          KK   DAWDB
116          KM   DIVERT OUTFLOW FOR STORM CENTERING
117          DT    DOUT
118          DI       0   50000
119          DQ       0   50000
             *

120          KK    A9-C
```

```
121          BA    0.71
122          LG    0.12     .28    4.75     .33      45
123          UD     .28
             *

124          KK     41A   CNAME
125          KM   COMBINE ROUTE 40A-41 AND SUBBASIN A9-C
126          HC       2
             *

127          KK  41A-50
128          KM   ROUTE COMBINATION POINT 41A THROUGH SUBBASIN A9-B
129          RK    4047    .008    .015            TRAP      16       1
             *

130          KK    A9-B
131          BA    0.82
132          LG    0.12     .28    4.57     .39      40
133          UD     .37
             *

134          KK     50A   CNAME
135          KM   COMBINE ROUTE 41A-50 AND ROUTE A9-B
136          HC       2
             *

137          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    36          A1
                 V
                 V
    49        A1-10
                 .
                 .
    52           .           A2
                 .            .
                 .            .
    56          10A............
                 V
                 V
    59       10A-20
                 .
                 .
    62           .           A3
                 .            .
                 .            .
    66           .            .          A4
                 .            .           .
                 .            .           .
    70          20A.........................
                 V
                 V
    73       20A-40
                 .
                 .
    76           .           A5
                 .            .
                 .            .
    80         40A5...........
                 .
                 .
    83           .           A6
                 .            .
                 .            .
    87           .            .          A7
                 .            .           .
                 .            .           .
    91           .          30A............
                 .            V
                 .            V
    94           .       30A-40
                 .            .
                 .            .
    97           .            .          A8
                 .            .           .
                 .            .           .
   101          40A.........................
                 V
                 V
   105         AWDB
                 .
                 .
   117           .-------->    DOUT
   115        DAWDB
                 .
                 .
   120           .         A9-C
                 .            .
                 .            .
   124          41A............
                 V
                 V
   127       41A-50
                 .
                 .
   130           .         A9-B
                 .            .
                 .            .
   134          50A............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*          VERSION 4.1                  *
*                                       *
*  RUN DATE   09JUN11  TIME  16:00:24   *
*                                       *
*****************************************
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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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*************************************************************
*                                                           *
*                ABBOTT AND PULSIPHER WASHES LOMR           *
*                ABBOTT WASH HYDROLOGIC MODEL               *
*                EXISTING CONDITIONS                        *
*                                                           *
*                RETURN PERIOD_ _ _ _100-YEAR               *
*                DISTRIBUTION_ _ _ _ 6-HOUR SDN3 SERIES B   *
*                PROJECT NO_ _ _ _ _ 550.048                *
*                FILENAME_ _ _ _ _ _ ABWA_SDN3b.DAT         *
*                DATE MODELED_ _ _ _ 03/31/11               *
*                MODELED BY_ _ _ _ _ PK/BG                  *
*                                                           *
*                                                           *
*************************************************************
 REFERENCED FROM CCRFCD CITY OF MESQUITE 2007 MPU
 USED ABBOTT WASH DETENTION BASIN AS BUILT SURVEY INFORMATION

  JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
    AREA       DARF
    (SQ MI)    (100-YR)
    6-8        0.89
    4-6        0.905
    2-4        0.92
    1.5-2      0.94
    1-1.5      0.96
    0.5-1      0.975
    0-0.5      0.99

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

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2   0  ENDING DATE
                    NDTIME        0055  ENDING TIME
                     ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE    24.92 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

    JP          MULTI-PLAN OPTION
                    NPLAN          1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   .89       .90       .92       .94       .96       .98       .99
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO


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


           ***************
           *             *
101 KK     *      40A    *       CNAME      50
           *             *
           ***************

103 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

104 HC          HYDROGRAPH COMBINATION
                     ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                ***

*************************************************************************************************************************************************
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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	50.	1		1230	151	0.	1		1845	226	0.
1		0005	2	3.	1		0620	77	42.	1		1235	152	0.	1		1850	227	0.
1		0010	3	17.	1		0625	78	34.	1		1240	153	0.	1		1855	228	0.
1		0015	4	42.	1		0630	79	29.	1		1245	154	0.	1		1900	229	0.
1		0020	5	66.	1		0635	80	24.	1		1250	155	0.	1		1905	230	0.
1		0025	6	83.	1		0640	81	20.	1		1255	156	0.	1		1910	231	0.
1		0030	7	94.	1		0645	82	17.	1		1300	157	0.	1		1915	232	0.
1		0035	8	99.	1		0650	83	15.	1		1305	158	0.	1		1920	233	0.
1		0040	9	98.	1		0655	84	12.	1		1310	159	0.	1		1925	234	0.
1		0045	10	89.	1		0700	85	11.	1		1315	160	0.	1		1930	235	0.
1		0050	11	75.	1		0705	86	9.	1		1320	161	0.	1		1935	236	0.
1		0055	12	61.	1		0710	87	8.	1		1325	162	0.	1		1940	237	0.
1		0100	13	50.	1		0715	88	7.	1		1330	163	0.	1		1945	238	0.
1		0105	14	41.	1		0720	89	6.	1		1335	164	0.	1		1950	239	0.
1		0110	15	37.	1		0725	90	5.	1		1340	165	0.	1		1955	240	0.
1		0115	16	35.	1		0730	91	5.	1		1345	166	0.	1		2000	241	0.
1		0120	17	35.	1		0735	92	4.	1		1350	167	0.	1		2005	242	0.
1		0125	18	37.	1		0740	93	4.	1		1355	168	0.	1		2010	243	0.
1		0130	19	42.	1		0745	94	3.	1		1400	169	0.	1		2015	244	0.
1		0135	20	48.	1		0750	95	3.	1		1405	170	0.	1		2020	245	0.
1		0140	21	55.	1		0755	96	3.	1		1410	171	0.	1		2025	246	0.
1		0145	22	59.	1		0800	97	2.	1		1415	172	0.	1		2030	247	0.
1		0150	23	59.	1		0805	98	2.	1		1420	173	0.	1		2035	248	0.
1		0155	24	56.	1		0810	99	2.	1		1425	174	0.	1		2040	249	0.
1		0200	25	50.	1		0815	100	2.	1		1430	175	0.	1		2045	250	0.
1		0205	26	43.	1		0820	101	2.	1		1435	176	0.	1		2050	251	0.
1		0210	27	39.	1		0825	102	2.	1		1440	177	0.	1		2055	252	0.
1		0215	28	41.	1		0830	103	1.	1		1445	178	0.	1		2100	253	0.
1		0220	29	47.	1		0835	104	1.	1		1450	179	0.	1		2105	254	0.
1		0225	30	56.	1		0840	105	1.	1		1455	180	0.	1		2110	255	0.
1		0230	31	60.	1		0845	106	1.	1		1500	181	0.	1		2115	256	0.
1		0235	32	59.	1		0850	107	1.	1		1505	182	0.	1		2120	257	0.
1		0240	33	57.	1		0855	108	1.	1		1510	183	0.	1		2125	258	0.
1		0245	34	57.	1		0900	109	1.	1		1515	184	0.	1		2130	259	0.
1		0250	35	59.	1		0905	110	1.	1		1520	185	0.	1		2135	260	0.
1		0255	36	58.	1		0910	111	1.	1		1525	186	0.	1		2140	261	0.
1		0300	37	56.	1		0915	112	1.	1		1530	187	0.	1		2145	262	0.
1		0305	38	57.	1		0920	113	1.	1		1535	188	0.	1		2150	263	0.
1		0310	39	71.	1		0925	114	1.	1		1540	189	0.	1		2155	264	0.
1		0315	40	110.	1		0930	115	1.	1		1545	190	0.	1		2200	265	0.
1		0320	41	198.	1		0935	116	1.	1		1550	191	0.	1		2205	266	0.
1		0325	42	349.	1		0940	117	1.	1		1555	192	0.	1		2210	267	0.
1		0330	43	561.	1		0945	118	1.	1		1600	193	0.	1		2215	268	0.
1		0335	44	826.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1204.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	1749.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	2383.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	2842.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	2996.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	2995.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	2874.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	2674.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	2413.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	2116.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	1816.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	1536.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	1288.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	1062.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	880.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	727.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	610.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	511.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	429.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	362.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	307.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	262.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	225.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	194.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	166.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	142.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	120.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	102.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	87.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	73.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	60.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2996.	4.00		546.	138.	133.	133.
		(INCHES)	1.078	1.088	1.088	1.088
		(AC-FT)	271.	273.	273.	273.

CUMULATIVE AREA = 4.71 SQ MI

HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .90

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	53.	1		1230	151	0.	1		1845	226	0.
1		0005	2	3.	1		0620	77	44.	1		1235	152	0.	1		1850	227	0.

1	0010	3	18.	*	1	0625	78	36.	*	1	1240	153	0.	*	1	1855	228	0.
1	0015	4	43.	*	1	0630	79	30.	*	1	1245	154	0.	*	1	1900	229	0.
1	0020	5	67.	*	1	0635	80	25.	*	1	1250	155	0.	*	1	1905	230	0.
1	0025	6	85.	*	1	0640	81	22.	*	1	1255	156	0.	*	1	1910	231	0.
1	0030	7	96.	*	1	0645	82	18.	*	1	1300	157	0.	*	1	1915	232	0.
1	0035	8	101.	*	1	0650	83	16.	*	1	1305	158	0.	*	1	1920	233	0.
1	0040	9	100.	*	1	0655	84	13.	*	1	1310	159	0.	*	1	1925	234	0.
1	0045	10	91.	*	1	0700	85	11.	*	1	1315	160	0.	*	1	1930	235	0.
1	0050	11	76.	*	1	0705	86	10.	*	1	1320	161	0.	*	1	1935	236	0.
1	0055	12	62.	*	1	0710	87	9.	*	1	1325	162	0.	*	1	1940	237	0.
1	0100	13	51.	*	1	0715	88	7.	*	1	1330	163	0.	*	1	1945	238	0.
1	0105	14	42.	*	1	0720	89	6.	*	1	1335	164	0.	*	1	1950	239	0.
1	0110	15	37.	*	1	0725	90	6.	*	1	1340	165	0.	*	1	1955	240	0.
1	0115	16	36.	*	1	0730	91	5.	*	1	1345	166	0.	*	1	2000	241	0.
1	0120	17	36.	*	1	0735	92	4.	*	1	1350	167	0.	*	1	2005	242	0.
1	0125	18	38.	*	1	0740	93	4.	*	1	1355	168	0.	*	1	2010	243	0.
1	0130	19	43.	*	1	0745	94	4.	*	1	1400	169	0.	*	1	2015	244	0.
1	0135	20	49.	*	1	0750	95	3.	*	1	1405	170	0.	*	1	2020	245	0.
1	0140	21	56.	*	1	0755	96	3.	*	1	1410	171	0.	*	1	2025	246	0.
1	0145	22	60.	*	1	0800	97	3.	*	1	1415	172	0.	*	1	2030	247	0.
1	0150	23	60.	*	1	0805	98	2.	*	1	1420	173	0.	*	1	2035	248	0.
1	0155	24	57.	*	1	0810	99	2.	*	1	1425	174	0.	*	1	2040	249	0.
1	0200	25	51.	*	1	0815	100	2.	*	1	1430	175	0.	*	1	2045	250	0.
1	0205	26	44.	*	1	0820	101	2.	*	1	1435	176	0.	*	1	2050	251	0.
1	0210	27	40.	*	1	0825	102	2.	*	1	1440	177	0.	*	1	2055	252	0.
1	0215	28	41.	*	1	0830	103	2.	*	1	1445	178	0.	*	1	2100	253	0.
1	0220	29	48.	*	1	0835	104	1.	*	1	1450	179	0.	*	1	2105	254	0.
1	0225	30	57.	*	1	0840	105	1.	*	1	1455	180	0.	*	1	2110	255	0.
1	0230	31	61.	*	1	0845	106	1.	*	1	1500	181	0.	*	1	2115	256	0.
1	0235	32	60.	*	1	0850	107	1.	*	1	1505	182	0.	*	1	2120	257	0.
1	0240	33	58.	*	1	0855	108	1.	*	1	1510	183	0.	*	1	2125	258	0.
1	0245	34	58.	*	1	0900	109	1.	*	1	1515	184	0.	*	1	2130	259	0.
1	0250	35	60.	*	1	0905	110	1.	*	1	1520	185	0.	*	1	2135	260	0.
1	0255	36	59.	*	1	0910	111	1.	*	1	1525	186	0.	*	1	2140	261	0.
1	0300	37	57.	*	1	0915	112	1.	*	1	1530	187	0.	*	1	2145	262	0.
1	0305	38	59.	*	1	0920	113	1.	*	1	1535	188	0.	*	1	2150	263	0.
1	0310	39	73.	*	1	0925	114	1.	*	1	1540	189	0.	*	1	2155	264	0.
1	0315	40	113.	*	1	0930	115	1.	*	1	1545	190	0.	*	1	2200	265	0.
1	0320	41	204.	*	1	0935	116	1.	*	1	1550	191	0.	*	1	2205	266	0.
1	0325	42	359.	*	1	0940	117	1.	*	1	1555	192	0.	*	1	2210	267	0.
1	0330	43	576.	*	1	0945	118	1.	*	1	1600	193	0.	*	1	2215	268	0.
1	0335	44	852.	*	1	0950	119	1.	*	1	1605	194	0.	*	1	2220	269	0.
1	0340	45	1252.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.
1	0345	46	1825.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	2466.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	2940.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	3082.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	3080.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	2961.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	2750.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	2474.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	2173.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	1868.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	1576.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	1321.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	1091.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	903.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	746.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	627.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	526.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	443.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	375.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	319.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	274.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	237.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	204.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	174.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	148.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	126.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	108.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	91.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	76.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	63.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3082.	4.00		563.	142.	137.	137.
		(INCHES)	1.111	1.121	1.121	1.121
		(AC-FT)	279.	282.	282.	282.

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .92

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DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0615	76	55.	*	1		1230	151	0.	*	1		1845	226	0.
1		0005	2	3.	*	1		0620	77	45.	*	1		1235	152	0.	*	1		1850	227	0.
1		0010	3	18.	*	1		0625	78	38.	*	1		1240	153	0.	*	1		1855	228	0.
1		0015	4	43.	*	1		0630	79	31.	*	1		1245	154	0.	*	1		1900	229	0.
1		0020	5	68.	*	1		0635	80	26.	*	1		1250	155	0.	*	1		1905	230	0.
1		0025	6	86.	*	1		0640	81	22.	*	1		1255	156	0.	*	1		1910	231	0.
1		0030	7	98.	*	1		0645	82	19.	*	1		1300	157	0.	*	1		1915	232	0.
1		0035	8	103.	*	1		0650	83	16.	*	1		1305	158	0.	*	1		1920	233	0.
1		0040	9	102.	*	1		0655	84	14.	*	1		1310	159	0.	*	1		1925	234	0.

1	0045	10	92.	*	1	0700	85	12.	*	1	1315	160	0.	*	1	1930	235	0.	
1	0050	11	78.	*	1	0705	86	10.	*	1	1320	161	0.	*	1	1935	236	0.	
1	0055	12	63.	*	1	0710	87	9.	*	1	1325	162	0.	*	1	1940	237	0.	
1	0100	13	52.	*	1	0715	88	8.	*	1	1330	163	0.	*	1	1945	238	0.	
1	0105	14	43.	*	1	0720	89	7.	*	1	1335	164	0.	*	1	1950	239	0.	
1	0110	15	38.	*	1	0725	90	6.	*	1	1340	165	0.	*	1	1955	240	0.	
1	0115	16	36.	*	1	0730	91	5.	*	1	1345	166	0.	*	1	2000	241	0.	
1	0120	17	36.	*	1	0735	92	4.	*	1	1350	167	0.	*	1	2005	242	0.	
1	0125	18	38.	*	1	0740	93	4.	*	1	1355	168	0.	*	1	2010	243	0.	
1	0130	19	43.	*	1	0745	94	4.	*	1	1400	169	0.	*	1	2015	244	0.	
1	0135	20	50.	*	1	0750	95	3.	*	1	1405	170	0.	*	1	2020	245	0.	
1	0140	21	56.	*	1	0755	96	3.	*	1	1410	171	0.	*	1	2025	246	0.	
1	0145	22	61.	*	1	0800	97	3.	*	1	1415	172	0.	*	1	2030	247	0.	
1	0150	23	61.	*	1	0805	98	2.	*	1	1420	173	0.	*	1	2035	248	0.	
1	0155	24	58.	*	1	0810	99	2.	*	1	1425	174	0.	*	1	2040	249	0.	
1	0200	25	51.	*	1	0815	100	2.	*	1	1430	175	0.	*	1	2045	250	0.	
1	0205	26	44.	*	1	0820	101	2.	*	1	1435	176	0.	*	1	2050	251	0.	
1	0210	27	40.	*	1	0825	102	2.	*	1	1440	177	0.	*	1	2055	252	0.	
1	0215	28	42.	*	1	0830	103	2.	*	1	1445	178	0.	*	1	2100	253	0.	
1	0220	29	49.	*	1	0835	104	1.	*	1	1450	179	0.	*	1	2105	254	0.	
1	0225	30	58.	*	1	0840	105	1.	*	1	1455	180	0.	*	1	2110	255	0.	
1	0230	31	62.	*	1	0845	106	1.	*	1	1500	181	0.	*	1	2115	256	0.	
1	0235	32	61.	*	1	0850	107	1.	*	1	1505	182	0.	*	1	2120	257	0.	
1	0240	33	59.	*	1	0855	108	1.	*	1	1510	183	0.	*	1	2125	258	0.	
1	0245	34	59.	*	1	0900	109	1.	*	1	1515	184	0.	*	1	2130	259	0.	
1	0250	35	61.	*	1	0905	110	1.	*	1	1520	185	0.	*	1	2135	260	0.	
1	0255	36	60.	*	1	0910	111	1.	*	1	1525	186	0.	*	1	2140	261	0.	
1	0300	37	58.	*	1	0915	112	1.	*	1	1530	187	0.	*	1	2145	262	0.	
1	0305	38	60.	*	1	0920	113	1.	*	1	1535	188	0.	*	1	2150	263	0.	
1	0310	39	75.	*	1	0925	114	1.	*	1	1540	189	0.	*	1	2155	264	0.	
1	0315	40	117.	*	1	0930	115	1.	*	1	1545	190	0.	*	1	2200	265	0.	
1	0320	41	210.	*	1	0935	116	1.	*	1	1550	191	0.	*	1	2205	266	0.	
1	0325	42	369.	*	1	0940	117	1.	*	1	1555	192	0.	*	1	2210	267	0.	
1	0330	43	592.	*	1	0945	118	1.	*	1	1600	193	0.	*	1	2215	268	0.	
1	0335	44	879.	*	1	0950	119	1.	*	1	1605	194	0.	*	1	2220	269	0.	
1	0340	45	1298.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.	
1	0345	46	1901.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.	
1	0350	47	2548.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.	
1	0355	48	3023.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.	
1	0400	49	3171.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.	
1	0405	50	3158.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.	
1	0410	51	3036.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.	
1	0415	52	2826.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.	
1	0420	53	2542.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.	
1	0425	54	2226.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.	
1	0430	55	1916.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.	
1	0435	56	1619.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.	
1	0440	57	1356.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.	
1	0445	58	1120.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.	
1	0450	59	928.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.	
1	0455	60	773.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.	
1	0500	61	645.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.	
1	0505	62	546.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.	
1	0510	63	460.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.	
1	0515	64	390.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.	
1	0520	65	334.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.	
1	0525	66	287.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.	
1	0530	67	248.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.	
1	0535	68	214.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.	
1	0540	69	183.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.	
1	0545	70	156.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.	
1	0550	71	133.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.	
1	0555	72	112.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.	
1	0600	73	95.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.	
1	0605	74	80.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.	
1	0610	75	66.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.	

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3171.	4.00		579.	146.	141.	141.
		(INCHES)	1.143	1.154	1.154	1.154
		(AC-FT)	287.	290.	290.	290.

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .94

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0615	76	58.	*	1		1230	151	0.	*	1		1845	226	0.
1		0005	2	4.	*	1		0620	77	48.	*	1		1235	152	0.	*	1		1850	227	0.
1		0010	3	18.	*	1		0625	78	39.	*	1		1240	153	0.	*	1		1855	228	0.
1		0015	4	44.	*	1		0630	79	33.	*	1		1245	154	0.	*	1		1900	229	0.
1		0020	5	70.	*	1		0635	80	27.	*	1		1250	155	0.	*	1		1905	230	0.
1		0025	6	88.	*	1		0640	81	23.	*	1		1255	156	0.	*	1		1910	231	0.
1		0030	7	100.	*	1		0645	82	19.	*	1		1300	157	0.	*	1		1915	232	0.
1		0035	8	105.	*	1		0650	83	16.	*	1		1305	158	0.	*	1		1920	233	0.
1		0040	9	104.	*	1		0655	84	14.	*	1		1310	159	0.	*	1		1925	234	0.
1		0045	10	94.	*	1		0700	85	12.	*	1		1315	160	0.	*	1		1930	235	0.
1		0050	11	79.	*	1		0705	86	10.	*	1		1320	161	0.	*	1		1935	236	0.
1		0055	12	65.	*	1		0710	87	9.	*	1		1325	162	0.	*	1		1940	237	0.
1		0100	13	53.	*	1		0715	88	8.	*	1		1330	163	0.	*	1		1945	238	0.
1		0105	14	44.	*	1		0720	89	7.	*	1		1335	164	0.	*	1		1950	239	0.
1		0110	15	39.	*	1		0725	90	6.	*	1		1340	165	0.	*	1		1955	240	0.
1		0115	16	37.	*	1		0730	91	5.	*	1		1345	166	0.	*	1		2000	241	0.

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0120	17	38.	1		0735	92	5.	1		1350	167	0.	1		2005	242	0.
1		0125	18	39.	1		0740	93	4.	1		1355	168	0.	1		2010	243	0.
1		0130	19	44.	1		0745	94	4.	1		1400	169	0.	1		2015	244	0.
1		0135	20	51.	1		0750	95	3.	1		1405	170	0.	1		2020	245	0.
1		0140	21	58.	1		0755	96	3.	1		1410	171	0.	1		2025	246	0.
1		0145	22	62.	1		0800	97	3.	1		1415	172	0.	1		2030	247	0.
1		0150	23	63.	1		0805	98	2.	1		1420	173	0.	1		2035	248	0.
1		0155	24	59.	1		0810	99	2.	1		1425	174	0.	1		2040	249	0.
1		0200	25	52.	1		0815	100	2.	1		1430	175	0.	1		2045	250	0.
1		0205	26	45.	1		0820	101	2.	1		1435	176	0.	1		2050	251	0.
1		0210	27	41.	1		0825	102	2.	1		1440	177	0.	1		2055	252	0.
1		0215	28	43.	1		0830	103	2.	1		1445	178	0.	1		2100	253	0.
1		0220	29	50.	1		0835	104	1.	1		1450	179	0.	1		2105	254	0.
1		0225	30	59.	1		0840	105	1.	1		1455	180	0.	1		2110	255	0.
1		0230	31	64.	1		0845	106	1.	1		1500	181	0.	1		2115	256	0.
1		0235	32	63.	1		0850	107	1.	1		1505	182	0.	1		2120	257	0.
1		0240	33	60.	1		0855	108	1.	1		1510	183	0.	1		2125	258	0.
1		0245	34	61.	1		0900	109	1.	1		1515	184	0.	1		2130	259	0.
1		0250	35	62.	1		0905	110	1.	1		1520	185	0.	1		2135	260	0.
1		0255	36	62.	1		0910	111	1.	1		1525	186	0.	1		2140	261	0.
1		0300	37	59.	1		0915	112	1.	1		1530	187	0.	1		2145	262	0.
1		0305	38	61.	1		0920	113	1.	1		1535	188	0.	1		2150	263	0.
1		0310	39	78.	1		0925	114	1.	1		1540	189	0.	1		2155	264	0.
1		0315	40	122.	1		0930	115	1.	1		1545	190	0.	1		2200	265	0.
1		0320	41	219.	1		0935	116	1.	1		1550	191	0.	1		2205	266	0.
1		0325	42	382.	1		0940	117	1.	1		1555	192	0.	1		2210	267	0.
1		0330	43	612.	1		0945	118	1.	1		1600	193	0.	1		2215	268	0.
1		0335	44	912.	1		0950	119	1.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1366.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	2001.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	2663.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	3130.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	3295.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	3269.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	3138.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	2921.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	2634.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	2308.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	1985.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	1678.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	1402.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	1163.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	959.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	798.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	670.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	563.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	478.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	406.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	348.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	301.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	261.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	227.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	194.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	165.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	140.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	119.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	100.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	84.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	70.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
3295.	4.00	(CFS)	601.	152.	146.	146.
		(INCHES)	1.187	1.198	1.198	1.198
		(AC-FT)	298.	301.	301.	301.

CUMULATIVE AREA = 4.71 SQ MI

HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .96

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	60.	1		1230	151	0.	1		1845	226	0.
1		0005	2	4.	1		0620	77	50.	1		1235	152	0.	1		1850	227	0.
1		0010	3	19.	1		0625	78	42.	1		1240	153	0.	1		1855	228	0.
1		0015	4	45.	1		0630	79	35.	1		1245	154	0.	1		1900	229	0.
1		0020	5	71.	1		0635	80	29.	1		1250	155	0.	1		1905	230	0.
1		0025	6	90.	1		0640	81	24.	1		1255	156	0.	1		1910	231	0.
1		0030	7	102.	1		0645	82	20.	1		1300	157	0.	1		1915	232	0.
1		0035	8	107.	1		0650	83	17.	1		1305	158	0.	1		1920	233	0.
1		0040	9	106.	1		0655	84	15.	1		1310	159	0.	1		1925	234	0.
1		0045	10	96.	1		0700	85	13.	1		1315	160	0.	1		1930	235	0.
1		0050	11	81.	1		0705	86	11.	1		1320	161	0.	1		1935	236	0.
1		0055	12	66.	1		0710	87	9.	1		1325	162	0.	1		1940	237	0.
1		0100	13	54.	1		0715	88	8.	1		1330	163	0.	1		1945	238	0.
1		0105	14	45.	1		0720	89	7.	1		1335	164	0.	1		1950	239	0.
1		0110	15	40.	1		0725	90	6.	1		1340	165	0.	1		1955	240	0.
1		0115	16	38.	1		0730	91	5.	1		1345	166	0.	1		2000	241	0.
1		0120	17	39.	1		0735	92	5.	1		1350	167	0.	1		2005	242	0.
1		0125	18	41.	1		0740	93	4.	1		1355	168	0.	1		2010	243	0.
1		0130	19	46.	1		0745	94	4.	1		1400	169	0.	1		2015	244	0.
1		0135	20	52.	1		0750	95	3.	1		1405	170	0.	1		2020	245	0.
1		0140	21	59.	1		0755	96	3.	1		1410	171	0.	1		2025	246	0.
1		0145	22	63.	1		0800	97	3.	1		1415	172	0.	1		2030	247	0.
1		0150	23	64.	1		0805	98	3.	1		1420	173	0.	1		2035	248	0.

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0155	24	60.	1		0810	99	2.	1		1425	174	0.	1		2040	249	0.
1		0200	25	54.	1		0815	100	2.	1		1430	175	0.	1		2045	250	0.
1		0205	26	46.	1		0820	101	2.	1		1435	176	0.	1		2050	251	0.
1		0210	27	42.	1		0825	102	2.	1		1440	177	0.	1		2055	252	0.
1		0215	28	44.	1		0830	103	2.	1		1445	178	0.	1		2100	253	0.
1		0220	29	51.	1		0835	104	1.	1		1450	179	0.	1		2105	254	0.
1		0225	30	60.	1		0840	105	1.	1		1455	180	0.	1		2110	255	0.
1		0230	31	65.	1		0845	106	1.	1		1500	181	0.	1		2115	256	0.
1		0235	32	64.	1		0850	107	1.	1		1505	182	0.	1		2120	257	0.
1		0240	33	61.	1		0855	108	1.	1		1510	183	0.	1		2125	258	0.
1		0245	34	62.	1		0900	109	1.	1		1515	184	0.	1		2130	259	0.
1		0250	35	64.	1		0905	110	1.	1		1520	185	0.	1		2135	260	0.
1		0255	36	63.	1		0910	111	1.	1		1525	186	0.	1		2140	261	0.
1		0300	37	60.	1		0915	112	1.	1		1530	187	0.	1		2145	262	0.
1		0305	38	63.	1		0920	113	1.	1		1535	188	0.	1		2150	263	0.
1		0310	39	81.	1		0925	114	1.	1		1540	189	0.	1		2155	264	0.
1		0315	40	127.	1		0930	115	1.	1		1545	190	0.	1		2200	265	0.
1		0320	41	227.	1		0935	116	1.	1		1550	191	0.	1		2205	266	0.
1		0325	42	395.	1		0940	117	1.	1		1555	192	0.	1		2210	267	0.
1		0330	43	632.	1		0945	118	1.	1		1600	193	0.	1		2215	268	0.
1		0335	44	942.	1		0950	119	1.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1435.	1		0955	120	1.	1		1610	195	0.	1		2225	270	0.
1		0345	46	2101.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	2775.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	3240.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	3407.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	3390.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	3249.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	3018.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	2719.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	2384.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	2053.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	1737.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	1450.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	1203.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	992.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	829.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	696.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	589.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	499.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	424.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	366.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	317.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	276.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	238.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	204.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	174.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	148.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	125.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	105.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	89.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	74.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3407.	4.00		623.	157.	152.	152.
		(INCHES)	1.231	1.242	1.242	1.242
		(AC-FT)	309.	312.	312.	312.

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .98

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	63.	1		1230	151	0.	1		1845	226	0.
1		0005	2	4.	1		0620	77	52.	1		1235	152	0.	1		1850	227	0.
1		0010	3	19.	1		0625	78	43.	1		1240	153	0.	1		1855	228	0.
1		0015	4	46.	1		0630	79	35.	1		1245	154	0.	1		1900	229	0.
1		0020	5	73.	1		0635	80	29.	1		1250	155	0.	1		1905	230	0.
1		0025	6	91.	1		0640	81	25.	1		1255	156	0.	1		1910	231	0.
1		0030	7	103.	1		0645	82	21.	1		1300	157	0.	1		1915	232	0.
1		0035	8	109.	1		0650	83	18.	1		1305	158	0.	1		1920	233	0.
1		0040	9	108.	1		0655	84	15.	1		1310	159	0.	1		1925	234	0.
1		0045	10	98.	1		0700	85	13.	1		1315	160	0.	1		1930	235	0.
1		0050	11	82.	1		0705	86	11.	1		1320	161	0.	1		1935	236	0.
1		0055	12	67.	1		0710	87	10.	1		1325	162	0.	1		1940	237	0.
1		0100	13	55.	1		0715	88	8.	1		1330	163	0.	1		1945	238	0.
1		0105	14	45.	1		0720	89	7.	1		1335	164	0.	1		1950	239	0.
1		0110	15	40.	1		0725	90	6.	1		1340	165	0.	1		1955	240	0.
1		0115	16	39.	1		0730	91	6.	1		1345	166	0.	1		2000	241	0.
1		0120	17	39.	1		0735	92	5.	1		1350	167	0.	1		2005	242	0.
1		0125	18	41.	1		0740	93	4.	1		1355	168	0.	1		2010	243	0.
1		0130	19	46.	1		0745	94	4.	1		1400	169	0.	1		2015	244	0.
1		0135	20	53.	1		0750	95	3.	1		1405	170	0.	1		2020	245	0.
1		0140	21	60.	1		0755	96	3.	1		1410	171	0.	1		2025	246	0.
1		0145	22	64.	1		0800	97	3.	1		1415	172	0.	1		2030	247	0.
1		0150	23	65.	1		0805	98	2.	1		1420	173	0.	1		2035	248	0.
1		0155	24	61.	1		0810	99	2.	1		1425	174	0.	1		2040	249	0.
1		0200	25	54.	1		0815	100	2.	1		1430	175	0.	1		2045	250	0.
1		0205	26	47.	1		0820	101	2.	1		1435	176	0.	1		2050	251	0.
1		0210	27	43.	1		0825	102	2.	1		1440	177	0.	1		2055	252	0.
1		0215	28	44.	1		0830	103	2.	1		1445	178	0.	1		2100	253	0.
1		0220	29	52.	1		0835	104	1.	1		1450	179	0.	1		2105	254	0.
1		0225	30	61.	1		0840	105	1.	1		1455	180	0.	1		2110	255	0.

1	0230	31	66.	*	1	0845	106	1.	*	1	1500	181	0.	*	1	2115	256	0.	
1	0235	32	65.	*	1	0850	107	1.	*	1	1505	182	0.	*	1	2120	257	0.	
1	0240	33	63.	*	1	0855	108	1.	*	1	1510	183	0.	*	1	2125	258	0.	
1	0245	34	63.	*	1	0900	109	1.	*	1	1515	184	0.	*	1	2130	259	0.	
1	0250	35	65.	*	1	0905	110	1.	*	1	1520	185	0.	*	1	2135	260	0.	
1	0255	36	64.	*	1	0910	111	1.	*	1	1525	186	0.	*	1	2140	261	0.	
1	0300	37	61.	*	1	0915	112	1.	*	1	1530	187	0.	*	1	2145	262	0.	
1	0305	38	64.	*	1	0920	113	1.	*	1	1535	188	0.	*	1	2150	263	0.	
1	0310	39	83.	*	1	0925	114	1.	*	1	1540	189	0.	*	1	2155	264	0.	
1	0315	40	131.	*	1	0930	115	1.	*	1	1545	190	0.	*	1	2200	265	0.	
1	0320	41	233.	*	1	0935	116	1.	*	1	1550	191	0.	*	1	2205	266	0.	
1	0325	42	405.	*	1	0940	117	1.	*	1	1555	192	0.	*	1	2210	267	0.	
1	0330	43	647.	*	1	0945	118	1.	*	1	1600	193	0.	*	1	2215	268	0.	
1	0335	44	969.	*	1	0950	119	1.	*	1	1605	194	0.	*	1	2220	269	0.	
1	0340	45	1484.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.	
1	0345	46	2176.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.	
1	0350	47	2862.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.	
1	0355	48	3301.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.	
1	0400	49	3479.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.	
1	0405	50	3474.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.	
1	0410	51	3334.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.	
1	0415	52	3095.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.	
1	0420	53	2789.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.	
1	0425	54	2443.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.	
1	0430	55	2101.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.	
1	0435	56	1781.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.	
1	0440	57	1489.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.	
1	0445	58	1234.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.	
1	0450	59	1020.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.	
1	0455	60	851.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.	
1	0500	61	715.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.	
1	0505	62	606.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.	
1	0510	63	514.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.	
1	0515	64	439.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.	
1	0520	65	381.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.	
1	0525	66	329.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.	
1	0530	67	285.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.	
1	0535	68	248.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.	
1	0540	69	213.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.	
1	0545	70	182.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.	
1	0550	71	154.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.	
1	0555	72	131.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.	
1	0600	73	111.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.	
1	0605	74	92.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.	
1	0610	75	76.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.	

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3479.	4.00		640.	161.	156.	156.
		(INCHES)	1.263	1.275	1.275	1.275
		(AC-FT)	317.	320.	320.	320.

CUMULATIVE AREA = 4.71 SQ MI

HYDROGRAPH AT STATION 40A
SUM OF 3 HYDROGRAPHS
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0615	76	66.	*	1		1230	151	0.	*	1		1845	226	0.
1		0005	2	4.	*	1		0620	77	54.	*	1		1235	152	0.	*	1		1850	227	0.
1		0010	3	19.	*	1		0625	78	44.	*	1		1240	153	0.	*	1		1855	228	0.
1		0015	4	47.	*	1		0630	79	37.	*	1		1245	154	0.	*	1		1900	229	0.
1		0020	5	74.	*	1		0635	80	31.	*	1		1250	155	0.	*	1		1905	230	0.
1		0025	6	93.	*	1		0640	81	26.	*	1		1255	156	0.	*	1		1910	231	0.
1		0030	7	105.	*	1		0645	82	22.	*	1		1300	157	0.	*	1		1915	232	0.
1		0035	8	111.	*	1		0650	83	18.	*	1		1305	158	0.	*	1		1920	233	0.
1		0040	9	109.	*	1		0655	84	15.	*	1		1310	159	0.	*	1		1925	234	0.
1		0045	10	99.	*	1		0700	85	13.	*	1		1315	160	0.	*	1		1930	235	0.
1		0050	11	84.	*	1		0705	86	12.	*	1		1320	161	0.	*	1		1935	236	0.
1		0055	12	68.	*	1		0710	87	10.	*	1		1325	162	0.	*	1		1940	237	0.
1		0100	13	56.	*	1		0715	88	8.	*	1		1330	163	0.	*	1		1945	238	0.
1		0105	14	46.	*	1		0720	89	7.	*	1		1335	164	0.	*	1		1950	239	0.
1		0110	15	41.	*	1		0725	90	6.	*	1		1340	165	0.	*	1		1955	240	0.
1		0115	16	39.	*	1		0730	91	6.	*	1		1345	166	0.	*	1		2000	241	0.
1		0120	17	40.	*	1		0735	92	5.	*	1		1350	167	0.	*	1		2005	242	0.
1		0125	18	42.	*	1		0740	93	4.	*	1		1355	168	0.	*	1		2010	243	0.
1		0130	19	47.	*	1		0745	94	4.	*	1		1400	169	0.	*	1		2015	244	0.
1		0135	20	54.	*	1		0750	95	3.	*	1		1405	170	0.	*	1		2020	245	0.
1		0140	21	61.	*	1		0755	96	3.	*	1		1410	171	0.	*	1		2025	246	0.
1		0145	22	65.	*	1		0800	97	3.	*	1		1415	172	0.	*	1		2030	247	0.
1		0150	23	66.	*	1		0805	98	3.	*	1		1420	173	0.	*	1		2035	248	0.
1		0155	24	62.	*	1		0810	99	2.	*	1		1425	174	0.	*	1		2040	249	0.
1		0200	25	55.	*	1		0815	100	2.	*	1		1430	175	0.	*	1		2045	250	0.
1		0205	26	48.	*	1		0820	101	2.	*	1		1435	176	0.	*	1		2050	251	0.
1		0210	27	43.	*	1		0825	102	2.	*	1		1440	177	0.	*	1		2055	252	0.
1		0215	28	45.	*	1		0830	103	2.	*	1		1445	178	0.	*	1		2100	253	0.
1		0220	29	53.	*	1		0835	104	1.	*	1		1450	179	0.	*	1		2105	254	0.
1		0225	30	62.	*	1		0840	105	1.	*	1		1455	180	0.	*	1		2110	255	0.
1		0230	31	67.	*	1		0845	106	1.	*	1		1500	181	0.	*	1		2115	256	0.
1		0235	32	66.	*	1		0850	107	1.	*	1		1505	182	0.	*	1		2120	257	0.
1		0240	33	64.	*	1		0855	108	1.	*	1		1510	183	0.	*	1		2125	258	0.
1		0245	34	64.	*	1		0900	109	1.	*	1		1515	184	0.	*	1		2130	259	0.
1		0250	35	66.	*	1		0905	110	1.	*	1		1520	185	0.	*	1		2135	260	0.
1		0255	36	65.	*	1		0910	111	1.	*	1		1525	186	0.	*	1		2140	261	0.
1		0300	37	62.	*	1		0915	112	1.	*	1		1530	187	0.	*	1		2145	262	0.

1	0305	38	65.	*	1	0920	113	1.	*	1	1535	188	0.	*	1	2150	263	0.
1	0310	39	85.	*	1	0925	114	1.	*	1	1540	189	0.	*	1	2155	264	0.
1	0315	40	135.	*	1	0930	115	1.	*	1	1545	190	0.	*	1	2200	265	0.
1	0320	41	240.	*	1	0935	116	1.	*	1	1550	191	0.	*	1	2205	266	0.
1	0325	42	415.	*	1	0940	117	1.	*	1	1555	192	0.	*	1	2210	267	0.
1	0330	43	661.	*	1	0945	118	1.	*	1	1600	193	0.	*	1	2215	268	0.
1	0335	44	998.	*	1	0950	119	1.	*	1	1605	194	0.	*	1	2220	269	0.
1	0340	45	1532.	*	1	0955	120	1.	*	1	1610	195	0.	*	1	2225	270	0.
1	0345	46	2252.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	2952.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	3386.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	3561.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	3552.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	3414.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	3175.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	2859.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	2503.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	2150.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	1824.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	1526.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	1265.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	1047.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	872.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	735.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	623.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	531.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	456.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	395.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	342.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	298.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	259.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	223.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	190.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	161.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	137.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	115.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	96.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	79.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3561.	4.00		657.	166.	160.	160.
		(INCHES)	1.296	1.309	1.309	1.309
		(AC-FT)	326.	329.	329.	329.

CUMULATIVE AREA = 4.71 SQ MI

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105 KK      ***************
            *             *
            *      AWDB   *
            *             *
            ***************

107 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

108 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC    1659.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

109 SV            STORAGE         .0        .4       2.8       8.1      16.3      27.2      40.2      54.8      70.8      87.9
                                105.9     124.7     144.1     163.9     184.3     205.3     226.7     235.4     248.5     270.8

111 SE            ELEVATION  1659.00   1660.00   1661.00   1662.00   1663.00   1664.00   1665.00   1666.00   1667.00   1668.00
                             1669.00   1670.00   1671.00   1672.00   1673.00   1674.00   1675.00   1675.40   1676.00   1677.00

113 SQ            DISCHARGE       0.        0.        0.        7.       31.       55.      116.      155.      186.      212.
                                236.      257.      277.      295.      312.      329.      344.      350.     1074.     3416.
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HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .89

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	286.	153.7	1671.5	*	1		1640	201	61.	28.6	1664.1
1		0005	2	0.	.0	1659.0	*	1		0825	102	284.	151.8	1671.4	*	1		1645	202	59.	28.2	1664.1
1		0010	3	0.	.1	1659.2	*	1		0830	103	282.	149.8	1671.3	*	1		1650	203	57.	27.7	1664.0
1		0015	4	0.	.3	1659.7	*	1		0835	104	280.	147.9	1671.2	*	1		1655	204	56.	27.4	1664.0
1		0020	5	0.	.7	1660.1	*	1		0840	105	279.	146.0	1671.1	*	1		1700	205	54.	27.0	1664.0
1		0025	6	0.	1.2	1660.3	*	1		0845	106	277.	144.1	1671.0	*	1		1705	206	54.	26.6	1663.9
1		0030	7	0.	1.8	1660.6	*	1		0850	107	275.	142.2	1670.9	*	1		1710	207	53.	26.2	1663.9
1		0035	8	0.	2.5	1660.8	*	1		0855	108	273.	140.3	1670.8	*	1		1715	208	52.	25.9	1663.9
1		0040	9	0.	3.1	1661.1	*	1		0900	109	271.	138.4	1670.7	*	1		1720	209	51.	25.5	1663.8
1		0045	10	1.	3.8	1661.2	*	1		0905	110	269.	136.6	1670.6	*	1		1725	210	50.	25.2	1663.8

1	0050	11	2.	4.3	1661.3	*	1	0910	111	267.	134.7	1670.5	*	1	1730	211	50.	24.8	1663.8
1	0055	12	3.	4.8	1661.4	*	1	0915	112	265.	132.9	1670.4	*	1	1735	212	49.	24.5	1663.7
1	0100	13	3.	5.1	1661.4	*	1	0920	113	264.	131.1	1670.3	*	1	1740	213	48.	24.2	1663.7
1	0105	14	3.	5.4	1661.5	*	1	0925	114	262.	129.3	1670.2	*	1	1745	214	48.	23.8	1663.7
1	0110	15	4.	5.7	1661.5	*	1	0930	115	260.	127.5	1670.1	*	1	1750	215	47.	23.5	1663.7
1	0115	16	4.	5.9	1661.6	*	1	0935	116	258.	125.7	1670.1	*	1	1755	216	46.	23.2	1663.6
1	0120	17	4.	6.1	1661.6	*	1	0940	117	256.	123.9	1670.0	*	1	1800	217	45.	22.9	1663.6
1	0125	18	5.	6.3	1661.7	*	1	0945	118	254.	122.2	1669.9	*	1	1805	218	45.	22.6	1663.6
1	0130	19	5.	6.6	1661.7	*	1	0950	119	252.	120.4	1669.8	*	1	1810	219	44.	22.3	1663.5
1	0135	20	5.	6.9	1661.8	*	1	0955	120	250.	118.7	1669.7	*	1	1815	220	43.	22.0	1663.5
1	0140	21	6.	7.2	1661.8	*	1	1000	121	248.	117.0	1669.6	*	1	1820	221	43.	21.7	1663.5
1	0145	22	6.	7.5	1661.9	*	1	1005	122	246.	115.3	1669.5	*	1	1825	222	42.	21.4	1663.5
1	0150	23	7.	7.9	1662.0	*	1	1010	123	245.	113.6	1669.4	*	1	1830	223	41.	21.1	1663.4
1	0155	24	7.	8.2	1662.0	*	1	1015	124	243.	111.9	1669.3	*	1	1835	224	41.	20.8	1663.4
1	0200	25	8.	8.5	1662.0	*	1	1020	125	241.	110.3	1669.2	*	1	1840	225	40.	20.5	1663.4
1	0205	26	9.	8.8	1662.1	*	1	1025	126	239.	108.6	1669.1	*	1	1845	226	40.	20.2	1663.4
1	0210	27	10.	9.0	1662.1	*	1	1030	127	237.	107.0	1669.1	*	1	1850	227	39.	20.0	1663.3
1	0215	28	10.	9.2	1662.1	*	1	1035	128	235.	105.4	1669.0	*	1	1855	228	38.	19.7	1663.3
1	0220	29	11.	9.5	1662.2	*	1	1040	129	233.	103.8	1668.9	*	1	1900	229	38.	19.4	1663.3
1	0225	30	12.	9.7	1662.2	*	1	1045	130	231.	102.2	1668.8	*	1	1905	230	37.	19.2	1663.3
1	0230	31	13.	10.0	1662.2	*	1	1050	131	229.	100.6	1668.7	*	1	1910	231	37.	18.9	1663.2
1	0235	32	14.	10.4	1662.3	*	1	1055	132	227.	99.0	1668.6	*	1	1915	232	36.	18.7	1663.2
1	0240	33	14.	10.7	1662.3	*	1	1100	133	225.	97.5	1668.5	*	1	1920	233	36.	18.4	1663.2
1	0245	34	15.	11.0	1662.3	*	1	1105	134	223.	95.9	1668.4	*	1	1925	234	35.	18.2	1663.2
1	0250	35	16.	11.3	1662.4	*	1	1110	135	221.	94.4	1668.4	*	1	1930	235	35.	17.9	1663.1
1	0255	36	17.	11.5	1662.4	*	1	1115	136	219.	92.9	1668.3	*	1	1935	236	34.	17.7	1663.1
1	0300	37	18.	11.8	1662.4	*	1	1120	137	217.	91.4	1668.2	*	1	1940	237	34.	17.5	1663.1
1	0305	38	19.	12.1	1662.5	*	1	1125	138	215.	89.9	1668.1	*	1	1945	238	33.	17.2	1663.1
1	0310	39	19.	12.4	1662.5	*	1	1130	139	213.	88.4	1668.0	*	1	1950	239	33.	17.0	1663.1
1	0315	40	21.	12.9	1662.6	*	1	1135	140	211.	87.0	1667.9	*	1	1955	240	32.	16.8	1663.0
1	0320	41	24.	13.8	1662.7	*	1	1140	141	208.	85.5	1667.9	*	1	2000	241	32.	16.6	1663.0
1	0325	42	29.	15.5	1662.9	*	1	1145	142	206.	84.1	1667.8	*	1	2005	242	31.	16.4	1663.0
1	0330	43	36.	18.4	1663.2	*	1	1150	143	204.	82.7	1667.7	*	1	2010	243	30.	16.2	1663.0
1	0335	44	45.	22.9	1663.6	*	1	1155	144	202.	81.3	1667.6	*	1	2015	244	30.	15.9	1663.0
1	0340	45	66.	29.5	1664.2	*	1	1200	145	200.	79.9	1667.5	*	1	2020	245	29.	15.7	1662.9
1	0345	46	111.	39.1	1664.9	*	1	1205	146	198.	78.5	1667.5	*	1	2025	246	29.	15.5	1662.9
1	0350	47	149.	52.4	1665.8	*	1	1210	147	196.	77.2	1667.4	*	1	2030	247	28.	15.3	1662.9
1	0355	48	183.	69.3	1666.9	*	1	1215	148	194.	75.8	1667.3	*	1	2035	248	28.	15.2	1662.9
1	0400	49	212.	88.0	1668.0	*	1	1220	149	192.	74.5	1667.2	*	1	2040	249	27.	15.0	1662.8
1	0405	50	237.	107.1	1669.1	*	1	1225	150	190.	73.2	1667.1	*	1	2045	250	26.	14.8	1662.8
1	0410	51	258.	125.6	1670.0	*	1	1230	151	188.	71.9	1667.1	*	1	2050	251	26.	14.6	1662.8
1	0415	52	276.	142.9	1670.9	*	1	1235	152	186.	70.6	1667.0	*	1	2055	252	25.	14.4	1662.8
1	0420	53	290.	158.4	1671.7	*	1	1240	153	183.	69.4	1666.9	*	1	2100	253	25.	14.3	1662.7
1	0425	54	302.	172.0	1672.4	*	1	1245	154	181.	68.1	1666.8	*	1	2105	254	24.	14.1	1662.7
1	0430	55	311.	183.4	1673.0	*	1	1250	155	178.	66.9	1666.8	*	1	2110	255	24.	13.9	1662.7
1	0435	56	319.	192.8	1673.4	*	1	1255	156	176.	65.6	1666.7	*	1	2115	256	23.	13.8	1662.7
1	0440	57	325.	200.3	1673.8	*	1	1300	157	174.	64.4	1666.6	*	1	2120	257	23.	13.6	1662.7
1	0445	58	330.	206.1	1674.0	*	1	1305	158	171.	63.3	1666.5	*	1	2125	258	23.	13.4	1662.6
1	0450	59	333.	210.5	1674.2	*	1	1310	159	169.	62.1	1666.5	*	1	2130	259	22.	13.3	1662.6
1	0455	60	335.	213.8	1674.4	*	1	1315	160	167.	60.9	1666.4	*	1	2135	260	22.	13.1	1662.6
1	0500	61	337.	216.1	1674.5	*	1	1320	161	165.	59.8	1666.3	*	1	2140	261	21.	13.0	1662.6
1	0505	62	338.	217.6	1674.6	*	1	1325	162	163.	58.7	1666.2	*	1	2145	262	21.	12.8	1662.6
1	0510	63	338.	218.5	1674.6	*	1	1330	163	160.	57.5	1666.2	*	1	2150	263	20.	12.7	1662.6
1	0515	64	339.	218.9	1674.6	*	1	1335	164	158.	56.5	1666.1	*	1	2155	264	20.	12.6	1662.5
1	0520	65	339.	218.9	1674.6	*	1	1340	165	156.	55.4	1666.0	*	1	2200	265	20.	12.4	1662.5
1	0525	66	338.	218.5	1674.6	*	1	1345	166	154.	54.3	1666.0	*	1	2205	266	19.	12.3	1662.5
1	0530	67	338.	217.8	1674.6	*	1	1350	167	151.	53.3	1665.9	*	1	2210	267	19.	12.2	1662.5
1	0535	68	337.	217.0	1674.5	*	1	1355	168	148.	52.2	1665.8	*	1	2215	268	18.	12.0	1662.5
1	0540	69	336.	215.9	1674.5	*	1	1400	169	145.	51.2	1665.8	*	1	2220	269	18.	11.9	1662.5
1	0545	70	336.	214.6	1674.4	*	1	1405	170	143.	50.2	1665.7	*	1	2225	270	18.	11.8	1662.4
1	0550	71	335.	213.2	1674.4	*	1	1410	171	140.	49.2	1665.6	*	1	2230	271	17.	11.7	1662.4
1	0555	72	333.	211.7	1674.3	*	1	1415	172	138.	48.3	1665.6	*	1	2235	272	17.	11.5	1662.4
1	0600	73	332.	210.1	1674.2	*	1	1420	173	135.	47.4	1665.5	*	1	2240	273	17.	11.4	1662.4
1	0605	74	331.	208.3	1674.1	*	1	1425	174	133.	46.4	1665.4	*	1	2245	274	16.	11.3	1662.4
1	0610	75	330.	206.5	1674.1	*	1	1430	175	130.	45.5	1665.4	*	1	2250	275	16.	11.2	1662.4
1	0615	76	328.	204.6	1674.0	*	1	1435	176	128.	44.6	1665.3	*	1	2255	276	16.	11.1	1662.4
1	0620	77	327.	202.7	1673.9	*	1	1440	177	126.	43.8	1665.2	*	1	2300	277	15.	11.0	1662.3
1	0625	78	325.	200.7	1673.8	*	1	1445	178	123.	42.9	1665.2	*	1	2305	278	15.	10.9	1662.3
1	0630	79	324.	198.7	1673.7	*	1	1450	179	121.	42.1	1665.1	*	1	2310	279	15.	10.8	1662.3
1	0635	80	322.	196.6	1673.6	*	1	1455	180	119.	41.2	1665.1	*	1	2315	280	14.	10.7	1662.3
1	0640	81	320.	194.6	1673.5	*	1	1500	181	117.	40.4	1665.0	*	1	2320	281	14.	10.6	1662.3
1	0645	82	319.	192.5	1673.4	*	1	1505	182	113.	39.6	1665.0	*	1	2325	282	14.	10.5	1662.3
1	0650	83	317.	190.4	1673.3	*	1	1510	183	110.	38.9	1664.9	*	1	2330	283	14.	10.4	1662.3
1	0655	84	315.	188.3	1673.2	*	1	1515	184	106.	38.1	1664.8	*	1	2335	284	13.	10.3	1662.3
1	0700	85	314.	186.2	1673.1	*	1	1520	185	103.	37.4	1664.8	*	1	2340	285	13.	10.2	1662.3
1	0705	86	312.	184.2	1673.0	*	1	1525	186	100.	36.7	1664.7	*	1	2345	286	13.	10.1	1662.2
1	0710	87	310.	182.1	1672.9	*	1	1530	187	96.	36.0	1664.7	*	1	2350	287	13.	10.0	1662.2
1	0715	88	308.	180.0	1672.8	*	1	1535	188	93.	35.4	1664.6	*	1	2355	288	12.	9.9	1662.2
1	0720	89	307.	177.9	1672.7	*	1	1540	189	90.	34.8	1664.6	*	2	0000	289	12.	9.9	1662.2
1	0725	90	305.	175.9	1672.6	*	1	1545	190	88.	34.1	1664.5	*	2	0005	290	12.	9.8	1662.2
1	0730	91	303.	173.8	1672.5	*	1	1550	191	85.	33.5	1664.5	*	2	0010	291	12.	9.7	1662.2
1	0735	92	302.	171.7	1672.4	*	1	1555	192	82.	33.0	1664.4	*	2	0015	292	11.	9.6	1662.2
1	0740	93	300.	169.7	1672.3	*	1	1600	193	79.	32.4	1664.4	*	2	0020	293	11.	9.5	1662.2
1	0745	94	298.	167.7	1672.2	*	1	1605	194	77.	31.9	1664.4	*	2	0025	294	11.	9.5	1662.2
1	0750	95	296.	165.6	1672.1	*	1	1610	195	74.	31.4	1664.3	*	2	0030	295	11.	9.4	1662.2
1	0755	96	295.	163.6	1672.0	*	1	1615	196	72.	30.9	1664.3	*	2	0035	296	10.	9.3	1662.1
1	0800	97	293.	161.6	1671.9	*	1	1620	197	70.	30.4	1664.2	*	2	0040	297	10.	9.3	1662.1
1	0805	98	291.	159.6	1671.8	*	1	1625	198	68.	29.9	1664.2	*	2	0045	298	10.	9.2	1662.1
1	0810	99	289.	157.6	1671.7	*	1	1630	199	65.	29.4	1664.2	*	2	0050	299	10.	9.1	1662.1
1	0815	100	288.	155.7	1671.6	*	1	1635	200	63.	29.0	1664.1	*	2	0055	300	10.	9.0	1662.1
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 339.	5.25		301.	133.	128.	128.
		(INCHES)	.594	1.052	1.052	1.052
		(AC-FT)	149.	264.	264.	264.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
+ 219.	5.25	173.	69.	66.	66.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1674.64	5.25	1672.43	1666.23	1666.02	1666.02

CUMULATIVE AREA = 4.71 SQ MI

HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .90

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	291.	160.0	1671.8	*	1		1640	201	68.	30.0	1664.2
1		0005	2	0.	.0	1659.0	*	1		0825	102	290.	158.0	1671.7	*	1		1645	202	66.	29.5	1664.2
1		0010	3	0.	.1	1659.2	*	1		0830	103	288.	156.0	1671.6	*	1		1650	203	64.	29.1	1664.1
1		0015	4	0.	.3	1659.7	*	1		0835	104	286.	154.0	1671.5	*	1		1655	204	62.	28.6	1664.1
1		0020	5	0.	.7	1660.1	*	1		0840	105	284.	152.1	1671.4	*	1		1700	205	60.	28.2	1664.1
1		0025	6	0.	1.2	1660.3	*	1		0845	106	283.	150.1	1671.3	*	1		1705	206	58.	27.8	1664.0
1		0030	7	0.	1.8	1660.6	*	1		0850	107	281.	148.2	1671.2	*	1		1710	207	56.	27.4	1664.0
1		0035	8	0.	2.5	1660.9	*	1		0855	108	279.	146.3	1671.1	*	1		1715	208	55.	27.0	1664.0
1		0040	9	0.	3.2	1661.1	*	1		0900	109	277.	144.4	1671.0	*	1		1720	209	54.	26.7	1663.9
1		0045	10	1.	3.8	1661.2	*	1		0905	110	275.	142.5	1670.9	*	1		1725	210	53.	26.3	1663.9
1		0050	11	2.	4.4	1661.3	*	1		0910	111	273.	140.6	1670.8	*	1		1730	211	52.	25.9	1663.9
1		0055	12	3.	4.9	1661.4	*	1		0915	112	271.	138.7	1670.7	*	1		1735	212	51.	25.6	1663.8
1		0100	13	3.	5.2	1661.5	*	1		0920	113	270.	136.9	1670.6	*	1		1740	213	51.	25.2	1663.8
1		0105	14	4.	5.5	1661.5	*	1		0925	114	268.	135.0	1670.5	*	1		1745	214	50.	24.9	1663.8
1		0110	15	4.	5.8	1661.6	*	1		0930	115	266.	133.2	1670.4	*	1		1750	215	49.	24.5	1663.8
1		0115	16	4.	6.0	1661.6	*	1		0935	116	264.	131.4	1670.3	*	1		1755	216	48.	24.2	1663.7
1		0120	17	4.	6.2	1661.6	*	1		0940	117	262.	129.6	1670.2	*	1		1800	217	48.	23.9	1663.7
1		0125	18	5.	6.4	1661.7	*	1		0945	118	260.	127.8	1670.2	*	1		1805	218	47.	23.6	1663.7
1		0130	19	5.	6.7	1661.7	*	1		0950	119	258.	126.0	1670.1	*	1		1810	219	46.	23.2	1663.6
1		0135	20	5.	7.0	1661.8	*	1		0955	120	256.	124.2	1670.0	*	1		1815	220	46.	22.9	1663.6
1		0140	21	6.	7.3	1661.8	*	1		1000	121	254.	122.5	1669.9	*	1		1820	221	45.	22.6	1663.6
1		0145	22	6.	7.6	1661.9	*	1		1005	122	253.	120.7	1669.8	*	1		1825	222	44.	22.3	1663.5
1		0150	23	7.	8.0	1662.0	*	1		1010	123	251.	119.0	1669.7	*	1		1830	223	43.	22.0	1663.5
1		0155	24	8.	8.4	1662.0	*	1		1015	124	249.	117.3	1669.6	*	1		1835	224	43.	21.7	1663.5
1		0200	25	9.	8.7	1662.1	*	1		1020	125	247.	115.6	1669.5	*	1		1840	225	42.	21.4	1663.5
1		0205	26	9.	8.9	1662.1	*	1		1025	126	245.	113.9	1669.4	*	1		1845	226	42.	21.1	1663.4
1		0210	27	10.	9.2	1662.1	*	1		1030	127	243.	112.2	1669.3	*	1		1850	227	41.	20.8	1663.4
1		0215	28	11.	9.4	1662.1	*	1		1035	128	241.	110.5	1669.2	*	1		1855	228	40.	20.6	1663.4
1		0220	29	11.	9.6	1662.2	*	1		1040	129	239.	108.9	1669.2	*	1		1900	229	40.	20.3	1663.4
1		0225	30	12.	9.9	1662.2	*	1		1045	130	237.	107.3	1669.1	*	1		1905	230	39.	20.0	1663.3
1		0230	31	13.	10.2	1662.3	*	1		1050	131	236.	105.6	1669.0	*	1		1910	231	39.	19.7	1663.3
1		0235	32	14.	10.5	1662.3	*	1		1055	132	233.	104.0	1668.9	*	1		1915	232	38.	19.5	1663.3
1		0240	33	15.	10.8	1662.3	*	1		1100	133	231.	102.4	1668.8	*	1		1920	233	37.	19.2	1663.3
1		0245	34	16.	11.1	1662.4	*	1		1105	134	229.	100.8	1668.7	*	1		1925	234	37.	19.0	1663.2
1		0250	35	17.	11.4	1662.4	*	1		1110	135	227.	99.3	1668.6	*	1		1930	235	36.	18.7	1663.2
1		0255	36	17.	11.7	1662.4	*	1		1115	136	225.	97.7	1668.5	*	1		1935	236	36.	18.5	1663.2
1		0300	37	18.	12.0	1662.5	*	1		1120	137	223.	96.2	1668.5	*	1		1940	237	35.	18.2	1663.2
1		0305	38	19.	12.3	1662.5	*	1		1125	138	221.	94.6	1668.4	*	1		1945	238	35.	18.0	1663.2
1		0310	39	20.	12.6	1662.5	*	1		1130	139	219.	93.1	1668.3	*	1		1950	239	34.	17.7	1663.1
1		0315	40	21.	13.1	1662.6	*	1		1135	140	217.	91.6	1668.2	*	1		1955	240	34.	17.5	1663.1
1		0320	41	24.	14.0	1662.7	*	1		1140	141	215.	90.1	1668.1	*	1		2000	241	33.	17.3	1663.1
1		0325	42	29.	15.8	1662.9	*	1		1145	142	213.	88.7	1668.0	*	1		2005	242	33.	17.1	1663.1
1		0330	43	36.	18.8	1663.2	*	1		1150	143	211.	87.2	1668.0	*	1		2010	243	32.	16.8	1663.0
1		0335	44	47.	23.4	1663.6	*	1		1155	144	209.	85.8	1667.9	*	1		2015	244	32.	16.6	1663.0
1		0340	45	69.	30.2	1664.2	*	1		1200	145	207.	84.3	1667.8	*	1		2020	245	31.	16.4	1663.0
1		0345	46	116.	40.2	1665.0	*	1		1205	146	204.	82.9	1667.7	*	1		2025	246	31.	16.2	1663.0
1		0350	47	153.	54.0	1665.9	*	1		1210	147	202.	81.5	1667.6	*	1		2030	247	30.	16.0	1663.0
1		0355	48	187.	71.5	1667.0	*	1		1215	148	200.	80.1	1667.5	*	1		2035	248	29.	15.8	1662.9
1		0400	49	216.	90.8	1668.2	*	1		1220	149	198.	78.8	1667.5	*	1		2040	249	29.	15.6	1662.9
1		0405	50	241.	110.5	1669.2	*	1		1225	150	196.	77.4	1667.4	*	1		2045	250	28.	15.4	1662.9
1		0410	51	262.	129.6	1670.2	*	1		1230	151	194.	76.1	1667.3	*	1		2050	251	28.	15.2	1662.9
1		0415	52	280.	147.4	1671.2	*	1		1235	152	192.	74.7	1667.2	*	1		2055	252	27.	15.0	1662.8
1		0420	53	295.	163.4	1672.0	*	1		1240	153	190.	73.4	1667.2	*	1		2100	253	27.	14.8	1662.8
1		0425	54	306.	177.3	1672.7	*	1		1245	154	188.	72.1	1667.1	*	1		2105	254	26.	14.6	1662.8
1		0430	55	316.	189.1	1673.2	*	1		1250	155	186.	70.8	1667.0	*	1		2110	255	26.	14.5	1662.8
1		0435	56	324.	198.7	1673.7	*	1		1255	156	184.	69.6	1666.9	*	1		2115	256	25.	14.3	1662.7
1		0440	57	330.	206.5	1674.1	*	1		1300	157	181.	68.3	1666.8	*	1		2120	257	24.	14.1	1662.7
1		0445	58	334.	212.5	1674.3	*	1		1305	158	179.	67.1	1666.8	*	1		2125	258	24.	13.9	1662.7
1		0450	59	337.	217.0	1674.5	*	1		1310	159	176.	65.8	1666.7	*	1		2130	259	24.	13.8	1662.7
1		0455	60	340.	220.4	1674.7	*	1		1315	160	174.	64.6	1666.6	*	1		2135	260	23.	13.6	1662.7
1		0500	61	341.	222.8	1674.8	*	1		1320	161	172.	63.4	1666.5	*	1		2140	261	23.	13.5	1662.6
1		0505	62	342.	224.4	1674.9	*	1		1325	162	170.	62.3	1666.5	*	1		2145	262	22.	13.3	1662.6
1		0510	63	343.	225.3	1674.9	*	1		1330	163	167.	61.1	1666.4	*	1		2150	263	22.	13.2	1662.6
1		0515	64	343.	225.8	1675.0	*	1		1335	164	165.	60.0	1666.3	*	1		2155	264	21.	13.0	1662.6
1		0520	65	343.	225.8	1675.0	*	1		1340	165	163.	58.8	1666.3	*	1		2200	265	21.	12.9	1662.6
1		0525	66	343.	225.5	1674.9	*	1		1345	166	161.	57.7	1666.2	*	1		2205	266	20.	12.7	1662.6
1		0530	67	343.	224.9	1674.9	*	1		1350	167	159.	56.6	1666.1	*	1		2210	267	20.	12.6	1662.5
1		0535	68	342.	224.1	1674.9	*	1		1355	168	156.	55.5	1666.0	*	1		2215	268	20.	12.4	1662.5
1		0540	69	341.	223.0	1674.8	*	1		1400	169	154.	54.5	1666.0	*	1		2220	269	19.	12.3	1662.5
1		0545	70	341.	221.8	1674.8	*	1		1405	170	151.	53.4	1665.9	*	1		2225	270	19.	12.2	1662.5
1		0550	71	340.	220.4	1674.7	*	1		1410	171	149.	52.4	1665.8	*	1		2230	271	18.	12.1	1662.5
1		0555	72	339.	218.8	1674.6	*	1		1415	172	146.	51.4	1665.8	*	1		2235	272	18.	11.9	1662.5
1		0600	73	337.	217.2	1674.6	*	1		1420	173	143.	50.4	1665.7	*	1		2240	273	18.	11.8	1662.4
1		0605	74	336.	215.5	1674.5	*	1		1425	174	141.	49.4	1665.6	*	1		2245	274	17.	11.7	1662.4
1		0610	75	335.	213.6	1674.4	*	1		1430	175	138.	48.4	1665.6	*	1		2250	275	17.	11.6	1662.4
1		0615	76	334.	211.7	1674.3	*	1		1435	176	136.	47.5	1665.5	*	1		2255	276	17.	11.4	1662.4
1		0620	77	332.	209.8	1674.2	*	1		1440	177	133.	46.6	1665.4	*	1		2300	277	16.	11.3	1662.4
1		0625	78	331.	207.7	1674.1	*	1		1445	178	131.	45.7	1665.4	*	1		2305	278	16.	11.2	1662.4
1		0630	79	329.	205.7	1674.0	*	1		1450	179	128.	44.8	1665.3	*	1		2310	279	16.	11.1	1662.4
1		0635	80	328.	203.6	1673.9	*	1		1455	180	126.	43.9	1665.3	*	1		2315	280	15.	11.0	1662.3
1		0640	81	326.	201.5	1673.8	*	1		1500	181	124.	43.0	1665.2	*	1		2320	281	15.	10.9	1662.3
1		0645	82	324.	199.4	1673.7	*	1		1505	182	121.	42.2	1665.1	*	1		2325	282	15.	10.8	1662.3
1		0650	83	323.	197.3	1673.6	*	1		1510	183	119.	41.4	1665.1	*	1		2330	283	14.	10.7	1662.3
1		0655	84	321.	195.2	1673.5	*	1		1515	184	117.	40.6	1665.0	*	1		2335	284	14.	10.6	1662.3
1		0700	85	319.	193.1	1673.4	*	1		1520	185	114.	39.8	1665.0	*	1		2340	285	14.	10.5	1662.3
1		0705	86	317.	191.0	1673.3	*	1		1525	186	110.	39.0	1664.9	*	1		2345	286	14.	10.4	1662.3
1		0710	87	316.	188.9	1673.2	*	1		1530	187	107.	38.2	1664.8	*	1		2350	287	13.	10.3	1662.3
1		0715	88	314.	186.7	1673.1	*	1		1535	188	103.	37.5	1664.8	*	1		2355	288	13.	10.2	1662.3
1		0720	89	312.	184.6	1673.0	*	1		1540	189	100.	36.8	1664.7	*	2		0000	289	13.	10.1	1662.2

1	0725	90	311.	182.5	1672.9	*	1	1545	190	97.	36.1	1664.7	*	2	0005	290	13.	10.0	1662.2
1	0730	91	309.	180.4	1672.8	*	1	1550	191	94.	35.5	1664.6	*	2	0010	291	12.	10.0	1662.2
1	0735	92	307.	178.4	1672.7	*	1	1555	192	91.	34.9	1664.6	*	2	0015	292	12.	9.9	1662.2
1	0740	93	305.	176.3	1672.6	*	1	1600	193	88.	34.2	1664.5	*	2	0020	293	12.	9.8	1662.2
1	0745	94	304.	174.2	1672.5	*	1	1605	194	85.	33.6	1664.5	*	2	0025	294	12.	9.7	1662.2
1	0750	95	302.	172.1	1672.4	*	1	1610	195	82.	33.1	1664.4	*	2	0030	295	11.	9.6	1662.2
1	0755	96	300.	170.1	1672.3	*	1	1615	196	80.	32.5	1664.4	*	2	0035	296	11.	9.6	1662.2
1	0800	97	298.	168.0	1672.2	*	1	1620	197	77.	32.0	1664.4	*	2	0040	297	11.	9.5	1662.2
1	0805	98	297.	166.0	1672.1	*	1	1625	198	75.	31.4	1664.3	*	2	0045	298	11.	9.4	1662.2
1	0810	99	295.	164.0	1672.0	*	1	1630	199	72.	30.9	1664.3	*	2	0050	299	10.	9.3	1662.1
1	0815	100	293.	162.0	1671.9	*	1	1635	200	70.	30.4	1664.2	*	2	0055	300	10.	9.3	1662.1
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 343.	5.33		306.	137.	132.	132.
		(INCHES)	.605	1.084	1.085	1.085
		(AC-FT)	152.	272.	272.	272.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
226.	5.33	180.	71.	69.	69.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1674.96	5.33	1672.74	1666.40	1666.18	1666.18

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .92

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	297.	166.3	1672.1	*	1		1640	201	75.	31.5	1664.3
1		0005	2	0.	.0	1659.0	*	1		0825	102	295.	164.2	1672.0	*	1		1645	202	73.	31.0	1664.3
1		0010	3	0.	.1	1659.2	*	1		0830	103	293.	162.2	1671.9	*	1		1650	203	70.	30.5	1664.3
1		0015	4	0.	.3	1659.7	*	1		0835	104	292.	160.2	1671.8	*	1		1655	204	68.	30.0	1664.2
1		0020	5	0.	.7	1660.1	*	1		0840	105	290.	158.2	1671.7	*	1		1700	205	66.	29.6	1664.2
1		0025	6	0.	1.2	1660.3	*	1		0845	106	288.	156.2	1671.6	*	1		1705	206	64.	29.1	1664.1
1		0030	7	0.	1.8	1660.6	*	1		0850	107	286.	154.3	1671.5	*	1		1710	207	62.	28.7	1664.1
1		0035	8	0.	2.5	1660.9	*	1		0855	108	284.	152.3	1671.4	*	1		1715	208	60.	28.3	1664.1
1		0040	9	1.	3.2	1661.1	*	1		0900	109	283.	150.4	1671.3	*	1		1720	209	58.	27.8	1664.0
1		0045	10	1.	3.9	1661.2	*	1		0905	110	281.	148.4	1671.2	*	1		1725	210	56.	27.5	1664.0
1		0050	11	2.	4.5	1661.3	*	1		0910	111	279.	146.5	1671.1	*	1		1730	211	55.	27.1	1664.0
1		0055	12	3.	4.9	1661.4	*	1		0915	112	277.	144.6	1671.0	*	1		1735	212	54.	26.7	1664.0
1		0100	13	3.	5.3	1661.5	*	1		0920	113	276.	142.7	1670.9	*	1		1740	213	53.	26.3	1663.9
1		0105	14	4.	5.6	1661.5	*	1		0925	114	274.	140.8	1670.8	*	1		1745	214	52.	26.0	1663.9
1		0110	15	4.	5.9	1661.6	*	1		0930	115	272.	138.9	1670.7	*	1		1750	215	51.	25.6	1663.9
1		0115	16	4.	6.1	1661.6	*	1		0935	116	270.	137.1	1670.6	*	1		1755	216	51.	25.3	1663.8
1		0120	17	5.	6.3	1661.7	*	1		0940	117	268.	135.2	1670.5	*	1		1800	217	50.	24.9	1663.8
1		0125	18	5.	6.5	1661.7	*	1		0945	118	266.	133.4	1670.4	*	1		1805	218	49.	24.6	1663.8
1		0130	19	5.	6.8	1661.7	*	1		0950	119	264.	131.6	1670.4	*	1		1810	219	48.	24.2	1663.7
1		0135	20	6.	7.1	1661.8	*	1		0955	120	262.	129.8	1670.3	*	1		1815	220	48.	23.9	1663.7
1		0140	21	6.	7.4	1661.9	*	1		1000	121	260.	128.0	1670.2	*	1		1820	221	47.	23.6	1663.7
1		0145	22	6.	7.7	1661.9	*	1		1005	122	258.	126.2	1670.1	*	1		1825	222	46.	23.3	1663.6
1		0150	23	7.	8.1	1662.0	*	1		1010	123	257.	124.4	1670.0	*	1		1830	223	46.	22.9	1663.6
1		0155	24	8.	8.5	1662.0	*	1		1015	124	255.	122.7	1669.9	*	1		1835	224	45.	22.6	1663.6
1		0200	25	9.	8.8	1662.1	*	1		1020	125	253.	120.9	1669.8	*	1		1840	225	44.	22.3	1663.6
1		0205	26	10.	9.1	1662.1	*	1		1025	126	251.	119.2	1669.7	*	1		1845	226	44.	22.0	1663.5
1		0210	27	10.	9.3	1662.1	*	1		1030	127	249.	117.5	1669.6	*	1		1850	227	43.	21.7	1663.5
1		0215	28	11.	9.5	1662.2	*	1		1035	128	247.	115.8	1669.5	*	1		1855	228	42.	21.4	1663.5
1		0220	29	12.	9.7	1662.2	*	1		1040	129	245.	114.1	1669.4	*	1		1900	229	42.	21.1	1663.4
1		0225	30	12.	10.0	1662.2	*	1		1045	130	243.	112.4	1669.3	*	1		1905	230	41.	20.9	1663.4
1		0230	31	13.	10.3	1662.3	*	1		1050	131	241.	110.7	1669.3	*	1		1910	231	40.	20.6	1663.4
1		0235	32	14.	10.7	1662.3	*	1		1055	132	239.	109.1	1669.2	*	1		1915	232	40.	20.3	1663.4
1		0240	33	15.	11.0	1662.3	*	1		1100	133	238.	107.4	1669.1	*	1		1920	233	39.	20.0	1663.3
1		0245	34	16.	11.3	1662.4	*	1		1105	134	236.	105.8	1669.0	*	1		1925	234	39.	19.8	1663.3
1		0250	35	17.	11.6	1662.4	*	1		1110	135	234.	104.2	1668.9	*	1		1930	235	38.	19.5	1663.3
1		0255	36	18.	11.9	1662.5	*	1		1115	136	232.	102.6	1668.8	*	1		1935	236	37.	19.2	1663.3
1		0300	37	19.	12.2	1662.5	*	1		1120	137	229.	101.0	1668.7	*	1		1940	237	37.	19.0	1663.2
1		0305	38	20.	12.4	1662.5	*	1		1125	138	227.	99.4	1668.6	*	1		1945	238	36.	18.7	1663.2
1		0310	39	21.	12.8	1662.6	*	1		1130	139	225.	97.9	1668.6	*	1		1950	239	36.	18.5	1663.2
1		0315	40	22.	13.3	1662.6	*	1		1135	140	223.	96.3	1668.5	*	1		1955	240	35.	18.2	1663.2
1		0320	41	25.	14.2	1662.7	*	1		1140	141	221.	94.8	1668.4	*	1		2000	241	35.	18.0	1663.2
1		0325	42	30.	16.0	1663.0	*	1		1145	142	219.	93.3	1668.3	*	1		2005	242	34.	17.8	1663.1
1		0330	43	37.	19.1	1663.3	*	1		1150	143	217.	91.8	1668.2	*	1		2010	243	34.	17.5	1663.1
1		0335	44	48.	23.9	1663.7	*	1		1155	144	215.	90.3	1668.1	*	1		2015	244	33.	17.3	1663.1
1		0340	45	73.	31.0	1664.3	*	1		1200	145	213.	88.8	1668.1	*	1		2020	245	33.	17.1	1663.1
1		0345	46	119.	41.3	1665.1	*	1		1205	146	211.	87.3	1668.0	*	1		2025	246	32.	16.9	1663.0
1		0350	47	157.	55.7	1666.1	*	1		1210	147	209.	85.9	1667.9	*	1		2030	247	32.	16.6	1663.0
1		0355	48	190.	73.7	1667.2	*	1		1215	148	207.	84.5	1667.8	*	1		2035	248	31.	16.4	1663.0
1		0400	49	220.	93.6	1668.3	*	1		1220	149	205.	83.1	1667.7	*	1		2040	249	31.	16.2	1663.0
1		0405	50	245.	113.8	1669.4	*	1		1225	150	203.	81.7	1667.6	*	1		2045	250	30.	16.0	1663.0
1		0410	51	266.	133.4	1670.4	*	1		1230	151	200.	80.3	1667.6	*	1		2050	251	29.	15.8	1662.9
1		0415	52	284.	151.7	1671.4	*	1		1235	152	198.	78.9	1667.5	*	1		2055	252	29.	15.6	1662.9
1		0420	53	299.	168.1	1672.2	*	1		1240	153	196.	77.5	1667.4	*	1		2100	253	28.	15.4	1662.9
1		0425	54	310.	182.5	1672.9	*	1		1245	154	194.	76.2	1667.3	*	1		2105	254	28.	15.2	1662.9
1		0430	55	320.	194.5	1673.5	*	1		1250	155	192.	74.9	1667.2	*	1		2110	255	27.	15.0	1662.8
1		0435	56	328.	204.5	1674.0	*	1		1255	156	190.	73.5	1667.2	*	1		2115	256	27.	14.8	1662.8
1		0440	57	334.	212.5	1674.3	*	1		1300	157	188.	72.2	1667.1	*	1		2120	257	26.	14.6	1662.8
1		0445	58	338.	218.7	1674.6	*	1		1305	158	186.	71.0	1667.0	*	1		2125	258	26.	14.5	1662.8
1		0450	59	342.	223.4	1674.8	*	1		1310	159	184.	69.7	1666.9	*	1		2130	259	25.	14.3	1662.8
1		0455	60	344.	226.9	1675.0	*	1		1315	160	181.	68.4	1666.9	*	1		2135	260	25.	14.1	1662.7
1		0500	61	346.	229.4	1675.1	*	1		1320	161	179.	67.2	1666.8	*	1		2140	261	24.	14.0	1662.7
1		0505	62	347.	231.1	1675.2	*	1		1325	162	177.	66.0	1666.7	*	1		2145	262	24.	13.8	1662.7

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0510	63	348.	232.2	1675.3	1		1330	163	174.	64.7	1666.6	1		2150	263	23.	13.6	1662.7
1		0515	64	348.	232.7	1675.3	1		1335	164	172.	63.6	1666.5	1		2155	264	23.	13.5	1662.7
1		0520	65	348.	232.8	1675.3	1		1340	165	170.	62.4	1666.5	1		2200	265	22.	13.3	1662.6
1		0525	66	348.	232.5	1675.3	1		1345	166	167.	61.2	1666.4	1		2205	266	22.	13.2	1662.6
1		0530	67	348.	232.0	1675.2	1		1350	167	165.	60.1	1666.3	1		2210	267	21.	13.0	1662.6
1		0535	68	347.	231.2	1675.2	1		1355	168	163.	58.9	1666.3	1		2215	268	21.	12.9	1662.6
1		0540	69	346.	230.2	1675.2	1		1400	169	161.	57.8	1666.2	1		2220	269	20.	12.7	1662.6
1		0545	70	346.	228.9	1675.1	1		1405	170	159.	56.7	1666.1	1		2225	270	20.	12.6	1662.5
1		0550	71	345.	227.6	1675.0	1		1410	171	157.	55.6	1666.1	1		2230	271	20.	12.5	1662.5
1		0555	72	344.	226.0	1675.0	1		1415	172	154.	54.6	1666.0	1		2235	272	19.	12.3	1662.5
1		0600	73	342.	224.4	1674.9	1		1420	173	152.	53.5	1665.9	1		2240	273	19.	12.2	1662.5
1		0605	74	341.	222.6	1674.8	1		1425	174	149.	52.5	1665.8	1		2245	274	19.	12.1	1662.5
1		0610	75	340.	220.8	1674.7	1		1430	175	146.	51.5	1665.8	1		2250	275	18.	11.9	1662.5
1		0615	76	339.	218.9	1674.6	1		1435	176	143.	50.5	1665.7	1		2255	276	18.	11.8	1662.4
1		0620	77	337.	216.9	1674.5	1		1440	177	141.	49.5	1665.6	1		2300	277	17.	11.7	1662.4
1		0625	78	336.	214.9	1674.4	1		1445	178	138.	48.5	1665.6	1		2305	278	17.	11.6	1662.4
1		0630	79	334.	212.8	1674.4	1		1450	179	136.	47.6	1665.5	1		2310	279	17.	11.5	1662.4
1		0635	80	333.	210.7	1674.3	1		1455	180	133.	46.7	1665.4	1		2315	280	16.	11.3	1662.4
1		0640	81	331.	208.6	1674.2	1		1500	181	131.	45.8	1665.4	1		2320	281	16.	11.2	1662.4
1		0645	82	330.	206.4	1674.1	1		1505	182	128.	44.9	1665.3	1		2325	282	16.	11.1	1662.4
1		0650	83	328.	204.3	1674.0	1		1510	183	126.	44.0	1665.3	1		2330	283	15.	11.0	1662.4
1		0655	84	326.	202.1	1673.8	1		1515	184	124.	43.1	1665.2	1		2335	284	15.	10.9	1662.3
1		0700	85	325.	200.0	1673.7	1		1520	185	122.	42.3	1665.1	1		2340	285	15.	10.8	1662.3
1		0705	86	323.	197.8	1673.6	1		1525	186	119.	41.5	1665.1	1		2345	286	15.	10.7	1662.3
1		0710	87	321.	195.7	1673.5	1		1530	187	117.	40.6	1665.0	1		2350	287	14.	10.6	1662.3
1		0715	88	319.	193.5	1673.4	1		1535	188	114.	39.8	1665.0	1		2355	288	14.	10.5	1662.3
1		0720	89	318.	191.4	1673.3	1		1540	189	111.	39.1	1664.9	2		0000	289	14.	10.4	1662.3
1		0725	90	316.	189.2	1673.2	1		1545	190	107.	38.3	1664.9	2		0005	290	13.	10.3	1662.3
1		0730	91	314.	187.1	1673.1	1		1550	191	104.	37.6	1664.8	2		0010	291	13.	10.2	1662.3
1		0735	92	313.	185.0	1673.0	1		1555	192	100.	36.9	1664.7	2		0015	292	13.	10.1	1662.2
1		0740	93	311.	182.8	1672.9	1		1600	193	97.	36.2	1664.7	2		0020	293	13.	10.1	1662.2
1		0745	94	309.	180.7	1672.8	1		1605	194	94.	35.5	1664.6	2		0025	294	12.	10.0	1662.2
1		0750	95	307.	178.6	1672.7	1		1610	195	91.	34.9	1664.6	2		0030	295	12.	9.9	1662.2
1		0755	96	306.	176.6	1672.6	1		1615	196	88.	34.3	1664.5	2		0035	296	12.	9.8	1662.2
1		0800	97	304.	174.5	1672.5	1		1620	197	85.	33.7	1664.5	2		0040	297	12.	9.7	1662.2
1		0805	98	302.	172.4	1672.4	1		1625	198	83.	33.1	1664.5	2		0045	298	11.	9.6	1662.2
1		0810	99	300.	170.3	1672.3	1		1630	199	80.	32.6	1664.4	2		0050	299	11.	9.6	1662.2
1		0815	100	299.	168.3	1672.2	1		1635	200	78.	32.0	1664.4	2		0055	300	11.	9.5	1662.2

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)	(CFS)				
348.	5.33		312.	141.	136.	136.
		(INCHES)	.615	1.116	1.117	1.117
		(AC-FT)	155.	280.	280.	280.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
(AC-FT)	(HR)				
233.	5.33	186.	74.	72.	72.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
(FEET)	(HR)				
1675.28	5.33	1673.04	1666.56	1666.33	1666.33

CUMULATIVE AREA = 4.71 SQ MI

HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .94

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	1		0820	101	300.	169.9	1672.3	1		1640	201	79.	32.4	1664.4
1		0005	2	0.	.0	1659.0	1		0825	102	298.	167.8	1672.2	1		1645	202	77.	31.9	1664.4
1		0010	3	0.	.1	1659.2	1		0830	103	297.	165.8	1672.1	1		1650	203	74.	31.4	1664.3
1		0015	4	0.	.3	1659.7	1		0835	104	295.	163.7	1672.0	1		1655	204	72.	30.9	1664.3
1		0020	5	0.	.7	1660.1	1		0840	105	293.	161.7	1671.9	1		1700	205	70.	30.4	1664.2
1		0025	6	0.	1.2	1660.3	1		0845	106	291.	159.7	1671.8	1		1705	206	68.	29.9	1664.2
1		0030	7	0.	1.9	1660.6	1		0850	107	289.	157.7	1671.7	1		1710	207	65.	29.4	1664.2
1		0035	8	0.	2.6	1660.9	1		0855	108	288.	155.8	1671.6	1		1715	208	63.	29.0	1664.1
1		0040	9	1.	3.3	1661.1	1		0900	109	286.	153.8	1671.5	1		1720	209	61.	28.6	1664.1
1		0045	10	2.	4.0	1661.2	1		0905	110	284.	151.8	1671.4	1		1725	210	59.	28.2	1664.1
1		0050	11	2.	4.6	1661.3	1		0910	111	282.	149.9	1671.3	1		1730	211	57.	27.8	1664.0
1		0055	12	3.	5.0	1661.4	1		0915	112	281.	148.0	1671.2	1		1735	212	56.	27.4	1664.0
1		0100	13	3.	5.4	1661.5	1		0920	113	279.	146.0	1671.1	1		1740	213	54.	27.0	1664.0
1		0105	14	4.	5.7	1661.5	1		0925	114	277.	144.1	1671.0	1		1745	214	54.	26.6	1663.9
1		0110	15	4.	6.0	1661.6	1		0930	115	275.	142.2	1670.9	1		1750	215	53.	26.2	1663.9
1		0115	16	4.	6.2	1661.6	1		0935	116	273.	140.3	1670.8	1		1755	216	52.	25.9	1663.9
1		0120	17	5.	6.4	1661.7	1		0940	117	271.	138.5	1670.7	1		1800	217	51.	25.5	1663.8
1		0125	18	5.	6.7	1661.7	1		0945	118	269.	136.6	1670.6	1		1805	218	50.	25.2	1663.8
1		0130	19	5.	6.9	1661.8	1		0950	119	267.	134.8	1670.5	1		1810	219	50.	24.8	1663.8
1		0135	20	6.	7.2	1661.8	1		0955	120	265.	132.9	1670.4	1		1815	220	49.	24.5	1663.7
1		0140	21	6.	7.6	1661.9	1		1000	121	264.	131.1	1670.3	1		1820	221	48.	24.2	1663.7
1		0145	22	7.	7.9	1662.0	1		1005	122	262.	129.3	1670.2	1		1825	222	48.	23.8	1663.7
1		0150	23	7.	8.3	1662.0	1		1010	123	260.	127.5	1670.1	1		1830	223	47.	23.5	1663.7
1		0155	24	9.	8.7	1662.1	1		1015	124	258.	125.7	1670.1	1		1835	224	46.	23.2	1663.6
1		0200	25	9.	9.0	1662.1	1		1020	125	256.	124.0	1670.0	1		1840	225	45.	22.9	1663.6
1		0205	26	10.	9.3	1662.1	1		1025	126	254.	122.2	1669.9	1		1845	226	45.	22.6	1663.6
1		0210	27	11.	9.5	1662.2	1		1030	127	252.	120.5	1669.8	1		1850	227	44.	22.3	1663.5
1		0215	28	12.	9.7	1662.2	1		1035	128	250.	118.8	1669.7	1		1855	228	43.	22.0	1663.5
1		0220	29	12.	9.9	1662.2	1		1040	129	248.	117.0	1669.6	1		1900	229	43.	21.7	1663.5
1		0225	30	13.	10.2	1662.3	1		1045	130	246.	115.3	1669.5	1		1905	230	42.	21.4	1663.5
1		0230	31	14.	10.5	1662.3	1		1050	131	245.	113.6	1669.4	1		1910	231	41.	21.1	1663.4
1		0235	32	15.	10.9	1662.3	1		1055	132	243.	112.0	1669.3	1		1915	232	41.	20.8	1663.4
1		0240	33	16.	11.2	1662.4	1		1100	133	241.	110.3	1669.2	1		1920	233	40.	20.5	1663.4
1		0245	34	17.	11.5	1662.4	1		1105	134	239.	108.7	1669.1	1		1925	234	40.	20.2	1663.4
1		0250	35	18.	11.8	1662.4	1		1110	135	237.	107.0	1669.1	1		1930	235	39.	20.0	1663.3

1	0255	36	19.	12.1	1662.5	*	1	1115	136	235.	105.4	1669.0	*	1	1935	236	38.	19.7	1663.3
1	0300	37	19.	12.4	1662.5	*	1	1120	137	233.	103.8	1668.9	*	1	1940	237	38.	19.4	1663.3
1	0305	38	20.	12.7	1662.6	*	1	1125	138	231.	102.2	1668.8	*	1	1945	238	37.	19.2	1663.3
1	0310	39	21.	13.0	1662.6	*	1	1130	139	229.	100.6	1668.7	*	1	1950	239	37.	18.9	1663.2
1	0315	40	23.	13.5	1662.7	*	1	1135	140	227.	99.0	1668.6	*	1	1955	240	36.	18.7	1663.2
1	0320	41	26.	14.5	1662.8	*	1	1140	141	225.	97.5	1668.5	*	1	2000	241	36.	18.4	1663.2
1	0325	42	31.	16.4	1663.0	*	1	1145	142	223.	95.9	1668.4	*	1	2005	242	35.	18.2	1663.2
1	0330	43	38.	19.6	1663.3	*	1	1150	143	221.	94.4	1668.4	*	1	2010	243	35.	17.9	1663.1
1	0335	44	49.	24.6	1663.8	*	1	1155	144	219.	92.9	1668.3	*	1	2015	244	34.	17.7	1663.1
1	0340	45	77.	32.0	1664.4	*	1	1200	145	217.	91.4	1668.2	*	1	2020	245	34.	17.5	1663.1
1	0345	46	123.	42.9	1665.2	*	1	1205	146	215.	89.9	1668.1	*	1	2025	246	33.	17.2	1663.1
1	0350	47	161.	57.9	1666.2	*	1	1210	147	213.	88.4	1668.0	*	1	2030	247	33.	17.0	1663.1
1	0355	48	195.	76.7	1667.3	*	1	1215	148	211.	87.0	1667.9	*	1	2035	248	32.	16.8	1663.0
1	0400	49	225.	97.3	1668.5	*	1	1220	149	208.	85.5	1667.9	*	1	2040	249	32.	16.6	1663.0
1	0405	50	250.	118.3	1669.7	*	1	1225	150	206.	84.1	1667.8	*	1	2045	250	31.	16.4	1663.0
1	0410	51	271.	138.6	1670.7	*	1	1230	151	204.	82.7	1667.7	*	1	2050	251	30.	16.2	1663.0
1	0415	52	289.	157.5	1671.7	*	1	1235	152	202.	81.3	1667.6	*	1	2055	252	30.	15.9	1663.0
1	0420	53	304.	174.6	1672.5	*	1	1240	153	200.	79.9	1667.5	*	1	2100	253	29.	15.7	1662.9
1	0425	54	316.	189.5	1673.2	*	1	1245	154	198.	78.6	1667.5	*	1	2105	254	29.	15.5	1662.9
1	0430	55	326.	202.1	1673.8	*	1	1250	155	196.	77.2	1667.4	*	1	2110	255	28.	15.3	1662.9
1	0435	56	334.	212.4	1674.3	*	1	1255	156	194.	75.9	1667.3	*	1	2115	256	28.	15.2	1662.9
1	0440	57	340.	220.7	1674.7	*	1	1300	157	192.	74.5	1667.2	*	1	2120	257	27.	15.0	1662.8
1	0445	58	344.	227.2	1675.0	*	1	1305	158	190.	73.2	1667.1	*	1	2125	258	26.	14.8	1662.8
1	0450	59	348.	232.1	1675.2	*	1	1310	159	188.	71.9	1667.1	*	1	2130	259	26.	14.6	1662.8
1	0455	60	368.	235.7	1675.4	*	1	1315	160	186.	70.6	1667.0	*	1	2135	260	25.	14.4	1662.8
1	0500	61	484.	237.8	1675.5	*	1	1320	161	183.	69.4	1666.9	*	1	2140	261	25.	14.3	1662.7
1	0505	62	527.	238.6	1675.5	*	1	1325	162	181.	68.1	1666.8	*	1	2145	262	24.	14.1	1662.7
1	0510	63	525.	238.5	1675.5	*	1	1330	163	178.	66.9	1666.8	*	1	2150	263	24.	13.9	1662.7
1	0515	64	498.	238.0	1675.5	*	1	1335	164	176.	65.7	1666.7	*	1	2155	264	23.	13.8	1662.7
1	0520	65	460.	237.3	1675.5	*	1	1340	165	174.	64.5	1666.6	*	1	2200	265	23.	13.6	1662.7
1	0525	66	417.	236.6	1675.5	*	1	1345	166	171.	63.3	1666.5	*	1	2205	266	23.	13.4	1662.6
1	0530	67	373.	235.8	1675.4	*	1	1350	167	169.	62.1	1666.5	*	1	2210	267	22.	13.3	1662.6
1	0535	68	350.	235.0	1675.4	*	1	1355	168	167.	60.9	1666.4	*	1	2215	268	22.	13.1	1662.6
1	0540	69	349.	234.0	1675.3	*	1	1400	169	165.	59.8	1666.3	*	1	2220	269	21.	13.0	1662.6
1	0545	70	348.	232.8	1675.3	*	1	1405	170	163.	58.7	1666.2	*	1	2225	270	21.	12.8	1662.6
1	0550	71	347.	231.5	1675.2	*	1	1410	171	160.	57.6	1666.2	*	1	2230	271	20.	12.7	1662.6
1	0555	72	346.	230.0	1675.2	*	1	1415	172	158.	56.5	1666.1	*	1	2235	272	20.	12.6	1662.5
1	0600	73	345.	228.4	1675.1	*	1	1420	173	156.	55.4	1666.0	*	1	2240	273	20.	12.4	1662.5
1	0605	74	344.	226.6	1675.0	*	1	1425	174	154.	54.3	1666.0	*	1	2245	274	19.	12.3	1662.5
1	0610	75	343.	224.8	1674.9	*	1	1430	175	151.	53.3	1665.9	*	1	2250	275	19.	12.2	1662.5
1	0615	76	341.	222.9	1674.8	*	1	1435	176	148.	52.2	1665.8	*	1	2255	276	18.	12.0	1662.5
1	0620	77	340.	220.9	1674.7	*	1	1440	177	145.	51.2	1665.8	*	1	2300	277	18.	11.9	1662.5
1	0625	78	339.	218.9	1674.6	*	1	1445	178	143.	50.2	1665.7	*	1	2305	278	18.	11.8	1662.4
1	0630	79	337.	216.8	1674.5	*	1	1450	179	140.	49.3	1665.6	*	1	2310	279	17.	11.7	1662.4
1	0635	80	336.	214.7	1674.4	*	1	1455	180	138.	48.3	1665.6	*	1	2315	280	17.	11.5	1662.4
1	0640	81	334.	212.5	1674.3	*	1	1500	181	135.	47.4	1665.5	*	1	2320	281	17.	11.4	1662.4
1	0645	82	333.	210.4	1674.2	*	1	1505	182	133.	46.4	1665.4	*	1	2325	282	16.	11.3	1662.4
1	0650	83	331.	208.2	1674.1	*	1	1510	183	130.	45.5	1665.4	*	1	2330	283	16.	11.2	1662.4
1	0655	84	330.	206.1	1674.0	*	1	1515	184	128.	44.6	1665.3	*	1	2335	284	16.	11.1	1662.4
1	0700	85	328.	203.9	1673.9	*	1	1520	185	126.	43.8	1665.2	*	1	2340	285	15.	11.0	1662.3
1	0705	86	326.	201.7	1673.8	*	1	1525	186	123.	42.9	1665.2	*	1	2345	286	15.	10.9	1662.3
1	0710	87	324.	199.5	1673.7	*	1	1530	187	121.	42.1	1665.1	*	1	2350	287	15.	10.8	1662.3
1	0715	88	323.	197.4	1673.6	*	1	1535	188	119.	41.2	1665.1	*	1	2355	288	14.	10.7	1662.3
1	0720	89	321.	195.2	1673.5	*	1	1540	189	117.	40.4	1665.0	*	2	0000	289	14.	10.6	1662.3
1	0725	90	319.	193.0	1673.4	*	1	1545	190	113.	39.6	1665.0	*	2	0005	290	14.	10.5	1662.3
1	0730	91	317.	190.9	1673.3	*	1	1550	191	110.	38.9	1664.9	*	2	0010	291	14.	10.4	1662.3
1	0735	92	316.	188.8	1673.2	*	1	1555	192	106.	38.1	1664.8	*	2	0015	292	13.	10.3	1662.3
1	0740	93	314.	186.6	1673.1	*	1	1600	193	103.	37.4	1664.8	*	2	0020	293	13.	10.2	1662.3
1	0745	94	312.	184.5	1673.0	*	1	1605	194	100.	36.7	1664.7	*	2	0025	294	13.	10.1	1662.2
1	0750	95	310.	182.4	1672.9	*	1	1610	195	96.	36.0	1664.7	*	2	0030	295	13.	10.0	1662.2
1	0755	96	309.	180.3	1672.8	*	1	1615	196	93.	35.4	1664.6	*	2	0035	296	12.	9.9	1662.2
1	0800	97	307.	178.2	1672.7	*	1	1620	197	90.	34.8	1664.6	*	2	0040	297	12.	9.9	1662.2
1	0805	98	305.	176.1	1672.6	*	1	1625	198	88.	34.1	1664.5	*	2	0045	298	12.	9.8	1662.2
1	0810	99	303.	174.0	1672.5	*	1	1630	199	85.	33.6	1664.5	*	2	0050	299	12.	9.7	1662.2
1	0815	100	302.	171.9	1672.4	*	1	1635	200	82.	33.0	1664.4	*	2	0055	300	11.	9.6	1662.2
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 527.	5.08		327.	147.	141.	141.
		(INCHES)	.645	1.159	1.160	1.160
		(AC-FT)	162.	291.	291.	291.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
239.	5.08	190.	76.	73.	73.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1675.55	5.08	1673.25	1666.67	1666.44	1666.44

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .96

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	301.	170.8	1672.3	*	1		1640	201	81.	32.7	1664.4
1		0005	2	0.	.0	1659.0	*	1		0825	102	299.	168.7	1672.2	*	1		1645	202	78.	32.1	1664.4
1		0010	3	0.	.1	1659.2	*	1		0830	103	297.	166.7	1672.1	*	1		1650	203	76.	31.6	1664.3
1		0015	4	0.	.3	1659.7	*	1		0835	104	296.	164.6	1672.0	*	1		1655	204	73.	31.1	1664.3
1		0020	5	0.	.7	1660.1	*	1		0840	105	294.	162.6	1671.9	*	1		1700	205	71.	30.6	1664.3
1		0025	6	0.	1.3	1660.3	*	1		0845	106	292.	160.6	1671.8	*	1		1705	206	69.	30.1	1664.2
1		0030	7	0.	1.9	1660.6	*	1		0850	107	290.	158.6	1671.7	*	1		1710	207	66.	29.6	1664.2
1		0035	8	0.	2.6	1660.9	*	1		0855	108	288.	156.6	1671.6	*	1		1715	208	64.	29.2	1664.2

1	0040	9	1.	3.4	1661.1	*	1	0900	109	287.	154.7	1671.5	*	1	1720	209	62.	28.8	1664.1
1	0045	10	2.	4.1	1661.2	*	1	0905	110	285.	152.7	1671.4	*	1	1725	210	60.	28.3	1664.1
1	0050	11	2.	4.7	1661.3	*	1	0910	111	283.	150.7	1671.3	*	1	1730	211	58.	27.9	1664.1
1	0055	12	3.	5.2	1661.4	*	1	0915	112	281.	148.8	1671.2	*	1	1735	212	56.	27.5	1664.0
1	0100	13	4.	5.5	1661.5	*	1	0920	113	280.	146.9	1671.1	*	1	1740	213	55.	27.1	1664.0
1	0105	14	4.	5.9	1661.6	*	1	0925	114	278.	145.0	1671.0	*	1	1745	214	54.	26.8	1664.0
1	0110	15	4.	6.1	1661.6	*	1	0930	115	276.	143.1	1670.9	*	1	1750	215	53.	26.4	1663.9
1	0115	16	5.	6.4	1661.7	*	1	0935	116	274.	141.2	1670.8	*	1	1755	216	52.	26.0	1663.9
1	0120	17	5.	6.6	1661.7	*	1	0940	117	272.	139.3	1670.8	*	1	1800	217	52.	25.7	1663.9
1	0125	18	5.	6.8	1661.8	*	1	0945	118	270.	137.4	1670.7	*	1	1805	218	51.	25.3	1663.8
1	0130	19	6.	7.1	1661.8	*	1	0950	119	268.	135.6	1670.6	*	1	1810	219	50.	25.0	1663.8
1	0135	20	6.	7.4	1661.9	*	1	0955	120	266.	133.8	1670.5	*	1	1815	220	49.	24.6	1663.8
1	0140	21	6.	7.7	1661.9	*	1	1000	121	264.	131.9	1670.4	*	1	1820	221	49.	24.3	1663.7
1	0145	22	7.	8.1	1662.0	*	1	1005	122	263.	130.1	1670.3	*	1	1825	222	48.	24.0	1663.7
1	0150	23	8.	8.5	1662.0	*	1	1010	123	261.	128.3	1670.2	*	1	1830	223	47.	23.6	1663.7
1	0155	24	9.	8.8	1662.1	*	1	1015	124	259.	126.5	1670.1	*	1	1835	224	46.	23.3	1663.6
1	0200	25	10.	9.2	1662.1	*	1	1020	125	257.	124.8	1670.0	*	1	1840	225	46.	23.0	1663.6
1	0205	26	11.	9.4	1662.2	*	1	1025	126	255.	123.0	1669.9	*	1	1845	226	45.	22.7	1663.6
1	0210	27	11.	9.7	1662.2	*	1	1030	127	253.	121.2	1669.8	*	1	1850	227	44.	22.4	1663.6
1	0215	28	12.	9.9	1662.2	*	1	1035	128	251.	119.5	1669.7	*	1	1855	228	44.	22.1	1663.5
1	0220	29	13.	10.1	1662.2	*	1	1040	129	249.	117.8	1669.6	*	1	1900	229	43.	21.8	1663.5
1	0225	30	14.	10.4	1662.3	*	1	1045	130	247.	116.1	1669.5	*	1	1905	230	42.	21.5	1663.5
1	0230	31	15.	10.8	1662.3	*	1	1050	131	245.	114.4	1669.4	*	1	1910	231	42.	21.2	1663.4
1	0235	32	16.	11.1	1662.4	*	1	1055	132	244.	112.7	1669.4	*	1	1915	232	41.	20.9	1663.4
1	0240	33	17.	11.4	1662.4	*	1	1100	133	242.	111.0	1669.3	*	1	1920	233	40.	20.6	1663.4
1	0245	34	17.	11.7	1662.4	*	1	1105	134	240.	109.4	1669.2	*	1	1925	234	40.	20.4	1663.4
1	0250	35	18.	12.0	1662.5	*	1	1110	135	238.	107.7	1669.1	*	1	1930	235	39.	20.1	1663.3
1	0255	36	19.	12.3	1662.5	*	1	1115	136	236.	106.1	1669.0	*	1	1935	236	39.	19.8	1663.3
1	0300	37	20.	12.6	1662.5	*	1	1120	137	234.	104.5	1668.9	*	1	1940	237	38.	19.6	1663.3
1	0305	38	21.	12.9	1662.6	*	1	1125	138	232.	102.9	1668.8	*	1	1945	238	38.	19.3	1663.3
1	0310	39	22.	13.3	1662.6	*	1	1130	139	230.	101.3	1668.7	*	1	1950	239	37.	19.0	1663.2
1	0315	40	24.	13.8	1662.7	*	1	1135	140	228.	99.7	1668.7	*	1	1955	240	36.	18.8	1663.2
1	0320	41	27.	14.9	1662.8	*	1	1140	141	226.	98.2	1668.6	*	1	2000	241	36.	18.5	1663.2
1	0325	42	32.	16.8	1663.0	*	1	1145	142	224.	96.6	1668.5	*	1	2005	242	35.	18.3	1663.2
1	0330	43	39.	20.1	1663.3	*	1	1150	143	222.	95.1	1668.4	*	1	2010	243	35.	18.1	1663.2
1	0335	44	51.	25.2	1663.8	*	1	1155	144	220.	93.6	1668.3	*	1	2015	244	34.	17.8	1663.1
1	0340	45	82.	32.9	1664.4	*	1	1200	145	218.	92.1	1668.2	*	1	2020	245	34.	17.6	1663.1
1	0345	46	127.	44.4	1665.3	*	1	1205	146	216.	90.6	1668.1	*	1	2025	246	33.	17.3	1663.1
1	0350	47	165.	60.2	1666.3	*	1	1210	147	214.	89.1	1668.1	*	1	2030	247	33.	17.1	1663.1
1	0355	48	199.	79.6	1667.5	*	1	1215	148	212.	87.6	1668.0	*	1	2035	248	32.	16.9	1663.1
1	0400	49	230.	101.0	1668.7	*	1	1220	149	209.	86.2	1667.9	*	1	2040	249	32.	16.7	1663.0
1	0405	50	255.	122.8	1669.9	*	1	1225	150	207.	84.7	1667.8	*	1	2045	250	31.	16.5	1663.0
1	0410	51	277.	143.8	1671.0	*	1	1230	151	205.	83.3	1667.7	*	1	2050	251	31.	16.2	1663.0
1	0415	52	295.	163.4	1672.0	*	1	1235	152	203.	81.9	1667.7	*	1	2055	252	30.	16.0	1663.0
1	0420	53	309.	181.1	1672.8	*	1	1240	153	201.	80.5	1667.6	*	1	2100	253	30.	15.8	1662.9
1	0425	54	322.	196.5	1673.6	*	1	1245	154	199.	79.2	1667.5	*	1	2105	254	29.	15.6	1662.9
1	0430	55	332.	209.5	1674.2	*	1	1250	155	197.	77.8	1667.4	*	1	2110	255	28.	15.4	1662.9
1	0435	56	340.	220.3	1674.7	*	1	1255	156	195.	76.5	1667.3	*	1	2115	256	28.	15.2	1662.9
1	0440	57	346.	228.9	1675.1	*	1	1300	157	193.	75.1	1667.3	*	1	2120	257	27.	15.1	1662.8
1	0445	58	362.	235.6	1675.4	*	1	1305	158	191.	73.8	1667.2	*	1	2125	258	27.	14.9	1662.8
1	0450	59	597.	239.8	1675.6	*	1	1310	159	189.	72.5	1667.1	*	1	2130	259	26.	14.7	1662.8
1	0455	60	697.	241.6	1675.7	*	1	1315	160	187.	71.2	1667.0	*	1	2135	260	26.	14.5	1662.8
1	0500	61	718.	242.0	1675.7	*	1	1320	161	184.	69.9	1666.9	*	1	2140	261	25.	14.3	1662.8
1	0505	62	694.	241.6	1675.7	*	1	1325	162	182.	68.7	1666.9	*	1	2145	262	25.	14.2	1662.7
1	0510	63	646.	240.7	1675.6	*	1	1330	163	180.	67.4	1666.8	*	1	2150	263	24.	14.0	1662.7
1	0515	64	587.	239.7	1675.6	*	1	1335	164	177.	66.2	1666.7	*	1	2155	264	24.	13.8	1662.7
1	0520	65	526.	238.5	1675.5	*	1	1340	165	175.	65.0	1666.6	*	1	2200	265	23.	13.7	1662.7
1	0525	66	467.	237.5	1675.5	*	1	1345	166	172.	63.8	1666.6	*	1	2205	266	23.	13.5	1662.7
1	0530	67	413.	236.5	1675.5	*	1	1350	167	170.	62.6	1666.5	*	1	2210	267	22.	13.4	1662.6
1	0535	68	363.	235.6	1675.4	*	1	1355	168	168.	61.4	1666.4	*	1	2215	268	22.	13.2	1662.6
1	0540	69	350.	234.7	1675.4	*	1	1400	169	166.	60.3	1666.3	*	1	2220	269	21.	13.1	1662.6
1	0545	70	349.	233.6	1675.3	*	1	1405	170	163.	59.2	1666.3	*	1	2225	270	21.	12.9	1662.6
1	0550	71	348.	232.3	1675.3	*	1	1410	171	161.	58.0	1666.2	*	1	2230	271	21.	12.8	1662.6
1	0555	72	347.	230.8	1675.2	*	1	1415	172	159.	56.9	1666.1	*	1	2235	272	20.	12.6	1662.5
1	0600	73	346.	229.2	1675.1	*	1	1420	173	157.	55.9	1666.1	*	1	2240	273	20.	12.5	1662.5
1	0605	74	345.	227.5	1675.0	*	1	1425	174	155.	54.8	1666.0	*	1	2245	274	19.	12.4	1662.5
1	0610	75	343.	225.7	1675.0	*	1	1430	175	152.	53.7	1665.9	*	1	2250	275	19.	12.2	1662.5
1	0615	76	342.	223.8	1674.9	*	1	1435	176	149.	52.7	1665.9	*	1	2255	276	19.	12.1	1662.5
1	0620	77	341.	221.8	1674.8	*	1	1440	177	147.	51.7	1665.8	*	1	2300	277	18.	12.0	1662.5
1	0625	78	339.	219.8	1674.7	*	1	1445	178	144.	50.7	1665.7	*	1	2305	278	18.	11.8	1662.5
1	0630	79	338.	217.7	1674.6	*	1	1450	179	141.	49.7	1665.7	*	1	2310	279	17.	11.7	1662.4
1	0635	80	336.	215.6	1674.5	*	1	1455	180	139.	48.7	1665.6	*	1	2315	280	17.	11.6	1662.4
1	0640	81	335.	213.5	1674.4	*	1	1500	181	136.	47.8	1665.5	*	1	2320	281	17.	11.5	1662.4
1	0645	82	333.	211.4	1674.3	*	1	1505	182	134.	46.8	1665.5	*	1	2325	282	16.	11.4	1662.4
1	0650	83	332.	209.2	1674.2	*	1	1510	183	131.	45.9	1665.4	*	1	2330	283	16.	11.3	1662.4
1	0655	84	330.	207.0	1674.1	*	1	1515	184	129.	45.0	1665.3	*	1	2335	284	16.	11.1	1662.4
1	0700	85	329.	204.9	1674.0	*	1	1520	185	127.	44.2	1665.3	*	1	2340	285	15.	11.0	1662.4
1	0705	86	327.	202.7	1673.9	*	1	1525	186	124.	43.3	1665.2	*	1	2345	286	15.	10.9	1662.3
1	0710	87	325.	200.5	1673.8	*	1	1530	187	122.	42.4	1665.2	*	1	2350	287	15.	10.8	1662.3
1	0715	88	323.	198.3	1673.7	*	1	1535	188	120.	41.6	1665.1	*	1	2355	288	15.	10.7	1662.3
1	0720	89	322.	196.2	1673.6	*	1	1540	189	118.	40.8	1665.0	*	2	0000	289	14.	10.6	1662.3
1	0725	90	320.	194.0	1673.5	*	1	1545	190	115.	40.0	1665.0	*	2	0005	290	14.	10.5	1662.3
1	0730	91	318.	191.9	1673.4	*	1	1550	191	111.	39.2	1664.9	*	2	0010	291	14.	10.4	1662.3
1	0735	92	316.	189.7	1673.3	*	1	1555	192	108.	38.5	1664.9	*	2	0015	292	13.	10.3	1662.3
1	0740	93	315.	187.6	1673.2	*	1	1600	193	104.	37.7	1664.8	*	2	0020	293	13.	10.2	1662.3
1	0745	94	313.	185.4	1673.1	*	1	1605	194	101.	37.0	1664.8	*	2	0025	294	13.	10.2	1662.2
1	0750	95	311.	183.3	1673.0	*	1	1610	195	98.	36.3	1664.7	*	2	0030	295	13.	10.1	1662.2
1	0755	96	309.	181.2	1672.8	*	1	1615	196	95.	35.7	1664.7	*	2	0035	296	12.	10.0	1662.2
1	0800	97	308.	179.1	1672.7	*	1	1620	197	92.	35.0	1664.6	*	2	0040	297	12.	9.9	1662.2
1	0805	98	306.	177.0	1672.6	*	1	1625	198	89.	34.4	1664.6	*	2	0045	298	12.	9.8	1662.2
1	0810	99	304.	174.9	1672.5	*	1	1630	199	86.	33.8	1664.5	*	2	0050	299	12.	9.7	1662.2
1	0815	100	302.	172.8	1672.4	*	1	1635	200	83.	33.2	1664.5	*	2	0055	300	11.	9.7	1662.2

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 718.	5.00		347.	152.	147.	147.
		(INCHES)	.685	1.204	1.204	1.204
		(AC-FT)	172.	302.	302.	302.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				

242.	5.00	192.	77.	74.	74.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1675.70	5.00	1673.35	1666.71	1666.48	1666.48

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .98

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	301.	171.3	1672.4	*	1		1640	201	81.	32.8	1664.4
1		0005	2	0.	.0	1659.0	*	1		0825	102	299.	169.3	1672.3	*	1		1645	202	79.	32.3	1664.4
1		0010	3	0.	.1	1659.2	*	1		0830	103	298.	167.2	1672.2	*	1		1650	203	76.	31.7	1664.3
1		0015	4	0.	.3	1659.7	*	1		0835	104	296.	165.2	1672.1	*	1		1655	204	74.	31.2	1664.3
1		0020	5	0.	.7	1660.1	*	1		0840	105	294.	163.2	1672.0	*	1		1700	205	71.	30.7	1664.3
1		0025	6	0.	1.3	1660.4	*	1		0845	106	293.	161.2	1671.9	*	1		1705	206	69.	30.2	1664.2
1		0030	7	0.	2.0	1660.6	*	1		0850	107	291.	159.2	1671.8	*	1		1710	207	67.	29.8	1664.2
1		0035	8	0.	2.7	1660.9	*	1		0855	108	289.	157.2	1671.7	*	1		1715	208	65.	29.3	1664.2
1		0040	9	1.	3.4	1661.1	*	1		0900	109	287.	155.2	1671.6	*	1		1720	209	63.	28.9	1664.1
1		0045	10	2.	4.1	1661.2	*	1		0905	110	285.	153.2	1671.5	*	1		1725	210	61.	28.4	1664.1
1		0050	11	3.	4.7	1661.4	*	1		0910	111	284.	151.3	1671.4	*	1		1730	211	59.	28.0	1664.1
1		0055	12	3.	5.2	1661.5	*	1		0915	112	282.	149.3	1671.3	*	1		1735	212	57.	27.6	1664.0
1		0100	13	4.	5.6	1661.5	*	1		0920	113	280.	147.4	1671.2	*	1		1740	213	55.	27.3	1664.0
1		0105	14	4.	5.9	1661.6	*	1		0925	114	278.	145.5	1671.1	*	1		1745	214	54.	26.9	1664.0
1		0110	15	4.	6.2	1661.6	*	1		0930	115	276.	143.6	1671.0	*	1		1750	215	53.	26.5	1663.9
1		0115	16	5.	6.5	1661.7	*	1		0935	116	275.	141.7	1670.9	*	1		1755	216	53.	26.1	1663.9
1		0120	17	5.	6.7	1661.7	*	1		0940	117	273.	139.8	1670.8	*	1		1800	217	52.	25.8	1663.9
1		0125	18	5.	6.9	1661.8	*	1		0945	118	271.	137.9	1670.7	*	1		1805	218	51.	25.4	1663.8
1		0130	19	6.	7.2	1661.8	*	1		0950	119	269.	136.1	1670.6	*	1		1810	219	50.	25.1	1663.8
1		0135	20	6.	7.5	1661.9	*	1		0955	120	267.	134.2	1670.5	*	1		1815	220	50.	24.7	1663.8
1		0140	21	7.	7.8	1661.9	*	1		1000	121	265.	132.4	1670.4	*	1		1820	221	49.	24.4	1663.7
1		0145	22	7.	8.2	1662.0	*	1		1005	122	263.	130.6	1670.3	*	1		1825	222	48.	24.1	1663.7
1		0150	23	8.	8.6	1662.1	*	1		1010	123	261.	128.8	1670.2	*	1		1830	223	47.	23.7	1663.7
1		0155	24	9.	9.0	1662.1	*	1		1015	124	259.	127.0	1670.1	*	1		1835	224	47.	23.4	1663.6
1		0200	25	10.	9.3	1662.1	*	1		1020	125	258.	125.2	1670.0	*	1		1840	225	46.	23.1	1663.6
1		0205	26	11.	9.6	1662.2	*	1		1025	126	256.	123.5	1669.9	*	1		1845	226	45.	22.8	1663.6
1		0210	27	12.	9.8	1662.2	*	1		1030	127	254.	121.7	1669.8	*	1		1850	227	45.	22.5	1663.6
1		0215	28	13.	10.0	1662.2	*	1		1035	128	252.	120.0	1669.7	*	1		1855	228	44.	22.2	1663.5
1		0220	29	13.	10.3	1662.3	*	1		1040	129	250.	118.3	1669.7	*	1		1900	229	43.	21.9	1663.5
1		0225	30	14.	10.6	1662.3	*	1		1045	130	248.	116.5	1669.6	*	1		1905	230	43.	21.6	1663.5
1		0230	31	15.	10.9	1662.3	*	1		1050	131	246.	114.8	1669.5	*	1		1910	231	42.	21.3	1663.5
1		0235	32	16.	11.2	1662.4	*	1		1055	132	244.	113.2	1669.4	*	1		1915	232	41.	21.0	1663.4
1		0240	33	17.	11.6	1662.4	*	1		1100	133	242.	111.5	1669.3	*	1		1920	233	41.	20.7	1663.4
1		0245	34	18.	11.9	1662.5	*	1		1105	134	240.	109.8	1669.2	*	1		1925	234	40.	20.4	1663.4
1		0250	35	19.	12.2	1662.5	*	1		1110	135	239.	108.2	1669.1	*	1		1930	235	39.	20.2	1663.4
1		0255	36	20.	12.5	1662.5	*	1		1115	136	237.	106.5	1669.0	*	1		1935	236	39.	19.9	1663.3
1		0300	37	21.	12.8	1662.6	*	1		1120	137	235.	104.9	1668.9	*	1		1940	237	38.	19.6	1663.3
1		0305	38	21.	13.1	1662.6	*	1		1125	138	233.	103.3	1668.9	*	1		1945	238	38.	19.4	1663.3
1		0310	39	23.	13.4	1662.6	*	1		1130	139	230.	101.7	1668.8	*	1		1950	239	37.	19.1	1663.3
1		0315	40	24.	14.0	1662.7	*	1		1135	140	228.	100.1	1668.7	*	1		1955	240	37.	18.9	1663.2
1		0320	41	27.	15.1	1662.8	*	1		1140	141	226.	98.6	1668.6	*	1		2000	241	36.	18.6	1663.2
1		0325	42	33.	17.1	1663.1	*	1		1145	142	224.	97.0	1668.5	*	1		2005	242	35.	18.4	1663.2
1		0330	43	40.	20.5	1663.4	*	1		1150	143	222.	95.5	1668.4	*	1		2010	243	35.	18.1	1663.2
1		0335	44	52.	25.7	1663.9	*	1		1155	144	220.	94.0	1668.3	*	1		2015	244	34.	17.9	1663.1
1		0340	45	85.	33.7	1664.5	*	1		1200	145	218.	92.5	1668.3	*	1		2020	245	34.	17.6	1663.1
1		0345	46	130.	45.5	1665.4	*	1		1205	146	216.	91.0	1668.2	*	1		2025	246	33.	17.4	1663.1
1		0350	47	169.	61.8	1666.4	*	1		1210	147	214.	89.5	1668.1	*	1		2030	247	33.	17.2	1663.1
1		0355	48	203.	81.8	1667.6	*	1		1215	148	212.	88.0	1668.0	*	1		2035	248	32.	17.0	1663.1
1		0400	49	233.	103.6	1668.9	*	1		1220	149	210.	86.6	1667.9	*	1		2040	249	32.	16.7	1663.0
1		0405	50	258.	125.9	1670.1	*	1		1225	150	208.	85.1	1667.8	*	1		2045	250	31.	16.5	1663.0
1		0410	51	280.	147.5	1671.2	*	1		1230	151	206.	83.7	1667.8	*	1		2050	251	31.	16.3	1663.0
1		0415	52	298.	167.6	1672.2	*	1		1235	152	204.	82.3	1667.7	*	1		2055	252	30.	16.1	1663.0
1		0420	53	313.	185.8	1673.1	*	1		1240	153	201.	80.9	1667.6	*	1		2100	253	30.	15.9	1662.9
1		0425	54	326.	201.6	1673.8	*	1		1245	154	199.	79.5	1667.5	*	1		2105	254	29.	15.7	1662.9
1		0430	55	336.	215.0	1674.5	*	1		1250	155	197.	78.2	1667.4	*	1		2110	255	29.	15.5	1662.9
1		0435	56	344.	226.0	1675.0	*	1		1255	156	195.	76.8	1667.4	*	1		2115	256	28.	15.3	1662.9
1		0440	57	350.	234.9	1675.4	*	1		1300	157	193.	75.5	1667.3	*	1		2120	257	27.	15.1	1662.8
1		0445	58	651.	240.8	1675.6	*	1		1305	158	191.	74.2	1667.2	*	1		2125	258	27.	14.9	1662.8
1		0450	59	803.	243.6	1675.8	*	1		1310	159	189.	72.8	1667.1	*	1		2130	259	26.	14.7	1662.8
1		0455	60	845.	244.3	1675.8	*	1		1315	160	187.	71.5	1667.0	*	1		2135	260	26.	14.6	1662.8
1		0500	61	825.	244.0	1675.8	*	1		1320	161	185.	70.3	1667.0	*	1		2140	261	25.	14.4	1662.8
1		0505	62	773.	243.0	1675.8	*	1		1325	162	183.	69.0	1666.9	*	1		2145	262	25.	14.2	1662.7
1		0510	63	705.	241.8	1675.7	*	1		1330	163	180.	67.8	1666.8	*	1		2150	263	24.	14.0	1662.7
1		0515	64	632.	240.5	1675.6	*	1		1335	164	178.	66.5	1666.7	*	1		2155	264	24.	13.9	1662.7
1		0520	65	561.	239.2	1675.6	*	1		1340	165	175.	65.3	1666.7	*	1		2200	265	23.	13.7	1662.7
1		0525	66	495.	238.0	1675.5	*	1		1345	166	173.	64.1	1666.6	*	1		2205	266	23.	13.5	1662.7
1		0530	67	435.	236.9	1675.5	*	1		1350	167	171.	62.9	1666.5	*	1		2210	267	22.	13.4	1662.6
1		0535	68	382.	235.9	1675.4	*	1		1355	168	169.	61.8	1666.4	*	1		2215	268	22.	13.2	1662.6
1		0540	69	350.	235.0	1675.4	*	1		1400	169	166.	60.6	1666.4	*	1		2220	269	22.	13.1	1662.6
1		0545	70	349.	233.9	1675.3	*	1		1405	170	164.	59.5	1666.3	*	1		2225	270	21.	12.9	1662.6
1		0550	71	348.	232.7	1675.3	*	1		1410	171	162.	58.3	1666.2	*	1		2230	271	21.	12.8	1662.6
1		0555	72	347.	231.3	1675.2	*	1		1415	172	160.	57.2	1666.2	*	1		2235	272	20.	12.7	1662.6
1		0600	73	346.	229.7	1675.1	*	1		1420	173	158.	56.1	1666.1	*	1		2240	273	20.	12.5	1662.5
1		0605	74	345.	228.1	1675.1	*	1		1425	174	156.	55.1	1666.0	*	1		2245	274	19.	12.4	1662.5
1		0610	75	344.	226.3	1675.0	*	1		1430	175	153.	54.0	1665.9	*	1		2250	275	19.	12.3	1662.5
1		0615	76	342.	224.4	1674.9	*	1		1435	176	150.	53.0	1665.9	*	1		2255	276	19.	12.1	1662.5
1		0620	77	341.	222.4	1674.8	*	1		1440	177	147.	51.9	1665.8	*	1		2300	277	18.	12.0	1662.5
1		0625	78	340.	220.4	1674.7	*	1		1445	178	145.	50.9	1665.7	*	1		2305	278	18.	11.9	1662.5
1		0630	79	338.	218.3	1674.6	*	1		1450	179	142.	49.9	1665.7	*	1		2310	279	18.	11.7	1662.4
1		0635	80	337.	216.2	1674.5	*	1		1455	180	139.	49.0	1665.6	*	1		2315	280	17.	11.6	1662.4
1		0640	81	335.	214.1	1674.4	*	1		1500	181	137.	48.0	1665.5	*	1		2320	281	17.	11.5	1662.4
1		0645	82	334.	212.0	1674.3	*	1		1505	182	134.	47.1	1665.5	*	1		2325	282	17.	11.4	1662.4
1		0650	83	332.	209.8	1674.2	*	1		1510	183	132.	46.2	1665.4	*	1		2330	283	16.	11.3	1662.4
1		0655	84	331.	207.6	1674.1	*	1		1515	184	130.	45.3	1665.3	*	1		2335	284	16.	11.2	1662.4
1		0700	85	329.	205.5	1674.0	*	1		1520	185	127.	44.4	1665.3	*	1		2340	285	16.	11.1	1662.4
1		0705	86	327.	203.3	1673.9	*	1		1525	186	125.	43.5	1665.2	*	1		2345	286	15.	11.0	1662.3
1		0710	87	326.	201.1	1673.8	*	1		1530	187	123.	42.7	1665.2	*	1		2350	287	15.	10.9	1662.3

1	0715	88	324.	198.9	1673.7	*	1	1535	188	120.	41.8	1665.1	*	1	2355	288	15.	10.8	1662.3
1	0720	89	322.	196.8	1673.6	*	1	1540	189	118.	41.0	1665.1	*	2	0000	289	14.	10.7	1662.3
1	0725	90	320.	194.6	1673.5	*	1	1545	190	116.	40.2	1665.0	*	2	0005	290	14.	10.6	1662.3
1	0730	91	319.	192.4	1673.4	*	1	1550	191	112.	39.4	1664.9	*	2	0010	291	14.	10.5	1662.3
1	0735	92	317.	190.3	1673.3	*	1	1555	192	109.	38.7	1664.9	*	2	0015	292	14.	10.4	1662.3
1	0740	93	315.	188.1	1673.2	*	1	1600	193	105.	37.9	1664.8	*	2	0020	293	13.	10.3	1662.3
1	0745	94	313.	186.0	1673.1	*	1	1605	194	102.	37.2	1664.8	*	2	0025	294	13.	10.2	1662.2
1	0750	95	312.	183.9	1673.0	*	1	1610	195	99.	36.5	1664.7	*	2	0030	295	13.	10.1	1662.2
1	0755	96	310.	181.8	1672.9	*	1	1615	196	96.	35.8	1664.7	*	2	0035	296	12.	10.0	1662.2
1	0800	97	308.	179.7	1672.8	*	1	1620	197	92.	35.2	1664.6	*	2	0040	297	12.	9.9	1662.2
1	0805	98	306.	177.6	1672.7	*	1	1625	198	90.	34.6	1664.6	*	2	0045	298	12.	9.8	1662.2
1	0810	99	305.	175.5	1672.6	*	1	1630	199	87.	34.0	1664.5	*	2	0050	299	12.	9.8	1662.2
1	0815	100	303.	173.4	1672.5	*	1	1635	200	84.	33.4	1664.5	*	2	0055	300	12.	9.7	1662.2
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR	
+ (CFS)	(HR)	(CFS)				
+ 845.	4.92	362.	157.	151.	151.	
		(INCHES) .715	1.236	1.236	1.236	
		(AC-FT) 180.	311.	311.	311.	

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
244.	4.92	193.	77.	75.	75.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1675.81	4.92	1673.40	1666.74	1666.50	1666.50

CUMULATIVE AREA = 4.71 SQ MI

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HYDROGRAPH AT STATION AWDB
PLAN 1, RATIO = .99

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1659.0	*	1		0820	101	302.	171.9	1672.4	*	1		1640	201	82.	33.0	1664.4
1		0005	2	0.	.0	1659.0	*	1		0825	102	300.	169.8	1672.3	*	1		1645	202	79.	32.4	1664.4
1		0010	3	0.	.1	1659.2	*	1		0830	103	298.	167.8	1672.2	*	1		1650	203	77.	31.9	1664.4
1		0015	4	0.	.3	1659.7	*	1		0835	104	297.	165.8	1672.1	*	1		1655	204	74.	31.4	1664.3
1		0020	5	0.	.7	1660.1	*	1		0840	105	295.	163.7	1672.0	*	1		1700	205	72.	30.9	1664.3
1		0025	6	0.	1.3	1660.4	*	1		0845	106	293.	161.7	1671.9	*	1		1705	206	70.	30.4	1664.2
1		0030	7	0.	2.0	1660.6	*	1		0850	107	291.	159.7	1671.8	*	1		1710	207	68.	29.9	1664.2
1		0035	8	0.	2.7	1661.0	*	1		0855	108	289.	157.7	1671.7	*	1		1715	208	65.	29.4	1664.2
1		0040	9	1.	3.5	1661.1	*	1		0900	109	288.	155.7	1671.6	*	1		1720	209	63.	29.0	1664.1
1		0045	10	2.	4.2	1661.3	*	1		0905	110	286.	153.8	1671.5	*	1		1725	210	61.	28.6	1664.1
1		0050	11	3.	4.8	1661.4	*	1		0910	111	284.	151.8	1671.4	*	1		1730	211	59.	28.1	1664.1
1		0055	12	3.	5.3	1661.5	*	1		0915	112	282.	149.9	1671.3	*	1		1735	212	57.	27.7	1664.0
1		0100	13	4.	5.7	1661.5	*	1		0920	113	281.	147.9	1671.2	*	1		1740	213	56.	27.4	1664.0
1		0105	14	4.	6.0	1661.6	*	1		0925	114	279.	146.0	1671.1	*	1		1745	214	54.	27.0	1664.0
1		0110	15	5.	6.3	1661.7	*	1		0930	115	277.	144.1	1671.0	*	1		1750	215	54.	26.6	1663.9
1		0115	16	5.	6.5	1661.7	*	1		0935	116	275.	142.2	1670.9	*	1		1755	216	53.	26.2	1663.9
1		0120	17	5.	6.8	1661.7	*	1		0940	117	273.	140.3	1670.8	*	1		1800	217	52.	25.9	1663.9
1		0125	18	6.	7.0	1661.8	*	1		0945	118	271.	138.5	1670.7	*	1		1805	218	51.	25.5	1663.8
1		0130	19	6.	7.3	1661.8	*	1		0950	119	269.	136.6	1670.6	*	1		1810	219	50.	25.2	1663.8
1		0135	20	6.	7.6	1661.9	*	1		0955	120	267.	134.8	1670.5	*	1		1815	220	50.	24.8	1663.8
1		0140	21	7.	8.0	1662.0	*	1		1000	121	265.	132.9	1670.4	*	1		1820	221	49.	24.5	1663.7
1		0145	22	8.	8.3	1662.0	*	1		1005	122	264.	131.1	1670.3	*	1		1825	222	48.	24.2	1663.7
1		0150	23	9.	8.7	1662.1	*	1		1010	123	262.	129.3	1670.2	*	1		1830	223	48.	23.8	1663.7
1		0155	24	10.	9.1	1662.1	*	1		1015	124	260.	127.5	1670.1	*	1		1835	224	47.	23.5	1663.7
1		0200	25	11.	9.4	1662.2	*	1		1020	125	258.	125.7	1670.1	*	1		1840	225	46.	23.2	1663.6
1		0205	26	12.	9.7	1662.2	*	1		1025	126	256.	124.0	1670.0	*	1		1845	226	45.	22.9	1663.6
1		0210	27	12.	9.9	1662.2	*	1		1030	127	254.	122.2	1669.9	*	1		1850	227	45.	22.6	1663.6
1		0215	28	13.	10.2	1662.2	*	1		1035	128	252.	120.5	1669.8	*	1		1855	228	44.	22.3	1663.5
1		0220	29	14.	10.4	1662.3	*	1		1040	129	250.	118.7	1669.7	*	1		1900	229	43.	21.9	1663.5
1		0225	30	15.	10.7	1662.3	*	1		1045	130	248.	117.0	1669.6	*	1		1905	230	43.	21.7	1663.5
1		0230	31	16.	11.1	1662.4	*	1		1050	131	246.	115.3	1669.5	*	1		1910	231	42.	21.4	1663.5
1		0235	32	17.	11.4	1662.4	*	1		1055	132	245.	113.6	1669.4	*	1		1915	232	41.	21.1	1663.4
1		0240	33	18.	11.7	1662.4	*	1		1100	133	243.	112.0	1669.3	*	1		1920	233	41.	20.8	1663.4
1		0245	34	18.	12.0	1662.5	*	1		1105	134	241.	110.3	1669.2	*	1		1925	234	40.	20.5	1663.4
1		0250	35	19.	12.4	1662.5	*	1		1110	135	239.	108.6	1669.1	*	1		1930	235	40.	20.2	1663.4
1		0255	36	20.	12.7	1662.6	*	1		1115	136	237.	107.0	1669.1	*	1		1935	236	39.	20.0	1663.3
1		0300	37	21.	13.0	1662.6	*	1		1120	137	235.	105.4	1669.0	*	1		1940	237	38.	19.7	1663.3
1		0305	38	22.	13.3	1662.6	*	1		1125	138	233.	103.8	1668.9	*	1		1945	238	38.	19.4	1663.3
1		0310	39	23.	13.6	1662.7	*	1		1130	139	231.	102.2	1668.8	*	1		1950	239	37.	19.2	1663.3
1		0315	40	25.	14.2	1662.7	*	1		1135	140	229.	100.6	1668.7	*	1		1955	240	37.	18.9	1663.2
1		0320	41	28.	15.3	1662.9	*	1		1140	141	227.	99.0	1668.6	*	1		2000	241	36.	18.7	1663.2
1		0325	42	33.	17.4	1663.1	*	1		1145	142	225.	97.5	1668.5	*	1		2005	242	36.	18.4	1663.2
1		0330	43	41.	20.8	1663.4	*	1		1150	143	223.	95.9	1668.4	*	1		2010	243	35.	18.2	1663.2
1		0335	44	53.	26.2	1663.9	*	1		1155	144	221.	94.4	1668.4	*	1		2015	244	35.	17.9	1663.1
1		0340	45	89.	34.4	1664.6	*	1		1200	145	219.	92.9	1668.3	*	1		2020	245	34.	17.7	1663.1
1		0345	46	133.	46.7	1665.4	*	1		1205	146	217.	91.4	1668.2	*	1		2025	246	34.	17.5	1663.1
1		0350	47	172.	63.6	1666.5	*	1		1210	147	215.	89.9	1668.1	*	1		2030	247	33.	17.2	1663.1
1		0355	48	206.	84.1	1667.8	*	1		1215	148	213.	88.4	1668.0	*	1		2035	248	33.	17.0	1663.1
1		0400	49	237.	106.5	1669.0	*	1		1220	149	211.	87.0	1667.9	*	1		2040	249	32.	16.8	1663.0
1		0405	50	262.	129.3	1670.2	*	1		1225	150	208.	85.5	1667.9	*	1		2045	250	32.	16.6	1663.0
1		0410	51	284.	151.4	1671.4	*	1		1230	151	206.	84.1	1667.8	*	1		2050	251	31.	16.4	1663.0
1		0415	52	302.	172.0	1672.4	*	1		1235	152	204.	82.7	1667.7	*	1		2055	252	30.	16.2	1663.0
1		0420	53	317.	190.7	1673.3	*	1		1240	153	202.	81.3	1667.6	*	1		2100	253	30.	15.9	1663.0
1		0425	54	330.	206.9	1674.1	*	1		1245	154	200.	79.9	1667.5	*	1		2105	254	29.	15.7	1662.9
1		0430	55	340.	220.7	1674.7	*	1		1250	155	198.	78.5	1667.5	*	1		2110	255	29.	15.5	1662.9
1		0435	56	348.	232.0	1675.2	*	1		1255	156	196.	77.2	1667.4	*	1		2115	256	28.	15.3	1662.9
1		0440	57	617.	240.2	1675.6	*	1		1300	157	194.	75.8	1667.3	*	1		2120	257	28.	15.2	1662.9
1		0445	58	865.	244.7	1675.8	*	1		1305	158	192.	74.5	1667.2	*	1		2125	258	27.	15.0	1662.8
1		0450	59	958.	246.4	1675.9	*	1		1310	159	190.	73.2	1667.1	*	1		2130	259	26.	14.8	1662.8
1		0455	60	958.	246.4	1675.9	*	1		1315	160	188.	71.9	1667.1	*	1		2135	260	26.	14.6	1662.8

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ROUTED TO											
+	20A-40	2.79	1	FLOW	1771.	1831.	1882.	1948.	2024.	2081.	2134.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	A5	.51	1	FLOW	649.	664.	678.	697.	716.	730.	744.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	40A5	3.30	1	FLOW	1916.	1980.	2033.	2104.	2185.	2245.	2301.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	A6	.66	1	FLOW	609.	626.	642.	664.	686.	702.	718.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	A7	.28	1	FLOW	313.	321.	329.	340.	351.	359.	367.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	30A	.94	1	FLOW	901.	925.	949.	981.	1013.	1037.	1061.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	30A-40	.94	1	FLOW	872.	909.	929.	956.	984.	987.	1010.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	A8	.47	1	FLOW	354.	363.	372.	384.	395.	404.	413.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3 COMBINED AT											
+	40A	4.71	1	FLOW	2996.	3082.	3171.	3295.	3407.	3479.	3561.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO											
+	AWDB	4.71	1	FLOW	339.	343.	348.	527.	718.	845.	958.
				TIME	5.25	5.33	5.33	5.08	5.00	4.92	4.92
			** PEAK STAGES IN FEET **								
			1	STAGE	1674.64	1674.96	1675.28	1675.55	1675.70	1675.81	1675.90
				TIME	5.25	5.33	5.33	5.08	5.00	4.92	4.92
DIVERSION TO											
+	DOUT	4.71	1	FLOW	339.	343.	348.	527.	718.	845.	958.
				TIME	5.25	5.33	5.33	5.08	5.00	4.92	4.92
HYDROGRAPH AT											
+	DAWDB	4.71	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT											
+	A9-C	.71	1	FLOW	884.	903.	922.	947.	973.	992.	1011.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	41A	5.42	1	FLOW	884.	903.	922.	947.	973.	992.	1011.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	41A-50	5.42	1	FLOW	861.	879.	898.	923.	947.	966.	984.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	A9-B	.82	1	FLOW	833.	852.	871.	897.	923.	942.	961.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	50A	6.24	1	FLOW	1694.	1731.	1769.	1820.	1870.	1908.	1946.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75

control -4.71 = 0.71

control -4.71 = 1.53

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .89									
20A-40	MANE	2.96	1785.29	251.45	.95	5.00	1771.21	250.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1416E+03 EXCESS= .0000E+00 OUTFLOW= .1419E+03 BASIN STORAGE= .6174E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .90									
20A-40	MANE	2.82	1837.20	250.40	.99	5.00	1831.36	250.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1462E+03 EXCESS= .0000E+00 OUTFLOW= .1466E+03 BASIN STORAGE= .7355E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .92									
20A-40	MANE	2.86	1884.12	252.75	1.02	5.00	1881.59	250.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1510E+03 EXCESS= .0000E+00 OUTFLOW= .1513E+03 BASIN STORAGE= .6789E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .94									
20A-40	MANE	2.74	1959.01	251.75	1.06	5.00	1948.11	250.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1574E+03 EXCESS= .0000E+00 OUTFLOW= .1577E+03 BASIN STORAGE= .6689E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .96

20A-40	MANE	2.70	2034.45	250.77	1.10	5.00	2024.28	250.00	1.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1638E+03 EXCESS= .0000E+00 OUTFLOW= .1641E+03 BASIN STORAGE= .7471E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .98

20A-40	MANE	2.75	2087.90	250.43	1.14	5.00	2081.30	250.00	1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1687E+03 EXCESS= .0000E+00 OUTFLOW= .1690E+03 BASIN STORAGE= .5669E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .99

20A-40	MANE	2.73	2133.91	249.93	1.17	5.00	2133.85	250.00	1.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1736E+03 EXCESS= .0000E+00 OUTFLOW= .1739E+03 BASIN STORAGE= .7324E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .89

30A-40	MANE	5.00	887.84	235.36	1.00	5.00	872.05	235.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4914E+02 EXCESS= .0000E+00 OUTFLOW= .5005E+02 BASIN STORAGE= .2302E-02 PERCENT ERROR= -1.9

FOR PLAN = 1 RATIO= .90

30A-40	MANE	5.00	909.18	234.98	1.03	5.00	909.09	235.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5074E+02 EXCESS= .0000E+00 OUTFLOW= .5170E+02 BASIN STORAGE= .2261E-02 PERCENT ERROR= -1.9

FOR PLAN = 1 RATIO= .92

30A-40	MANE	5.00	930.47	234.62	1.07	5.00	928.81	235.00	1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5238E+02 EXCESS= .0000E+00 OUTFLOW= .5341E+02 BASIN STORAGE= .2316E-02 PERCENT ERROR= -2.0

FOR PLAN = 1 RATIO= .94

30A-40	MANE	5.00	958.96	234.16	1.11	5.00	956.17	235.00	1.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5463E+02 EXCESS= .0000E+00 OUTFLOW= .5550E+02 BASIN STORAGE= .2082E-02 PERCENT ERROR= -1.6

FOR PLAN = 1 RATIO= .96

30A-40	MANE	5.00	986.99	233.67	1.15	5.00	984.21	235.00	1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5687E+02 EXCESS= .0000E+00 OUTFLOW= .5775E+02 BASIN STORAGE= .3290E-02 PERCENT ERROR= -1.5

FOR PLAN = 1 RATIO= .98

30A-40	MANE	5.00	1007.82	238.68	1.18	5.00	986.69	235.00	1.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5855E+02 EXCESS= .0000E+00 OUTFLOW= .5929E+02 BASIN STORAGE= .2766E-02 PERCENT ERROR= -1.3

FOR PLAN = 1 RATIO= .99

30A-40	MANE	5.00	1035.05	238.27	1.22	5.00	1010.41	235.00	1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6023E+02 EXCESS= .0000E+00 OUTFLOW= .6100E+02 BASIN STORAGE= .3076E-02 PERCENT ERROR= -1.3

FOR PLAN = 1 RATIO= .89

41A-50	MANE	1.05	879.51	221.93	.23	5.00	860.93	225.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6622E+02 EXCESS= .0000E+00 OUTFLOW= .6631E+02 BASIN STORAGE= .4726E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .90

41A-50	MANE	.99	897.08	222.68	.23	5.00	879.47	225.00	.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6766E+02 EXCESS= .0000E+00 OUTFLOW= .6773E+02 BASIN STORAGE= .5230E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .92

41A-50	MANE	1.05	918.78	222.32	.24	5.00	897.99	225.00	.24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6910E+02 EXCESS= .0000E+00 OUTFLOW= .6918E+02 BASIN STORAGE= .5061E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .94

41A-50	MANE	1.04	945.78	222.09	.25	5.00	922.70	225.00	.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7103E+02 EXCESS= .0000E+00 OUTFLOW= .7111E+02 BASIN STORAGE= .4411E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .96

41A-50	MANE	1.04	967.33	222.54	.25	5.00	947.35	225.00	.25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7295E+02 EXCESS= .0000E+00 OUTFLOW= .7303E+02 BASIN STORAGE= .5333E-04 PERCENT ERROR= -.1

```
          FOR PLAN = 1  RATIO=  .98
            41A-50  MANE          1.05    989.15    222.06       .26      5.00    965.82    225.00         .26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7439E+02 EXCESS= .0000E+00 OUTFLOW= .7446E+02 BASIN STORAGE= .4377E-04 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .99
            41A-50  MANE          1.07   1004.86    221.93       .26      5.00    984.26    225.00         .26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7583E+02 EXCESS= .0000E+00 OUTFLOW= .7589E+02 BASIN STORAGE= .4858E-04 PERCENT ERROR=   -.1


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

PULSIPHER WASH

Job Title **Mesquite LOMR**
Job Number **550-048**
Date **March 31, 2011**
For 100-Year, 6-Hour Storm Event
Detention Basin

Pulsipher Wash Detention Basin Stage Storage Calculation					
Stage Elevation (feet)	*Area[1] (ft)*	*Area (acres)*	*Volume (acre-feet)*	*Storage Volume Sum (acre-feet)*	contour
0.00	0	0.00	0.00	0.00	1656
1.00	55690	1.28	0.64	0.64	1657
2.00	144731	3.32	2.30	2.94	1658
3.00	215332	4.94	4.13	7.07	1659
4.00	262747	6.03	5.49	12.56	1660
5.00	291227	6.69	6.36	18.92	1661
6.00	311221	7.14	6.92	25.83	1662
7.00	326361	7.49	7.32	33.15	1663
8.00	340537	7.82	7.65	40.81	1664
9.00	354502	8.14	7.98	48.79	1665
10.00	368518	8.46	8.30	57.08	1666
11.00	383437	8.80	8.63	65.72	1667
12.00	410727	9.43	9.12	74.83	1668
13.00	429077	9.85	9.64	84.47	1669
14.00	445264	10.22	10.04	94.51	1670
15.00	466215	10.70	10.46	104.97	1671
16.00	480822	11.04	10.87	115.84	1672
17.00	492751	11.31	11.18	127.01	1673
17.70	500273	11.48	7.98	134.99	1673.7 Spillway Crest
18.00	503496	11.56	3.46	138.45	1674
19.00	514779	11.82	11.69	150.14	1675
20.00	525505	12.06	11.94	162.08	1676
21.00	536070	12.31	12.19	174.26	1677
22.00	546431	12.54	12.43	186.69	1678
23.00	556638	12.78	12.66	199.35	1679
24.00	567504	13.03	12.90	212.25	1680

[1]Area determined from existing topography

Storage Discharge
Pulsipher Detention Basin

Outlet Pipes	Low Flow	Silt
Pipe Diameter (in)	48	24
Pipe Invert El	1658.9	1654.7
Orifice Diameter (in)	38	24
Orifice Invelt El	1658.9	1654.7
Orifice Centerline El	1660.5	1655.7
Orifice Top El	1662.1	1656.7
Orifice Coefficient	0.65	0.65

$Q=CA(2gh)^{1/2}$

Emergency Spillway Data

Weir Length (ft)	400
Weir Crest Elevation	1673.7
P	3

Q = CLH^(3/2)

Orifice Equation: $Q=CA(2gh)^{1/2}$
Where: Q = discharge in cfs
A = Cross sectional area (ft^2)
g = Gravitational Constant (ft/sec^2)
h = Head, (ft) above centerline of orifice opening
C = Orifice Coefficient

Stage Elevation (ft)	P/H_0	Weir Coeff	Low Flow Orifice (cfs)	Silt Pipe Orifice (cfs)	Spillway (cfs)	Total (cfs)
1654.7			0	0		0
1655.0			0	0		0
1656.0			0	9		0
1657.0			0	18		0
1658.0			0	25		0
1659.0			1	30		1
1660.0			9	34		9
1661.0			30	38		30
1662.0			51	41		51
1663.0			65	44		65
1664.0			77	47		77
1665.0			87	50		87
1666.0			96	53		96
1667.0			105	55		105
1668.0			113	57		113
1669.0			120	60		120
1670.0			127	62		127
1671.0			133	64		133
1672.0			139	66		139
1673.0			145	68		145
1673.7	0.0	0	149	69	0	149
1674.0	8.8	3.95	151	70	313	464
1675.0	2.2	3.94	157	72	2445	2601
1676.0	1.3	3.91	162	74	5598	5760
1677.0	0.9	3.88	167	76	9474	9640
1678.0	0.7	3.85	172	77	13924	14096
1679.0	0.6	3.83	177	79	18905	19082
1680.0	0.5	3.80	181	81	24265	24446

Spillway Crest

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   09JUN11  TIME  15:56:54   *
*                                       *
*****************************************
```

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

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

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

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


```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
              *
              *DIAGRAM
    1         ID   ********************************************************************
    2         ID   * ..................................................................  *
    3         ID   * :                                                                :  *
    4         ID   * :              ABBOTT AND PULSIPHER WASHES LOMR                  :  *
    5         ID   * :              PULSIPHER WASH HYDROLOGIC MODEL                   :  *
    6         ID   * :              EXISTING CONDITIONS                               :  *
    7         ID   * :................................................................:  *
    8         ID   * :              RETURN PERIOD_ _ _ _100-YEAR                      :  *
    9         ID   * :              DISTRIBUTION_ _ _ _ 6-HOUR SDN3 SERIES A          :  *
   10         ID   * :              PROJECT NO_ _ _ _ _ 550.048                       :  *
   11         ID   * :              FILENAME_ _ _ _ _ _ PUWA_SDN3a.DAT                :  *
   12         ID   * :              DATE MODELED_ _ _ _ 03/31/11                      :  *
   13         ID   * :              MODELED BY_ _ _ _ _ PK/BG                         :  *
   14         ID   * :................................................................:  *
   15         ID   * :                                                                :  *
   16         ID   * :................................................................:  *
   17         ID   ********************************************************************
   18         ID    REFERENCED FROM CCRFCD CITY OF MESQUITE 2007 MPU
   19         ID    USED PULSIPHER WASH DETENTION BASIN AS BUILT SURVEY INFORMATION
   20         ID
   21         ID     JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
   22         ID     AREA       DARF
   23         ID     (SQ MI)    (100-YR)
   24         ID     4-6        0.905
   25         ID     2-4        0.92
   26         ID     1.5-2      0.94
   27         ID     1-1.5      0.96
   28         ID     0.5-1      0.975
   29         ID     0-0.5      0.99
   30         ID
   31         IT       5              0     300
   32         IO       5
   33         IN       5              0
   34         JR    PREC    .905     .92     .94     .96    .975     .99
              *

   35         KK      P1
   36         BA    0.86
   37         PB    3.00
   38         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   39         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   40         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   41         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   42         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   43         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   44         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   45         PC   0.998   0.999       1
   46         LG    0.14     .32     4.9     .28    20.0
   47         UD     .36
              *
```



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

   48         KK   P1-10   CNAME
   49         KM   ROUTE SUBBASIN P1 THROUGH SUBBASIN P2
   50         RM       1     .11     .15
              *

   51         KK      P2
   52         BA    0.51
   53         LG    0.13     .29    4.94     .31      30
   54         UD     .21
              *
```

```
55          KK     10P   CNAME       20
56          KM   COMBINE ROUTE P1-10 AND SUBBASIN 10P
57          HC       2
            *

58          KK  10P-20
59          KM   ROUTE COMBINATION 10P THROUGH SUBBASIN P3
60          RM       2     .20     .15
            *

61          KK      P3
62          BA    0.91
63          LG    0.14     .31    4.89     .29      23
64          UD     .33
            *

65          KK     20P   CNAME       30
66          KM   COMBINE ROUTE 10P-20 AND SUBBASIN P3
67          KO       1
68          HC       2
            *

69          KK    PWDB
70          KM    PULSIPHER Wash Detention Basin-Survey Information
71          KO       1
72          RS       1    ELEV  1656.0
73          SV       0    0.64    2.94    7.07   12.56   18.92   25.83   33.15   40.81   48.79
74          SV   57.08   65.72   74.83   84.47   94.51  104.97  115.84  127.01  134.99  138.45
75          SE  1656.0    1657    1658    1659    1660    1661    1662    1663    1664    1665
76          SE    1666    1667    1668    1669    1670    1671    1672    1673  1673.7    1674
77          SQ       0       0       0       1       9      30      51      65      77      87
78          SQ      96     105     113     120     127     133     139     145     149     464
            *

79          KK  20P-30
80          KM   ROUTE COMBINATION POINT 20P THROUGH SUBBASIN P4
81          RK    3109    .010    .025            TRAP      60       1
            *
```



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

82          KK      P4
83          BA     .82
84          LG    0.13     .32    4.86     .29      26
85          UD     .37
            *

86          KK     30P
87          KM   COMBINE ROUTE 20P-30 AND SUBBASIN P4
88          HC       2
            *

89          KK  30P-40
90          KM   ROUTE COMBINATION POINT 30P THROUGH SUBBASIN P7
91          RK    1566    .008    .015            TRAP      24       1
            *

92          KK      P6
93          BA    0.73
94          LG    0.15     .35    4.53     .31       0
95          UD     .56
            *

96          KK   P6-40
97          KM   ROUTE SUBBASIN P6 THROUGH SUBBASIN P7
98          RK    6454    .018    .025            TRAP      16       1
            *

99          KK      P7
100         BA    0.63
101         LG    0.12     .34    4.74     .27      31
102         UD     .46
            *

103         KK     40P   CNAME
104         KM   COMBINE ROUTE 30P-40, ROUTE P6-40, AND SUBBASIN P7
105         HC       3
            *

106         KK  40P-50
107         KM   ROUTE COMBINATION POINT 40P THROUGH SUBBASIN P8
108         RK    1653    .008    .025            TRAP      20       3
            *

109         KK      P8
110         BA    0.29
111         LG     .08     .26    4.52     .31      81
112         UD     .25
            *
```



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

113         KK     50P   CNAME
114         KM   COMBINE ROUTE 40P-50 AND SUBBASIN P8
115         KO       0       0       0       0      21
116         HC       2
            *

117         KK    D50P
118         KM   DIVERT OUTFLOW FOR I-15 BREAKOUT
119         DT    DOUT
120         DI       0     474
```

```
          121           DQ     474     474
                        *

          122           KK  50P-60
          123           KM   ROUTE COMBINATION POINT 50P THROUGH SUBBASIN P9
          124           RK    4552    .011    .025            TRAP      20       3
                        *

          125           KK      P9
          126           BA    0.13
          127           LG     .10     .29    3.51    0.69      57
          128           UD     .30
                        *

          129           KK      60
          130           KM   COMBINE ROUTE 50P-60 AND SUBBASIN P9
          131           HC       2
                        *
          132           ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    35           P1
                  V
                  V
    48         P1-10
                  .
                  .
    51            .           P2
                  .            .
                  .            .
    55          10P............
                  V
                  V
    58        10P-20
                  .
                  .
    61            .           P3
                  .            .
                  .            .
    65          20P............
                  V
                  V
    69          PWDB
                  V
                  V
    79        20P-30
                  .
                  .
    82            .           P4
                  .            .
                  .            .
    86          30P............
                  V
                  V
    89        30P-40
                  .
                  .
    92            .           P6
                  .            V
                  .            V
    96            .         P6-40
                  .            .
                  .            .
    99            .            .          P7
                  .            .           .
                  .            .           .
   103          40P.........................
                  V
                  V
   106        40P-50
                  .
                  .
   109            .           P8
                  .            .
                  .            .
   113          50P............
                  .
                  .
   119            .-------->    DOUT
   117          D50P
                  V
                  V
   122        50P-60
                  .
                  .
   125            .           P9
                  .            .
                  .            .
   129           60............

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN   1998                *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   09JUN11  TIME  15:56:54   *
*                                       *
*****************************************

*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
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**************************************************************
*  ..........................................................  *
*  :                                                        :  *
*  :            ABBOTT AND PULSIPHER WASHES LOMR            :  *
*  :            PULSIPHER WASH HYDROLOGIC MODEL             :  *
*  :            EXISTING CONDITIONS                         :  *
*  :                                                        :  *
*  :                                                        :  *
*  :            RETURN PERIOD_ _ _ _100-YEAR                :  *
*  :            DISTRIBUTION_ _ _ _ 6-HOUR SDN3 SERIES A    :  *
*  :            PROJECT NO_ _ _ _ _ 550.048                 :  *
*  :            FILENAME_ _ _ _ _ _ PUWA_SDN3a.DAT          :  *
*  :            DATE MODELED_ _ _ _ 03/31/11                :  *
*  :            MODELED BY_ _ _ _ _ PK/BG                   :  *
*  :                                                        :  *
*  :                                                        :  *
*  :                                                        :  *
*  ..........................................................  *
**************************************************************
 REFERENCED FROM CCRFCD CITY OF MESQUITE 2007 MPU
 USED PULSIPHER WASH DETENTION BASIN AS BUILT SURVEY INFORMATION

 JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
 AREA       DARF
 (SQ MI)    (100-YR)
 4-6        0.905
 2-4        0.92
 1.5-2      0.94
 1-1.5      0.96
 0.5-1      0.975
 0-0.5      0.99

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

   IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME        0000  STARTING TIME
                     NQ           300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2   0  ENDING DATE
                     NDTIME       0055  ENDING TIME
                     ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL      .08 HOURS
                    TOTAL TIME BASE    24.92 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

   JP          MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

   JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   .90       .92       .94       .96       .98       .99

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

          ***************
          *             *
65 KK     *      20P    *       CNAME      30
          *             *
          ***************

67 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

68 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                  ***

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

                                        HYDROGRAPH AT STATION      20P
                                            SUM OF  2 HYDROGRAPHS
                                          PLAN 1,    RATIO =   .90

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

 DA MON HRMN  ORD     FLOW   *  DA MON HRMN  ORD     FLOW   *  DA MON HRMN  ORD     FLOW   *  DA MON HRMN  ORD     FLOW
  1     0000    1       0.   *   1     0615   76      16.   *   1     1230  151       0.   *   1     1845  226       0.
  1     0005    2       2.   *   1     0620   77      13.   *   1     1235  152       0.   *   1     1850  227       0.
  1     0010    3      11.   *   1     0625   78      10.   *   1     1240  153       0.   *   1     1855  228       0.
  1     0015    4      31.   *   1     0630   79       8.   *   1     1245  154       0.   *   1     1900  229       0.
  1     0020    5      62.   *   1     0635   80       6.   *   1     1250  155       0.   *   1     1905  230       0.
  1     0025    6      95.   *   1     0640   81       4.   *   1     1255  156       0.   *   1     1910  231       0.
  1     0030    7     123.   *   1     0645   82       3.   *   1     1300  157       0.   *   1     1915  232       0.
```

1	0035	8	144.	*	1	0650	83	2.	*	1	1305	158	0.	*	1	1920	233	0.	
1	0040	9	154.	*	1	0655	84	2.	*	1	1310	159	0.	*	1	1925	234	0.	
1	0045	10	154.	*	1	0700	85	1.	*	1	1315	160	0.	*	1	1930	235	0.	
1	0050	11	143.	*	1	0705	86	1.	*	1	1320	161	0.	*	1	1935	236	0.	
1	0055	12	124.	*	1	0710	87	1.	*	1	1325	162	0.	*	1	1940	237	0.	
1	0100	13	102.	*	1	0715	88	0.	*	1	1330	163	0.	*	1	1945	238	0.	
1	0105	14	81.	*	1	0720	89	0.	*	1	1335	164	0.	*	1	1950	239	0.	
1	0110	15	65.	*	1	0725	90	0.	*	1	1340	165	0.	*	1	1955	240	0.	
1	0115	16	53.	*	1	0730	91	0.	*	1	1345	166	0.	*	1	2000	241	0.	
1	0120	17	46.	*	1	0735	92	0.	*	1	1350	167	0.	*	1	2005	242	0.	
1	0125	18	44.	*	1	0740	93	0.	*	1	1355	168	0.	*	1	2010	243	0.	
1	0130	19	46.	*	1	0745	94	0.	*	1	1400	169	0.	*	1	2015	244	0.	
1	0135	20	52.	*	1	0750	95	0.	*	1	1405	170	0.	*	1	2020	245	0.	
1	0140	21	62.	*	1	0755	96	0.	*	1	1410	171	0.	*	1	2025	246	0.	
1	0145	22	72.	*	1	0800	97	0.	*	1	1415	172	0.	*	1	2030	247	0.	
1	0150	23	79.	*	1	0805	98	0.	*	1	1420	173	0.	*	1	2035	248	0.	
1	0155	24	82.	*	1	0810	99	0.	*	1	1425	174	0.	*	1	2040	249	0.	
1	0200	25	79.	*	1	0815	100	0.	*	1	1430	175	0.	*	1	2045	250	0.	
1	0205	26	73.	*	1	0820	101	0.	*	1	1435	176	0.	*	1	2050	251	0.	
1	0210	27	65.	*	1	0825	102	0.	*	1	1440	177	0.	*	1	2055	252	0.	
1	0215	28	60.	*	1	0830	103	0.	*	1	1445	178	0.	*	1	2100	253	0.	
1	0220	29	60.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.	
1	0225	30	67.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.	
1	0230	31	76.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.	
1	0235	32	82.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.	
1	0240	33	84.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.	
1	0245	34	84.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.	
1	0250	35	85.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.	
1	0255	36	85.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.	
1	0300	37	84.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.	
1	0305	38	83.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.	
1	0310	39	90.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.	
1	0315	40	123.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.	
1	0320	41	216.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.	
1	0325	42	410.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.	
1	0330	43	731.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.	
1	0335	44	1129.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.	
1	0340	45	1520.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.	
1	0345	46	1779.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.	
1	0350	47	1865.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.	
1	0355	48	1805.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.	
1	0400	49	1642.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.	
1	0405	50	1435.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.	
1	0410	51	1216.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.	
1	0415	52	997.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.	
1	0420	53	797.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.	
1	0425	54	626.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.	
1	0430	55	491.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.	
1	0435	56	393.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.	
1	0440	57	328.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.	
1	0445	58	285.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.	
1	0450	59	256.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.	
1	0455	60	234.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.	
1	0500	61	219.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.	
1	0505	62	203.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.	
1	0510	63	184.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.	
1	0515	64	162.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.	
1	0520	65	138.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.	
1	0525	66	115.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.	
1	0530	67	94.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.	
1	0535	68	77.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.	
1	0540	69	62.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.	
1	0545	70	49.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.	
1	0550	71	40.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.	
1	0555	72	33.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.	
1	0600	73	27.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.	
1	0605	74	23.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.	
1	0610	75	20.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.	

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1865.	3.83		315.	79.	76.	76.
		(INCHES)	1.285	1.290	1.290	1.290
		(AC-FT)	156.	157.	157.	157.

CUMULATIVE AREA = 2.28 SQ MI

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HYDROGRAPH AT STATION 20P
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .92

****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	17.	1		1230	151	0.	1		1845	226	0.
1		0005	2	2.	1		0620	77	13.	1		1235	152	0.	1		1850	227	0.
1		0010	3	11.	1		0625	78	11.	1		1240	153	0.	1		1855	228	0.
1		0015	4	32.	1		0630	79	8.	1		1245	154	0.	1		1900	229	0.
1		0020	5	63.	1		0635	80	6.	1		1250	155	0.	1		1905	230	0.
1		0025	6	97.	1		0640	81	5.	1		1255	156	0.	1		1910	231	0.
1		0030	7	126.	1		0645	82	3.	1		1300	157	0.	1		1915	232	0.
1		0035	8	146.	1		0650	83	2.	1		1305	158	0.	1		1920	233	0.
1		0040	9	157.	1		0655	84	2.	1		1310	159	0.	1		1925	234	0.
1		0045	10	156.	1		0700	85	1.	1		1315	160	0.	1		1930	235	0.
1		0050	11	145.	1		0705	86	1.	1		1320	161	0.	1		1935	236	0.
1		0055	12	126.	1		0710	87	1.	1		1325	162	0.	1		1940	237	0.
1		0100	13	103.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	83.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0110	15	66.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	54.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	47.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	45.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	47.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	53.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	63.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	73.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	81.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	83.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	81.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	74.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	66.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	61.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	61.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	68.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	77.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	84.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	86.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	85.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	86.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	86.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	85.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	85.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	92.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	126.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	223.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	422.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	752.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	1159.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1559.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	1823.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	1912.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	1850.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	1684.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	1472.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	1247.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	1023.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	817.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	643.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	504.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	403.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	337.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	293.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	263.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	241.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	225.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	209.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	190.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	168.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	143.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	119.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	97.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	79.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	63.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	51.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	41.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	34.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	28.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	24.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	20.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)	(CFS)				
1912.	3.83		323.	81.	78.	78.
		(INCHES)	1.317	1.322	1.322	1.322
		(AC-FT)	160.	161.	161.	161.

CUMULATIVE AREA = 2.28 SQ MI

HYDROGRAPH AT STATION 20P
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .94

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	17.	1		1230	151	0.	1		1845	226	0.
1		0005	2	2.	1		0620	77	14.	1		1235	152	0.	1		1850	227	0.
1		0010	3	11.	1		0625	78	11.	1		1240	153	0.	1		1855	228	0.
1		0015	4	32.	1		0630	79	8.	1		1245	154	0.	1		1900	229	0.
1		0020	5	65.	1		0635	80	6.	1		1250	155	0.	1		1905	230	0.
1		0025	6	99.	1		0640	81	5.	1		1255	156	0.	1		1910	231	0.
1		0030	7	128.	1		0645	82	3.	1		1300	157	0.	1		1915	232	0.
1		0035	8	150.	1		0650	83	2.	1		1305	158	0.	1		1920	233	0.
1		0040	9	160.	1		0655	84	2.	1		1310	159	0.	1		1925	234	0.
1		0045	10	160.	1		0700	85	1.	1		1315	160	0.	1		1930	235	0.
1		0050	11	148.	1		0705	86	1.	1		1320	161	0.	1		1935	236	0.
1		0055	12	129.	1		0710	87	1.	1		1325	162	0.	1		1940	237	0.
1		0100	13	106.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	84.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	67.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	55.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	48.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	46.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	48.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	54.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	64.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0145	22	74.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	82.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	85.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	82.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	75.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	67.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	62.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	63.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	70.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	79.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	85.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	87.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	87.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	88.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	88.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	87.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	87.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	95.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	131.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	233.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	441.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	781.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	1200.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1611.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	1883.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	1974.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	1911.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	1740.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	1521.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	1289.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	1057.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	844.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	664.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	521.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	417.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	349.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	304.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	273.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	250.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	234.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	218.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	199.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	175.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	149.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	124.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	102.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	82.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	66.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	53.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	42.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	35.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	29.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	25.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	21.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 1974.	3.83		334.	84.	81.	81.
		(INCHES)	1.361	1.366	1.366	1.366
		(AC-FT)	165.	166.	166.	166.

CUMULATIVE AREA = 2.28 SQ MI

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HYDROGRAPH AT STATION 20P
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .96

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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	17.	1		1230	151	0.	1		1845	226	0.
1		0005	2	2.	1		0620	77	14.	1		1235	152	0.	1		1850	227	0.
1		0010	3	11.	1		0625	78	11.	1		1240	153	0.	1		1855	228	0.
1		0015	4	33.	1		0630	79	9.	1		1245	154	0.	1		1900	229	0.
1		0020	5	66.	1		0635	80	6.	1		1250	155	0.	1		1905	230	0.
1		0025	6	101.	1		0640	81	5.	1		1255	156	0.	1		1910	231	0.
1		0030	7	131.	1		0645	82	4.	1		1300	157	0.	1		1915	232	0.
1		0035	8	153.	1		0650	83	3.	1		1305	158	0.	1		1920	233	0.
1		0040	9	164.	1		0655	84	2.	1		1310	159	0.	1		1925	234	0.
1		0045	10	163.	1		0700	85	1.	1		1315	160	0.	1		1930	235	0.
1		0050	11	151.	1		0705	86	1.	1		1320	161	0.	1		1935	236	0.
1		0055	12	131.	1		0710	87	1.	1		1325	162	0.	1		1940	237	0.
1		0100	13	108.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	86.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	68.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	56.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	49.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	47.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	49.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	55.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	65.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	76.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	84.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	87.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	84.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	77.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	69.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	63.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.

1	0220	29	64.	*	1	0835	104	0.	*	1	1450	179	0.	*	1	2105	254	0.	
1	0225	30	71.	*	1	0840	105	0.	*	1	1455	180	0.	*	1	2110	255	0.	
1	0230	31	81.	*	1	0845	106	0.	*	1	1500	181	0.	*	1	2115	256	0.	
1	0235	32	87.	*	1	0850	107	0.	*	1	1505	182	0.	*	1	2120	257	0.	
1	0240	33	89.	*	1	0855	108	0.	*	1	1510	183	0.	*	1	2125	258	0.	
1	0245	34	89.	*	1	0900	109	0.	*	1	1515	184	0.	*	1	2130	259	0.	
1	0250	35	90.	*	1	0905	110	0.	*	1	1520	185	0.	*	1	2135	260	0.	
1	0255	36	90.	*	1	0910	111	0.	*	1	1525	186	0.	*	1	2140	261	0.	
1	0300	37	89.	*	1	0915	112	0.	*	1	1530	187	0.	*	1	2145	262	0.	
1	0305	38	89.	*	1	0920	113	0.	*	1	1535	188	0.	*	1	2150	263	0.	
1	0310	39	98.	*	1	0925	114	0.	*	1	1540	189	0.	*	1	2155	264	0.	
1	0315	40	138.	*	1	0930	115	0.	*	1	1545	190	0.	*	1	2200	265	0.	
1	0320	41	245.	*	1	0935	116	0.	*	1	1550	191	0.	*	1	2205	266	0.	
1	0325	42	461.	*	1	0940	117	0.	*	1	1555	192	0.	*	1	2210	267	0.	
1	0330	43	811.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.	
1	0335	44	1243.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.	
1	0340	45	1664.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.	
1	0345	46	1943.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.	
1	0350	47	2037.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.	
1	0355	48	1972.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.	
1	0400	49	1797.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.	
1	0405	50	1570.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.	
1	0410	51	1331.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.	
1	0415	52	1092.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.	
1	0420	53	872.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.	
1	0425	54	685.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.	
1	0430	55	537.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.	
1	0435	56	430.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.	
1	0440	57	360.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.	
1	0445	58	314.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.	
1	0450	59	282.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.	
1	0455	60	259.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.	
1	0500	61	243.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.	
1	0505	62	226.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.	
1	0510	63	207.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.	
1	0515	64	182.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.	
1	0520	65	155.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.	
1	0525	66	129.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.	
1	0530	67	106.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.	
1	0535	68	86.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.	
1	0540	69	69.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.	
1	0545	70	55.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.	
1	0550	71	44.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.	
1	0555	72	36.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.	
1	0600	73	30.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.	
1	0605	74	25.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.	
1	0610	75	21.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.	

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2037.	3.83		345.	86.	83.	83.
		(INCHES)	1.405	1.410	1.410	1.410
		(AC-FT)	171.	171.	171.	171.

CUMULATIVE AREA = 2.28 SQ MI

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HYDROGRAPH AT STATION 20P
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .98

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	*	1		0615	76	18.	*	1		1230	151	0.	*	1		1845	226	0.
1		0005	2	2.	*	1		0620	77	14.	*	1		1235	152	0.	*	1		1850	227	0.
1		0010	3	12.	*	1		0625	78	11.	*	1		1240	153	0.	*	1		1855	228	0.
1		0015	4	34.	*	1		0630	79	9.	*	1		1245	154	0.	*	1		1900	229	0.
1		0020	5	67.	*	1		0635	80	7.	*	1		1250	155	0.	*	1		1905	230	0.
1		0025	6	102.	*	1		0640	81	5.	*	1		1255	156	0.	*	1		1910	231	0.
1		0030	7	133.	*	1		0645	82	4.	*	1		1300	157	0.	*	1		1915	232	0.
1		0035	8	155.	*	1		0650	83	3.	*	1		1305	158	0.	*	1		1920	233	0.
1		0040	9	166.	*	1		0655	84	2.	*	1		1310	159	0.	*	1		1925	234	0.
1		0045	10	166.	*	1		0700	85	1.	*	1		1315	160	0.	*	1		1930	235	0.
1		0050	11	154.	*	1		0705	86	1.	*	1		1320	161	0.	*	1		1935	236	0.
1		0055	12	133.	*	1		0710	87	1.	*	1		1325	162	0.	*	1		1940	237	0.
1		0100	13	110.	*	1		0715	88	0.	*	1		1330	163	0.	*	1		1945	238	0.
1		0105	14	87.	*	1		0720	89	0.	*	1		1335	164	0.	*	1		1950	239	0.
1		0110	15	70.	*	1		0725	90	0.	*	1		1340	165	0.	*	1		1955	240	0.
1		0115	16	57.	*	1		0730	91	0.	*	1		1345	166	0.	*	1		2000	241	0.
1		0120	17	50.	*	1		0735	92	0.	*	1		1350	167	0.	*	1		2005	242	0.
1		0125	18	47.	*	1		0740	93	0.	*	1		1355	168	0.	*	1		2010	243	0.
1		0130	19	49.	*	1		0745	94	0.	*	1		1400	169	0.	*	1		2015	244	0.
1		0135	20	56.	*	1		0750	95	0.	*	1		1405	170	0.	*	1		2020	245	0.
1		0140	21	66.	*	1		0755	96	0.	*	1		1410	171	0.	*	1		2025	246	0.
1		0145	22	77.	*	1		0800	97	0.	*	1		1415	172	0.	*	1		2030	247	0.
1		0150	23	85.	*	1		0805	98	0.	*	1		1420	173	0.	*	1		2035	248	0.
1		0155	24	88.	*	1		0810	99	0.	*	1		1425	174	0.	*	1		2040	249	0.
1		0200	25	86.	*	1		0815	100	0.	*	1		1430	175	0.	*	1		2045	250	0.
1		0205	26	78.	*	1		0820	101	0.	*	1		1435	176	0.	*	1		2050	251	0.
1		0210	27	70.	*	1		0825	102	0.	*	1		1440	177	0.	*	1		2055	252	0.
1		0215	28	64.	*	1		0830	103	0.	*	1		1445	178	0.	*	1		2100	253	0.
1		0220	29	65.	*	1		0835	104	0.	*	1		1450	179	0.	*	1		2105	254	0.
1		0225	30	72.	*	1		0840	105	0.	*	1		1455	180	0.	*	1		2110	255	0.
1		0230	31	82.	*	1		0845	106	0.	*	1		1500	181	0.	*	1		2115	256	0.
1		0235	32	89.	*	1		0850	107	0.	*	1		1505	182	0.	*	1		2120	257	0.
1		0240	33	91.	*	1		0855	108	0.	*	1		1510	183	0.	*	1		2125	258	0.
1		0245	34	90.	*	1		0900	109	0.	*	1		1515	184	0.	*	1		2130	259	0.
1		0250	35	91.	*	1		0905	110	0.	*	1		1520	185	0.	*	1		2135	260	0.

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0255	36	92.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	90.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	90.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	101.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	143.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	254.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	476.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.
1		0330	43	835.	1		0945	118	0.	1		1600	193	0.	1		2215	268	0.
1		0335	44	1274.	1		0950	119	0.	1		1605	194	0.	1		2220	269	0.
1		0340	45	1704.	1		0955	120	0.	1		1610	195	0.	1		2225	270	0.
1		0345	46	1988.	1		1000	121	0.	1		1615	196	0.	1		2230	271	0.
1		0350	47	2084.	1		1005	122	0.	1		1620	197	0.	1		2235	272	0.
1		0355	48	2018.	1		1010	123	0.	1		1625	198	0.	1		2240	273	0.
1		0400	49	1839.	1		1015	124	0.	1		1630	199	0.	1		2245	274	0.
1		0405	50	1607.	1		1020	125	0.	1		1635	200	0.	1		2250	275	0.
1		0410	51	1362.	1		1025	126	0.	1		1640	201	0.	1		2255	276	0.
1		0415	52	1117.	1		1030	127	0.	1		1645	202	0.	1		2300	277	0.
1		0420	53	892.	1		1035	128	0.	1		1650	203	0.	1		2305	278	0.
1		0425	54	701.	1		1040	129	0.	1		1655	204	0.	1		2310	279	0.
1		0430	55	550.	1		1045	130	0.	1		1700	205	0.	1		2315	280	0.
1		0435	56	440.	1		1050	131	0.	1		1705	206	0.	1		2320	281	0.
1		0440	57	369.	1		1055	132	0.	1		1710	207	0.	1		2325	282	0.
1		0445	58	322.	1		1100	133	0.	1		1715	208	0.	1		2330	283	0.
1		0450	59	289.	1		1105	134	0.	1		1720	209	0.	1		2335	284	0.
1		0455	60	266.	1		1110	135	0.	1		1725	210	0.	1		2340	285	0.
1		0500	61	250.	1		1115	136	0.	1		1730	211	0.	1		2345	286	0.
1		0505	62	233.	1		1120	137	0.	1		1735	212	0.	1		2350	287	0.
1		0510	63	213.	1		1125	138	0.	1		1740	213	0.	1		2355	288	0.
1		0515	64	188.	1		1130	139	0.	1		1745	214	0.	2		0000	289	0.
1		0520	65	160.	1		1135	140	0.	1		1750	215	0.	2		0005	290	0.
1		0525	66	133.	1		1140	141	0.	1		1755	216	0.	2		0010	291	0.
1		0530	67	109.	1		1145	142	0.	1		1800	217	0.	2		0015	292	0.
1		0535	68	88.	1		1150	143	0.	1		1805	218	0.	2		0020	293	0.
1		0540	69	71.	1		1155	144	0.	1		1810	219	0.	2		0025	294	0.
1		0545	70	56.	1		1200	145	0.	1		1815	220	0.	2		0030	295	0.
1		0550	71	45.	1		1205	146	0.	1		1820	221	0.	2		0035	296	0.
1		0555	72	37.	1		1210	147	0.	1		1825	222	0.	2		0040	297	0.
1		0600	73	31.	1		1215	148	0.	1		1830	223	0.	2		0045	298	0.
1		0605	74	26.	1		1220	149	0.	1		1835	224	0.	2		0050	299	0.
1		0610	75	22.	1		1225	150	0.	1		1840	225	0.	2		0055	300	0.

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2084.	3.83		353.	88.	85.	85.
		(INCHES)	1.438	1.443	1.443	1.443
		(AC-FT)	175.	176.	176.	176.

CUMULATIVE AREA = 2.28 SQ MI

HYDROGRAPH AT STATION 20P
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	18.	1		1230	151	0.	1		1845	226	0.
1		0005	2	2.	1		0620	77	15.	1		1235	152	0.	1		1850	227	0.
1		0010	3	12.	1		0625	78	12.	1		1240	153	0.	1		1855	228	0.
1		0015	4	34.	1		0630	79	9.	1		1245	154	0.	1		1900	229	0.
1		0020	5	68.	1		0635	80	7.	1		1250	155	0.	1		1905	230	0.
1		0025	6	104.	1		0640	81	5.	1		1255	156	0.	1		1910	231	0.
1		0030	7	135.	1		0645	82	4.	1		1300	157	0.	1		1915	232	0.
1		0035	8	157.	1		0650	83	3.	1		1305	158	0.	1		1920	233	0.
1		0040	9	169.	1		0655	84	2.	1		1310	159	0.	1		1925	234	0.
1		0045	10	168.	1		0700	85	1.	1		1315	160	0.	1		1930	235	0.
1		0050	11	156.	1		0705	86	1.	1		1320	161	0.	1		1935	236	0.
1		0055	12	135.	1		0710	87	1.	1		1325	162	0.	1		1940	237	0.
1		0100	13	111.	1		0715	88	0.	1		1330	163	0.	1		1945	238	0.
1		0105	14	89.	1		0720	89	0.	1		1335	164	0.	1		1950	239	0.
1		0110	15	71.	1		0725	90	0.	1		1340	165	0.	1		1955	240	0.
1		0115	16	58.	1		0730	91	0.	1		1345	166	0.	1		2000	241	0.
1		0120	17	51.	1		0735	92	0.	1		1350	167	0.	1		2005	242	0.
1		0125	18	48.	1		0740	93	0.	1		1355	168	0.	1		2010	243	0.
1		0130	19	50.	1		0745	94	0.	1		1400	169	0.	1		2015	244	0.
1		0135	20	57.	1		0750	95	0.	1		1405	170	0.	1		2020	245	0.
1		0140	21	67.	1		0755	96	0.	1		1410	171	0.	1		2025	246	0.
1		0145	22	78.	1		0800	97	0.	1		1415	172	0.	1		2030	247	0.
1		0150	23	87.	1		0805	98	0.	1		1420	173	0.	1		2035	248	0.
1		0155	24	90.	1		0810	99	0.	1		1425	174	0.	1		2040	249	0.
1		0200	25	87.	1		0815	100	0.	1		1430	175	0.	1		2045	250	0.
1		0205	26	79.	1		0820	101	0.	1		1435	176	0.	1		2050	251	0.
1		0210	27	71.	1		0825	102	0.	1		1440	177	0.	1		2055	252	0.
1		0215	28	65.	1		0830	103	0.	1		1445	178	0.	1		2100	253	0.
1		0220	29	66.	1		0835	104	0.	1		1450	179	0.	1		2105	254	0.
1		0225	30	74.	1		0840	105	0.	1		1455	180	0.	1		2110	255	0.
1		0230	31	83.	1		0845	106	0.	1		1500	181	0.	1		2115	256	0.
1		0235	32	90.	1		0850	107	0.	1		1505	182	0.	1		2120	257	0.
1		0240	33	92.	1		0855	108	0.	1		1510	183	0.	1		2125	258	0.
1		0245	34	92.	1		0900	109	0.	1		1515	184	0.	1		2130	259	0.
1		0250	35	92.	1		0905	110	0.	1		1520	185	0.	1		2135	260	0.
1		0255	36	93.	1		0910	111	0.	1		1525	186	0.	1		2140	261	0.
1		0300	37	92.	1		0915	112	0.	1		1530	187	0.	1		2145	262	0.
1		0305	38	92.	1		0920	113	0.	1		1535	188	0.	1		2150	263	0.
1		0310	39	103.	1		0925	114	0.	1		1540	189	0.	1		2155	264	0.
1		0315	40	148.	1		0930	115	0.	1		1545	190	0.	1		2200	265	0.
1		0320	41	263.	1		0935	116	0.	1		1550	191	0.	1		2205	266	0.
1		0325	42	491.	1		0940	117	0.	1		1555	192	0.	1		2210	267	0.

1	0330	43	857.	*	1	0945	118	0.	*	1	1600	193	0.	*	1	2215	268	0.
1	0335	44	1306.	*	1	0950	119	0.	*	1	1605	194	0.	*	1	2220	269	0.
1	0340	45	1743.	*	1	0955	120	0.	*	1	1610	195	0.	*	1	2225	270	0.
1	0345	46	2033.	*	1	1000	121	0.	*	1	1615	196	0.	*	1	2230	271	0.
1	0350	47	2131.	*	1	1005	122	0.	*	1	1620	197	0.	*	1	2235	272	0.
1	0355	48	2064.	*	1	1010	123	0.	*	1	1625	198	0.	*	1	2240	273	0.
1	0400	49	1881.	*	1	1015	124	0.	*	1	1630	199	0.	*	1	2245	274	0.
1	0405	50	1644.	*	1	1020	125	0.	*	1	1635	200	0.	*	1	2250	275	0.
1	0410	51	1393.	*	1	1025	126	0.	*	1	1640	201	0.	*	1	2255	276	0.
1	0415	52	1143.	*	1	1030	127	0.	*	1	1645	202	0.	*	1	2300	277	0.
1	0420	53	912.	*	1	1035	128	0.	*	1	1650	203	0.	*	1	2305	278	0.
1	0425	54	717.	*	1	1040	129	0.	*	1	1655	204	0.	*	1	2310	279	0.
1	0430	55	562.	*	1	1045	130	0.	*	1	1700	205	0.	*	1	2315	280	0.
1	0435	56	450.	*	1	1050	131	0.	*	1	1705	206	0.	*	1	2320	281	0.
1	0440	57	378.	*	1	1055	132	0.	*	1	1710	207	0.	*	1	2325	282	0.
1	0445	58	330.	*	1	1100	133	0.	*	1	1715	208	0.	*	1	2330	283	0.
1	0450	59	297.	*	1	1105	134	0.	*	1	1720	209	0.	*	1	2335	284	0.
1	0455	60	274.	*	1	1110	135	0.	*	1	1725	210	0.	*	1	2340	285	0.
1	0500	61	257.	*	1	1115	136	0.	*	1	1730	211	0.	*	1	2345	286	0.
1	0505	62	240.	*	1	1120	137	0.	*	1	1735	212	0.	*	1	2350	287	0.
1	0510	63	219.	*	1	1125	138	0.	*	1	1740	213	0.	*	1	2355	288	0.
1	0515	64	194.	*	1	1130	139	0.	*	1	1745	214	0.	*	2	0000	289	0.
1	0520	65	165.	*	1	1135	140	0.	*	1	1750	215	0.	*	2	0005	290	0.
1	0525	66	137.	*	1	1140	141	0.	*	1	1755	216	0.	*	2	0010	291	0.
1	0530	67	112.	*	1	1145	142	0.	*	1	1800	217	0.	*	2	0015	292	0.
1	0535	68	91.	*	1	1150	143	0.	*	1	1805	218	0.	*	2	0020	293	0.
1	0540	69	73.	*	1	1155	144	0.	*	1	1810	219	0.	*	2	0025	294	0.
1	0545	70	58.	*	1	1200	145	0.	*	1	1815	220	0.	*	2	0030	295	0.
1	0550	71	46.	*	1	1205	146	0.	*	1	1820	221	0.	*	2	0035	296	0.
1	0555	72	38.	*	1	1210	147	0.	*	1	1825	222	0.	*	2	0040	297	0.
1	0600	73	31.	*	1	1215	148	0.	*	1	1830	223	0.	*	2	0045	298	0.
1	0605	74	26.	*	1	1220	149	0.	*	1	1835	224	0.	*	2	0050	299	0.
1	0610	75	22.	*	1	1225	150	0.	*	1	1840	225	0.	*	2	0055	300	0.
				*					*					*				

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2131.	3.83		361.	91.	87.	87.
		(INCHES)	1.471	1.477	1.477	1.477
		(AC-FT)	179.	180.	180.	180.

CUMULATIVE AREA = 2.28 SQ MI

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          ***************
          *             *
69 KK     *      PWDB   *
          *             *
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71 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          1  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

72 RS          STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                    ITYP        ELEV  TYPE OF INITIAL CONDITION
                   RSVRIC     1656.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

73 SV            STORAGE          .0       .6      2.9      7.1     12.6     18.9     25.8     33.2     40.8     48.8
                                57.1     65.7     74.8     84.5     94.5    105.0    115.8    127.0    135.0    138.4

75 SE            ELEVATION   1656.00  1657.00  1658.00  1659.00  1660.00  1661.00  1662.00  1663.00  1664.00  1665.00
                             1666.00  1667.00  1668.00  1669.00  1670.00  1671.00  1672.00  1673.00  1673.70  1674.00

77 SQ            DISCHARGE        0.       0.       0.       1.       9.      30.      51.      65.      77.      87.
                                96.     105.     113.     120.     127.     133.     139.     145.     149.     464.
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HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .90

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1656.0	*	1		0820	101	130.	100.1	1670.5	*	1		1640	201	63.	32.2	1662.9
1		0005	2	0.	.0	1656.0	*	1		0825	102	130.	99.2	1670.4	*	1		1645	202	62.	31.7	1662.8
1		0010	3	0.	.1	1656.1	*	1		0830	103	129.	98.3	1670.4	*	1		1650	203	61.	31.3	1662.7
1		0015	4	0.	.2	1656.3	*	1		0835	104	129.	97.4	1670.3	*	1		1655	204	61.	30.9	1662.7
1		0020	5	0.	.5	1656.8	*	1		0840	105	128.	96.5	1670.2	*	1		1700	205	60.	30.5	1662.6
1		0025	6	0.	1.1	1657.2	*	1		0845	106	128.	95.6	1670.1	*	1		1705	206	59.	30.1	1662.6
1		0030	7	0.	1.8	1657.5	*	1		0850	107	127.	94.8	1670.0	*	1		1710	207	58.	29.7	1662.5
1		0035	8	0.	2.7	1657.9	*	1		0855	108	127.	93.9	1669.9	*	1		1715	208	58.	29.3	1662.5
1		0040	9	0.	3.8	1658.2	*	1		0900	109	126.	93.0	1669.9	*	1		1720	209	57.	28.9	1662.4
1		0045	10	0.	4.8	1658.5	*	1		0905	110	125.	92.1	1669.8	*	1		1725	210	56.	28.5	1662.4
1		0050	11	1.	5.8	1658.7	*	1		0910	111	125.	91.3	1669.7	*	1		1730	211	55.	28.1	1662.3
1		0055	12	1.	6.7	1658.9	*	1		0915	112	124.	90.4	1669.6	*	1		1735	212	55.	27.7	1662.3
1		0100	13	2.	7.5	1659.1	*	1		0920	113	124.	89.6	1669.5	*	1		1740	213	54.	27.3	1662.2
1		0105	14	3.	8.1	1659.2	*	1		0925	114	123.	88.7	1669.4	*	1		1745	214	53.	27.0	1662.2
1		0110	15	3.	8.6	1659.3	*	1		0930	115	122.	87.9	1669.3	*	1		1750	215	52.	26.6	1662.1

1	0115	16	4.	9.0	1659.3	*	1	0935	116	122.	87.0	1669.3	*	1	1755	216	52.	26.2	1662.1
1	0120	17	4.	9.3	1659.4	*	1	0940	117	121.	86.2	1669.2	*	1	1800	217	51.	25.9	1662.0
1	0125	18	5.	9.6	1659.5	*	1	0945	118	121.	85.4	1669.1	*	1	1805	218	50.	25.5	1662.0
1	0130	19	5.	9.9	1659.5	*	1	0950	119	120.	84.5	1669.0	*	1	1810	219	49.	25.2	1661.9
1	0135	20	6.	10.2	1659.6	*	1	0955	120	119.	83.7	1668.9	*	1	1815	220	48.	24.9	1661.9
1	0140	21	6.	10.5	1659.6	*	1	1000	121	119.	82.9	1668.8	*	1	1820	221	47.	24.5	1661.8
1	0145	22	7.	10.9	1659.7	*	1	1005	122	118.	82.1	1668.8	*	1	1825	222	46.	24.2	1661.8
1	0150	23	7.	11.4	1659.8	*	1	1010	123	118.	81.3	1668.7	*	1	1830	223	45.	23.9	1661.7
1	0155	24	8.	11.9	1659.9	*	1	1015	124	117.	80.5	1668.6	*	1	1835	224	44.	23.6	1661.7
1	0200	25	9.	12.4	1660.0	*	1	1020	125	117.	79.7	1668.5	*	1	1840	225	43.	23.3	1661.6
1	0205	26	10.	12.9	1660.0	*	1	1025	126	116.	78.9	1668.4	*	1	1845	226	42.	23.0	1661.6
1	0210	27	11.	13.3	1660.1	*	1	1030	127	115.	78.1	1668.3	*	1	1850	227	42.	22.7	1661.5
1	0215	28	12.	13.6	1660.2	*	1	1035	128	115.	77.3	1668.3	*	1	1855	228	41.	22.4	1661.5
1	0220	29	14.	13.9	1660.2	*	1	1040	129	114.	76.5	1668.2	*	1	1900	229	40.	22.1	1661.5
1	0225	30	15.	14.3	1660.3	*	1	1045	130	114.	75.7	1668.1	*	1	1905	230	39.	21.9	1661.4
1	0230	31	16.	14.7	1660.3	*	1	1050	131	113.	74.9	1668.0	*	1	1910	231	38.	21.6	1661.4
1	0235	32	17.	15.1	1660.4	*	1	1055	132	112.	74.1	1667.9	*	1	1915	232	37.	21.4	1661.4
1	0240	33	19.	15.5	1660.5	*	1	1100	133	112.	73.4	1667.8	*	1	1920	233	37.	21.1	1661.3
1	0245	34	20.	16.0	1660.5	*	1	1105	134	111.	72.6	1667.8	*	1	1925	234	36.	20.8	1661.3
1	0250	35	22.	16.4	1660.6	*	1	1110	135	110.	71.8	1667.7	*	1	1930	235	35.	20.6	1661.2
1	0255	36	23.	16.8	1660.7	*	1	1115	136	110.	71.1	1667.6	*	1	1935	236	34.	20.4	1661.2
1	0300	37	25.	17.3	1660.7	*	1	1120	137	109.	70.3	1667.5	*	1	1940	237	34.	20.1	1661.2
1	0305	38	26.	17.7	1660.8	*	1	1125	138	108.	69.6	1667.4	*	1	1945	238	33.	19.9	1661.1
1	0310	39	27.	18.1	1660.9	*	1	1130	139	108.	68.8	1667.3	*	1	1950	239	32.	19.7	1661.1
1	0315	40	29.	18.6	1661.0	*	1	1135	140	107.	68.1	1667.3	*	1	1955	240	32.	19.5	1661.1
1	0320	41	32.	19.6	1661.1	*	1	1140	141	106.	67.4	1667.2	*	1	2000	241	31.	19.2	1661.0
1	0325	42	38.	21.5	1661.4	*	1	1145	142	106.	66.6	1667.1	*	1	2005	242	30.	19.0	1661.0
1	0330	43	49.	25.1	1661.9	*	1	1150	143	105.	65.9	1667.0	*	1	2010	243	30.	18.8	1661.0
1	0335	44	61.	31.1	1662.7	*	1	1155	144	104.	65.2	1666.9	*	1	2015	244	29.	18.6	1661.0
1	0340	45	75.	39.8	1663.9	*	1	1200	145	104.	64.5	1666.9	*	1	2020	245	28.	18.4	1660.9
1	0345	46	89.	50.6	1665.2	*	1	1205	146	103.	63.8	1666.8	*	1	2025	246	28.	18.2	1660.9
1	0350	47	102.	62.5	1666.6	*	1	1210	147	102.	63.0	1666.7	*	1	2030	247	27.	18.0	1660.9
1	0355	48	113.	74.4	1668.0	*	1	1215	148	101.	62.3	1666.6	*	1	2035	248	26.	17.9	1660.8
1	0400	49	121.	85.5	1669.1	*	1	1220	149	101.	61.6	1666.5	*	1	2040	249	26.	17.7	1660.8
1	0405	50	127.	95.2	1670.1	*	1	1225	150	100.	61.0	1666.4	*	1	2045	250	25.	17.5	1660.8
1	0410	51	132.	103.4	1670.9	*	1	1230	151	99.	60.3	1666.4	*	1	2050	251	25.	17.3	1660.7
1	0415	52	136.	110.1	1671.5	*	1	1235	152	99.	59.6	1666.3	*	1	2055	252	24.	17.2	1660.7
1	0420	53	139.	115.4	1672.0	*	1	1240	153	98.	58.9	1666.2	*	1	2100	253	24.	17.0	1660.7
1	0425	54	141.	119.3	1672.3	*	1	1245	154	97.	58.2	1666.1	*	1	2105	254	23.	16.8	1660.7
1	0430	55	142.	122.2	1672.6	*	1	1250	155	97.	57.6	1666.1	*	1	2110	255	23.	16.7	1660.6
1	0435	56	144.	124.2	1672.8	*	1	1255	156	96.	56.9	1666.0	*	1	2115	256	22.	16.5	1660.6
1	0440	57	144.	125.7	1672.9	*	1	1300	157	95.	56.3	1665.9	*	1	2120	257	22.	16.4	1660.6
1	0445	58	145.	126.8	1673.0	*	1	1305	158	94.	55.6	1665.8	*	1	2125	258	21.	16.2	1660.6
1	0450	59	145.	127.7	1673.1	*	1	1310	159	94.	55.0	1665.7	*	1	2130	259	21.	16.1	1660.6
1	0455	60	146.	128.4	1673.1	*	1	1315	160	93.	54.3	1665.7	*	1	2135	260	20.	15.9	1660.5
1	0500	61	146.	128.9	1673.2	*	1	1320	161	92.	53.7	1665.6	*	1	2140	261	20.	15.8	1660.5
1	0505	62	146.	129.4	1673.2	*	1	1325	162	92.	53.0	1665.5	*	1	2145	262	19.	15.7	1660.5
1	0510	63	146.	129.7	1673.2	*	1	1330	163	91.	52.4	1665.4	*	1	2150	263	19.	15.5	1660.5
1	0515	64	146.	129.9	1673.3	*	1	1335	164	90.	51.8	1665.4	*	1	2155	264	18.	15.4	1660.4
1	0520	65	146.	129.9	1673.3	*	1	1340	165	90.	51.2	1665.3	*	1	2200	265	18.	15.3	1660.4
1	0525	66	146.	129.8	1673.2	*	1	1345	166	89.	50.6	1665.2	*	1	2205	266	18.	15.2	1660.4
1	0530	67	146.	129.5	1673.2	*	1	1350	167	88.	49.9	1665.1	*	1	2210	267	17.	15.0	1660.4
1	0535	68	146.	129.1	1673.2	*	1	1355	168	88.	49.3	1665.1	*	1	2215	268	17.	14.9	1660.4
1	0540	69	146.	128.6	1673.1	*	1	1400	169	87.	48.7	1665.0	*	1	2220	269	16.	14.8	1660.4
1	0545	70	145.	127.9	1673.1	*	1	1405	170	86.	48.1	1664.9	*	1	2225	270	16.	14.7	1660.3
1	0550	71	145.	127.2	1673.0	*	1	1410	171	85.	47.5	1664.8	*	1	2230	271	16.	14.6	1660.3
1	0555	72	145.	126.5	1673.0	*	1	1415	172	85.	47.0	1664.8	*	1	2235	272	15.	14.5	1660.3
1	0600	73	144.	125.7	1672.9	*	1	1420	173	84.	46.4	1664.7	*	1	2240	273	15.	14.4	1660.3
1	0605	74	144.	124.9	1672.8	*	1	1425	174	83.	45.8	1664.6	*	1	2245	274	15.	14.3	1660.3
1	0610	75	143.	124.0	1672.7	*	1	1430	175	83.	45.2	1664.6	*	1	2250	275	14.	14.2	1660.3
1	0615	76	143.	123.2	1672.7	*	1	1435	176	82.	44.7	1664.5	*	1	2255	276	14.	14.1	1660.2
1	0620	77	142.	122.3	1672.6	*	1	1440	177	81.	44.1	1664.4	*	1	2300	277	14.	14.0	1660.2
1	0625	78	142.	121.4	1672.5	*	1	1445	178	80.	43.5	1664.3	*	1	2305	278	13.	13.9	1660.2
1	0630	79	141.	120.5	1672.4	*	1	1450	179	80.	43.0	1664.3	*	1	2310	279	13.	13.8	1660.2
1	0635	80	141.	119.6	1672.3	*	1	1455	180	79.	42.5	1664.2	*	1	2315	280	13.	13.7	1660.2
1	0640	81	140.	118.6	1672.2	*	1	1500	181	78.	41.9	1664.1	*	1	2320	281	13.	13.6	1660.2
1	0645	82	140.	117.7	1672.2	*	1	1505	182	78.	41.4	1664.1	*	1	2325	282	12.	13.5	1660.2
1	0650	83	139.	116.7	1672.1	*	1	1510	183	77.	40.8	1664.0	*	1	2330	283	12.	13.5	1660.1
1	0655	84	139.	115.8	1672.0	*	1	1515	184	76.	40.3	1663.9	*	1	2335	284	12.	13.4	1660.1
1	0700	85	138.	114.9	1671.9	*	1	1520	185	75.	39.8	1663.9	*	1	2340	285	11.	13.3	1660.1
1	0705	86	138.	113.9	1671.8	*	1	1525	186	75.	39.3	1663.8	*	1	2345	286	11.	13.2	1660.1
1	0710	87	137.	113.0	1671.7	*	1	1530	187	74.	38.8	1663.7	*	1	2350	287	11.	13.1	1660.1
1	0715	88	137.	112.0	1671.6	*	1	1535	188	73.	38.3	1663.7	*	1	2355	288	11.	13.1	1660.1
1	0720	89	136.	111.1	1671.6	*	1	1540	189	72.	37.8	1663.6	*	2	0000	289	10.	13.0	1660.1
1	0725	90	136.	110.1	1671.5	*	1	1545	190	71.	37.3	1663.5	*	2	0005	290	10.	12.9	1660.1
1	0730	91	135.	109.2	1671.4	*	1	1550	191	71.	36.8	1663.5	*	2	0010	291	10.	12.9	1660.0
1	0735	92	135.	108.3	1671.3	*	1	1555	192	70.	36.3	1663.4	*	2	0015	292	10.	12.8	1660.0
1	0740	93	134.	107.4	1671.2	*	1	1600	193	69.	35.8	1663.3	*	2	0020	293	10.	12.7	1660.0
1	0745	94	134.	106.4	1671.1	*	1	1605	194	68.	35.3	1663.3	*	2	0025	294	9.	12.7	1660.0
1	0750	95	133.	105.5	1671.1	*	1	1610	195	68.	34.9	1663.2	*	2	0030	295	9.	12.6	1660.0
1	0755	96	133.	104.6	1671.0	*	1	1615	196	67.	34.4	1663.2	*	2	0035	296	9.	12.5	1660.0
1	0800	97	132.	103.7	1670.9	*	1	1620	197	66.	33.9	1663.1	*	2	0040	297	9.	12.5	1660.0
1	0805	98	132.	102.8	1670.8	*	1	1625	198	66.	33.5	1663.0	*	2	0045	298	9.	12.4	1660.0
1	0810	99	131.	101.9	1670.7	*	1	1630	199	65.	33.0	1663.0	*	2	0050	299	9.	12.3	1660.0
1	0815	100	131.	101.0	1670.6	*	1	1635	200	64.	32.6	1662.9	*	2	0055	300	9.	12.3	1659.9
						*							*						

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 146.	5.33		136.	73.	70.	70.
		(INCHES)	.553	1.189	1.189	1.189
		(AC-FT)	67.	145.	145.	145.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
+ 130.	5.33	110.	52.	50.	50.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
+ 1673.26	5.33	1671.46	1664.90	1664.62	1664.62

CUMULATIVE AREA = 2.28 SQ MI

HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .92

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1656.0	1		0820	101	132.	103.2	1670.8	1		1640	201	66.	33.7	1663.1
1		0005	2	0.	.0	1656.0	1		0825	102	131.	102.3	1670.7	1		1645	202	65.	33.3	1663.0
1		0010	3	0.	.1	1656.1	1		0830	103	131.	101.4	1670.7	1		1650	203	64.	32.8	1663.0
1		0015	4	0.	.2	1656.3	1		0835	104	130.	100.5	1670.6	1		1655	204	64.	32.4	1662.9
1		0020	5	0.	.5	1656.8	1		0840	105	130.	99.6	1670.5	1		1700	205	63.	31.9	1662.8
1		0025	6	0.	1.1	1657.2	1		0845	106	129.	98.7	1670.4	1		1705	206	62.	31.5	1662.8
1		0030	7	0.	1.8	1657.5	1		0850	107	129.	97.8	1670.3	1		1710	207	61.	31.1	1662.7
1		0035	8	0.	2.8	1657.9	1		0855	108	128.	96.9	1670.2	1		1715	208	60.	30.7	1662.7
1		0040	9	0.	3.8	1658.2	1		0900	109	128.	96.1	1670.1	1		1720	209	59.	30.3	1662.6
1		0045	10	0.	4.9	1658.5	1		0905	110	127.	95.2	1670.1	1		1725	210	59.	29.8	1662.5
1		0050	11	1.	5.9	1658.7	1		0910	111	127.	94.3	1670.0	1		1730	211	58.	29.4	1662.5
1		0055	12	1.	6.9	1658.9	1		0915	112	126.	93.4	1669.9	1		1735	212	57.	29.0	1662.4
1		0100	13	2.	7.6	1659.1	1		0920	113	126.	92.6	1669.8	1		1740	213	56.	28.7	1662.4
1		0105	14	3.	8.3	1659.2	1		0925	114	125.	91.7	1669.7	1		1745	214	56.	28.3	1662.3
1		0110	15	3.	8.8	1659.3	1		0930	115	124.	90.8	1669.6	1		1750	215	55.	27.9	1662.3
1		0115	16	4.	9.1	1659.4	1		0935	116	124.	90.0	1669.5	1		1755	216	54.	27.5	1662.2
1		0120	17	4.	9.5	1659.4	1		0940	117	123.	89.1	1669.5	1		1800	217	54.	27.1	1662.2
1		0125	18	5.	9.7	1659.5	1		0945	118	123.	88.3	1669.4	1		1805	218	53.	26.8	1662.1
1		0130	19	5.	10.0	1659.5	1		0950	119	122.	87.4	1669.3	1		1810	219	52.	26.4	1662.1
1		0135	20	6.	10.3	1659.6	1		0955	120	121.	86.6	1669.2	1		1815	220	51.	26.1	1662.0
1		0140	21	6.	10.7	1659.7	1		1000	121	121.	85.8	1669.1	1		1820	221	51.	25.7	1662.0
1		0145	22	7.	11.1	1659.7	1		1005	122	120.	84.9	1669.0	1		1825	222	50.	25.4	1661.9
1		0150	23	8.	11.6	1659.8	1		1010	123	120.	84.1	1669.0	1		1830	223	49.	25.0	1661.9
1		0155	24	8.	12.1	1659.9	1		1015	124	119.	83.3	1668.9	1		1835	224	48.	24.7	1661.8
1		0200	25	9.	12.6	1660.0	1		1020	125	119.	82.5	1668.8	1		1840	225	47.	24.4	1661.8
1		0205	26	11.	13.1	1660.1	1		1025	126	118.	81.7	1668.7	1		1845	226	46.	24.1	1661.7
1		0210	27	12.	13.5	1660.1	1		1030	127	117.	80.8	1668.6	1		1850	227	45.	23.7	1661.7
1		0215	28	13.	13.8	1660.2	1		1035	128	117.	80.0	1668.5	1		1855	228	44.	23.4	1661.7
1		0220	29	14.	14.1	1660.2	1		1040	129	116.	79.2	1668.5	1		1900	229	43.	23.1	1661.6
1		0225	30	15.	14.5	1660.3	1		1045	130	116.	78.4	1668.4	1		1905	230	42.	22.8	1661.6
1		0230	31	17.	14.9	1660.4	1		1050	131	115.	77.6	1668.3	1		1910	231	41.	22.6	1661.5
1		0235	32	18.	15.3	1660.4	1		1055	132	114.	76.9	1668.2	1		1915	232	40.	22.3	1661.5
1		0240	33	20.	15.8	1660.5	1		1100	133	114.	76.1	1668.1	1		1920	233	39.	22.0	1661.4
1		0245	34	21.	16.2	1660.6	1		1105	134	113.	75.3	1668.0	1		1925	234	39.	21.7	1661.4
1		0250	35	22.	16.6	1660.6	1		1110	135	113.	74.5	1668.0	1		1930	235	38.	21.5	1661.4
1		0255	36	24.	17.1	1660.7	1		1115	136	112.	73.7	1667.9	1		1935	236	37.	21.2	1661.3
1		0300	37	25.	17.5	1660.8	1		1120	137	111.	73.0	1667.8	1		1940	237	36.	21.0	1661.3
1		0305	38	27.	17.9	1660.8	1		1125	138	111.	72.2	1667.7	1		1945	238	35.	20.7	1661.3
1		0310	39	28.	18.3	1660.9	1		1130	139	110.	71.4	1667.6	1		1950	239	35.	20.5	1661.2
1		0315	40	30.	18.9	1661.0	1		1135	140	109.	70.7	1667.5	1		1955	240	34.	20.2	1661.2
1		0320	41	33.	19.9	1661.1	1		1140	141	109.	69.9	1667.5	1		2000	241	33.	20.0	1661.2
1		0325	42	39.	21.8	1661.4	1		1145	142	108.	69.2	1667.4	1		2005	242	33.	19.8	1661.1
1		0330	43	50.	25.6	1662.0	1		1150	143	107.	68.4	1667.3	1		2010	243	32.	19.6	1661.1
1		0335	44	62.	31.8	1662.8	1		1155	144	107.	67.7	1667.2	1		2015	244	31.	19.3	1661.1
1		0340	45	77.	40.6	1664.0	1		1200	145	106.	67.0	1667.1	1		2020	245	31.	19.1	1661.0
1		0345	46	90.	51.7	1665.4	1		1205	146	105.	66.2	1667.1	1		2025	246	30.	18.9	1661.0
1		0350	47	103.	63.9	1666.8	1		1210	147	105.	65.5	1667.0	1		2030	247	29.	18.7	1661.0
1		0355	48	114.	76.1	1668.1	1		1215	148	104.	64.8	1666.9	1		2035	248	29.	18.5	1660.9
1		0400	49	122.	87.5	1669.3	1		1220	149	103.	64.1	1666.8	1		2040	249	28.	18.3	1660.9
1		0405	50	129.	97.5	1670.3	1		1225	150	103.	63.4	1666.7	1		2045	250	27.	18.1	1660.9
1		0410	51	134.	105.9	1671.1	1		1230	151	102.	62.7	1666.6	1		2050	251	27.	17.9	1660.8
1		0415	52	137.	112.8	1671.7	1		1235	152	101.	62.0	1666.6	1		2055	252	26.	17.8	1660.8
1		0420	53	140.	118.2	1672.2	1		1240	153	100.	61.3	1666.5	1		2100	253	26.	17.6	1660.8
1		0425	54	142.	122.3	1672.6	1		1245	154	100.	60.6	1666.4	1		2105	254	25.	17.4	1660.8
1		0430	55	144.	125.2	1672.8	1		1250	155	99.	59.9	1666.3	1		2110	255	24.	17.2	1660.7
1		0435	56	145.	127.3	1673.0	1		1255	156	98.	59.2	1666.2	1		2115	256	24.	17.1	1660.7
1		0440	57	146.	128.9	1673.2	1		1300	157	98.	58.6	1666.2	1		2120	257	23.	16.9	1660.7
1		0445	58	147.	130.1	1673.3	1		1305	158	97.	57.9	1666.1	1		2125	258	23.	16.8	1660.7
1		0450	59	147.	131.0	1673.3	1		1310	159	96.	57.2	1666.0	1		2130	259	22.	16.6	1660.6
1		0455	60	147.	131.7	1673.4	1		1315	160	95.	56.6	1665.9	1		2135	260	22.	16.4	1660.6
1		0500	61	148.	132.3	1673.5	1		1320	161	95.	55.9	1665.9	1		2140	261	21.	16.3	1660.6
1		0505	62	148.	132.8	1673.5	1		1325	162	94.	55.3	1665.8	1		2145	262	21.	16.1	1660.6
1		0510	63	148.	133.1	1673.5	1		1330	163	93.	54.6	1665.7	1		2150	263	20.	16.0	1660.5
1		0515	64	148.	133.3	1673.6	1		1335	164	93.	54.0	1665.6	1		2155	264	20.	15.9	1660.5
1		0520	65	148.	133.4	1673.6	1		1340	165	92.	53.3	1665.5	1		2200	265	19.	15.7	1660.5
1		0525	66	148.	133.3	1673.5	1		1345	166	91.	52.7	1665.5	1		2205	266	19.	15.6	1660.5
1		0530	67	148.	133.0	1673.5	1		1350	167	91.	52.1	1665.4	1		2210	267	19.	15.5	1660.5
1		0535	68	148.	132.6	1673.5	1		1355	168	90.	51.5	1665.3	1		2215	268	18.	15.3	1660.4
1		0540	69	148.	132.0	1673.4	1		1400	169	89.	50.8	1665.2	1		2220	269	18.	15.2	1660.4
1		0545	70	147.	131.4	1673.4	1		1405	170	89.	50.2	1665.2	1		2225	270	17.	15.1	1660.4
1		0550	71	147.	130.7	1673.3	1		1410	171	88.	49.6	1665.1	1		2230	271	17.	15.0	1660.4
1		0555	72	146.	130.0	1673.3	1		1415	172	87.	49.0	1665.0	1		2235	272	17.	14.9	1660.4
1		0600	73	146.	129.2	1673.2	1		1420	173	87.	48.4	1665.0	1		2240	273	16.	14.8	1660.3
1		0605	74	146.	128.3	1673.1	1		1425	174	86.	47.8	1664.9	1		2245	274	16.	14.6	1660.3
1		0610	75	145.	127.5	1673.0	1		1430	175	85.	47.2	1664.8	1		2250	275	16.	14.5	1660.3
1		0615	76	145.	126.6	1673.0	1		1435	176	84.	46.7	1664.7	1		2255	276	15.	14.4	1660.3
1		0620	77	144.	125.7	1672.9	1		1440	177	84.	46.1	1664.7	1		2300	277	15.	14.3	1660.3
1		0625	78	144.	124.8	1672.8	1		1445	178	83.	45.5	1664.6	1		2305	278	14.	14.2	1660.3
1		0630	79	143.	123.9	1672.7	1		1450	179	82.	44.9	1664.5	1		2310	279	14.	14.1	1660.2
1		0635	80	143.	123.0	1672.6	1		1455	180	81.	44.4	1664.4	1		2315	280	14.	14.0	1660.2
1		0640	81	142.	122.0	1672.6	1		1500	181	81.	43.8	1664.4	1		2320	281	14.	13.9	1660.2
1		0645	82	142.	121.1	1672.5	1		1505	182	80.	43.3	1664.3	1		2325	282	13.	13.8	1660.2
1		0650	83	141.	120.1	1672.4	1		1510	183	79.	42.7	1664.2	1		2330	283	13.	13.8	1660.2
1		0655	84	141.	119.2	1672.3	1		1515	184	79.	42.2	1664.2	1		2335	284	13.	13.7	1660.2
1		0700	85	140.	118.2	1672.2	1		1520	185	78.	41.6	1664.1	1		2340	285	12.	13.6	1660.2
1		0705	86	140.	117.2	1672.1	1		1525	186	77.	41.1	1664.0	1		2345	286	12.	13.5	1660.1
1		0710	87	139.	116.3	1672.0	1		1530	187	77.	40.6	1664.0	1		2350	287	12.	13.4	1660.1
1		0715	88	139.	115.3	1672.0	1		1535	188	76.	40.0	1663.9	1		2355	288	12.	13.3	1660.1
1		0720	89	138.	114.4	1671.9	1		1540	189	75.	39.5	1663.8	2		0000	289	11.	13.3	1660.1
1		0725	90	138.	113.4	1671.8	1		1545	190	74.	39.0	1663.8	2		0005	290	11.	13.2	1660.1
1		0730	91	137.	112.5	1671.7	1		1550	191	73.	38.5	1663.7	2		0010	291	11.	13.1	1660.1
1		0735	92	137.	111.5	1671.6	1		1555	192	73.	38.0	1663.6	2		0015	292	11.	13.0	1660.1
1		0740	93	136.	110.6	1671.5	1		1600	193	72.	37.5	1663.6	2		0020	293	10.	13.0	1660.1
1		0745	94	136.	109.7	1671.4	1		1605	194	71.	37.0	1663.5	2		0025	294	10.	12.9	1660.1

1	0750	95	135.	108.7	1671.3	*	1	1610	195	70.	36.5	1663.4	*	2	0030	295	10.	12.8	1660.0
1	0755	96	135.	107.8	1671.3	*	1	1615	196	70.	36.0	1663.4	*	2	0035	296	10.	12.7	1660.0
1	0800	97	134.	106.9	1671.2	*	1	1620	197	69.	35.6	1663.3	*	2	0040	297	9.	12.7	1660.0
1	0805	98	134.	106.0	1671.1	*	1	1625	198	68.	35.1	1663.3	*	2	0045	298	9.	12.6	1660.0
1	0810	99	133.	105.0	1671.0	*	1	1630	199	67.	34.6	1663.2	*	2	0050	299	9.	12.6	1660.0
1	0815	100	133.	104.1	1670.9	*	1	1635	200	67.	34.2	1663.1	*	2	0055	300	9.	12.5	1660.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)	137.	75.	72.	72.
+ 148.	5.33	(INCHES)	.560	1.219	1.220	1.220
		(AC-FT)	68.	148.	148.	148.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
133.	5.33	113.	54.	52.	52.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1673.56	5.33	1671.75	1665.09	1664.81	1664.81

CUMULATIVE AREA = 2.28 SQ MI

HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .94

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE		DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	0000		1	0.	.0	1656.0	*	1	0820		101	133.	105.0	1671.0	*	1	1640		201	67.	34.6	1663.2
1	0005		2	0.	.0	1656.0	*	1	0825		102	132.	104.0	1670.9	*	1	1645		202	67.	34.1	1663.1
1	0010		3	0.	.1	1656.1	*	1	0830		103	132.	103.1	1670.8	*	1	1650		203	66.	33.7	1663.1
1	0015		4	0.	.2	1656.3	*	1	0835		104	131.	102.2	1670.7	*	1	1655		204	65.	33.2	1663.0
1	0020		5	0.	.5	1656.8	*	1	0840		105	131.	101.3	1670.7	*	1	1700		205	64.	32.8	1662.9
1	0025		6	0.	1.1	1657.2	*	1	0845		106	130.	100.4	1670.6	*	1	1705		206	63.	32.3	1662.9
1	0030		7	0.	1.9	1657.5	*	1	0850		107	130.	99.5	1670.5	*	1	1710		207	63.	31.9	1662.8
1	0035		8	0.	2.8	1658.0	*	1	0855		108	129.	98.6	1670.4	*	1	1715		208	62.	31.5	1662.8
1	0040		9	0.	3.9	1658.2	*	1	0900		109	129.	97.7	1670.3	*	1	1720		209	61.	31.0	1662.7
1	0045		10	0.	5.0	1658.5	*	1	0905		110	128.	96.9	1670.2	*	1	1725		210	60.	30.6	1662.7
1	0050		11	1.	6.1	1658.8	*	1	0910		111	128.	96.0	1670.1	*	1	1730		211	59.	30.2	1662.6
1	0055		12	1.	7.0	1659.0	*	1	0915		112	127.	95.1	1670.1	*	1	1735		212	59.	29.8	1662.5
1	0100		13	2.	7.8	1659.1	*	1	0920		113	127.	94.2	1670.0	*	1	1740		213	58.	29.4	1662.5
1	0105		14	3.	8.4	1659.2	*	1	0925		114	126.	93.4	1669.9	*	1	1745		214	57.	29.0	1662.4
1	0110		15	4.	8.9	1659.3	*	1	0930		115	126.	92.5	1669.8	*	1	1750		215	56.	28.6	1662.4
1	0115		16	4.	9.3	1659.4	*	1	0935		116	125.	91.6	1669.7	*	1	1755		216	56.	28.2	1662.3
1	0120		17	5.	9.7	1659.5	*	1	0940		117	124.	90.8	1669.6	*	1	1800		217	55.	27.9	1662.3
1	0125		18	5.	9.9	1659.5	*	1	0945		118	124.	89.9	1669.5	*	1	1805		218	54.	27.5	1662.2
1	0130		19	6.	10.2	1659.6	*	1	0950		119	123.	89.1	1669.5	*	1	1810		219	53.	27.1	1662.2
1	0135		20	6.	10.5	1659.6	*	1	0955		120	123.	88.2	1669.4	*	1	1815		220	53.	26.7	1662.1
1	0140		21	7.	10.9	1659.7	*	1	1000		121	122.	87.4	1669.3	*	1	1820		221	52.	26.4	1662.1
1	0145		22	7.	11.3	1659.8	*	1	1005		122	121.	86.5	1669.2	*	1	1825		222	51.	26.0	1662.0
1	0150		23	8.	11.8	1659.9	*	1	1010		123	121.	85.7	1669.1	*	1	1830		223	51.	25.7	1662.0
1	0155		24	9.	12.3	1660.0	*	1	1015		124	120.	84.9	1669.0	*	1	1835		224	49.	25.3	1661.9
1	0200		25	10.	12.8	1660.0	*	1	1020		125	120.	84.0	1669.0	*	1	1840		225	48.	25.0	1661.9
1	0205		26	12.	13.3	1660.1	*	1	1025		126	119.	83.2	1668.9	*	1	1845		226	47.	24.7	1661.8
1	0210		27	13.	13.7	1660.2	*	1	1030		127	118.	82.4	1668.8	*	1	1850		227	46.	24.3	1661.8
1	0215		28	14.	14.1	1660.2	*	1	1035		128	118.	81.6	1668.7	*	1	1855		228	46.	24.0	1661.7
1	0220		29	15.	14.4	1660.3	*	1	1040		129	117.	80.8	1668.6	*	1	1900		229	45.	23.7	1661.7
1	0225		30	16.	14.8	1660.3	*	1	1045		130	117.	80.0	1668.5	*	1	1905		230	44.	23.4	1661.6
1	0230		31	18.	15.2	1660.4	*	1	1050		131	116.	79.2	1668.4	*	1	1910		231	43.	23.1	1661.6
1	0235		32	19.	15.6	1660.5	*	1	1055		132	116.	78.4	1668.4	*	1	1915		232	42.	22.8	1661.6
1	0240		33	21.	16.1	1660.5	*	1	1100		133	115.	77.6	1668.3	*	1	1920		233	41.	22.5	1661.5
1	0245		34	22.	16.5	1660.6	*	1	1105		134	114.	76.8	1668.2	*	1	1925		234	40.	22.3	1661.5
1	0250		35	23.	17.0	1660.7	*	1	1110		135	114.	76.0	1668.1	*	1	1930		235	39.	22.0	1661.4
1	0255		36	25.	17.4	1660.8	*	1	1115		136	113.	75.2	1668.0	*	1	1935		236	38.	21.7	1661.4
1	0300		37	26.	17.8	1660.8	*	1	1120		137	113.	74.4	1668.0	*	1	1940		237	38.	21.5	1661.4
1	0305		38	28.	18.2	1660.9	*	1	1125		138	112.	73.7	1667.9	*	1	1945		238	37.	21.2	1661.3
1	0310		39	29.	18.7	1661.0	*	1	1130		139	111.	72.9	1667.8	*	1	1950		239	36.	20.9	1661.3
1	0315		40	31.	19.2	1661.0	*	1	1135		140	111.	72.1	1667.7	*	1	1955		240	35.	20.7	1661.3
1	0320		41	34.	20.3	1661.2	*	1	1140		141	110.	71.4	1667.6	*	1	2000		241	35.	20.5	1661.2
1	0325		42	40.	22.3	1661.5	*	1	1145		142	109.	70.6	1667.5	*	1	2005		242	34.	20.2	1661.2
1	0330		43	52.	26.2	1662.1	*	1	1150		143	109.	69.9	1667.5	*	1	2010		243	33.	20.0	1661.2
1	0335		44	64.	32.6	1662.9	*	1	1155		144	108.	69.1	1667.4	*	1	2015		244	33.	19.8	1661.1
1	0340		45	78.	41.8	1664.1	*	1	1200		145	107.	68.4	1667.3	*	1	2020		245	32.	19.5	1661.1
1	0345		46	92.	53.3	1665.5	*	1	1205		146	107.	67.6	1667.2	*	1	2025		246	31.	19.3	1661.1
1	0350		47	105.	65.9	1667.0	*	1	1210		147	106.	66.9	1667.1	*	1	2030		247	31.	19.1	1661.0
1	0355		48	116.	78.5	1668.4	*	1	1215		148	105.	66.2	1667.1	*	1	2035		248	30.	18.9	1661.0
1	0400		49	124.	90.2	1669.6	*	1	1220		149	105.	65.5	1667.0	*	1	2040		249	29.	18.7	1661.0
1	0405		50	130.	100.6	1670.6	*	1	1225		150	104.	64.7	1666.9	*	1	2045		250	29.	18.5	1660.9
1	0410		51	135.	109.4	1671.4	*	1	1230		151	103.	64.0	1666.8	*	1	2050		251	28.	18.3	1660.9
1	0415		52	139.	116.5	1672.1	*	1	1235		152	102.	63.3	1666.7	*	1	2055		252	27.	18.1	1660.9
1	0420		53	142.	122.1	1672.6	*	1	1240		153	102.	62.6	1666.6	*	1	2100		253	27.	17.9	1660.8
1	0425		54	145.	126.3	1672.9	*	1	1245		154	101.	61.9	1666.6	*	1	2105		254	26.	17.7	1660.8
1	0430		55	146.	129.4	1673.2	*	1	1250		155	100.	61.2	1666.5	*	1	2110		255	26.	17.6	1660.8
1	0435		56	147.	131.6	1673.4	*	1	1255		156	100.	60.5	1666.4	*	1	2115		256	25.	17.4	1660.8
1	0440		57	148.	133.2	1673.5	*	1	1300		157	99.	59.9	1666.3	*	1	2120		257	24.	17.2	1660.7
1	0445		58	149.	134.4	1673.6	*	1	1305		158	98.	59.2	1666.2	*	1	2125		258	24.	17.1	1660.7
1	0450		59	176.	135.3	1673.7	*	1	1310		159	97.	58.5	1666.2	*	1	2130		259	23.	16.9	1660.7
1	0455		60	217.	135.7	1673.8	*	1	1315		160	97.	57.8	1666.1	*	1	2135		260	23.	16.7	1660.7
1	0500		61	229.	135.9	1673.8	*	1	1320		161	96.	57.2	1666.0	*	1	2140		261	22.	16.6	1660.6
1	0505		62	228.	135.9	1673.8	*	1	1325		162	95.	56.5	1665.9	*	1	2145		262	22.	16.4	1660.6
1	0510		63	218.	135.8	1673.8	*	1	1330		163	95.	55.9	1665.9	*	1	2150		263	21.	16.3	1660.6
1	0515		64	203.	135.6	1673.8	*	1	1335		164	94.	55.2	1665.8	*	1	2155		264	21.	16.1	1660.6
1	0520		65	184.	135.4	1673.7	*	1	1340		165	93.	54.6	1665.7	*	1	2200		265	20.	16.0	1660.5
1	0525		66	161.	135.1	1673.7	*	1	1345		166	93.	53.9	1665.6	*	1	2205		266	20.	15.9	1660.5
1	0530		67	149.	134.8	1673.7	*	1	1350		167	92.	53.3	1665.5	*	1	2210		267	19.	15.7	1660.5

1	0535	68	149.	134.4	1673.7	*	1	1355	168	91.	52.7	1665.5	*	1	2215	268	19.	15.6	1660.5
1	0540	69	148.	133.9	1673.6	*	1	1400	169	91.	52.0	1665.4	*	1	2220	269	19.	15.5	1660.5
1	0545	70	148.	133.3	1673.6	*	1	1405	170	90.	51.4	1665.3	*	1	2225	270	18.	15.3	1660.4
1	0550	71	148.	132.6	1673.5	*	1	1410	171	89.	50.8	1665.2	*	1	2230	271	18.	15.2	1660.4
1	0555	72	147.	131.9	1673.4	*	1	1415	172	89.	50.2	1665.2	*	1	2235	272	17.	15.1	1660.4
1	0600	73	147.	131.1	1673.4	*	1	1420	173	88.	49.6	1665.1	*	1	2240	273	17.	15.0	1660.4
1	0605	74	147.	130.3	1673.3	*	1	1425	174	87.	49.0	1665.0	*	1	2245	274	17.	14.9	1660.4
1	0610	75	146.	129.4	1673.2	*	1	1430	175	86.	48.4	1664.9	*	1	2250	275	16.	14.7	1660.3
1	0615	76	146.	128.5	1673.1	*	1	1435	176	86.	47.8	1664.9	*	1	2255	276	16.	14.6	1660.3
1	0620	77	145.	127.6	1673.1	*	1	1440	177	85.	47.2	1664.8	*	1	2300	277	15.	14.5	1660.3
1	0625	78	145.	126.7	1673.0	*	1	1445	178	84.	46.6	1664.7	*	1	2305	278	15.	14.4	1660.3
1	0630	79	144.	125.8	1672.9	*	1	1450	179	84.	46.0	1664.7	*	1	2310	279	15.	14.3	1660.3
1	0635	80	144.	124.8	1672.8	*	1	1455	180	83.	45.5	1664.6	*	1	2315	280	14.	14.2	1660.3
1	0640	81	143.	123.9	1672.7	*	1	1500	181	82.	44.9	1664.5	*	1	2320	281	14.	14.1	1660.2
1	0645	82	143.	122.9	1672.6	*	1	1505	182	81.	44.3	1664.4	*	1	2325	282	14.	14.0	1660.2
1	0650	83	142.	122.0	1672.5	*	1	1510	183	81.	43.8	1664.4	*	1	2330	283	14.	13.9	1660.2
1	0655	84	142.	121.0	1672.5	*	1	1515	184	80.	43.2	1664.3	*	1	2335	284	13.	13.8	1660.2
1	0700	85	141.	120.0	1672.4	*	1	1520	185	79.	42.7	1664.2	*	1	2340	285	13.	13.7	1660.2
1	0705	86	141.	119.1	1672.3	*	1	1525	186	79.	42.1	1664.2	*	1	2345	286	13.	13.7	1660.2
1	0710	87	140.	118.1	1672.2	*	1	1530	187	78.	41.6	1664.1	*	1	2350	287	12.	13.6	1660.2
1	0715	88	140.	117.2	1672.1	*	1	1535	188	77.	41.0	1664.0	*	1	2355	288	12.	13.5	1660.1
1	0720	89	139.	116.2	1672.0	*	1	1540	189	77.	40.5	1664.0	*	2	0000	289	12.	13.4	1660.1
1	0725	90	139.	115.2	1671.9	*	1	1545	190	76.	40.0	1663.9	*	2	0005	290	12.	13.3	1660.1
1	0730	91	138.	114.3	1671.9	*	1	1550	191	75.	39.5	1663.8	*	2	0010	291	11.	13.2	1660.1
1	0735	92	138.	113.3	1671.8	*	1	1555	192	74.	39.0	1663.8	*	2	0015	292	11.	13.2	1660.1
1	0740	93	137.	112.4	1671.7	*	1	1600	193	73.	38.5	1663.7	*	2	0020	293	11.	13.1	1660.1
1	0745	94	137.	111.5	1671.6	*	1	1605	194	73.	37.9	1663.6	*	2	0025	294	11.	13.0	1660.1
1	0750	95	136.	110.5	1671.5	*	1	1610	195	72.	37.5	1663.6	*	2	0030	295	10.	12.9	1660.1
1	0755	96	136.	109.6	1671.4	*	1	1615	196	71.	37.0	1663.5	*	2	0035	296	10.	12.9	1660.1
1	0800	97	135.	108.6	1671.3	*	1	1620	197	70.	36.5	1663.4	*	2	0040	297	10.	12.8	1660.0
1	0805	98	135.	107.7	1671.3	*	1	1625	198	69.	36.0	1663.4	*	2	0045	298	10.	12.7	1660.0
1	0810	99	134.	106.8	1671.2	*	1	1630	199	69.	35.5	1663.3	*	2	0050	299	9.	12.7	1660.0
1	0815	100	133.	105.9	1671.1	*	1	1635	200	68.	35.0	1663.2	*	2	0055	300	9.	12.6	1660.0
						*							*							

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 229.	5.00		144.	77.	75.	75.
		(INCHES)	.589	1.262	1.262	1.262
		(AC-FT)	72.	153.	153.	153.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
136.	5.00	116.	55.	53.	53.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1673.78	5.00	1671.95	1665.21	1664.92	1664.92

CUMULATIVE AREA = 2.28 SQ MI

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HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .96

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1656.0	*	1		0820	101	133.	105.1	1671.0	*	1		1640	201	67.	34.7	1663.2
1		0005	2	0.	.0	1656.0	*	1		0825	102	133.	104.2	1670.9	*	1		1645	202	67.	34.2	1663.1
1		0010	3	0.	.1	1656.1	*	1		0830	103	132.	103.3	1670.8	*	1		1650	203	66.	33.8	1663.1
1		0015	4	0.	.2	1656.3	*	1		0835	104	132.	102.4	1670.8	*	1		1655	204	65.	33.3	1663.0
1		0020	5	0.	.5	1656.9	*	1		0840	105	131.	101.5	1670.7	*	1		1700	205	64.	32.9	1663.0
1		0025	6	0.	1.1	1657.2	*	1		0845	106	130.	100.6	1670.6	*	1		1705	206	64.	32.4	1662.9
1		0030	7	0.	1.9	1657.6	*	1		0850	107	130.	99.7	1670.5	*	1		1710	207	63.	32.0	1662.8
1		0035	8	0.	2.9	1658.0	*	1		0855	108	129.	98.8	1670.4	*	1		1715	208	62.	31.6	1662.8
1		0040	9	0.	4.0	1658.3	*	1		0900	109	129.	97.9	1670.3	*	1		1720	209	61.	31.1	1662.7
1		0045	10	1.	5.1	1658.5	*	1		0905	110	128.	97.0	1670.2	*	1		1725	210	60.	30.7	1662.7
1		0050	11	1.	6.2	1658.8	*	1		0910	111	128.	96.2	1670.2	*	1		1730	211	60.	30.3	1662.6
1		0055	12	1.	7.2	1659.0	*	1		0915	112	127.	95.3	1670.1	*	1		1735	212	59.	29.9	1662.6
1		0100	13	2.	8.0	1659.2	*	1		0920	113	127.	94.4	1670.0	*	1		1740	213	58.	29.5	1662.5
1		0105	14	3.	8.6	1659.3	*	1		0925	114	126.	93.5	1669.9	*	1		1745	214	57.	29.1	1662.4
1		0110	15	4.	9.1	1659.4	*	1		0930	115	126.	92.7	1669.8	*	1		1750	215	56.	28.7	1662.4
1		0115	16	5.	9.5	1659.4	*	1		0935	116	125.	91.8	1669.7	*	1		1755	216	56.	28.3	1662.3
1		0120	17	5.	9.9	1659.5	*	1		0940	117	125.	90.9	1669.6	*	1		1800	217	55.	27.9	1662.3
1		0125	18	5.	10.1	1659.6	*	1		0945	118	124.	90.1	1669.6	*	1		1805	218	54.	27.6	1662.2
1		0130	19	6.	10.4	1659.6	*	1		0950	119	123.	89.2	1669.5	*	1		1810	219	54.	27.2	1662.2
1		0135	20	6.	10.7	1659.7	*	1		0955	120	123.	88.4	1669.4	*	1		1815	220	53.	26.8	1662.1
1		0140	21	7.	11.1	1659.7	*	1		1000	121	122.	87.5	1669.3	*	1		1820	221	52.	26.5	1662.1
1		0145	22	8.	11.6	1659.8	*	1		1005	122	122.	86.7	1669.2	*	1		1825	222	52.	26.1	1662.0
1		0150	23	8.	12.1	1659.9	*	1		1010	123	121.	85.9	1669.1	*	1		1830	223	51.	25.7	1662.0
1		0155	24	9.	12.6	1660.0	*	1		1015	124	120.	85.0	1669.1	*	1		1835	224	50.	25.4	1661.9
1		0200	25	11.	13.1	1660.1	*	1		1020	125	120.	84.2	1669.0	*	1		1840	225	49.	25.1	1661.9
1		0205	26	12.	13.6	1660.2	*	1		1025	126	119.	83.4	1668.9	*	1		1845	226	48.	24.7	1661.8
1		0210	27	14.	14.0	1660.2	*	1		1030	127	119.	82.6	1668.8	*	1		1850	227	47.	24.4	1661.8
1		0215	28	15.	14.3	1660.3	*	1		1035	128	118.	81.7	1668.7	*	1		1855	228	46.	24.1	1661.7
1		0220	29	16.	14.7	1660.3	*	1		1040	129	117.	80.9	1668.6	*	1		1900	229	45.	23.8	1661.7
1		0225	30	17.	15.0	1660.4	*	1		1045	130	117.	80.1	1668.5	*	1		1905	230	44.	23.5	1661.7
1		0230	31	18.	15.4	1660.5	*	1		1050	131	116.	79.3	1668.5	*	1		1910	231	43.	23.2	1661.6
1		0235	32	20.	15.9	1660.5	*	1		1055	132	116.	78.5	1668.4	*	1		1915	232	42.	22.9	1661.6
1		0240	33	21.	16.3	1660.6	*	1		1100	133	115.	77.7	1668.3	*	1		1920	233	41.	22.6	1661.5
1		0245	34	23.	16.8	1660.7	*	1		1105	134	115.	76.9	1668.2	*	1		1925	234	40.	22.3	1661.5
1		0250	35	24.	17.3	1660.7	*	1		1110	135	114.	76.2	1668.1	*	1		1930	235	39.	22.0	1661.5
1		0255	36	26.	17.7	1660.8	*	1		1115	136	113.	75.4	1668.1	*	1		1935	236	39.	21.8	1661.4
1		0300	37	27.	18.1	1660.9	*	1		1120	137	113.	74.6	1668.0	*	1		1940	237	38.	21.5	1661.4
1		0305	38	29.	18.6	1660.9	*	1		1125	138	112.	73.8	1667.9	*	1		1945	238	37.	21.2	1661.3
1		0310	39	30.	19.0	1661.0	*	1		1130	139	111.	73.0	1667.8	*	1		1950	239	36.	21.0	1661.3
1		0315	40	32.	19.6	1661.1	*	1		1135	140	111.	72.3	1667.7	*	1		1955	240	36.	20.7	1661.3

1	0320	41	35.	20.7	1661.3	*	1	1140	141	110.	71.5	1667.6	*	1	2000	241	35.	20.5	1661.2
1	0325	42	42.	22.8	1661.6	*	1	1145	142	109.	70.8	1667.6	*	1	2005	242	34.	20.3	1661.2
1	0330	43	53.	26.9	1662.1	*	1	1150	143	109.	70.0	1667.5	*	1	2010	243	33.	20.0	1661.2
1	0335	44	66.	33.6	1663.1	*	1	1155	144	108.	69.3	1667.4	*	1	2015	244	33.	19.8	1661.1
1	0340	45	80.	43.1	1664.3	*	1	1200	145	107.	68.5	1667.3	*	1	2020	245	32.	19.6	1661.1
1	0345	46	94.	54.9	1665.7	*	1	1205	146	107.	67.8	1667.2	*	1	2025	246	31.	19.4	1661.1
1	0350	47	107.	67.9	1667.2	*	1	1210	147	106.	67.1	1667.1	*	1	2030	247	31.	19.2	1661.0
1	0355	48	117.	80.9	1668.6	*	1	1215	148	106.	66.3	1667.1	*	1	2035	248	30.	18.9	1661.0
1	0400	49	126.	93.1	1669.9	*	1	1220	149	105.	65.6	1667.0	*	1	2040	249	29.	18.7	1661.0
1	0405	50	132.	103.8	1670.9	*	1	1225	150	104.	64.9	1666.9	*	1	2045	250	29.	18.5	1660.9
1	0410	51	137.	112.8	1671.7	*	1	1230	151	103.	64.2	1666.8	*	1	2050	251	28.	18.3	1660.9
1	0415	52	141.	120.2	1672.4	*	1	1235	152	103.	63.5	1666.7	*	1	2055	252	27.	18.2	1660.9
1	0420	53	144.	126.0	1672.9	*	1	1240	153	102.	62.8	1666.7	*	1	2100	253	27.	18.0	1660.8
1	0425	54	147.	130.4	1673.3	*	1	1245	154	101.	62.1	1666.6	*	1	2105	254	26.	17.8	1660.8
1	0430	55	148.	133.6	1673.6	*	1	1250	155	100.	61.4	1666.5	*	1	2110	255	26.	17.6	1660.8
1	0435	56	210.	135.7	1673.8	*	1	1255	156	100.	60.7	1666.4	*	1	2115	256	25.	17.4	1660.8
1	0440	57	298.	136.6	1673.8	*	1	1300	157	99.	60.0	1666.3	*	1	2120	257	25.	17.3	1660.7
1	0445	58	317.	136.8	1673.9	*	1	1305	158	98.	59.3	1666.3	*	1	2125	258	24.	17.1	1660.7
1	0450	59	308.	136.7	1673.9	*	1	1310	159	98.	58.6	1666.2	*	1	2130	259	23.	16.9	1660.7
1	0455	60	290.	136.5	1673.8	*	1	1315	160	97.	58.0	1666.1	*	1	2135	260	23.	16.8	1660.7
1	0500	61	272.	136.3	1673.8	*	1	1320	161	96.	57.3	1666.0	*	1	2140	261	22.	16.6	1660.6
1	0505	62	254.	136.1	1673.8	*	1	1325	162	96.	56.6	1665.9	*	1	2145	262	22.	16.5	1660.6
1	0510	63	236.	135.9	1673.8	*	1	1330	163	95.	56.0	1665.9	*	1	2150	263	21.	16.3	1660.6
1	0515	64	216.	135.7	1673.8	*	1	1335	164	94.	55.3	1665.8	*	1	2155	264	21.	16.2	1660.6
1	0520	65	194.	135.5	1673.7	*	1	1340	165	93.	54.7	1665.7	*	1	2200	265	20.	16.0	1660.5
1	0525	66	169.	135.2	1673.7	*	1	1345	166	93.	54.0	1665.6	*	1	2205	266	20.	15.9	1660.5
1	0530	67	149.	134.9	1673.7	*	1	1350	167	92.	53.4	1665.6	*	1	2210	267	20.	15.7	1660.5
1	0535	68	149.	134.6	1673.7	*	1	1355	168	91.	52.8	1665.5	*	1	2215	268	19.	15.6	1660.5
1	0540	69	149.	134.1	1673.6	*	1	1400	169	91.	52.2	1665.4	*	1	2220	269	19.	15.5	1660.5
1	0545	70	148.	133.5	1673.6	*	1	1405	170	90.	51.5	1665.3	*	1	2225	270	18.	15.4	1660.4
1	0550	71	148.	132.8	1673.5	*	1	1410	171	89.	50.9	1665.3	*	1	2230	271	18.	15.2	1660.4
1	0555	72	148.	132.0	1673.4	*	1	1415	172	89.	50.3	1665.2	*	1	2235	272	17.	15.1	1660.4
1	0600	73	147.	131.3	1673.4	*	1	1420	173	88.	49.7	1665.1	*	1	2240	273	17.	15.0	1660.4
1	0605	74	147.	130.4	1673.3	*	1	1425	174	87.	49.1	1665.0	*	1	2245	274	17.	14.9	1660.4
1	0610	75	146.	129.6	1673.2	*	1	1430	175	87.	48.5	1665.0	*	1	2250	275	16.	14.8	1660.3
1	0615	76	146.	128.7	1673.1	*	1	1435	176	86.	47.9	1664.9	*	1	2255	276	16.	14.7	1660.3
1	0620	77	145.	127.8	1673.1	*	1	1440	177	85.	47.3	1664.8	*	1	2300	277	16.	14.5	1660.3
1	0625	78	145.	126.9	1673.0	*	1	1445	178	84.	46.7	1664.7	*	1	2305	278	15.	14.4	1660.3
1	0630	79	144.	126.0	1672.9	*	1	1450	179	84.	46.1	1664.7	*	1	2310	279	15.	14.3	1660.3
1	0635	80	144.	125.0	1672.8	*	1	1455	180	83.	45.6	1664.6	*	1	2315	280	15.	14.2	1660.3
1	0640	81	143.	124.1	1672.7	*	1	1500	181	82.	45.0	1664.5	*	1	2320	281	14.	14.1	1660.2
1	0645	82	143.	123.1	1672.7	*	1	1505	182	82.	44.4	1664.5	*	1	2325	282	14.	14.0	1660.2
1	0650	83	142.	122.2	1672.6	*	1	1510	183	81.	43.9	1664.4	*	1	2330	283	14.	13.9	1660.2
1	0655	84	142.	121.2	1672.5	*	1	1515	184	80.	43.3	1664.3	*	1	2335	284	13.	13.9	1660.2
1	0700	85	141.	120.2	1672.4	*	1	1520	185	79.	42.8	1664.2	*	1	2340	285	13.	13.8	1660.2
1	0705	86	141.	119.3	1672.3	*	1	1525	186	79.	42.2	1664.2	*	1	2345	286	13.	13.7	1660.2
1	0710	87	140.	118.3	1672.2	*	1	1530	187	78.	41.7	1664.1	*	1	2350	287	12.	13.6	1660.2
1	0715	88	140.	117.3	1672.1	*	1	1535	188	77.	41.2	1664.0	*	1	2355	288	12.	13.5	1660.1
1	0720	89	139.	116.4	1672.0	*	1	1540	189	77.	40.6	1664.0	*	2	0000	289	12.	13.4	1660.1
1	0725	90	139.	115.4	1672.0	*	1	1545	190	76.	40.1	1663.9	*	2	0005	290	12.	13.3	1660.1
1	0730	91	138.	114.5	1671.9	*	1	1550	191	75.	39.6	1663.8	*	2	0010	291	11.	13.3	1660.1
1	0735	92	138.	113.5	1671.8	*	1	1555	192	74.	39.1	1663.8	*	2	0015	292	11.	13.2	1660.1
1	0740	93	137.	112.6	1671.7	*	1	1600	193	73.	38.6	1663.7	*	2	0020	293	11.	13.1	1660.1
1	0745	94	137.	111.6	1671.6	*	1	1605	194	73.	38.0	1663.6	*	2	0025	294	11.	13.0	1660.1
1	0750	95	136.	110.7	1671.5	*	1	1610	195	72.	37.6	1663.6	*	2	0030	295	10.	13.0	1660.1
1	0755	96	136.	109.8	1671.4	*	1	1615	196	71.	37.1	1663.5	*	2	0035	296	10.	12.9	1660.1
1	0800	97	135.	108.8	1671.4	*	1	1620	197	70.	36.6	1663.4	*	2	0040	297	10.	12.8	1660.0
1	0805	98	135.	107.9	1671.3	*	1	1625	198	70.	36.1	1663.4	*	2	0045	298	10.	12.8	1660.0
1	0810	99	134.	107.0	1671.2	*	1	1630	199	69.	35.6	1663.3	*	2	0050	299	9.	12.7	1660.0
1	0815	100	134.	106.1	1671.1	*	1	1635	200	68.	35.1	1663.3	*	2	0055	300	9.	12.6	1660.0

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 317.	4.75		154.	80.	77.	77.
		(INCHES)	.630	1.306	1.306	1.306
		(AC-FT)	77.	159.	159.	159.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
137.	4.75	116.	55.	53.	53.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1673.86	4.75	1672.01	1665.24	1664.95	1664.95

CUMULATIVE AREA = 2.28 SQ MI

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HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .98

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1656.0	*	1		0820	101	133.	105.3	1671.0	*	1		1640	201	67.	34.7	1663.2
1		0005	2	0.	.0	1656.0	*	1		0825	102	133.	104.4	1670.9	*	1		1645	202	67.	34.3	1663.1
1		0010	3	0.	.1	1656.1	*	1		0830	103	132.	103.4	1670.9	*	1		1650	203	66.	33.8	1663.1
1		0015	4	0.	.2	1656.3	*	1		0835	104	132.	102.5	1670.8	*	1		1655	204	65.	33.4	1663.0
1		0020	5	0.	.6	1656.9	*	1		0840	105	131.	101.6	1670.7	*	1		1700	205	65.	32.9	1663.0
1		0025	6	0.	1.1	1657.2	*	1		0845	106	131.	100.7	1670.6	*	1		1705	206	64.	32.5	1662.9
1		0030	7	0.	2.0	1657.6	*	1		0850	107	130.	99.8	1670.5	*	1		1710	207	63.	32.0	1662.8
1		0035	8	0.	2.9	1658.0	*	1		0855	108	130.	98.9	1670.4	*	1		1715	208	62.	31.6	1662.8
1		0040	9	0.	4.0	1658.3	*	1		0900	109	129.	98.0	1670.3	*	1		1720	209	61.	31.2	1662.7
1		0045	10	1.	5.2	1658.5	*	1		0905	110	129.	97.2	1670.3	*	1		1725	210	60.	30.8	1662.7
1		0050	11	1.	6.3	1658.8	*	1		0910	111	128.	96.3	1670.2	*	1		1730	211	60.	30.4	1662.6
1		0055	12	1.	7.3	1659.0	*	1		0915	112	128.	95.4	1670.1	*	1		1735	212	59.	29.9	1662.6
1		0100	13	2.	8.1	1659.2	*	1		0920	113	127.	94.5	1670.0	*	1		1740	213	58.	29.5	1662.5

1	0105	14	3.	8.7	1659.3	*	1	0925	114	126.	93.7	1669.9	*	1	1745	214	57.	29.1	1662.5
1	0110	15	4.	9.3	1659.4	*	1	0930	115	126.	92.8	1669.8	*	1	1750	215	57.	28.8	1662.4
1	0115	16	5.	9.7	1659.5	*	1	0935	116	125.	91.9	1669.7	*	1	1755	216	56.	28.4	1662.3
1	0120	17	5.	10.0	1659.5	*	1	0940	117	125.	91.1	1669.7	*	1	1800	217	55.	28.0	1662.3
1	0125	18	6.	10.3	1659.6	*	1	0945	118	124.	90.2	1669.6	*	1	1805	218	54.	27.6	1662.2
1	0130	19	6.	10.6	1659.6	*	1	0950	119	123.	89.3	1669.5	*	1	1810	219	54.	27.2	1662.2
1	0135	20	7.	10.9	1659.7	*	1	0955	120	123.	88.5	1669.4	*	1	1815	220	53.	26.9	1662.1
1	0140	21	7.	11.3	1659.8	*	1	1000	121	122.	87.7	1669.3	*	1	1820	221	52.	26.5	1662.1
1	0145	22	8.	11.7	1659.8	*	1	1005	122	122.	86.8	1669.2	*	1	1825	222	52.	26.1	1662.0
1	0150	23	9.	12.2	1659.9	*	1	1010	123	121.	86.0	1669.2	*	1	1830	223	51.	25.8	1662.0
1	0155	24	10.	12.8	1660.0	*	1	1015	124	120.	85.2	1669.1	*	1	1835	224	50.	25.4	1661.9
1	0200	25	11.	13.3	1660.1	*	1	1020	125	120.	84.3	1669.0	*	1	1840	225	49.	25.1	1661.9
1	0205	26	13.	13.8	1660.2	*	1	1025	126	119.	83.5	1668.9	*	1	1845	226	48.	24.8	1661.8
1	0210	27	14.	14.2	1660.3	*	1	1030	127	119.	82.7	1668.8	*	1	1850	227	47.	24.5	1661.8
1	0215	28	16.	14.5	1660.3	*	1	1035	128	118.	81.9	1668.7	*	1	1855	228	46.	24.1	1661.8
1	0220	29	17.	14.9	1660.4	*	1	1040	129	118.	81.1	1668.6	*	1	1900	229	45.	23.8	1661.7
1	0225	30	18.	15.2	1660.4	*	1	1045	130	117.	80.2	1668.6	*	1	1905	230	44.	23.5	1661.7
1	0230	31	19.	15.6	1660.5	*	1	1050	131	116.	79.4	1668.5	*	1	1910	231	43.	23.2	1661.6
1	0235	32	21.	16.1	1660.6	*	1	1055	132	116.	78.6	1668.4	*	1	1915	232	42.	22.9	1661.6
1	0240	33	22.	16.6	1660.6	*	1	1100	133	115.	77.8	1668.3	*	1	1920	233	41.	22.6	1661.5
1	0245	34	24.	17.0	1660.7	*	1	1105	134	115.	77.1	1668.2	*	1	1925	234	40.	22.4	1661.5
1	0250	35	25.	17.5	1660.8	*	1	1110	135	114.	76.3	1668.1	*	1	1930	235	40.	22.1	1661.5
1	0255	36	27.	17.9	1660.8	*	1	1115	136	113.	75.5	1668.1	*	1	1935	236	39.	21.8	1661.4
1	0300	37	28.	18.4	1660.9	*	1	1120	137	113.	74.7	1668.0	*	1	1940	237	38.	21.5	1661.4
1	0305	38	30.	18.8	1661.0	*	1	1125	138	112.	73.9	1667.9	*	1	1945	238	37.	21.3	1661.3
1	0310	39	31.	19.2	1661.0	*	1	1130	139	112.	73.2	1667.8	*	1	1950	239	36.	21.0	1661.3
1	0315	40	33.	19.9	1661.1	*	1	1135	140	111.	72.4	1667.7	*	1	1955	240	36.	20.8	1661.3
1	0320	41	36.	21.0	1661.3	*	1	1140	141	110.	71.6	1667.6	*	1	2000	241	35.	20.5	1661.2
1	0325	42	43.	23.2	1661.6	*	1	1145	142	110.	70.9	1667.6	*	1	2005	242	34.	20.3	1661.2
1	0330	43	54.	27.4	1662.2	*	1	1150	143	109.	70.1	1667.5	*	1	2010	243	33.	20.1	1661.2
1	0335	44	67.	34.3	1663.1	*	1	1155	144	108.	69.4	1667.4	*	1	2015	244	33.	19.8	1661.1
1	0340	45	81.	44.0	1664.4	*	1	1200	145	108.	68.6	1667.3	*	1	2020	245	32.	19.6	1661.1
1	0345	46	95.	56.1	1665.9	*	1	1205	146	107.	67.9	1667.2	*	1	2025	246	31.	19.4	1661.1
1	0350	47	108.	69.4	1667.4	*	1	1210	147	106.	67.2	1667.2	*	1	2030	247	31.	19.2	1661.0
1	0355	48	119.	82.8	1668.8	*	1	1215	148	106.	66.4	1667.1	*	1	2035	248	30.	19.0	1661.0
1	0400	49	127.	95.2	1670.1	*	1	1220	149	105.	65.7	1667.0	*	1	2040	249	29.	18.8	1661.0
1	0405	50	134.	106.2	1671.1	*	1	1225	150	104.	65.0	1666.9	*	1	2045	250	29.	18.6	1660.9
1	0410	51	139.	115.5	1672.0	*	1	1230	151	103.	64.3	1666.8	*	1	2050	251	28.	18.4	1660.9
1	0415	52	143.	123.0	1672.6	*	1	1235	152	103.	63.6	1666.8	*	1	2055	252	28.	18.2	1660.9
1	0420	53	146.	128.9	1673.2	*	1	1240	153	102.	62.9	1666.7	*	1	2100	253	27.	18.0	1660.9
1	0425	54	148.	133.4	1673.6	*	1	1245	154	101.	62.2	1666.6	*	1	2105	254	26.	17.8	1660.8
1	0430	55	268.	136.3	1673.8	*	1	1250	155	101.	61.5	1666.5	*	1	2110	255	26.	17.6	1660.8
1	0435	56	376.	137.5	1673.9	*	1	1255	156	100.	60.8	1666.4	*	1	2115	256	25.	17.5	1660.8
1	0440	57	390.	137.6	1673.9	*	1	1300	157	99.	60.1	1666.3	*	1	2120	257	25.	17.3	1660.7
1	0445	58	369.	137.4	1673.9	*	1	1305	158	98.	59.4	1666.3	*	1	2125	258	24.	17.1	1660.7
1	0450	59	339.	137.1	1673.9	*	1	1310	159	98.	58.7	1666.2	*	1	2130	259	23.	17.0	1660.7
1	0455	60	310.	136.8	1673.9	*	1	1315	160	97.	58.1	1666.1	*	1	2135	260	23.	16.8	1660.7
1	0500	61	285.	136.5	1673.8	*	1	1320	161	96.	57.4	1666.0	*	1	2140	261	22.	16.6	1660.6
1	0505	62	264.	136.3	1673.8	*	1	1325	162	96.	56.7	1666.0	*	1	2145	262	22.	16.5	1660.6
1	0510	63	244.	136.0	1673.8	*	1	1330	163	95.	56.1	1665.9	*	1	2150	263	21.	16.3	1660.6
1	0515	64	223.	135.8	1673.8	*	1	1335	164	94.	55.4	1665.8	*	1	2155	264	21.	16.2	1660.6
1	0520	65	200.	135.5	1673.7	*	1	1340	165	94.	54.8	1665.7	*	1	2200	265	20.	16.0	1660.5
1	0525	66	174.	135.3	1673.7	*	1	1345	166	93.	54.1	1665.6	*	1	2205	266	20.	15.9	1660.5
1	0530	67	149.	135.0	1673.7	*	1	1350	167	92.	53.5	1665.6	*	1	2210	267	20.	15.8	1660.5
1	0535	68	149.	134.6	1673.7	*	1	1355	168	91.	52.9	1665.5	*	1	2215	268	19.	15.6	1660.5
1	0540	69	149.	134.2	1673.6	*	1	1400	169	91.	52.2	1665.4	*	1	2220	269	19.	15.5	1660.5
1	0545	70	148.	133.6	1673.6	*	1	1405	170	90.	51.6	1665.3	*	1	2225	270	18.	15.4	1660.4
1	0550	71	148.	132.9	1673.5	*	1	1410	171	89.	51.0	1665.3	*	1	2230	271	18.	15.3	1660.4
1	0555	72	148.	132.2	1673.5	*	1	1415	172	89.	50.4	1665.2	*	1	2235	272	17.	15.1	1660.4
1	0600	73	147.	131.4	1673.4	*	1	1420	173	88.	49.8	1665.1	*	1	2240	273	17.	15.0	1660.4
1	0605	74	147.	130.6	1673.3	*	1	1425	174	87.	49.2	1665.0	*	1	2245	274	17.	14.9	1660.4
1	0610	75	146.	129.7	1673.2	*	1	1430	175	87.	48.6	1665.0	*	1	2250	275	16.	14.8	1660.3
1	0615	76	146.	128.8	1673.2	*	1	1435	176	86.	48.0	1664.9	*	1	2255	276	16.	14.7	1660.3
1	0620	77	145.	128.0	1673.1	*	1	1440	177	85.	47.4	1664.8	*	1	2300	277	16.	14.6	1660.3
1	0625	78	145.	127.0	1673.0	*	1	1445	178	85.	46.8	1664.8	*	1	2305	278	15.	14.5	1660.3
1	0630	79	145.	126.1	1672.9	*	1	1450	179	84.	46.2	1664.7	*	1	2310	279	15.	14.3	1660.3
1	0635	80	144.	125.2	1672.8	*	1	1455	180	83.	45.7	1664.6	*	1	2315	280	15.	14.2	1660.3
1	0640	81	144.	124.2	1672.8	*	1	1500	181	82.	45.1	1664.5	*	1	2320	281	14.	14.1	1660.2
1	0645	82	143.	123.3	1672.7	*	1	1505	182	82.	44.5	1664.5	*	1	2325	282	14.	14.1	1660.2
1	0650	83	142.	122.3	1672.6	*	1	1510	183	81.	44.0	1664.4	*	1	2330	283	14.	14.0	1660.2
1	0655	84	142.	121.3	1672.5	*	1	1515	184	80.	43.4	1664.3	*	1	2335	284	13.	13.9	1660.2
1	0700	85	141.	120.4	1672.4	*	1	1520	185	80.	42.9	1664.3	*	1	2340	285	13.	13.8	1660.2
1	0705	86	141.	119.4	1672.3	*	1	1525	186	79.	42.3	1664.2	*	1	2345	286	13.	13.7	1660.2
1	0710	87	140.	118.4	1672.2	*	1	1530	187	78.	41.8	1664.1	*	1	2350	287	12.	13.6	1660.2
1	0715	88	140.	117.5	1672.1	*	1	1535	188	78.	41.2	1664.1	*	1	2355	288	12.	13.5	1660.2
1	0720	89	139.	116.5	1672.1	*	1	1540	189	77.	40.7	1664.0	*	2	0000	289	12.	13.4	1660.1
1	0725	90	139.	115.6	1672.0	*	1	1545	190	76.	40.2	1663.9	*	2	0005	290	12.	13.4	1660.1
1	0730	91	138.	114.6	1671.9	*	1	1550	191	75.	39.7	1663.8	*	2	0010	291	11.	13.3	1660.1
1	0735	92	138.	113.7	1671.8	*	1	1555	192	74.	39.1	1663.8	*	2	0015	292	11.	13.2	1660.1
1	0740	93	137.	112.7	1671.7	*	1	1600	193	74.	38.6	1663.7	*	2	0020	293	11.	13.1	1660.1
1	0745	94	137.	111.8	1671.6	*	1	1605	194	73.	38.1	1663.6	*	2	0025	294	11.	13.0	1660.1
1	0750	95	136.	110.8	1671.5	*	1	1610	195	72.	37.6	1663.6	*	2	0030	295	10.	13.0	1660.1
1	0755	96	136.	109.9	1671.5	*	1	1615	196	71.	37.1	1663.5	*	2	0035	296	10.	12.9	1660.1
1	0800	97	135.	109.0	1671.4	*	1	1620	197	70.	36.6	1663.5	*	2	0040	297	10.	12.8	1660.0
1	0805	98	135.	108.0	1671.3	*	1	1625	198	70.	36.2	1663.4	*	2	0045	298	10.	12.8	1660.0
1	0810	99	134.	107.1	1671.2	*	1	1630	199	69.	35.7	1663.3	*	2	0050	299	9.	12.7	1660.0
1	0815	100	134.	106.2	1671.1	*	1	1635	200	68.	35.2	1663.3	*	2	0055	300	9.	12.6	1660.0
						*							*							

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PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 390.	4.67		162.	82.	79.	79.
		(INCHES)	.661	1.339	1.339	1.339
		(AC-FT)	80.	163.	163.	163.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
138.	4.67	117.	55.	53.	53.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				

1673.93 4.67 1672.05 1665.26 1664.97 1664.97

CUMULATIVE AREA = 2.28 SQ MI

WARNING --- ROUTED OUTFLOW (470.) IS GREATER THAN MAXIMUM OUTFLOW (464.) IN STORAGE-OUTFLOW TABLE

HYDROGRAPH AT STATION PWDB
PLAN 1, RATIO = .99

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	.0	1656.0	1		0820	101	133.	105.4	1671.0	1		1640	201	68.	34.8	1663.2
1		0005	2	0.	.0	1656.0	1		0825	102	133.	104.5	1671.0	1		1645	202	67.	34.3	1663.2
1		0010	3	0.	.1	1656.1	1		0830	103	132.	103.6	1670.9	1		1650	203	66.	33.9	1663.1
1		0015	4	0.	.2	1656.3	1		0835	104	132.	102.7	1670.8	1		1655	204	65.	33.4	1663.0
1		0020	5	0.	.6	1656.9	1		0840	105	131.	101.7	1670.7	1		1700	205	65.	33.0	1663.0
1		0025	6	0.	1.2	1657.2	1		0845	106	131.	100.8	1670.6	1		1705	206	64.	32.5	1662.9
1		0030	7	0.	2.0	1657.6	1		0850	107	130.	100.0	1670.5	1		1710	207	63.	32.1	1662.9
1		0035	8	0.	3.0	1658.0	1		0855	108	130.	99.1	1670.4	1		1715	208	62.	31.7	1662.8
1		0040	9	0.	4.1	1658.3	1		0900	109	129.	98.2	1670.3	1		1720	209	61.	31.2	1662.7
1		0045	10	1.	5.3	1658.6	1		0905	110	129.	97.3	1670.3	1		1725	210	61.	30.8	1662.7
1		0050	11	1.	6.4	1658.8	1		0910	111	128.	96.4	1670.2	1		1730	211	60.	30.4	1662.6
1		0055	12	1.	7.4	1659.1	1		0915	112	128.	95.5	1670.1	1		1735	212	59.	30.0	1662.6
1		0100	13	3.	8.2	1659.2	1		0920	113	127.	94.6	1670.0	1		1740	213	58.	29.6	1662.5
1		0105	14	4.	8.9	1659.3	1		0925	114	126.	93.8	1669.9	1		1745	214	57.	29.2	1662.5
1		0110	15	4.	9.4	1659.4	1		0930	115	126.	92.9	1669.8	1		1750	215	57.	28.8	1662.4
1		0115	16	5.	9.8	1659.5	1		0935	116	125.	92.0	1669.8	1		1755	216	56.	28.4	1662.4
1		0120	17	5.	10.1	1659.6	1		0940	117	125.	91.2	1669.7	1		1800	217	55.	28.0	1662.3
1		0125	18	6.	10.4	1659.6	1		0945	118	124.	90.3	1669.6	1		1805	218	54.	27.7	1662.2
1		0130	19	6.	10.7	1659.7	1		0950	119	123.	89.5	1669.5	1		1810	219	54.	27.3	1662.2
1		0135	20	7.	11.1	1659.7	1		0955	120	123.	88.6	1669.4	1		1815	220	53.	26.9	1662.1
1		0140	21	7.	11.4	1659.8	1		1000	121	122.	87.8	1669.3	1		1820	221	52.	26.6	1662.1
1		0145	22	8.	11.9	1659.9	1		1005	122	122.	86.9	1669.2	1		1825	222	52.	26.2	1662.0
1		0150	23	9.	12.4	1660.0	1		1010	123	121.	86.1	1669.2	1		1830	223	51.	25.8	1662.0
1		0155	24	10.	12.9	1660.1	1		1015	124	121.	85.3	1669.1	1		1835	224	50.	25.5	1662.0
1		0200	25	12.	13.5	1660.1	1		1020	125	120.	84.4	1669.0	1		1840	225	49.	25.2	1661.9
1		0205	26	14.	14.0	1660.2	1		1025	126	119.	83.6	1668.9	1		1845	226	48.	24.8	1661.9
1		0210	27	15.	14.4	1660.3	1		1030	127	119.	82.8	1668.8	1		1850	227	47.	24.5	1661.8
1		0215	28	16.	14.7	1660.3	1		1035	128	118.	82.0	1668.7	1		1855	228	46.	24.2	1661.8
1		0220	29	17.	15.1	1660.4	1		1040	129	118.	81.2	1668.7	1		1900	229	45.	23.9	1661.7
1		0225	30	19.	15.4	1660.5	1		1045	130	117.	80.4	1668.6	1		1905	230	44.	23.6	1661.7
1		0230	31	20.	15.8	1660.5	1		1050	131	116.	79.5	1668.5	1		1910	231	43.	23.3	1661.6
1		0235	32	21.	16.3	1660.6	1		1055	132	116.	78.7	1668.4	1		1915	232	42.	23.0	1661.6
1		0240	33	23.	16.8	1660.7	1		1100	133	115.	78.0	1668.3	1		1920	233	41.	22.7	1661.5
1		0245	34	24.	17.2	1660.7	1		1105	134	115.	77.2	1668.2	1		1925	234	41.	22.4	1661.5
1		0250	35	26.	17.7	1660.8	1		1110	135	114.	76.4	1668.2	1		1930	235	40.	22.1	1661.5
1		0255	36	27.	18.2	1660.9	1		1115	136	114.	75.6	1668.1	1		1935	236	39.	21.8	1661.4
1		0300	37	29.	18.6	1660.9	1		1120	137	113.	74.8	1668.0	1		1940	237	38.	21.6	1661.4
1		0305	38	30.	19.0	1661.0	1		1125	138	112.	74.0	1667.9	1		1945	238	37.	21.3	1661.3
1		0310	39	32.	19.5	1661.1	1		1130	139	112.	73.3	1667.8	1		1950	239	37.	21.1	1661.3
1		0315	40	34.	20.1	1661.2	1		1135	140	111.	72.5	1667.7	1		1955	240	36.	20.8	1661.3
1		0320	41	37.	21.3	1661.3	1		1140	141	110.	71.7	1667.7	1		2000	241	35.	20.6	1661.2
1		0325	42	44.	23.6	1661.7	1		1145	142	110.	71.0	1667.6	1		2005	242	34.	20.3	1661.2
1		0330	43	55.	27.9	1662.3	1		1150	143	109.	70.2	1667.5	1		2010	243	34.	20.1	1661.2
1		0335	44	68.	34.9	1663.2	1		1155	144	108.	69.5	1667.4	1		2015	244	33.	19.9	1661.1
1		0340	45	82.	44.9	1664.5	1		1200	145	108.	68.7	1667.3	1		2020	245	32.	19.6	1661.1
1		0345	46	96.	57.3	1666.0	1		1205	146	107.	68.0	1667.2	1		2025	246	32.	19.4	1661.1
1		0350	47	110.	70.9	1667.6	1		1210	147	106.	67.3	1667.2	1		2030	247	31.	19.2	1661.0
1		0355	48	120.	84.6	1669.0	1		1215	148	106.	66.5	1667.1	1		2035	248	30.	19.0	1661.0
1		0400	49	129.	97.3	1670.3	1		1220	149	105.	65.8	1667.0	1		2040	249	30.	18.8	1661.0
1		0405	50	135.	108.6	1671.3	1		1225	150	104.	65.1	1666.9	1		2045	250	29.	18.6	1660.9
1		0410	51	140.	118.1	1672.2	1		1230	151	104.	64.4	1666.8	1		2050	251	28.	18.4	1660.9
1		0415	52	144.	125.8	1672.9	1		1235	152	103.	63.7	1666.8	1		2055	252	28.	18.2	1660.9
1		0420	53	147.	131.9	1673.4	1		1240	153	102.	62.9	1666.7	1		2100	253	27.	18.0	1660.9
1		0425	54	252.	136.1	1673.8	1		1245	154	101.	62.2	1666.6	1		2105	254	26.	17.8	1660.8
1		0430	55	437.	138.2	1674.0	1		1250	155	101.	61.6	1666.5	1		2110	255	26.	17.7	1660.8
1		0435	56	470.	138.5	1674.0	1		1255	156	100.	60.9	1666.4	1		2115	256	25.	17.5	1660.8
1		0440	57	443.	138.2	1674.0	1		1300	157	99.	60.2	1666.4	1		2120	257	25.	17.3	1660.7
1		0445	58	401.	137.8	1673.9	1		1305	158	99.	59.5	1666.3	1		2125	258	24.	17.1	1660.7
1		0450	59	359.	137.3	1673.9	1		1310	159	98.	58.8	1666.2	1		2130	259	24.	17.0	1660.7
1		0455	60	324.	136.9	1673.9	1		1315	160	97.	58.1	1666.1	1		2135	260	23.	16.8	1660.7
1		0500	61	296.	136.6	1673.8	1		1320	161	96.	57.5	1666.0	1		2140	261	23.	16.7	1660.6
1		0505	62	273.	136.4	1673.8	1		1325	162	96.	56.8	1666.0	1		2145	262	22.	16.5	1660.6
1		0510	63	252.	136.1	1673.8	1		1330	163	95.	56.2	1665.9	1		2150	263	22.	16.4	1660.6
1		0515	64	231.	135.9	1673.8	1		1335	164	94.	55.5	1665.8	1		2155	264	21.	16.2	1660.6
1		0520	65	206.	135.6	1673.8	1		1340	165	94.	54.9	1665.7	1		2200	265	21.	16.1	1660.6
1		0525	66	180.	135.3	1673.7	1		1345	166	93.	54.2	1665.7	1		2205	266	20.	15.9	1660.5
1		0530	67	153.	135.0	1673.7	1		1350	167	92.	53.6	1665.6	1		2210	267	20.	15.8	1660.5
1		0535	68	149.	134.7	1673.7	1		1355	168	92.	52.9	1665.5	1		2215	268	19.	15.7	1660.5
1		0540	69	149.	134.2	1673.6	1		1400	169	91.	52.3	1665.4	1		2220	269	19.	15.5	1660.5
1		0545	70	148.	133.7	1673.6	1		1405	170	90.	51.7	1665.4	1		2225	270	18.	15.4	1660.4
1		0550	71	148.	133.0	1673.5	1		1410	171	89.	51.1	1665.3	1		2230	271	18.	15.3	1660.4
1		0555	72	148.	132.3	1673.5	1		1415	172	89.	50.5	1665.2	1		2235	272	18.	15.1	1660.4
1		0600	73	147.	131.5	1673.4	1		1420	173	88.	49.9	1665.1	1		2240	273	17.	15.0	1660.4
1		0605	74	147.	130.7	1673.3	1		1425	174	88.	49.3	1665.1	1		2245	274	17.	14.9	1660.4
1		0610	75	146.	129.8	1673.2	1		1430	175	87.	48.7	1665.0	1		2250	275	16.	14.8	1660.4
1		0615	76	146.	129.0	1673.2	1		1435	176	86.	48.1	1664.9	1		2255	276	16.	14.7	1660.3
1		0620	77	146.	128.1	1673.1	1		1440	177	85.	47.5	1664.8	1		2300	277	16.	14.6	1660.3
1		0625	78	145.	127.2	1673.0	1		1445	178	85.	46.9	1664.8	1		2305	278	15.	14.5	1660.3
1		0630	79	145.	126.2	1672.9	1		1450	179	84.	46.3	1664.7	1		2310	279	15.	14.4	1660.3
1		0635	80	144.	125.3	1672.8	1		1455	180	83.	45.7	1664.6	1		2315	280	15.	14.3	1660.3
1		0640	81	144.	124.4	1672.8	1		1500	181	82.	45.2	1664.5	1		2320	281	14.	14.2	1660.3
1		0645	82	143.	123.4	1672.7	1		1505	182	82.	44.6	1664.5	1		2325	282	14.	14.1	1660.2
1		0650	83	143.	122.4	1672.6	1		1510	183	81.	44.0	1664.4	1		2330	283	14.	14.0	1660.2
1		0655	84	142.	121.5	1672.5	1		1515	184	80.	43.5	1664.3	1		2335	284	13.	13.9	1660.2
1		0700	85	142.	120.5	1672.4	1		1520	185	80.	42.9	1664.3	1		2340	285	13.	13.8	1660.2
1		0705	86	141.	119.5	1672.3	1		1525	186	79.	42.4	1664.2	1		2345	286	13.	13.7	1660.2
1		0710	87	140.	118.6	1672.2	1		1530	187	78.	41.8	1664.1	1		2350	287	12.	13.6	1660.2
1		0715	88	140.	117.6	1672.2	1		1535	188	78.	41.3	1664.1	1		2355	288	12.	13.5	1660.2
1		0720	89	139.	116.7	1672.1	1		1540	189	77.	40.8	1664.0	2		0000	289	12.	13.4	1660.1
1		0725	90	139.	115.7	1672.0	1		1545	190	76.	40.2	1663.9	2		0005	290	12.	13.4	1660.1

1	0730	91	138.	114.7	1671.9	*	1	1550	191	75.	39.7	1663.9	*	2	0010	291	11.	13.3	1660.1
1	0735	92	138.	113.8	1671.8	*	1	1555	192	74.	39.2	1663.8	*	2	0015	292	11.	13.2	1660.1
1	0740	93	137.	112.8	1671.7	*	1	1600	193	74.	38.7	1663.7	*	2	0020	293	11.	13.1	1660.1
1	0745	94	137.	111.9	1671.6	*	1	1605	194	73.	38.2	1663.7	*	2	0025	294	11.	13.1	1660.1
1	0750	95	136.	111.0	1671.6	*	1	1610	195	72.	37.7	1663.6	*	2	0030	295	10.	13.0	1660.1
1	0755	96	136.	110.0	1671.5	*	1	1615	196	71.	37.2	1663.5	*	2	0035	296	10.	12.9	1660.1
1	0800	97	135.	109.1	1671.4	*	1	1620	197	71.	36.7	1663.5	*	2	0040	297	10.	12.8	1660.0
1	0805	98	135.	108.2	1671.3	*	1	1625	198	70.	36.2	1663.4	*	2	0045	298	10.	12.8	1660.0
1	0810	99	134.	107.2	1671.2	*	1	1630	199	69.	35.7	1663.3	*	2	0050	299	9.	12.7	1660.0
1	0815	100	134.	106.3	1671.1	*	1	1635	200	68.	35.3	1663.3	*	2	0055	300	9.	12.6	1660.0
						*							*						

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PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
470.	4.58	(CFS)	170.	84.	81.	81.
		(INCHES)	.692	1.373	1.373	1.373
		(AC-FT)	84.	167.	167.	167.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	24.92-HR
139.	4.58	117.	55.	53.	53.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	24.92-HR
1674.01	4.58	1672.08	1665.28	1664.99	1664.99

CUMULATIVE AREA = 2.28 SQ MI

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113 KK    *      50P    *      CNAME
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115 KO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE
IPNCH	0	PUNCH COMPUTED HYDROGRAPH
IOUT	21	SAVE HYDROGRAPH ON THIS UNIT
ISAV1	1	FIRST ORDINATE PUNCHED OR SAVED
ISAV2	300	LAST ORDINATE PUNCHED OR SAVED
TIMINT	.083	TIME INTERVAL IN HOURS

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .90	RATIO 2 .92	RATIO 3 .94	RATIO 4 .96	RATIO 5 .98	RATIO 6 .99
HYDROGRAPH AT	P1	.86	1	FLOW	813.	833.	860.	887.	907.	928.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	P1-10	.86	1	FLOW	756.	775.	800.	826.	845.	864.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	P2	.51	1	FLOW	651.	666.	685.	705.	720.	734.
+				TIME	3.58	3.58	3.58	3.58	3.58	3.58
2 COMBINED AT	10P	1.37	1	FLOW	1188.	1218.	1257.	1297.	1327.	1357.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO	10P-20	1.37	1	FLOW	1094.	1121.	1158.	1195.	1223.	1250.
+				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT	P3	.91	1	FLOW	916.	938.	968.	997.	1020.	1042.
+				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT	20P	2.28	1	FLOW	1865.	1912.	1974.	2037.	2084.	2131.
+				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO	PWDB	2.28	1	FLOW	146.	148.	229.	317.	390.	470.
+				TIME	5.33	5.33	5.00	4.75	4.67	4.58
			** PEAK STAGES IN FEET **							
			1	STAGE	1673.26	1673.56	1673.78	1673.86	1673.93	1674.01
				TIME	5.33	5.33	5.00	4.75	4.67	4.58
ROUTED TO	20P-30	2.28	1	FLOW	146.	148.	228.	315.	384.	462.
+				TIME	5.42	5.42	5.08	4.83	4.75	4.67

HYDROGRAPH AT										
+	P4	.82	1	FLOW	777.	796.	821.	846.	865.	884.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT										
+	30P	3.10	1	FLOW	847.	867.	894.	921.	941.	961.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO										
+	30P-40	3.10	1	FLOW	846.	866.	893.	919.	939.	959.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT										
+	P6	.73	1	FLOW	429.	443.	460.	478.	492.	505.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO										
+	P6-40	.73	1	FLOW	426.	439.	456.	474.	488.	501.
				TIME	4.00	4.00	4.00	4.08	4.00	4.00
HYDROGRAPH AT										
+	P7	.63	1	FLOW	539.	552.	569.	586.	599.	612.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
3 COMBINED AT										
+	40P	4.46	1	FLOW	1723.	1767.	1826.	1885.	1928.	1973.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
ROUTED TO										
+	40P-50	4.46	1	FLOW	1720.	1764.	1823.	1882.	1925.	1969.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	P8	.29	1	FLOW	420.	427.	437.	447.	455.	462.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	50P	4.75	1	FLOW	1972.	2022.	2088.	2154.	2202.	2252.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
DIVERSION TO										
+	DOUT	4.75	1	FLOW	474.	474.	474.	474.	474.	474.
				TIME	3.50	3.50	3.42	3.42	3.42	3.42
HYDROGRAPH AT										
+	D50P	4.75	1	FLOW	1498.	1548.	1614.	1680.	1728.	1778.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	50P-60	4.75	1	FLOW	1496.	1545.	1610.	1676.	1724.	1772.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT										
+	P9	.13	1	FLOW	141.	144.	148.	152.	155.	158.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	60	4.88	1	FLOW	1595.	1647.	1715.	1783.	1833.	1885.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .90									
20P-30	MANE	2.66	146.46	323.48	1.19	5.00	146.45	325.00	1.19
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1446E+03 EXCESS= .0000E+00 OUTFLOW= .1443E+03 BASIN STORAGE= .2792E+00 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .92									
20P-30	MANE	2.68	148.19	325.16	1.22	5.00	148.18	325.00	1.22
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1483E+03 EXCESS= .0000E+00 OUTFLOW= .1481E+03 BASIN STORAGE= .2843E+00 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .94									
20P-30	MANE	2.24	228.57	304.36	1.26	5.00	228.49	305.00	1.26
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1535E+03 EXCESS= .0000E+00 OUTFLOW= .1532E+03 BASIN STORAGE= .2956E+00 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .96									
20P-30	MANE	1.99	314.85	289.99	1.30	5.00	314.83	290.00	1.30
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1589E+03 EXCESS= .0000E+00 OUTFLOW= .1586E+03 BASIN STORAGE= .2958E+00 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .98									
20P-30	MANE	1.93	388.26	283.98	1.34	5.00	384.00	285.00	1.34
CONTINUITY SUMMARY (AC-FT) - INFLOW= .1629E+03 EXCESS= .0000E+00 OUTFLOW= .1626E+03 BASIN STORAGE= .2945E+00 PERCENT ERROR= .0									
FOR PLAN = 1 RATIO= .99									
20P-30	MANE	1.72	467.90	278.79	1.37	5.00	461.52	280.00	1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1669E+03 EXCESS= .0000E+00 OUTFLOW= .1666E+03 BASIN STORAGE= .2947E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90									
30P-40	MANE	.44	847.02	225.94	1.23	5.00	846.41	230.00	1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2026E+03 EXCESS= .0000E+00 OUTFLOW= .2025E+03 BASIN STORAGE= .7480E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92									
30P-40	MANE	.44	866.86	226.03	1.26	5.00	866.18	230.00	1.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2078E+03 EXCESS= .0000E+00 OUTFLOW= .2077E+03 BASIN STORAGE= .7788E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .94									
30P-40	MANE	.48	894.01	226.06	1.30	5.00	892.84	230.00	1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2149E+03 EXCESS= .0000E+00 OUTFLOW= .2148E+03 BASIN STORAGE= .7985E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .96									
30P-40	MANE	.43	920.80	226.08	1.34	5.00	919.36	230.00	1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2222E+03 EXCESS= .0000E+00 OUTFLOW= .2221E+03 BASIN STORAGE= .8023E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98									
30P-40	MANE	.44	940.65	226.25	1.38	5.00	939.27	230.00	1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2277E+03 EXCESS= .0000E+00 OUTFLOW= .2276E+03 BASIN STORAGE= .8037E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .99									
30P-40	MANE	.43	960.94	226.17	1.41	5.00	959.16	230.00	1.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2331E+03 EXCESS= .0000E+00 OUTFLOW= .2330E+03 BASIN STORAGE= .8076E-01 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90									
P6-40	MANE	2.21	428.41	243.93	.80	5.00	426.04	240.00	.80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3119E+02 EXCESS= .0000E+00 OUTFLOW= .3123E+02 BASIN STORAGE= .2042E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .92									
P6-40	MANE	2.13	441.87	243.40	.83	5.00	438.90	240.00	.83

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3231E+02 EXCESS= .0000E+00 OUTFLOW= .3234E+02 BASIN STORAGE= .2022E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .94									
P6-40	MANE	2.16	459.42	243.32	.87	5.00	456.16	240.00	.87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3378E+02 EXCESS= .0000E+00 OUTFLOW= .3387E+02 BASIN STORAGE= .1831E-03 PERCENT ERROR= -.3

FOR PLAN = 1 RATIO= .96									
P6-40	MANE	2.13	476.94	242.82	.91	5.00	474.38	245.00	.91

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3526E+02 EXCESS= .0000E+00 OUTFLOW= .3534E+02 BASIN STORAGE= .1903E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .98									
P6-40	MANE	2.14	490.52	243.69	.93	5.00	488.08	240.00	.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3636E+02 EXCESS= .0000E+00 OUTFLOW= .3639E+02 BASIN STORAGE= .1893E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99									
P6-40	MANE	2.13	503.80	243.36	.96	5.00	500.89	240.00	.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3749E+02 EXCESS= .0000E+00 OUTFLOW= .3751E+02 BASIN STORAGE= .2486E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .90									
40P-50	MANE	1.07	1721.37	235.97	1.19	5.00	1719.97	235.00	1.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2825E+03 EXCESS= .0000E+00 OUTFLOW= .2824E+03 BASIN STORAGE= .1168E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92									
40P-50	MANE	1.11	1765.01	235.57	1.22	5.00	1764.27	235.00	1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2899E+03 EXCESS= .0000E+00 OUTFLOW= .2898E+03 BASIN STORAGE= .1232E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .94									
40P-50	MANE	1.06	1824.72	236.08	1.26	5.00	1823.24	235.00	1.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3001E+03 EXCESS= .0000E+00 OUTFLOW= .3000E+03 BASIN STORAGE= .1257E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .96									
40P-50 MANE	1.16	1883.09	235.95	1.30	5.00	1882.19	235.00	1.30	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3104E+03 EXCESS= .0000E+00 OUTFLOW= .3103E+03 BASIN STORAGE= .1268E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98									
40P-50 MANE	1.01	1926.70	236.51	1.34	5.00	1924.94	235.00	1.34	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3181E+03 EXCESS= .0000E+00 OUTFLOW= .3180E+03 BASIN STORAGE= .1272E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .99									
40P-50 MANE	1.15	1969.80	235.42	1.37	5.00	1969.20	235.00	1.37	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3259E+03 EXCESS= .0000E+00 OUTFLOW= .3258E+03 BASIN STORAGE= .1277E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90									
50P-60 MANE	1.47	1497.53	233.38	.33	5.00	1495.53	235.00	.33	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8416E+02 EXCESS= .0000E+00 OUTFLOW= .8427E+02 BASIN STORAGE= .6298E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .92									
50P-60 MANE	1.45	1548.00	233.07	.35	5.00	1545.07	235.00	.35	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8770E+02 EXCESS= .0000E+00 OUTFLOW= .8779E+02 BASIN STORAGE= .6809E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .94									
50P-60 MANE	1.53	1613.30	233.33	.37	5.00	1610.44	235.00	.37	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9326E+02 EXCESS= .0000E+00 OUTFLOW= .9338E+02 BASIN STORAGE= .7066E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .96									
50P-60 MANE	1.52	1676.97	234.38	.41	5.00	1675.74	235.00	.41	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1027E+03 EXCESS= .0000E+00 OUTFLOW= .1027E+03 BASIN STORAGE= .7041E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .98									
50P-60 MANE	1.40	1726.23	233.68	.43	5.00	1723.51	235.00	.43	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1099E+03 EXCESS= .0000E+00 OUTFLOW= .1101E+03 BASIN STORAGE= .8451E-04 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .99									
50P-60 MANE	1.47	1776.28	233.28	.46	5.00	1772.49	235.00	.46	

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1171E+03 EXCESS= .0000E+00 OUTFLOW= .1173E+03 BASIN STORAGE= .7307E-04 PERCENT ERROR= -.1

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

3.2 HYDRAULIC MODELING COMPUTATIONS

HEC-RAS Model: Abbott Wash
CHECK-RAS Analysis of Abbott Wash HEC-RAS Model
HEC-RAS Model: Pulsipher Wash
CHECK-RAS Analysis of Pulsipher Wash HEC-RAS
Pulsipher Wash Calculations: Hardy Way, Falcon Ridge, I-15 Breakout
Pulsipher Wash Zone AE BFE Comparison Table 2
Hydraulic Modeling Summary: Table 3, Abbott Wash
Hydraulic Modeling Summary: Table 4, Pulsipher Wash

HEC-RAS MODEL: ABBOTT WASH
CHECK-RAS ANALYSIS OF HEC-RAS MODEL

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

****

PROJECT DATA
Project Title: ABBOTT WASH LOMR
Project File : ABBOTTWASH.prj
Run Date and Time: 8/1/2011 10:35:01 AM

Project in English units

Project Description:

****

PLAN DATA

Plan Title: LOMR
Plan File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.p01

Geometry Title: LOMR
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.g01

Flow Title : LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.f05

Plan Description:
LOMR Model with New Topo.

Plan Summary Information:
Number of: Cross Sections = 16 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 2 Lateral Structures = 0

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

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

****

FLOW DATA

Flow Title: LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.f05

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	1152	992
RIVER-1	Reach-1	1100	1820

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	Known WS = 1645.86

****

GEOMETRY DATA

Geometry Title: LOMR
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.g01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1152

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1670	1000.01	1670	1003.87	1669	1006.65	1668	1008	1667

```
 1009.47    1666 1010.38    1666 1016.87    1666  1019.2    1665 1021.34    1664
  1023.6    1663  1026.8    1662 1036.01    1661 1048.61    1660 1071.31    1659
 1181.66    1658 1186.12    1656 1195.98    1656 1200.36    1658 1393.48    1659
 1413.57    1660 1417.97    1661 1417.97    1672

Manning's n Values         num=       1
     Sta   n Val
*****************
    1000    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1000 1413.57             103.1    96.8    92.8            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1664.70  * Element               *  Left OB *  Channel  * Right OB *
* Vel Head (ft)         *    0.00  * Wt. n-Val.           *          *    0.025  *   0.025  *
* W.S. Elev (ft)        * 1664.70  * Reach Len. (ft)      *  103.10  *   96.80  *   92.80  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)     *          * 2348.65  *   18.46  *
* E.G. Slope (ft/ft)    *0.000005  * Area (sq ft)         *          * 2348.65  *   18.46  *
* Q Total (cfs)         *  992.00  * Flow (cfs)           *          *  987.94  *    4.06  *
* Top Width (ft)        *  398.12  * Top Width (ft)       *          *  393.72  *    4.40  *
* Vel Total (ft/s)      *    0.42  * Avg. Vel. (ft/s)     *          *    0.42  *    0.22  *
* Max Chl Dpth (ft)     *    8.70  * Hydr. Depth (ft)     *          *    5.97  *    4.20  *
* Conv. Total (cfs)     *459855.3  * Conv. (cfs)          *          *457972.0  *  1883.3  *
* Length Wtd. (ft)      *   96.79  * Wetted Per. (ft)     *          *  395.25  *    8.21  *
* Min Ch El (ft)        * 1656.00  * Shear (lb/sq ft)     *          *    0.00  *    0.00  *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *        *    0.00  *    0.00  *
* Frctn Loss (ft)       *    0.00  * Cum Volume (acre-ft) *          *   23.93  *    0.45  *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)       *          *    4.86  *    0.49  *
*************************************************************************************************

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1             RS: 1150

INPUT
Description:
Station Elevation Data     num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    1000    1670 1005.84    1669 1010.25    1669 1011.39    1669 1013.93    1668
 1016.71    1667  1019.5    1666 1022.36    1665 1025.29    1664 1028.28    1663
 1032.14    1662 1036.59    1661 1047.03    1660 1109.37    1659 1183.77    1658
 1206.34 1656.28 1210.09    1656  1218.3    1656 1222.84    1658 1227.61 1658.03
 1363.01    1659 1388.45    1660  1404.1    1661 1407.33    1662  1410.6    1663
 1413.88    1664 1417.22    1665 1432.22    1670

Manning's n Values         num=       1
     Sta   n Val
*****************
    1000    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1010.25 1432.22             115.3   115.8   113.3            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1664.70  * Element               *  Left OB *  Channel  * Right OB *
* Vel Head (ft)         *    0.00  * Wt. n-Val.           *          *    0.025  *          *
* W.S. Elev (ft)        * 1664.69  * Reach Len. (ft)      *  115.30  *  115.80  *  113.30  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)     *          * 2252.91  *          *
* E.G. Slope (ft/ft)    *0.000005  * Area (sq ft)         *          * 2252.91  *          *
* Q Total (cfs)         *  992.00  * Flow (cfs)           *          *  992.00  *          *
* Top Width (ft)        *  392.94  * Top Width (ft)       *          *  392.94  *          *
* Vel Total (ft/s)      *    0.44  * Avg. Vel. (ft/s)     *          *    0.44  *          *
* Max Chl Dpth (ft)     *    8.69  * Hydr. Depth (ft)     *          *    5.73  *          *
* Conv. Total (cfs)     *427729.8  * Conv. (cfs)          *          *427729.8  *          *
* Length Wtd. (ft)      *  115.80  * Wetted Per. (ft)     *          *  394.63  *          *
* Min Ch El (ft)        * 1656.00  * Shear (lb/sq ft)     *          *    0.00  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *        *    0.00  *          *
* Frctn Loss (ft)       *    0.00  * Cum Volume (acre-ft) *          *   18.81  *    0.43  *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)       *          *    3.98  *    0.48  *
*************************************************************************************************

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1             RS: 1145

INPUT
Description:
Station Elevation Data     num=      36
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
    1000    1678 1009.25    1677 1015.15    1676 1020.69    1675 1026.48    1674
  1033.2    1673 1039.39    1672 1044.57    1671 1048.76    1670  1053.2    1669
 1058.62    1668 1063.74    1667 1068.68    1666 1073.53    1665 1076.39    1664
 1079.29    1663 1082.32    1662 1089.85    1661 1115.05    1660 1167.15    1659
 1231.41    1658 1232.07    1658 1234.39    1658 1241.17    1658 1242.67    1658
 1248.58    1656 1258.39    1656 1262.58    1658 1314.48    1659 1387.81    1660
 1398.31    1661 1401.71    1662 1405.23    1663 1408.78    1664 1412.31    1665
 1431.48    1670

Manning's n Values         num=       1
     Sta   n Val
*****************
    1000    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1000 1431.48               266     266     266            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
```

E.G. Elev (ft)	1664.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1664.69	Reach Len. (ft)	266.00	266.00	266.00
Crit W.S. (ft)		Flow Area (sq ft)		1816.89	
E.G. Slope (ft/ft)	*0.000009	Area (sq ft)		1816.89	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	336.81	Top Width (ft)		336.81	
Vel Total (ft/s)	0.55	Avg. Vel. (ft/s)		0.55	
Max Chl Dpth (ft)	8.69	Hydr. Depth (ft)		5.39	
Conv. Total (cfs)	*330906.3	Conv. (cfs)		*330906.3	
Length Wtd. (ft)	266.00	Wetted Per. (ft)		338.72	
Min Ch El (ft)	1656.00	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		13.40	0.43
C & E Loss (ft)	0.02	Cum SA (acres)		3.01	0.48

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1140

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1200.58	1665	1202.41	1664.09	1202.59	1664	1204.64	1663	1206.68	1662
1208.71	1661	1210.67	1660	1212.64	1659	1214.51	1658	1217.78	1656
1219.07	1655	1230.44	1655	1232.23	1656	1236.02	1658	1237.98	1659
1240.49	1660	1242.92	1661	1245.23	1662	1247.41	1663	1249.58	1664
1255.76	1664	1319.9	1664	1327.5	1665	1343.4	1670		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1200.58	.04	1217.78	.025	1232.23	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1200.58 1249.58 187.7 187.7 187.7 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1200.58	1200.58	1668	F
1249.58	1343.4	1668	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1664.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.036	
W.S. Elev (ft)	1664.47	Reach Len. (ft)	187.70	187.70	187.70
Crit W.S. (ft)	1659.89	Flow Area (sq ft)		276.05	
E.G. Slope (ft/ft)	*0.000828	Area (sq ft)		276.05	33.78
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	121.81	Top Width (ft)		47.93	73.88
Vel Total (ft/s)	3.59	Avg. Vel. (ft/s)		3.59	
Max Chl Dpth (ft)	9.47	Hydr. Depth (ft)		5.76	
Conv. Total (cfs)	34471.5	Conv. (cfs)		34471.5	
Length Wtd. (ft)	187.70	Wetted Per. (ft)		52.40	
Min Ch El (ft)	1655.00	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.98	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)		7.01	0.33
C & E Loss (ft)	0.22	Cum SA (acres)		1.84	0.26

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1135

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1670	1015.05	1669	1020.96	1668	1029.71	1660.96	1029.71	1652.96
1038.71	1652.96	1038.71	1660.96	1040.89	1663	1045.22	1662	1048.56	1661
1051.86	1660	1055.82	1659	1067.51	1658	1074.9	1658	1082.41	1659
1085.92	1660	1089.54	1661	1092.87	1662	1095.63	1663	1098.13	1664
1101.27	1665	1105.1	1666	1108.93	1667	1112.81	1668	1117.21	1669
1120.81	1670								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.025	1020.96	.015	1040.89	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1020.96 1040.89 284.4 284.4 284.4 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1000	1020.96		F
1040.89	1120.81		F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1664.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.36	Wt. n-Val.		0.015	
W.S. Elev (ft)	1661.80	Reach Len. (ft)	0.10	0.10	0.10
Crit W.S. (ft)	1660.19	Flow Area (sq ft)		80.38	
E.G. Slope (ft/ft)	*0.003726	Area (sq ft)		80.38	119.78
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	57.26	Top Width (ft)		10.94	46.32
Vel Total (ft/s)	12.34	Avg. Vel. (ft/s)		12.34	
Max Chl Dpth (ft)	8.84	Hydr. Depth (ft)		7.35	
Conv. Total (cfs)	16250.4	Conv. (cfs)		16250.4	
Length Wtd. (ft)	0.10	Wetted Per. (ft)		27.57	
Min Ch El (ft)	1652.96	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)		8.37	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		6.24	0.00
C & E Loss (ft)	0.37	Cum SA (acres)		1.71	0.00

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 1133

INPUT
Description: Horizon Boulevard Bridge
Distance from Upstream XS = .1
Deck/Roadway Width = 283.5
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 4

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1673	1650 1029.71	1673 1660.96	1038.71	1673 1660.96
1130	1673	1650			

Upstream Bridge Cross Section Data
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1670	1015.05	1669	1020.96	1668	1029.71	1660.96	1029.71	1652.96
1038.71	1652.96	1038.71	1660.96	1040.89	1663	1045.22	1662	1048.56	1661
1051.86	1660	1055.82	1659	1067.51	1658	1074.9	1658	1082.41	1659
1085.92	1660	1089.54	1661	1092.87	1662	1095.63	1663	1098.13	1664
1101.27	1665	1105.1	1666	1108.93	1667	1112.81	1668	1117.21	1669
1120.81	1670								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.025	1020.96	.015	1040.89	.025

Bank Sta: Left Right Coeff Contr. Expan.
1020.96 1040.89 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1000	1020.96		F
1040.89	1120.81		F

Downstream Deck/Roadway Coordinates
num= 4

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1673	1650 1034.72	1673 1658.57	1043.72	1673 1658.57
1130	1673	1650			

Downstream Bridge Cross Section Data
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1029.92	1662	1034.72	1658.57	1034.72	1650.57	1043.72	1650.57	1043.72	1658.57
1047.97	1665	1051.34	1666	1054.73	1667	1058.13	1668	1061.49	1669
1064.9	1670								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1029.92	.025	1029.92	.015	1047.97	.025

Bank Sta: Left Right Coeff Contr. Expan.
1029.92 1047.97 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Energy

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8

Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	1664.17	Element	Inside BR US	Inside BR DS	
W.S. US. (ft)	1661.80	E.G. Elev (ft)	1663.80	1661.62	
Q Total (cfs)	992.00	W.S. Elev (ft)	1660.20	1658.67	
Q Bridge (cfs)	992.00	Crit W.S. (ft)	1660.19	1657.80	
Q Weir (cfs)		Max Chl Dpth (ft)	7.24	8.10	
Weir Sta Lft (ft)		Vel Total (ft/s)	15.23	13.78	
Weir Sta Rgt (ft)		Flow Area (sq ft)	65.15	72.00	
Weir Submerg		Froude # Chl	1.00	0.85	
Weir Max Depth (ft)		Specif Force (cu ft)	704.89	719.50	
Min El Weir Flow (ft)	1673.01	Hydr Depth (ft)	7.24	12.96	
Min El Prs (ft)	1660.96	W.P. Total (ft)	23.48	34.00	
Delta EG (ft)	2.76	Conv. Total (cfs)	12744.3	11761.8	
Delta WS (ft)	4.01	Top Width (ft)	9.00		
BR Open Area (sq ft)	72.00	Frctn Loss (ft)	1.86	0.01	
BR Open Vel (ft/s)	15.23	C & E Loss (ft)	0.33	0.20	
Coef of Q		Shear Total (lb/sq ft)	1.05	0.94	
Br Sel Method	Energy only	Power Total (lb/ft s)	15.98	12.96	

Warning: The sluice gate calculations did not converge during the pressure flow only calculation.
Warning: The pressure flow only method gave an invalid answer. The upstream energy was less than the downstream energy. The program defaulted to an energy based solution.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1130

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1029.92	1662	1034.72	1658.57	1034.72	1650.57	1043.72	1650.57	1043.72	1658.57
1047.97	1665	1051.34	1666	1054.73	1667	1058.13	1668	1061.49	1669
1064.9	1670								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1029.92	.025	1029.92	.015	1047.97	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1029.92 1047.97 126.1 126.1 126.1 .3 .5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1661.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.62	Wt. n-Val.		0.015	
W.S. Elev (ft)	1657.79	Reach Len. (ft)	126.10	126.10	126.10
Crit W.S. (ft)	1657.79	Flow Area (sq ft)		64.99	
E.G. Slope (ft/ft)	0.006097	Area (sq ft)		64.99	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	9.00	Top Width (ft)		9.00	
Vel Total (ft/s)	15.26	Avg. Vel. (ft/s)		15.26	
Max Chl Dpth (ft)	7.22	Hydr. Depth (ft)		7.22	
Conv. Total (cfs)	12704.3	Conv. (cfs)		12704.3	
Length Wtd. (ft)	126.10	Wetted Per. (ft)		23.44	
Min Ch El (ft)	1650.57	Shear (lb/sq ft)		1.06	
Alpha	1.00	Stream Power (lb/ft s)		16.11	
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)		5.80	
C & E Loss (ft)	1.51	Cum SA (acres)		1.68	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1125

INPUT
Description:

Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1088.75	1669	1089.46	1669	1091.95	1668	1093.86	1667	1095.61	1666
1097.43	1665	1099.37	1664	1101.45	1663	1103.91	1662	1106.54	1661
1109.17	1660	1111.83	1659	1114.47	1658	1117.09	1657	1119.81	1656
1122.88	1655	1125.98	1654	1127.41	1653	1128.12	1652	1130.47	1651
1137.27	1650	1153.45	1650	1155.49	1651	1157.08	1652	1157.71	1653
1158.39	1654	1159.08	1655	1159.84	1656	1160.69	1657	1161.62	1658
1162.55	1659	1163.5	1660	1164.66	1661	1167.07	1662	1169.41	1663
1171.7	1664	1174.03	1665	1176.45	1666	1178.8	1667	1181.23	1668
1183.66	1669	1186.12	1670	1188.53	1671	1191.09	1672	1193.85	1673
1197.49	1674	1201.61	1675	1205.66	1676	1209.48	1677	1213.1	1678
1216.61	1679	1220.37	1680						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1088.75	.04	1122.88	.025	1153.45	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1088.75	1220.37	229.8	229.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1656.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.029	
W.S. Elev (ft)	1655.45	Reach Len. (ft)	229.80	229.80	229.80
Crit W.S. (ft)		Flow Area (sq ft)		159.43	
E.G. Slope (ft/ft)	0.002434	Area (sq ft)		159.43	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	37.91	Top Width (ft)		37.91	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)		6.22	
Max Chl Dpth (ft)	5.45	Hydr. Depth (ft)		4.21	
Conv. Total (cfs)	20105.4	Conv. (cfs)		20105.4	
Length Wtd. (ft)	229.80	Wetted Per. (ft)		41.60	
Min Ch El (ft)	1650.00	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)		3.62	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)		5.47	
C & E Loss (ft)	0.02	Cum SA (acres)		1.61	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1120

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1328.4	1661	1331.55	1661	1332.47	1660	1333.46	1659	1338.25	1658
1340.88	1657	1342.74	1656	1344.67	1655	1346.78	1654	1349.04	1653
1351.43	1652	1353.87	1651	1355.57	1650	1356.83	1649	1371.38	1649
1372.82	1650	1375.08	1651	1377.69	1652	1380.29	1653	1382.96	1654
1385.58	1655	1388.23	1656	1391.33	1657				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1328.4	.04	1355.57	.025	1372.82	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1331.55	1391.33	186.2	186.2	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.034	
W.S. Elev (ft)	1654.39	Reach Len. (ft)	186.20	186.20	186.20
Crit W.S. (ft)		Flow Area (sq ft)		135.76	
E.G. Slope (ft/ft)	0.005498	Area (sq ft)		135.76	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	38.02	Top Width (ft)		38.02	
Vel Total (ft/s)	7.31	Avg. Vel. (ft/s)		7.31	
Max Chl Dpth (ft)	5.39	Hydr. Depth (ft)		3.57	
Conv. Total (cfs)	13378.4	Conv. (cfs)		13378.4	
Length Wtd. (ft)	186.20	Wetted Per. (ft)		40.48	
Min Ch El (ft)	1649.00	Shear (lb/sq ft)		1.15	
Alpha	1.00	Stream Power (lb/ft s)		8.41	
Frctn Loss (ft)	1.41	Cum Volume (acre-ft)		4.69	
C & E Loss (ft)	0.05	Cum SA (acres)		1.41	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1115

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

1196.6	1659	1197.87	1658	1199.25	1657	1200.54	1656	1201.86	1655
1203.23	1654	1204.51	1653	1205.86	1652	1207.05	1651	1207.99	1650
1208.91	1649	1229.83	1649	1234.41	1650	1240.22	1651	1245.03	1652
1249.46	1653	1254.17	1654	1259.01	1655	1264.86	1656	1269.64	1657

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1196.6	.04	1207.99	.025	1234.41	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Expan.
1196.6	1269.64		112.2	112.2	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1653.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.31	Wt. n-Val.		0.031	
W.S. Elev (ft)	1652.45	Reach Len. (ft)	112.20	112.20	112.20
Crit W.S. (ft)	1652.45	Flow Area (sq ft)		108.03	
E.G. Slope (ft/ft)	*0.011015	Area (sq ft)		108.03	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	41.80	Top Width (ft)		41.80	
Vel Total (ft/s)	9.18	Avg. Vel. (ft/s)		9.18	
Max Chl Dpth (ft)	3.45	Hydr. Depth (ft)		2.58	
Conv. Total (cfs)	9451.9	Conv. (cfs)		9451.9	
Length Wtd. (ft)	112.20	Wetted Per. (ft)		43.53	
Min Ch El (ft)	1649.00	Shear (lb/sq ft)		1.71	
Alpha	1.00	Stream Power (lb/ft s)		15.67	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		4.17	
C & E Loss (ft)	0.21	Cum SA (acres)		1.24	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1112

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1168.69	1659	1169.04	1659	1174.83	1658	1176.54	1657	1178.26	1656
1179.95	1655	1181.62	1654	1183.3	1653	1184.96	1652	1186.69	1651
1187.92	1650	1188.36	1649	1189.25	1648	1210.4	1648	1220.59	1648
1230.84	1649	1235.76	1650	1242.27	1651	1248.72	1652	1255.13	1653
1261.47	1654	1267.74	1655	1273.63	1656	1277.65	1657	1281.74	1658
1292.26	1659	1299.09	1659	1310.12	1659	1316.38	1660	1317.43	1661
1318.48	1662	1319.47	1663	1320.48	1664	1321.43	1665	1322.05	1666
1322.55	1667	1323.12	1668	1323.85	1669	1324.47	1670	1325.17	1671
1325.83	1672	1326.55	1673	1327.26	1674				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1168.69	.04	1187.92	.025	1235.76	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Expan.
1168.69	1292.26		62.6	62.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1652.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.		0.028	
W.S. Elev (ft)	1651.43	Reach Len. (ft)	62.60	62.60	62.60
Crit W.S. (ft)	1650.69	Flow Area (sq ft)		158.19	
E.G. Slope (ft/ft)	*0.003968	Area (sq ft)		158.19	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	59.06	Top Width (ft)		59.06	
Vel Total (ft/s)	6.27	Avg. Vel. (ft/s)		6.27	
Max Chl Dpth (ft)	3.43	Hydr. Depth (ft)		2.68	
Conv. Total (cfs)	15748.7	Conv. (cfs)		15748.7	
Length Wtd. (ft)	62.60	Wetted Per. (ft)		60.89	
Min Ch El (ft)	1648.00	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		4.04	
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)		3.83	
C & E Loss (ft)	0.04	Cum SA (acres)		1.11	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1110

INPUT
Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1188.84	1658	1190.43	1657	1192.05	1656	1193.74	1655	1195.36	1654
1196.98	1653	1198.58	1652	1200.49	1651	1202.99	1650	1205.21	1649
1206.88	1648	1244.19	1648	1248.62	1649	1254.58	1650	1260.56	1651
1266.45	1652	1272.02	1653	1276.66	1654	1280.93	1655	1284.5	1655.85
1285.13	1656	1301.62	1656						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1188.84	.04	1202.99	.025	1254.58	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1188.84	1285.13	162.1	162.1	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1651.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.03	Wt. n-Val.		0.027	
W.S. Elev (ft)	1650.63	Reach Len. (ft)	162.10	162.10	162.10
Crit W.S. (ft)	1650.59	Flow Area (sq ft)		121.89	
E.G. Slope (ft/ft)	0.007842	Area (sq ft)		121.89	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	56.91	Top Width (ft)		56.91	
Vel Total (ft/s)	8.14	Avg. Vel. (ft/s)		8.14	
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	11201.9	Conv. (cfs)		11201.9	
Length Wtd. (ft)	162.10	Wetted Per. (ft)		57.77	
Min Ch El (ft)	1648.00	Shear (lb/sq ft)		1.03	
Alpha	1.00	Stream Power (lb/ft s)		8.41	
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)		3.63	
C & E Loss (ft)	0.22	Cum SA (acres)		1.03	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1105

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1257.29	1653	1260.19	1652	1262.63	1651	1266.3	1650	1269.83	1649
1273.08	1648	1286.35	1647	1330.47	1647	1331.3	1648	1332.07	1649
1332.89	1650	1336.31	1651	1340.71	1652	1344.94	1653	1348.97	1654
1351.55	1655	1354.17	1656	1358.62	1657				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1257.29	.04	1266.3	.025	1332.89	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1257.29	1358.62	275.7	275.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1650.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.026	
W.S. Elev (ft)	1650.69	Reach Len. (ft)	275.70	275.70	275.70
Crit W.S. (ft)		Flow Area (sq ft)		223.09	
E.G. Slope (ft/ft)	0.001392	Area (sq ft)		223.09	
Q Total (cfs)	992.00	Flow (cfs)		992.00	
Top Width (ft)	71.45	Top Width (ft)		71.45	
Vel Total (ft/s)	4.45	Avg. Vel. (ft/s)		4.45	
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)		3.12	
Conv. Total (cfs)	26588.8	Conv. (cfs)		26588.8	
Length Wtd. (ft)	275.70	Wetted Per. (ft)		73.40	
Min Ch El (ft)	1647.00	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.17	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)		2.99	
C & E Loss (ft)	0.09	Cum SA (acres)		0.79	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1100

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
978.5	1652.69	978.5	1644.54	1021.5	1644.54	1021.5	1652.69

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
***********************************************
   978.5    .015   978.5    .015  1021.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         978.5  1021.5               94      94      94            .3       .5

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************************
* E.G. Elev (ft)         * 1650.53  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.22  * Wt. n-Val.            *          *    0.015  *          *
* W.S. Elev (ft)         * 1649.31  * Reach Len. (ft)       *    0.50  *     0.50  *    0.50  *
* Crit W.S. (ft)         * 1648.35  * Flow Area (sq ft)     *          *   205.06  *          *
* E.G. Slope (ft/ft)     *0.001306  * Area (sq ft)          *          *   205.06  *          *
* Q Total (cfs)          * 1820.00  * Flow (cfs)           *          * 1820.00  *          *
* Top Width (ft)         *   43.00  * Top Width (ft)       *          *    43.00  *          *
* Vel Total (ft/s)       *    8.88  * Avg. Vel. (ft/s)     *          *     8.88  *          *
* Max Chl Dpth (ft)      *    4.77  * Hydr. Depth (ft)     *          *     4.77  *          *
* Conv. Total (cfs)      * 50358.2  * Conv. (cfs)          *          * 50358.2  *          *
* Length Wtd. (ft)       *    0.50  * Wetted Per. (ft)     *          *    52.54  *          *
* Min Ch El (ft)         * 1644.54  * Shear (lb/sq ft)     *          *     0.32  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *     2.82  *          *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)  *          *     1.63  *          *
* C & E Loss (ft)        *    0.08  * Cum SA (acres)        *          *     0.43  *          *
*****************************************************************************************************

BRIDGE


RIVER: RIVER-1
REACH: Reach-1            RS: 1099

INPUT
Description: Hardy Way Bridge
Distance from Upstream XS =       .5
Deck/Roadway Width        =      93
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************
   978.5    1654 1651.04  1021.5    1654 1651.04

Upstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
   978.5 1651.54   978.5 1644.54  1021.5 1644.54  1021.5 1651.54

Manning's n Values        num=       1
     Sta   n Val
*****************
   978.5    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         978.5  1021.5             .3       .5

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
***************************************************
   978.5    1654 1650.29  1021.5    1654 1650.29

Downstream Bridge Cross Section Data
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************
   978.5 1650.79   978.5 1643.79  1021.5 1643.79  1021.5 1650.79

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***************************************************
   978.5    .015   978.5    .015  1021.5    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
         978.5  1021.5             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =    1654
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  2

Pier Data
Pier Station     Upstream=  992.75    Downstream=  992.75
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
       .5 1644.54       .5 1651.04
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
       .5 1643.79       .5 1650.29

Pier Data
Pier Station     Upstream= 1007.25    Downstream= 1007.25
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
       .5 1644.54       .5 1651.04
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
```

```
      .5 1643.79      .5 1650.29

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. US. (ft)          *    1650.53  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *    1649.31  * E.G. Elev (ft)        *    1650.46  *    1650.07  *
* Q Total (cfs)          *    1820.00  * W.S. Elev (ft)        *    1648.99  *    1649.00  *
* Q Bridge (cfs)         *    1820.00  * Crit W.S. (ft)        *    1648.43  *    1647.67  *
* Q Weir (cfs)           *             * Max Chl Dpth (ft)     *       4.44  *       5.21  *
* Weir Sta Lft (ft)      *             * Vel Total (ft/s)      *       9.75  *       8.32  *
* Weir Sta Rgt (ft)      *             * Flow Area (sq ft)     *     186.68  *     218.67  *
* Weir Submerg           *             * Froude # Chl          *       0.81  *       0.64  *
* Weir Max Depth (ft)    *             * Specif Force (cu ft)  *     965.92  *    1039.69  *
* Min El Weir Flow (ft)  *    1654.01  * Hydr Depth (ft)       *       4.44  *       5.21  *
* Min El Prs (ft)        *    1651.04  * W.P. Total (ft)       *      68.67  *      73.24  *
* Delta EG (ft)          *       0.49  * Conv. Total (cfs)     *    36020.8  *    44916.5  *
* Delta WS (ft)          *       0.28  * Top Width (ft)        *      42.00  *      42.00  *
* BR Open Area (sq ft)   *     273.00  * Frctn Loss (ft)       *       0.19  *       0.00  *
* BR Open Vel (ft/s)     *       9.75  * C & E Loss (ft)       *       0.20  *       0.03  *
* Coef of Q              *             * Shear Total (lb/sq ft) *       0.43  *       0.31  *
* Br Sel Method          *Energy only  * Power Total (lb/ft s)  *       4.22  *       2.55  *
*************************************************************************************************

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 1098

INPUT
Description:
Station Elevation Data    num=       4
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************
   978.5 1650.79   978.5 1643.79  1021.5 1643.79  1021.5 1650.79

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
   978.5    .015   978.5    .015  1021.5    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         978.5  1021.5               94      94      94             .3       .5

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1650.04  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.01  * Wt. n-Val.            *          *    0.015  *          *
* W.S. Elev (ft)         * 1649.03  * Reach Len. (ft)       *   94.00  *   94.00  *   94.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *          *  225.17  *          *
* E.G. Slope (ft/ft)     *0.000979  * Area (sq ft)          *          *  225.17  *          *
* Q Total (cfs)          * 1820.00  * Flow (cfs)            *          * 1820.00  *          *
* Top Width (ft)         *   43.00  * Top Width (ft)        *          *   43.00  *          *
* Vel Total (ft/s)       *    8.08  * Avg. Vel. (ft/s)      *          *    8.08  *          *
* Max Chl Dpth (ft)      *    5.24  * Hydr. Depth (ft)      *          *    5.24  *          *
* Conv. Total (cfs)      * 58164.4  * Conv. (cfs)           *          * 58164.4  *          *
* Length Wtd. (ft)       *   94.00  * Wetted Per. (ft)      *          *   53.47  *          *
* Min Ch El (ft)         * 1643.79  * Shear (lb/sq ft)      *          *    0.26  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    2.08  *          *
* Frctn Loss (ft)        *    0.14  * Cum Volume (acre-ft)  *          *    1.19  *          *
* C & E Loss (ft)        *    0.18  * Cum SA (acres)        *          *    0.34  *          *
*************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 1095

INPUT
Description:
Station Elevation Data    num=      18
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
 1213.62     1650    1218     1649 1234.84     1646 1239.38     1645 1243.64     1644
 1247.41     1643 1252.47     1643  1254.6     1643 1260.87     1643 1266.84     1644
 1270.24     1645 1272.91     1646 1275.64     1647 1278.33     1648 1281.08     1649
 1283.78     1650  1286.5     1651 1289.15     1652

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
***********************************************
 1213.62     .04 1213.62     .015 1289.15     .04
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1213.62 1289.15             187.9   187.9   187.9            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1649.72  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    1.63  * Wt. n-Val.           *          *    0.015  *          *
* W.S. Elev (ft)        * 1648.09  * Reach Len. (ft)      *  187.90  *  187.90  *  187.90  *
* Crit W.S. (ft)        * 1648.09  * Flow Area (sq ft)    *          *  177.82  *          *
* E.G. Slope (ft/ft)    *0.002332  * Area (sq ft)         *          *  177.82  *          *
* Q Total (cfs)         * 1820.00  * Flow (cfs)           *          * 1820.00  *          *
* Top Width (ft)        *   55.50  * Top Width (ft)       *          *   55.50  *          *
* Vel Total (ft/s)      *   10.24  * Avg. Vel. (ft/s)     *          *   10.24  *          *
* Max Chl Dpth (ft)     *    5.09  * Hydr. Depth (ft)     *          *    3.20  *          *
* Conv. Total (cfs)     * 37684.9  * Conv. (cfs)          *          * 37684.9  *          *
* Length Wtd. (ft)      *  187.90  * Wetted Per. (ft)     *          *   56.83  *          *
* Min Ch El (ft)        * 1643.00  * Shear (lb/sq ft)     *          *    0.46  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *          *    4.66  *          *
* Frctn Loss (ft)       *    0.44  * Cum Volume (acre-ft)  *          *    0.76  *          *
* C & E Loss (ft)       *    0.01  * Cum SA (acres)        *          *    0.23  *          *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 1090

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************************************
 1213.58    1652 1216.57    1651  1219.6    1650 1222.58    1649 1225.55    1648
  1228.5    1647 1231.35    1646  1234.2    1645  1237.1    1644 1239.94    1643
 1246.39    1642 1255.42    1641 1259.88    1641 1269.02    1642 1275.16    1643
 1277.58    1644 1280.62    1645 1283.31    1646  1286.1    1647 1288.85    1648
 1291.59    1649 1294.29    1650

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 1213.58     .04 1213.58    .015 1294.29     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1213.58 1294.29               0       0       0            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1647.72  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    1.69  * Wt. n-Val.           *          *    0.015  *          *
* W.S. Elev (ft)        * 1646.02  * Reach Len. (ft)      *          *           *          *
* Crit W.S. (ft)        * 1646.02  * Flow Area (sq ft)    *          *  174.22  *          *
* E.G. Slope (ft/ft)    *0.002299  * Area (sq ft)         *          *  174.22  *          *
* Q Total (cfs)         * 1820.00  * Flow (cfs)           *          * 1820.00  *          *
* Top Width (ft)        *   52.10  * Top Width (ft)       *          *   52.10  *          *
* Vel Total (ft/s)      *   10.45  * Avg. Vel. (ft/s)     *          *   10.45  *          *
* Max Chl Dpth (ft)     *    5.02  * Hydr. Depth (ft)     *          *    3.34  *          *
* Conv. Total (cfs)     * 37953.9  * Conv. (cfs)          *          * 37953.9  *          *
* Length Wtd. (ft)      *          * Wetted Per. (ft)     *          *   53.42  *          *
* Min Ch El (ft)        * 1641.00  * Shear (lb/sq ft)     *          *    0.47  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *          *    4.89  *          *
* Frctn Loss (ft)       *          * Cum Volume (acre-ft)  *          *          *          *
* C & E Loss (ft)       *          * Cum SA (acres)        *          *          *          *
*************************************************************************************************

Warning: User specified water surface is not possible for the specified flow regime. The program used
         critical depth as the starting water surface.

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

SUMMARY OF MANNING'S N VALUES

River:RIVER-1
*********************************************************************
*     Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*********************************************************************
*Reach-1         *    1152        *     .025*         *         *
*Reach-1         *    1150        *     .025*         *         *
*Reach-1         *    1145        *     .025*         *         *
*Reach-1         *    1140        *      .04*     .025*      .04*
*Reach-1         *    1135        *     .025*     .015*     .025*
*Reach-1         *    1133        *Bridge   *         *         *
*Reach-1         *    1130        *     .025*     .015*     .025*
*Reach-1         *    1125        *      .04*     .025*      .04*
*Reach-1         *    1120        *      .04*     .025*      .04*
*Reach-1         *    1115        *      .04*     .025*      .04*
*Reach-1         *    1112        *      .04*     .025*      .04*
*Reach-1         *    1110        *      .04*     .025*      .04*
*Reach-1         *    1105        *      .04*     .025*      .04*
*Reach-1         *    1100        *     .015*     .015*     .015*
*Reach-1         *    1099        *Bridge   *         *         *
*Reach-1         *    1098        *     .015*     .015*     .015*
*Reach-1         *    1095        *      .04*     .015*      .04*
*Reach-1         *    1090        *      .04*     .015*      .04*
*********************************************************************
```

SUMMARY OF REACH LENGTHS

River: RIVER-1

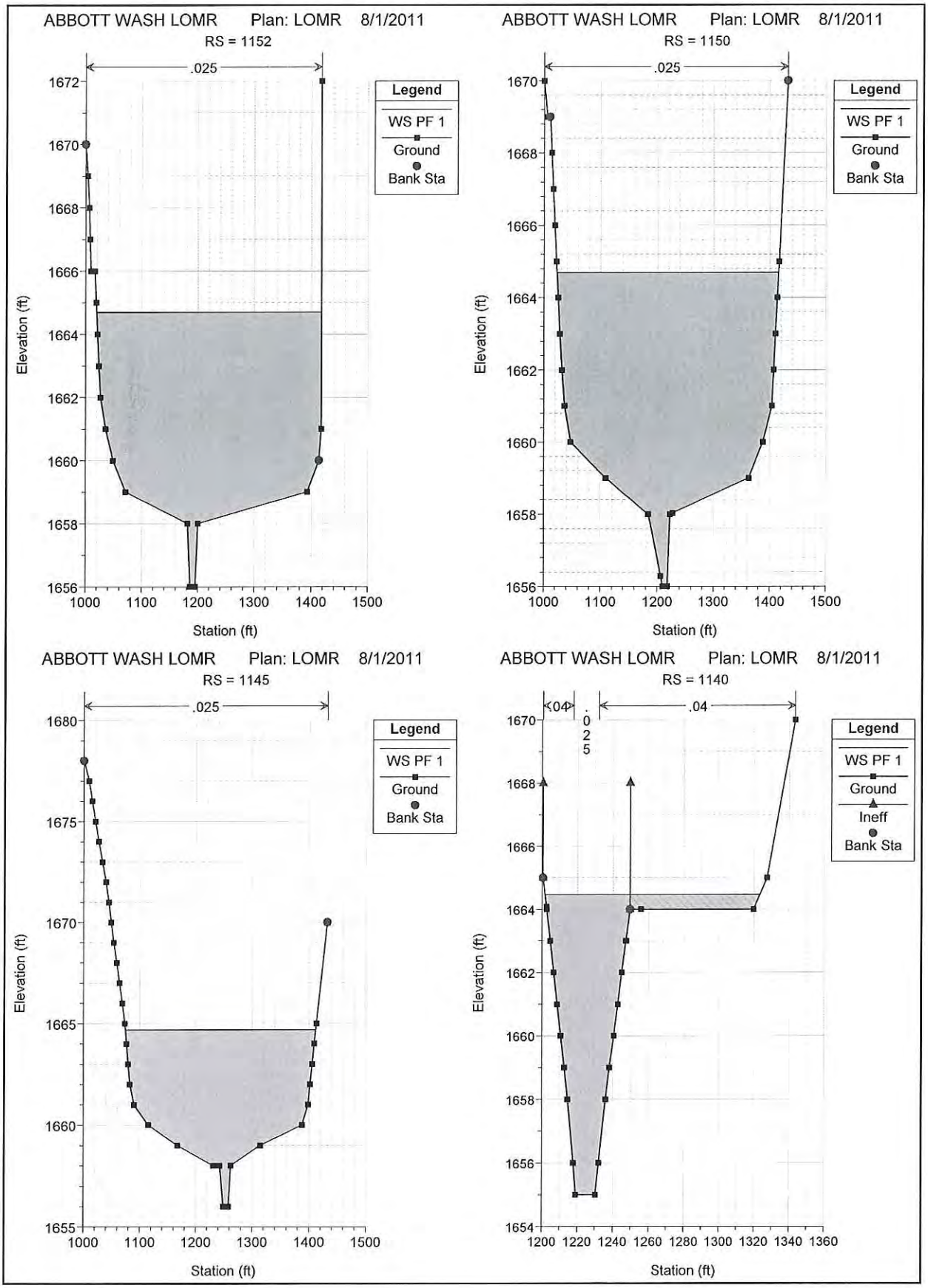
Reach	River Sta.	Left	Channel	Right
Reach-1	1152	103.1	96.8	92.8
Reach-1	1150	115.3	115.8	113.3
Reach-1	1145	266	266	266
Reach-1	1140	187.7	187.7	187.7
Reach-1	1135	284.4	284.4	284.4
Reach-1	1133	Bridge		
Reach-1	1130	126.1	126.1	126.1
Reach-1	1125	229.8	229.8	229.8
Reach-1	1120	186.2	186.2	186.2
Reach-1	1115	112.2	112.2	112.2
Reach-1	1112	62.6	62.6	62.6
Reach-1	1110	162.1	162.1	162.1
Reach-1	1105	275.7	275.7	275.7
Reach-1	1100	94	94	94
Reach-1	1099	Bridge		
Reach-1	1098	94	94	94
Reach-1	1095	187.9	187.9	187.9
Reach-1	1090	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	1152	.1	.3
Reach-1	1150	.1	.3
Reach-1	1145	.1	.3
Reach-1	1140	.1	.3
Reach-1	1135	.3	.5
Reach-1	1133	Bridge	
Reach-1	1130	.3	.5
Reach-1	1125	.1	.3
Reach-1	1120	.1	.3
Reach-1	1115	.1	.3
Reach-1	1112	.1	.3
Reach-1	1110	.1	.3
Reach-1	1105	.1	.3
Reach-1	1100	.3	.5
Reach-1	1099	Bridge	
Reach-1	1098	.3	.5
Reach-1	1095	.1	.3
Reach-1	1090	.1	.3

Profile Output Table - CHECKRAS

Reach	River Sta	Froude # Chl	Top Wdth Act	Conv. Total	Prof Delta WS	Left Sta Eff	Enc Sta L	Center Station	Enc Sta R	Rght Sta Eff	Min Ch El	Left Stagn	Right Stagn
			(ft)	(cfs)	(ft)	(ft)	(ft)	(ft)			(ft)	(ft)	(ft)
Reach-1	1152	0.03	398.12	459855.3		1019.85		1206.79		1417.97	1656.00		
Reach-1	1150	0.03	392.94	427729.8		1023.26		1221.24		1416.20	1656.00		
Reach-1	1145	0.04	336.81	330906.3		1074.41		1215.74		1411.22	1656.00		
Reach-1	1140	0.26	47.93	34471.5		1201.65		1225.08		1249.58	1655.00		
Reach-1	1135	0.80	10.94	16250.4		1028.67		1030.93		1092.21	1652.96		
Reach-1	1133	BR U 1.00	9.00	12744.3		1029.71		1030.93		1038.71	1652.96		
Reach-1	1133	BR D 0.85		11761.8		1034.72		1038.95		1043.72	1650.57		
Reach-1	1130	1.00	9.00	12704.3		1034.72		1038.95		1043.72	1650.57		
Reach-1	1125	0.53	37.91	20105.4		1121.51		1154.56		1159.42	1650.00		
Reach-1	1120	0.68	38.02	13378.4		1345.96		1361.44		1383.98	1649.00		
Reach-1	1115	1.01	41.80	9451.9		1205.25		1233.12		1247.04	1649.00		
Reach-1	1112	0.68	59.06	15748.7		1185.95		1230.48		1245.02	1648.00		
Reach-1	1110	0.98	56.91	11201.9		1201.42		1236.99		1258.33	1648.00		
Reach-1	1105	0.44	71.45	26588.8		1263.79		1307.96		1335.23	1647.00		
Reach-1	1100	0.72	43.00	50358.2		978.50		1000.00		1021.50	1644.54		
Reach-1	1099	BR U 0.81	42.00	36020.8		978.50		1000.00		1021.50	1644.54		
Reach-1	1099	BR D 0.64	42.00	44916.5		978.50		1000.00		1021.50	1643.79		
Reach-1	1098	0.62	43.00	58164.4		978.50		1000.00		1021.50	1643.79		
Reach-1	1095	1.01	55.50	37684.9		1223.09		1251.39		1278.59	1643.00		
Reach-1	1090	1.01	52.10	37953.9		1231.28		1253.94		1283.38	1641.00		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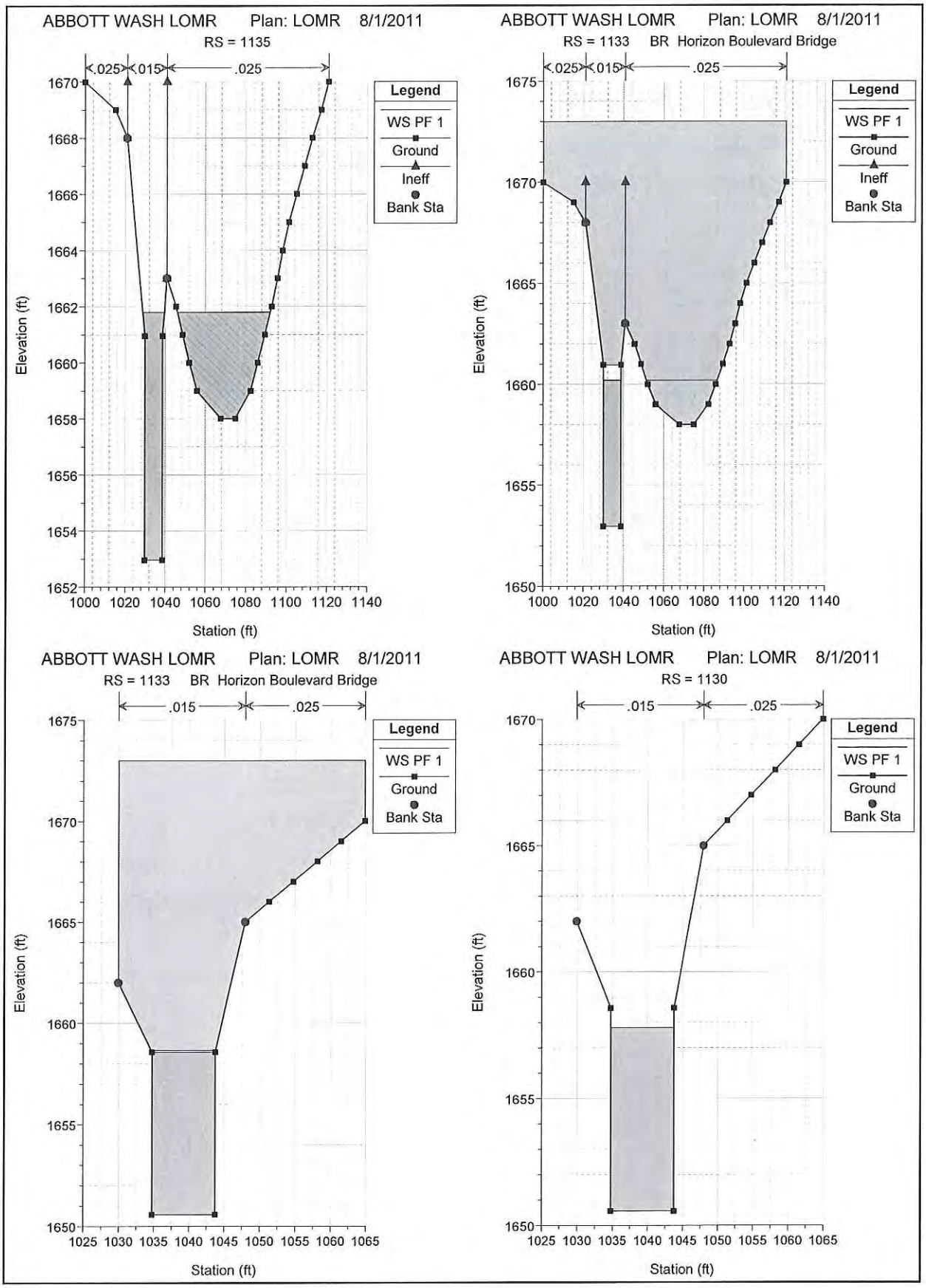
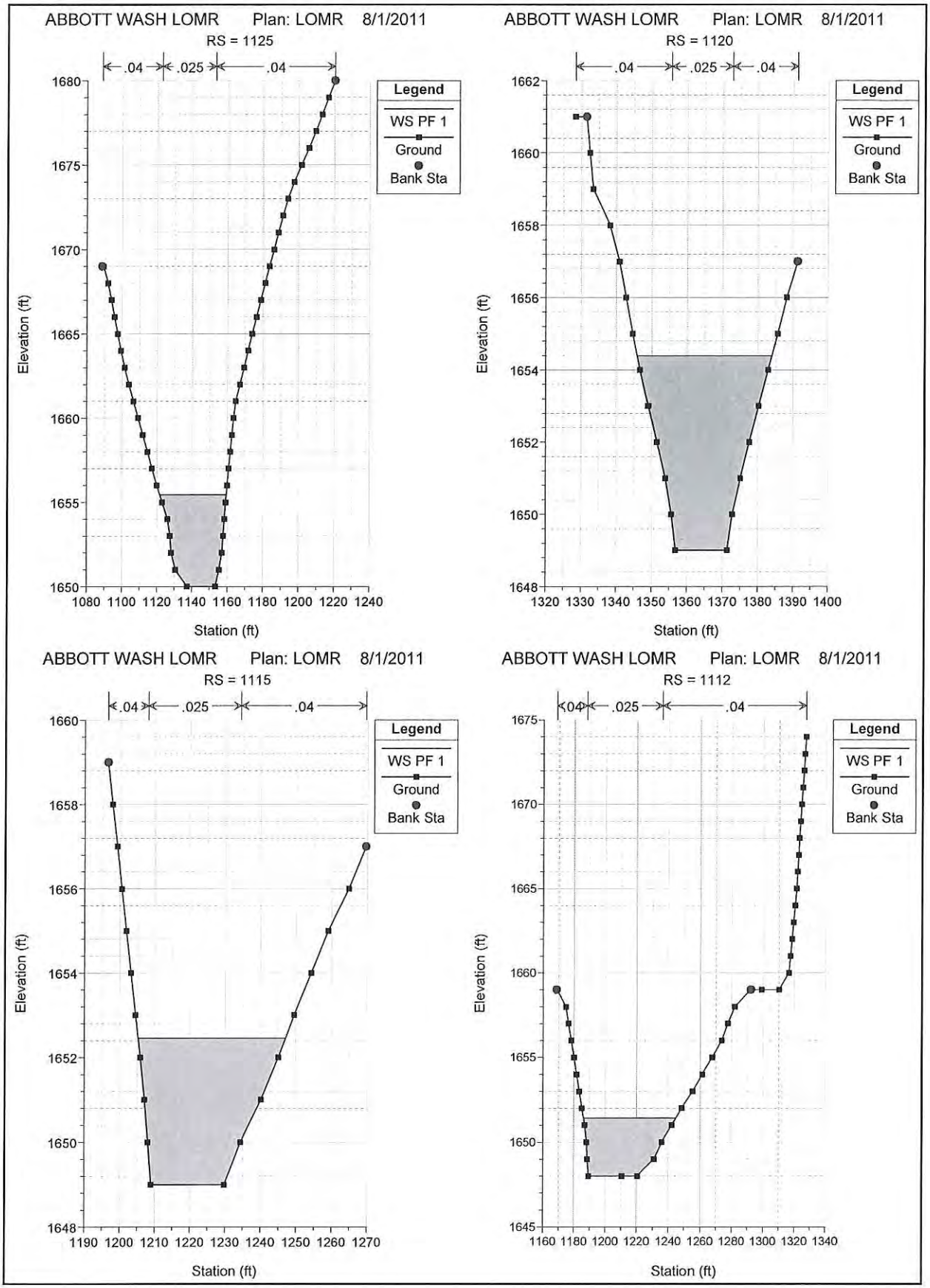
RS = 1152
.025
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1150
.025
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1145
.025
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1140
.04
.025
.04
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1135
.025
.015
.025
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1133 BR Horizon Boulevard Bridge
.025
.015
.025
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1133 BR Horizon Boulevard Bridge
.015
.025
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1130
.015
.025
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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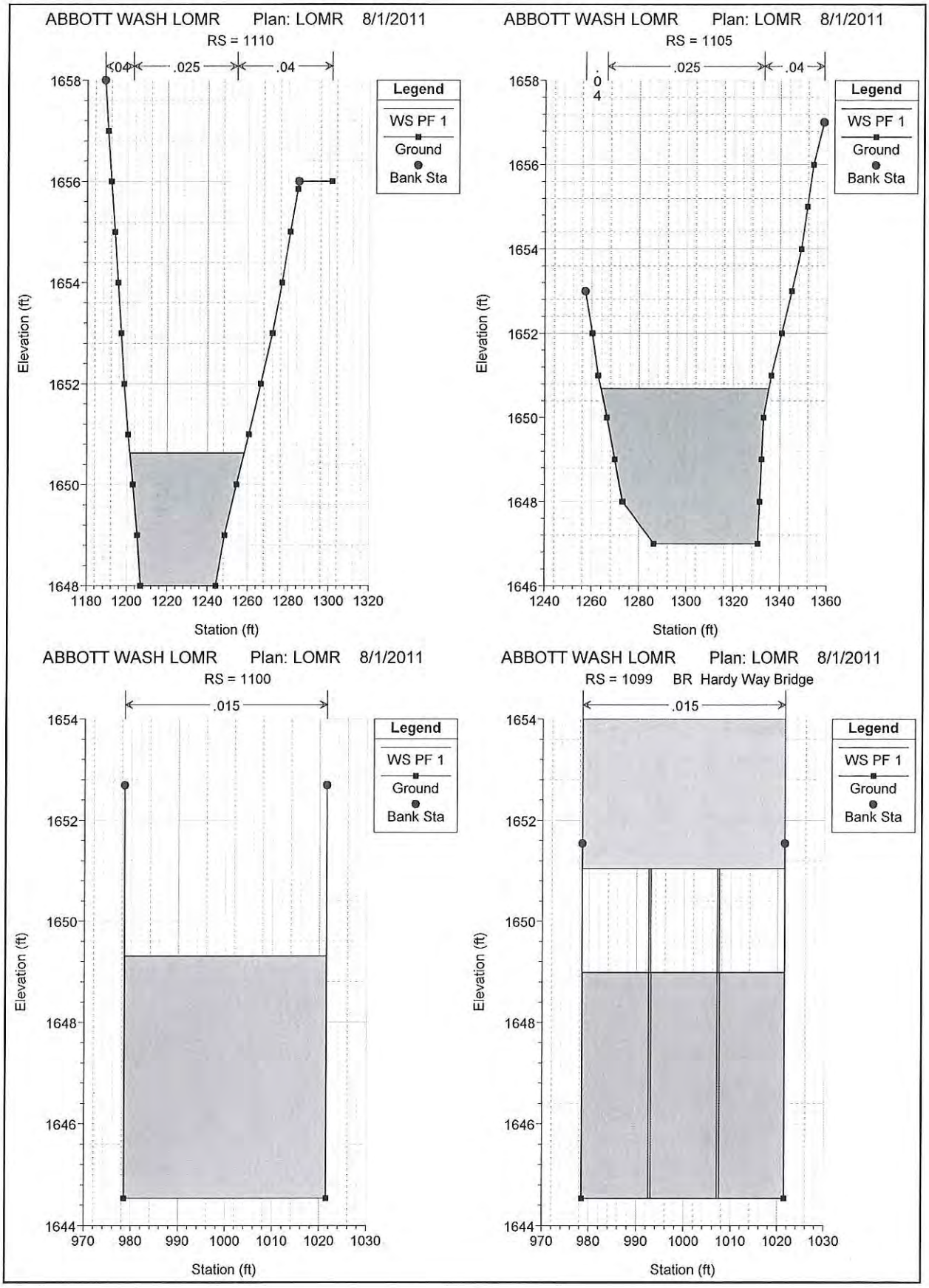
RS = 1125
.04
.025
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1120
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1115
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1112
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)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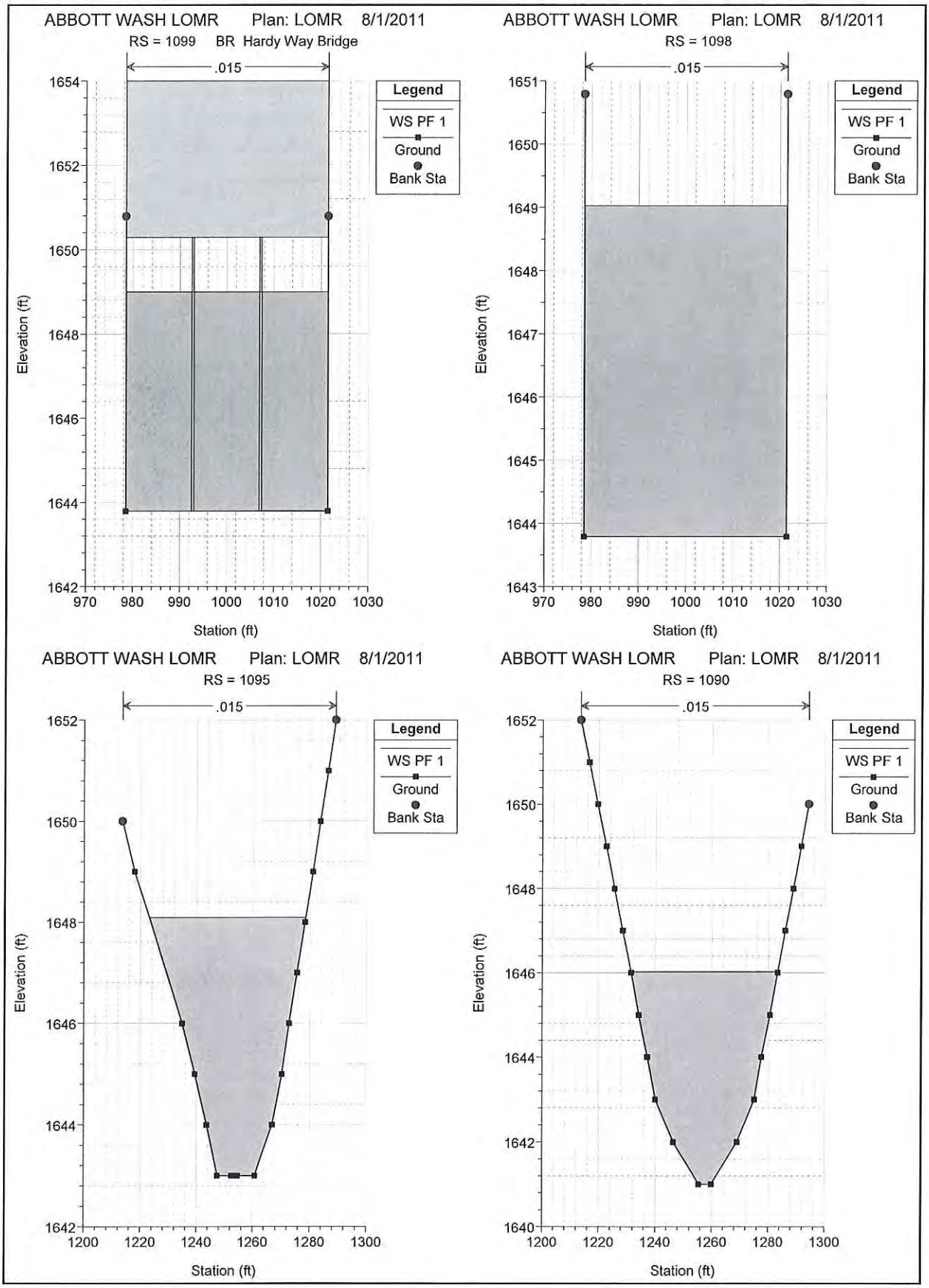
RS = 1110
.04
.025
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1105
.025
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1100
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1099 BR Hardy Way Bridge
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1099 BR Hardy Way Bridge
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1098
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1095
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ABBOTT WASH LOMR Plan: LOMR 8/1/2011
RS = 1090
.015
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

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

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	1152	992	1656.0	1664.7		1664.7	0.000005	0.4	2367.1	398	0.03
Reach-1	1150	992	1656.0	1664.7		1664.7	0.000005	0.4	2252.9	393	0.03
Reach-1	1145	992	1656.0	1664.7		1664.7	0.000009	0.5	1816.9	337	0.04
Reach-1	1140	992	1655.0	1664.5	1659.9	1664.7	0.000828	3.6	276.0	122	0.26
Reach-1	1135	992	1653.0	1661.8	1660.2	1664.2	0.003726	12.3	80.4	57	0.80
Reach-1	1133	Bridge									
Reach-1	1130	992	1650.6	1657.8	1657.8	1661.4	0.006097	15.3	65.0	9	1.00
Reach-1	1125	992	1650.0	1655.4		1656.0	0.002434	6.2	159.4	38	0.53
Reach-1	1120	992	1649.0	1654.4		1655.2	0.005498	7.3	135.8	38	0.68
Reach-1	1115	992	1649.0	1652.5	1652.5	1653.8	0.011015	9.2	108.0	42	1.01
Reach-1	1112	992	1648.0	1651.4	1650.7	1652.0	0.003968	6.3	158.2	59	0.68
Reach-1	1110	992	1648.0	1650.6	1650.6	1651.7	0.007842	8.1	121.9	57	0.98
Reach-1	1105	992	1647.0	1650.7		1651.0	0.001392	4.4	223.1	71	0.44
Reach-1	1100	1820	1644.5	1649.3	1648.3	1650.5	0.001306	8.9	205.1	43	0.72
Reach-1	1099	Bridge									
Reach-1	1098	1820	1643.8	1649.0		1650.0	0.000979	8.1	225.2	43	0.62
Reach-1	1095	1820	1643.0	1648.1	1648.1	1649.7	0.002332	10.2	177.8	56	1.01
Reach-1	1090	1820	1641.0	1646.0	1646.0	1647.7	0.002299	10.4	174.2	52	1.01

ABBOTT WASH LOMR Plan: LOMR 8/1/2011

RIVER-1 Reach-1

Legend

WS PF 1

Ground

Elevation (ft)

1675
1670
1665
1660
1655
1650
1645
1640

1095 1098 1099 1105 1110 1112 1115 1120 1125 1130 1133 1140 1145 1150 1152

0 500 1000 1500 2000 2500

Main Channel Distance (ft)

CHECK-RAS Program: NT Check
Manning's n Value and Transition Loss Coefficient Review

Project File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.prj
Plan File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.p01
Geometry File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.g01
Flow File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.f05
Report File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.nt
Selected profiles: PF 1
Date: 8/2/2011
Time: 10:04:07 AM

SECNO	STRUCTURE	NLOB	NCHL	NROB	CNTR	EXP
RIVER-1,Reach-1						
1152		-----	0.025	-----	0.1	0.3
1150		0.025	-----	-----	0.1	0.3
1145		-----	0.025	-----	0.1	0.3
1140		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1135		0.025	0.015	0.025	0.3	0.5
1133	Bridge-Up	0.025	0.015	0.025	0.3	0.5
1133	Bridge-Dn	-----	0.015	0.025	0.3	0.5
		-----	0.025	-----		
1130		-----	0.025	0.025	0.3	0.5
		-----	0.015	-----		
1125		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1120		0.04	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1115		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1112		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1110		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1105		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1100		-----	0.015	0.015	0.3	0.5
		-----	0.015	-----		
1099	Bridge-Up	-----	0.015	-----	0.3	0.5
1099	Bridge-Dn	-----	0.015	0.015	0.3	0.5
		-----	0.015	-----		
1098		-----	0.015	0.015	0.3	0.5
		-----	0.015	-----		
1095		-----	0.04	0.04	0.1	0.3
		-----	0.015	-----		
1090		-----	0.04	0.04	0.1	0.3
		-----	0.015	-----		

---Summary of Statistics---

	Minimum	Maximum
Left Overbank n Value:	0.025	0.04
Right Overbank n Value:	0.015	0.04
Channel n Value:	0.015	0.04
Contraction Coefficient:	0.1	0.3
Expansion Coefficient:	0.3	0.5

ROUGHNESS COEFFICIENT CHECK

RS: 1152
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a concrete lined channel.

RS: 1150
NT RC 01 Left overbank n value is less than 0.035
The n value for overbank is usually larger then 0.035.
The n value should be reevaluated.

RS: 1145
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a concrete lined channel.

RS: 1135
NT RC 01 Left overbank n value is less than 0.035
The n value for overbank is usually larger then 0.035.
The n value should be reevaluated.

RS: 1135

```
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1135
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1133
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:      1133
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1133
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1133
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1133
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1130
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1130
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1100
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1100
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       1099
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1099
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1099
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      1098
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1098
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.
```

Reply (TYPICAL): Channel 'n' have been referenced from approved FIS and field verified.

```
TRANSITION LOSS COEFFICIENT CHECK
---------------------------------
```

```
RS:      1140
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      1105
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

ROUGHNESS COEFFICIENT AT STRUCTURES
-----------------------------------

RS:      1130
NT RS 01 This is Section 2.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 1.

RS:      1135
NT RS 01 This is Section 3.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 4.

RS:      1133
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      1133
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

RS:      1100
NT RS 01 This is Section 3.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 4.

RS:      1099
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      1099
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

---END---

                    CHECK-RAS Program, XS Check
               Cross Section Location and Alignment Review


Project File:   F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.prj
Plan File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.p01
Geometry File:  F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.g01
Flow File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.f05
Report File:    F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.xs
Selected profiles: PF 1
Date: 8/2/2011
Time: 10:04:08 AM


SECNO    Len Lob   Len Chl   Len Rob   TopWdthAct     Q Total   Flow Code
-------------------------------------------------------------------------
RIVER-1,Reach-1
1152      103.1     96.8      92.8      398.12         992
1150      115.3     115.8     113.3     392.94         992
1145      266       266       266       336.81         992
1140      187.7     187.7     187.7     47.93          992
1135      284.4     284.4     284.4     10.94          992      D
1133     Bridge #1-Up
1133     Bridge #1-Dn
1130      126.1     126.1     126.1     9              992      C
1125      229.8     229.8     229.8     37.91          992
1120      186.2     186.2     186.2     38.02          992
1115      112.2     112.2     112.2     41.8           992      C
1112      62.6      62.6      62.6      59.06          992
1110      162.1     162.1     162.1     56.91          992
1105      275.7     275.7     275.7     71.45          992
1100      94        94        94        43             1820
1099     Bridge #1-Up
1099     Bridge #1-Dn
1098      94        94        94        43             1820
1095      187.9     187.9     187.9     55.5           1820     C
1090      0         0         0         52.1           1820     C
```

```
--------------------------------------------------------------------------------
B=blocked obstruction      XS SC 05
C=critial depth            XS SC 03
D=divided flow             XS SC 01
E=cross section extended   XS SC 02
K=known water-surface      XS SC 04


DISTANCE CHECK
----------------

SPACING CHECK
--------------

INEFFECTIVE FLOW CHECK
------------------------

DISCHARGE CHECK
----------------

LOCATION CHECK
---------------

BOUNDARY CONDITION CHECK
-------------------------

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Known WS = 1645.86 is specified as the downstream boundary
         for profile PF 1

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Critical is specified as the upstream boundary
         for profile PF 1

XS BC 03 Maximum number of iterations is 0
         It should not be less than 20.
```

Reply: Maximum number of iteration is 20 as verified in the model.

```
LATERAL WEIRS CHECK
------------------------

---END---

                          CHECK-RAS Program: Structure Check

Project File:   F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.prj
Plan File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.p01
Geometry File:  F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.g01
Flow File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.f05
Report File:    F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-ABT\ABBOTTWASH.br
Selected profiles: PF 1
Date: 8/2/2011
Time: 10:04:13 AM
```

RS	MaxLoChord	MnTpRd	EGEL	WSEL	MinChEl	Structure
RIVER-1,Reach-1						
1152			1664.7	1664.7	1656	
1150			1664.7	1664.69	1656	
1145			1664.7	1664.69	1656	
1140			1664.67	1664.47	1655	
1135			1664.17	1661.8	1652.96	
1133	1660.96	1673	1663.8	1660.2	1652.96	Bridge #1-Up
1133	1658.57	1673	1661.62	1658.67	1650.57	Bridge #1-Dn
1130			1661.41	1657.79	1650.57	
1125			1656.05	1655.45	1650	
1120			1655.22	1654.39	1649	
1115			1653.76	1652.45	1649	
1112			1652.04	1651.43	1648	
1110			1651.66	1650.63	1648	
1105			1650.99	1650.69	1647	
1100			1650.53	1649.31	1644.54	
1099	1651.04	1654	1650.46	1648.99	1644.54	Bridge #1-Up
1099	1650.29	1654	1650.07	1649	1643.79	Bridge #1-Dn
1098			1650.04	1649.03	1643.79	
1095			1649.72	1648.09	1643	
1090			1647.72	1646.02	1641	

```
--------------------------------------------------------------------------------
RIVER/REACH:       RIVER-1, Reach-1
RIVER STATION:     1133
TYPE OF STRUCTURE: Bridge
--------------------------------------------------------------------------------
```

```
Description:                                        Horizon Boulevard Bridge
Distance from Upstream XS:                           0.1
Deck/Roadway Width:                                  283.5
Weir Coefficient:                                    2.6
Maximum allowable submergence for weir flow:         0.98
Elevation at which weir flow begins:                 0
Weir crest shape:                                    Broad Crested
```

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	1140	187.70	1664.47		1664.67	47.93	
3	1135	284.40	1661.8		1664.17	10.94	
	1133	283.50	1660.2		1663.8	9	Bridge #1-Up
	1133	0.80	1658.67		1661.62	0	Bridge #1-Dn
2	1130	126.10	1657.79		1661.41	9	
1	1125	229.80	1655.45		1656.05	37.91	

	Ineffective Flow, Section 3 Sta L	Sta R	Elev	Ineffective Flow, Section 2 Sta L	Sta R	Elev
1	1000	1020.96	1670			
2	1040.89	1120.81	1670			

```
BRIDGE:
Bridge Name:    Bridge #1
LowFlowMethod:  Energy
Momentum Cd:     0
HighFlowMethod: Pressure and Weir flow
SluiceGate Cd: 0        Submerged Cd:   0.8

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

MaxLowChord:   1660.96  MinTopRd:  1673.01       MinElPrs:       1660.96
```

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS
Bridge					1020.96	1040.89U D

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd
Bridge #1	1029.71	1038.71	1673.00	1673.00	1673.00	1660.96 U
	1034.72	1043.72	1673.00	1673.00	1673.00	1658.57 D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Bridge #1	992	992	0	Energy only	Sluicegate Pressure Flow

```
GEOMETRIC CHECK
---------------

RS:       1133
ST GD 03  The starting station of 1000 from downstream road/weir data
          is less than the starting station of 1029.92 from downstream internal
          section.
          The high chord elevation of 1673 for the starting road/weir station is
          greater than the ground elevation of 1662 for the starting ground station.
          The EGEL at section 3 of 1664.17 is greater than the ground elevation.
          The road/weir data should be included in the ground data

TYPE OF FLOW CHECK
------------------

RS:       1133 This is Bridge #1
BR PF 01  Type of flow is sluicegate pressure flow because,
          1. EGEL 3 of 1664.17 is equal to or less than MinTopRd of 1673.01.
          2. EGEL 3 of 1664.17 is equal to or greater than MxLoCdU of 1660.96.
          3. WSEL 2 of 1657.79 is less than MxLoCdD of 1658.57.

DISTANCE CHECK
--------------

RS:       1133 This is Bridge #1
ST DT 01  'Distance from Upstream XS' of 0.10 is less than the height of the
          bridge opening of  8.00
          Section 3 should be placed at the foot of the road embankment or
          wing walls.
```

Distances at Sections 4 & 3, and 'Distance from Upstream XS' should
be adjusted.

RS: 1133 This is Bridge #1
ST DT 02 The channel distance of 0.7999939 at Downstream Internal Section is less than
the height of the bridge opening of 10.39
Section 2 should be placed at the foot of the road embankment or
wing walls.
Distances at Sections 4, 3 & 2 should be adjusted.

INEFFECTIVE FLOW CHECK

RS: 1130 This is section 2
ST GD 06 Pressure flow occurs at Bridge
The EGEL at section 2 is greater than the lowest MxLoCdD of Bridge
by more than 0.5
The velocity head at Section 2 is more than 0.5 foot and more than
the velocity head at Section 1.
Section 2 should be recoded to represent the natural valley
cross section.

RS: 1135 This is Section 3.
ST IF 03 Pressure flow occurs at the structure. Ineffective flow is
considered at Section 3.
However, the velocity head at Section 3 is more than 0.5 foot and
more than the velocity head at section 4.
The ineffective flow stations should be widened until the velocity

head at Section 3 is equal to or less than 0.5 foot, or equal to or less than
the velocity head at Section 4.

RS: 1135 This is Section 3.
ST IF 06 Pressure flow occurs at Bridge
The velocity head at Section 3 is more than 0.5
The computed right ineffective flow station of 1046.71 is greater than
the selected right ineffective flow station of 1040.89
The right ineffective flow station should be adjusted.

RS: 1140 This is Section 4
ST IF 07 Ineffective flow option was considered at this section.
However, it should be a fully expanded cross section.
Ineffective flow stations and elevations should be cleared from
this section, unless the areas beyond the ineffective flow stations
are not within the flow path of the stream.
This message should be ignored if this section is Section 2 of
the upstream structure.

RIVER/REACH: RIVER-1, Reach-1
RIVER STATION: 1099
TYPE OF STRUCTURE: Bridge

Description:	Hardy Way Bridge
Distance from Upstream XS:	0.5
Deck/Roadway Width:	93
Weir Coefficient:	2.6
Maximum allowable submergence for weir flow:	0.98
Elevation at which weir flow begins:	1654
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	1105	275.70	1650.69		1650.99	71.45	
3	1100	94.00	1649.31		1650.53	43	
	1099	93.00	1648.99		1650.46	42	Bridge #1-Up
	1099	0.50	1649		1650.07	42	Bridge #1-Dn
2	1098	94.00	1649.03		1650.04	43	
1	1095	187.90	1648.09		1649.72	55.5	

Ineffective Flow, Section 3			Ineffective Flow, Section 2		
Sta L	Sta R	Elev	Sta L	Sta R	Elev

BRIDGE:
Bridge Name: Bridge #1
LowFlowMethod: Highest Energy Answer
Momentum Cd: 0
HighFlowMethod: Energy Only
SluiceGate Cd: 0 Submerged Cd: 0

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum

```
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
-------------------------------------------------------------------------------

-------------------------------------------------------------------------------
MaxLowChord:   1651.04  MinTopRd:  1654.01       MinElPrs:       1651.04

Opening Type      StagStaL    StagStaR  EncStaL   EncStaR   LIfStaS   RIfStaS
-------------------------------------------------------------------------------
Bridge                                                                      U
                                                                            D
                  LAbutSt     RAbutSt   LMnTpRd   RMnTpRd   MnTpRd    MxLoCd
-------------------------------------------------------------------------------
Bridge #1         1021.50     1021.50   1654.00   1654.00   1654.00   1651.04 U
                  1021.50     1021.50   1654.00   1654.00   1654.00   1650.29 D

Name          Q Total.  Q Struc   Q Weir    Selected Method     Flow Type
-------------------------------------------------------------------------------
Bridge #1     1820      1820      0         Energy only         Low Flow
-------------------------------------------------------------------------------

GEOMETRIC CHECK
------------------

TYPE OF FLOW CHECK
-------------------

RS:       1099 This is Bridge #1
BR LF 01  Type of flow is low flow because,
          1. EGEL 3 of 1650.53 is equal to or less than MinTopRd of 1654.0.
          2. EGEL 3 of 1650.53 is less than MxLoCdU of 1651.0.

DISTANCE CHECK
---------------

RS:       1099 This is Bridge #1
ST DT 01  'Distance from Upstream XS' of 0.50 is less than the height of the
          bridge opening of  6.50
          Section 3 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4 & 3, and 'Distance from Upstream XS' should
          be adjusted.


RS:       1099 This is Bridge #1
ST DT 02  The channel distance of 0.5 at Downstream Internal Section is less than
          the height of the bridge opening of 7.25
          Section 2 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4, 3 & 2 should be adjusted.

INEFFECTIVE FLOW CHECK
-----------------------

---END
```

HEC-RAS MODEL: PULSIPHER WASH
CHECK-RAS ANALYSIS OF HEC-RAS MODEL

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

****

PROJECT DATA
Project Title: PULSIPHER WASH LOMR
Project File : PULSWASH.prj
Run Date and Time: 8/2/2011 10:25:45 AM

Project in English units

Project Description:

****

PLAN DATA

Plan Title: LOMR
Plan File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.p02

Geometry Title: LOMR
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02

Flow Title : LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07

Plan Description:
LOMR Model With New Topo.

Plan Summary Information:
Number of: Cross Sections = 51 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 4 Lateral Structures = 0

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

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
2600	PF 2	1	1037.67	1062.33
2590	PF 2	1	1040	1100
2500	PF 2	1	1030.12	1106.13
2400	PF 2	1	1293.09	1384.56
2350	PF 2	1	1080	1220.41
2330	PF 2	1	1150	1330.73
2300	PF 2	1	1163.5	1383.27
2200	PF 2	1	1400	1594.9
2100	PF 2	1	1010.56	1206.95
2000.1	PF 2	1	990.1	1094.79
2000	PF 2	1	1044.29	1056.29
1900	PF 2	1	1193.33	1205.33
1800	PF 2	1	1117.33	1148.63
1750	PF 2	1	1278.17	1318.26
1700	PF 2	1	1408.08	1464.52
1650	PF 2	1	1557.78	1600.56
1600	PF 2	1	1462.44	1508.14
1500	PF 2	1	1046	1152.39
1400	PF 2	1	1311.27	1345.71
1300	PF 2	1	1634.75	1667.65
1200	PF 2	1	1624.95	1659.47
1100	PF 2	1	1619.57	1655.53
1000	PF 2	1	1619.06	1659.32
900	PF 2	1	1615.48	1651.44
800	PF 2	1	1601.95	1646.84
700	PF 2	1	1594.24	1641.44
600	PF 2	1	1581.21	1627.65
580	PF 2	1	995	1042.34
500	PF 2	1	1000	1037.34
400	PF 2	1	1501.15	1526.53
300	PF 2	1	1441.01	1481.38
200	PF 2	1	1535.63	1591.46

FLOW DATA

Flow Title: LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	3800	867	867
RIVER-1	Reach-1	3020	1723	1723
RIVER-1	Reach-1	2500	1972	1972
RIVER-1	Reach-1	2000	1498	1498
RIVER-1	Reach-1	1900	1595	1595

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	Critical
RIVER-1	Reach-1	PF 2	Critical	Critical

GEOMETRY DATA

Geometry Title: LOMR
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3800

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1671	1002.55	1670	1004.98	1669	1007.44	1668	1009.93	1667
1012.44	1666	1014.93	1665	1017.43	1664	1019.96	1663	1022.51	1662
1025.01	1661	1028.37	1660	1033.4	1659	1039.81	1658	1062.59	1657
1109.41	1656	1175.5	1655	1176.9	1654	1182.94	1654	1186.39	1655
1305.1	1656	1372.97	1657	1416.24	1658	1439.98	1659	1445.27	1660
1451.68	1661	1456.68	1662	1462.39	1663	1467.92	1664	1474.06	1665
1480.09	1666	1486.5	1667	1494.56	1668	1506.49	1669	1529.92	1670

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1028.37	.025	1445.27	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1000 1506.49 580 566 553 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1656.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.025	
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	36.95	42.78	1.50
C & E Loss (ft)	0.09	Cum SA (acres)	10.01	12.43	0.82

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1656.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.025	
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	14.10	41.50	1.25
C & E Loss (ft)	0.09	Cum SA (acres)	3.19	10.77	0.61

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3700

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1280.37	1657	1280.37	1655	1281.45	1655	1314.63	1655	1322.87	1654
1330.66	1653	1346.03	1652	1356.88	1651	1360.42	1650	1379.62	1650
1381.69	1651	1386.37	1652	1389	1653	1407.85	1654	1447.99	1655
1471.23	1656	1480.45	1657	1483.65	1658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1280.37	.024	1314.63	.025	1447.99	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1314.63	1447.99	222.1	225	219.5	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1656.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.024	0.025	0.040
W.S. Elev (ft)	1655.97	Reach Len. (ft)	222.10	225.00	219.50
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	33.34	414.54	11.01
Q Total (cfs)	867.00	Flow (cfs)	31.66	831.31	4.02
Top Width (ft)	190.24	Top Width (ft)	34.26	133.36	22.62
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.95	2.01	0.37
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.97	3.11	0.49
Conv. Total (cfs)	54487.9	Conv. (cfs)	1990.0	52245.1	252.8
Length Wtd. (ft)	224.44	Wetted Per. (ft)	35.23	134.26	22.64
Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.73	38.94	1.43
C & E Loss (ft)	0.00	Cum SA (acres)	9.79	10.07	0.68

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1656.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.024	0.025	0.040
W.S. Elev (ft)	1655.97	Reach Len. (ft)	222.10	225.00	219.50
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	33.34	414.54	11.01
Q Total (cfs)	867.00	Flow (cfs)	31.66	831.31	4.02
Top Width (ft)	190.24	Top Width (ft)	34.26	133.36	22.62
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.95	2.01	0.37
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.97	3.11	0.49
Conv. Total (cfs)	54487.9	Conv. (cfs)	1990.0	52245.1	252.8
Length Wtd. (ft)	224.44	Wetted Per. (ft)	35.23	134.26	22.64
Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.87	37.66	1.18
C & E Loss (ft)	0.00	Cum SA (acres)	2.96	8.41	0.47

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3660

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1053.91	42.6	42.6	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040

W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	*0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	36.42	37.22	1.22
C & E Loss (ft)		Cum SA (acres)	9.60	9.58	0.53

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1655.96	Element			
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040
W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	*0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	13.56	35.94	0.97
C & E Loss (ft)		Cum SA (acres)	2.78	7.93	0.31

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3650

INPUT
Description: Bridge #1
Distance from Upstream XS = .05
Deck/Roadway Width = 42.5
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 8

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
961.8	1653.41	1653.41	978.2	1653.93	1653.93	1000	1654.76
1018	1655	1651.92	1030	1655	1651.92	1044.54	1655.2
1080	1656	1653.53	1092.95	1656			

1651.92
1652

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left Right Coeff Contr. Expan.
1000 1053.91 .3 .5

Downstream Deck/Roadway Coordinates
num= 5

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
978.2	1653.6	1653	1000	1654.76	1651.78
1025.95	1654.76	1651.78	1200	1655	1651.78

1013.95
1654.76

Downstream Bridge Cross Section Data
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
956.1	1654	956.1	1653	1000	1653	1004.55	1652	1013.95	1651.78
1013.95	1647.78	1025.95	1647.78	1025.95	1651.78	1030.32	1652	1041.18	1653
1056.22	1654								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
956.1	.04	1013.95	.015	1025.95	.04

Bank Sta: Left Right Coeff Contr. Expan.
1000 1030.32 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

```
High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. US. (ft)          *    1655.96  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *    1655.87  * E.G. Elev (ft)        *    1655.95  *    1655.95  *
* Q Total (cfs)          *     867.00  * W.S. Elev (ft)        *    1655.87  *    1655.28  *
* Q Bridge (cfs)         *     472.60  * Crit W.S. (ft)        *    1655.64  *    1655.28  *
* Q Weir (cfs)           *     394.40  * Max Chl Dpth (ft)     *       7.96  *       7.50  *
* Weir Sta Lft (ft)      *     961.80  * Vel Total (ft/s)      *       4.91  *       3.97  *
* Weir Sta Rgt (ft)      *    1077.92  * Flow Area (sq ft)     *     176.43  *     218.36  *
* Weir Submerg           *       0.00  * Froude # Chl          *       0.32  *       0.37  *
* Weir Max Depth (ft)    *       2.54  * Specif Force (cu ft)  *     523.60  *     522.47  *
* Min El Weir Flow (ft)  *    1653.42  * Hydr Depth (ft)       *       1.57  *       2.18  *
* Min El Prs (ft)        *    1652.00  * W.P. Total (ft)       *     179.21  *     135.51  *
* Delta EG (ft)          *       1.48  * Conv. Total (cfs)     *             *             *
* Delta WS (ft)          *       2.27  * Top Width (ft)        *     112.36  *     100.12  *
* BR Open Area (sq ft)   *      48.00  * Frctn Loss (ft)       *             *             *
* BR Open Vel (ft/s)     *       9.85  * C & E Loss (ft)       *             *             *
* Coef of Q              *             * Shear Total (lb/sq ft) *             *             *
* Br Sel Method          * Press/Weir  * Power Total (lb/ft s)  *             *             *
*********************************************************************************************

Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

BRIDGE OUTPUT  Profile #PF 2
*********************************************************************************************
* E.G. US. (ft)          *    1655.96  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *    1655.87  * E.G. Elev (ft)        *    1655.95  *    1655.95  *
* Q Total (cfs)          *     867.00  * W.S. Elev (ft)        *    1655.87  *    1655.28  *
* Q Bridge (cfs)         *     472.60  * Crit W.S. (ft)        *    1655.64  *    1655.28  *
* Q Weir (cfs)           *     394.40  * Max Chl Dpth (ft)     *       7.96  *       7.50  *
* Weir Sta Lft (ft)      *     961.80  * Vel Total (ft/s)      *       4.91  *       3.97  *
* Weir Sta Rgt (ft)      *    1077.92  * Flow Area (sq ft)     *     176.43  *     218.36  *
* Weir Submerg           *       0.00  * Froude # Chl          *       0.32  *       0.37  *
* Weir Max Depth (ft)    *       2.54  * Specif Force (cu ft)  *     523.60  *     522.47  *
* Min El Weir Flow (ft)  *    1653.42  * Hydr Depth (ft)       *       1.57  *       2.18  *
* Min El Prs (ft)        *    1652.00  * W.P. Total (ft)       *     179.21  *     135.51  *
* Delta EG (ft)          *       1.48  * Conv. Total (cfs)     *             *             *
* Delta WS (ft)          *       2.27  * Top Width (ft)        *     112.36  *     100.12  *
* BR Open Area (sq ft)   *      48.00  * Frctn Loss (ft)       *             *             *
* BR Open Vel (ft/s)     *       9.85  * C & E Loss (ft)       *             *             *
* Coef of Q              *             * Shear Total (lb/sq ft) *             *             *
* Br Sel Method          * Press/Weir  * Power Total (lb/ft s)  *             *             *
*********************************************************************************************

Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 3640

INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
   956.1    1654   956.1    1653    1000    1653 1004.55    1652 1013.95 1651.78
 1013.95 1647.78 1025.95 1647.78 1025.95 1651.78 1030.32    1652 1041.18    1653
 1056.22    1654

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
   956.1     .04 1013.95    .015 1025.95     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1000 1030.32             143.1   143.1   143.1             .3       .5

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
```

* E.G. Elev (ft)	* 1654.47	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.87	* Wt. n-Val.	* 0.040	* 0.028	* 0.040 *
* W.S. Elev (ft)	* 1653.60	* Reach Len. (ft)	* 143.10	* 143.10	* 143.10 *
* Crit W.S. (ft)	* 1653.60	* Flow Area (sq ft)	* 26.28	* 98.35	* 14.63 *
* E.G. Slope (ft/ft)	*0.006509	* Area (sq ft)	* 26.28	* 98.35	* 14.63 *
* Q Total (cfs)	* 867.00	* Flow (cfs)	* 55.44	* 775.89	* 35.67 *
* Top Width (ft)	* 94.08	* Top Width (ft)	* 43.90	* 30.32	* 19.86 *
* Vel Total (ft/s)	* 6.23	* Avg. Vel. (ft/s)	* 2.11	* 7.89	* 2.44 *
* Max Chl Dpth (ft)	* 5.82	* Hydr. Depth (ft)	* 0.60	* 3.24	* 0.74 *
* Conv. Total (cfs)	* 10746.1	* Conv. (cfs)	* 687.2	* 9616.8	* 442.1 *
* Length Wtd. (ft)	* 143.10	* Wetted Per. (ft)	* 44.50	* 38.44	* 19.93 *
* Min Ch El (ft)	* 1647.78	* Shear (lb/sq ft)	* 0.24	* 1.04	* 0.30 *
* Alpha	* 1.45	* Stream Power (lb/ft s)	* 0.51	* 8.20	* 0.73 *
* Frctn Loss (ft)	* 1.01	* Cum Volume (acre-ft)	* 36.35	* 37.14	* 1.21 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 9.56	* 9.54	* 0.50 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1654.47	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.87	* Wt. n-Val.	* 0.040	* 0.028	* 0.040 *
* W.S. Elev (ft)	* 1653.60	* Reach Len. (ft)	* 143.10	* 143.10	* 143.10 *
* Crit W.S. (ft)	* 1653.60	* Flow Area (sq ft)	* 26.28	* 98.35	* 14.63 *
* E.G. Slope (ft/ft)	*0.006509	* Area (sq ft)	* 26.28	* 98.35	* 14.63 *
* Q Total (cfs)	* 867.00	* Flow (cfs)	* 55.44	* 775.89	* 35.67 *
* Top Width (ft)	* 94.08	* Top Width (ft)	* 43.90	* 30.32	* 19.86 *
* Vel Total (ft/s)	* 6.23	* Avg. Vel. (ft/s)	* 2.11	* 7.89	* 2.44 *
* Max Chl Dpth (ft)	* 5.82	* Hydr. Depth (ft)	* 0.60	* 3.24	* 0.74 *
* Conv. Total (cfs)	* 10746.1	* Conv. (cfs)	* 687.2	* 9616.8	* 442.1 *
* Length Wtd. (ft)	* 143.10	* Wetted Per. (ft)	* 44.50	* 38.44	* 19.93 *
* Min Ch El (ft)	* 1647.78	* Shear (lb/sq ft)	* 0.24	* 1.04	* 0.30 *
* Alpha	* 1.45	* Stream Power (lb/ft s)	* 0.51	* 8.20	* 0.73 *
* Frctn Loss (ft)	* 1.01	* Cum Volume (acre-ft)	* 13.49	* 35.86	* 0.97 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 2.74	* 7.89	* 0.29 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3600

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.66	1651	1192.77	1650	1195.19	1649	1195.3	1648	1195.4	1647
1196.31	1646	1222.7	1646	1244.81	1646	1245.9	1647	1246.87	1648
1274.89	1649	1319.68	1650						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.66	.025	1246.87	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1185.66 1246.87 366.01 370 383 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1649.14	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.03	* Wt. n-Val.	*	* 0.025	* 0.040 *
* W.S. Elev (ft)	* 1648.11	* Reach Len. (ft)	* 366.01	* 370.00	* 383.00 *
* Crit W.S. (ft)	* 1648.11	* Flow Area (sq ft)	*	* 106.20	* 0.17 *
* E.G. Slope (ft/ft)	*0.007625	* Area (sq ft)	*	* 106.20	* 0.17 *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 866.92	* 0.08 *
* Top Width (ft)	* 54.66	* Top Width (ft)	*	* 51.58	* 3.08 *
* Vel Total (ft/s)	* 8.15	* Avg. Vel. (ft/s)	*	* 8.16	* 0.47 *
* Max Chl Dpth (ft)	* 2.11	* Hydr. Depth (ft)	*	* 2.06	* 0.05 *
* Conv. Total (cfs)	* 9929.1	* Conv. (cfs)	*	* 9928.2	* 0.9 *
* Length Wtd. (ft)	* 370.00	* Wetted Per. (ft)	*	* 53.84	* 3.08 *
* Min Ch El (ft)	* 1646.00	* Shear (lb/sq ft)	*	* 0.94	* 0.03 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.66	* 0.01 *
* Frctn Loss (ft)	* 2.90	* Cum Volume (acre-ft)	* 36.30	* 36.80	* 1.19 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 9.49	* 9.41	* 0.47 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1649.14	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.03	* Wt. n-Val.	*	* 0.025	* 0.040 *
* W.S. Elev (ft)	* 1648.11	* Reach Len. (ft)	* 366.01	* 370.00	* 383.00 *
* Crit W.S. (ft)	* 1648.11	* Flow Area (sq ft)	*	* 106.20	* 0.17 *
* E.G. Slope (ft/ft)	*0.007625	* Area (sq ft)	*	* 106.20	* 0.17 *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 866.92	* 0.08 *
* Top Width (ft)	* 54.66	* Top Width (ft)	*	* 51.58	* 3.08 *
* Vel Total (ft/s)	* 8.15	* Avg. Vel. (ft/s)	*	* 8.16	* 0.47 *
* Max Chl Dpth (ft)	* 2.11	* Hydr. Depth (ft)	*	* 2.06	* 0.05 *
* Conv. Total (cfs)	* 9929.1	* Conv. (cfs)	*	* 9928.2	* 0.9 *
* Length Wtd. (ft)	* 370.00	* Wetted Per. (ft)	*	* 53.84	* 3.08 *
* Min Ch El (ft)	* 1646.00	* Shear (lb/sq ft)	*	* 0.94	* 0.03 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.66	* 0.01 *
* Frctn Loss (ft)	* 2.90	* Cum Volume (acre-ft)	* 13.45	* 35.53	* 0.94 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 2.66	* 7.75	* 0.25 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3500

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.43	1649	1191.81	1648	1200.57	1647	1203.67	1646	1203.79	1645
1203.93	1644	1204.11	1643	1271.04	1643	1272.02	1644	1272.99	1645

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.43	.025	1272.99	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1185.43 1272.99 392 394 393 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1645.58	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.86	* Wt. n-Val.	*	* 0.025	* *
* W.S. Elev (ft)	* 1644.72	* Reach Len. (ft)	* 392.00	* 394.00	* 393.00 *
* Crit W.S. (ft)	* 1644.72	* Flow Area (sq ft)	*	* 116.69	* *
* E.G. Slope (ft/ft)	*0.008069	* Area (sq ft)	*	* 116.69	* *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 867.00	* *
* Top Width (ft)	* 68.89	* Top Width (ft)	*	* 68.89	* *
* Vel Total (ft/s)	* 7.43	* Avg. Vel. (ft/s)	*	* 7.43	* *
* Max Chl Dpth (ft)	* 1.72	* Hydr. Depth (ft)	*	* 1.69	* *
* Conv. Total (cfs)	* 9652.1	* Conv. (cfs)	*	* 9652.1	* *
* Length Wtd. (ft)	* 394.00	* Wetted Per. (ft)	*	* 71.07	* *
* Min Ch El (ft)	* 1643.00	* Shear (lb/sq ft)	*	* 0.83	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 6.14	* *
* Frctn Loss (ft)	* 3.15	* Cum Volume (acre-ft)	* 36.30	* 35.86	* 1.19 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 9.49	* 8.90	* 0.45 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1645.58	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.86	* Wt. n-Val.	*	* 0.025	* *
* W.S. Elev (ft)	* 1644.72	* Reach Len. (ft)	* 392.00	* 394.00	* 393.00 *
* Crit W.S. (ft)	* 1644.72	* Flow Area (sq ft)	*	* 116.69	* *
* E.G. Slope (ft/ft)	*0.008069	* Area (sq ft)	*	* 116.69	* *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 867.00	* *
* Top Width (ft)	* 68.89	* Top Width (ft)	*	* 68.89	* *
* Vel Total (ft/s)	* 7.43	* Avg. Vel. (ft/s)	*	* 7.43	* *
* Max Chl Dpth (ft)	* 1.72	* Hydr. Depth (ft)	*	* 1.69	* *
* Conv. Total (cfs)	* 9652.1	* Conv. (cfs)	*	* 9652.1	* *
* Length Wtd. (ft)	* 394.00	* Wetted Per. (ft)	*	* 71.07	* *
* Min Ch El (ft)	* 1643.00	* Shear (lb/sq ft)	*	* 0.83	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 6.14	* *
* Frctn Loss (ft)	* 3.15	* Cum Volume (acre-ft)	* 13.45	* 34.58	* 0.94 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.66	* 7.24	* 0.24 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3400

```
INPUT
Description:
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1174.01    1645 1182.77    1644 1191.91    1643 1203.38    1642 1203.74    1641
 1204.11    1640 1204.45    1639 1205.66    1638 1267.93    1638  1268.7    1639
  1269.3    1640 1269.92    1641 1270.52    1642

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*********************************
 1174.01    .025 1270.52     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1174.01 1270.52              347     344     345             .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1640.68  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.89  * Wt. n-Val.           *          *    0.025  *          *
* W.S. Elev (ft)        * 1639.79  * Reach Len. (ft)      *  347.00  *  344.00  *  345.00  *
* Crit W.S. (ft)        * 1639.79  * Flow Area (sq ft)    *          *  114.49  *          *
* E.G. Slope (ft/ft)    *0.007925  * Area (sq ft)         *          *  114.49  *          *
* Q Total (cfs)         *  867.00  * Flow (cfs)           *          *  867.00  *          *
* Top Width (ft)        *   65.00  * Top Width (ft)       *          *   65.00  *          *
* Vel Total (ft/s)      *    7.57  * Avg. Vel. (ft/s)     *          *    7.57  *          *
* Max Chl Dpth (ft)     *    1.79  * Hydr. Depth (ft)     *          *    1.76  *          *
* Conv. Total (cfs)     *  9739.3  * Conv. (cfs)          *          *  9739.3  *          *
* Length Wtd. (ft)      *  344.00  * Wetted Per. (ft)     *          *   66.86  *          *
* Min Ch El (ft)        * 1638.00  * Shear (lb/sq ft)     *          *    0.85  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *        *    6.42  *          *
* Frctn Loss (ft)       *    0.70  * Cum Volume (acre-ft)  *  36.30  *  34.81  *    1.19  *
* C & E Loss (ft)       *    0.18  * Cum SA (acres)        *   9.49  *   8.29  *    0.45  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)        * 1640.68  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)         *    0.89  * Wt. n-Val.           *          *    0.025  *          *
* W.S. Elev (ft)        * 1639.79  * Reach Len. (ft)      *  347.00  *  344.00  *  345.00  *
* Crit W.S. (ft)        * 1639.79  * Flow Area (sq ft)    *          *  114.49  *          *
* E.G. Slope (ft/ft)    *0.007925  * Area (sq ft)         *          *  114.49  *          *
* Q Total (cfs)         *  867.00  * Flow (cfs)           *          *  867.00  *          *
* Top Width (ft)        *   65.00  * Top Width (ft)       *          *   65.00  *          *
* Vel Total (ft/s)      *    7.57  * Avg. Vel. (ft/s)     *          *    7.57  *          *
* Max Chl Dpth (ft)     *    1.79  * Hydr. Depth (ft)     *          *    1.76  *          *
* Conv. Total (cfs)     *  9739.3  * Conv. (cfs)          *          *  9739.3  *          *
* Length Wtd. (ft)      *  344.00  * Wetted Per. (ft)     *          *   66.86  *          *
* Min Ch El (ft)        * 1638.00  * Shear (lb/sq ft)     *          *    0.85  *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *        *    6.42  *          *
* Frctn Loss (ft)       *    0.70  * Cum Volume (acre-ft)  *  13.45  *  33.53  *    0.94  *
* C & E Loss (ft)       *    0.18  * Cum SA (acres)        *   2.66  *   6.64  *    0.24  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 3300

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
  1144.3    1642 1153.36    1641 1158.42    1640 1162.21    1639 1162.36    1638
 1162.51    1637 1162.62    1636 1162.75    1635  1163.8    1634 1189.67    1633
 1242.25    1633 1242.79    1634 1243.32    1635 1243.87    1636 1244.41    1637
 1244.96    1638 1245.55    1639 1246.13    1640    1251    1641

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
*********************************
  1144.3    .025    1251     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1144.3    1251              49      51      53             .1      .3
Ineffective Flow     num=       1
   Sta L    Sta R    Elev  Permanent
  1144.3 1189.67    1642        F
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1637.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.025	
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	*0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	33.20	1.19
C & E Loss (ft)	0.13	Cum SA (acres)	9.49	7.71	0.45

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1637.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.025	
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	*0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.45	31.92	0.94
C & E Loss (ft)	0.13	Cum SA (acres)	2.66	6.06	0.24

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3280

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1165.69	1641	1173.74	1640	1182.15	1639	1191.29	1638	1197.14	1637
1201.59	1636	1205.39	1635	1206.42	1634	1207.35	1633	1208.6	1632
1232.89	1632	1261.87	1633	1290.19	1634	1295.73	1635	1319.69	1635
1353.86	1635	1373.83	1636	1395.64	1637	1415.94	1638	1430.06	1639

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1165.69	.04	1205.39	.025	1295.73	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1205.39 1295.73 17.5 17.5 17.5 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1165.69	1205.39	1655	F
1232.89	1430.06	1655	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1636.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	*0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.30	32.90	1.18
C & E Loss (ft)	0.01	Cum SA (acres)	9.49	7.61	0.41

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there

is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1636.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	*0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.45	31.62	0.93
C & E Loss (ft)	0.01	Cum SA (acres)	2.66	5.95	0.20

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3275

INPUT
Description: Start of U Channel
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1639.64	1037.67	1631.64	1050	1631.49	1062.33	1631.64	1062.33	1639.64

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	33	33	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1636.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	*0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	32.84	1.17
C & E Loss (ft)	0.00	Cum SA (acres)	9.49	7.59	0.40

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1636.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	*0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.45	31.56	0.93
C & E Loss (ft)	0.00	Cum SA (acres)	2.66	5.93	0.19

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

CROSS SECTION

```
RIVER: RIVER-1
REACH: Reach-1            RS: 3270

INPUT
Description:
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1037.67 1639.12 1037.67 1631.12    1050 1630.88 1062.33 1631.12 1062.33 1639.12

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1037.67 1062.33              250     250     250             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1636.06  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.70  * Wt. n-Val.            *          *    0.015  *          *
* W.S. Elev (ft)         * 1634.36  * Reach Len. (ft)       *  250.00  *  250.00  *  250.00  *
* Crit W.S. (ft)         * 1634.36  * Flow Area (sq ft)     *          *   82.84  *          *
* E.G. Slope (ft/ft)     *0.003029  * Area (sq ft)          *          *   82.84  *          *
* Q Total (cfs)          *  867.00  * Flow (cfs)            *          *  867.00  *          *
* Top Width (ft)         *   24.66  * Top Width (ft)        *          *   24.66  *          *
* Vel Total (ft/s)       *   10.47  * Avg. Vel. (ft/s)      *          *   10.47  *          *
* Max Chl Dpth (ft)      *    3.48  * Hydr. Depth (ft)      *          *    3.36  *          *
* Conv. Total (cfs)      * 15753.8  * Conv. (cfs)           *          * 15753.8  *          *
* Length Wtd. (ft)       *  250.00  * Wetted Per. (ft)      *          *   31.14  *          *
* Min Ch El (ft)         * 1630.88  * Shear (lb/sq ft)      *          *    0.50  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    5.26  *          *
* Frctn Loss (ft)        *    0.76  * Cum Volume (acre-ft)  *   36.30  *   32.77  *    1.17  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *    9.49  *    7.57  *    0.40  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1636.06  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.70  * Wt. n-Val.            *          *    0.015  *          *
* W.S. Elev (ft)         * 1634.36  * Reach Len. (ft)       *  250.00  *  250.00  *  250.00  *
* Crit W.S. (ft)         * 1634.36  * Flow Area (sq ft)     *          *   82.84  *          *
* E.G. Slope (ft/ft)     *0.003029  * Area (sq ft)          *          *   82.84  *          *
* Q Total (cfs)          *  867.00  * Flow (cfs)            *          *  867.00  *          *
* Top Width (ft)         *   24.66  * Top Width (ft)        *          *   24.66  *          *
* Vel Total (ft/s)       *   10.47  * Avg. Vel. (ft/s)      *          *   10.47  *          *
* Max Chl Dpth (ft)      *    3.48  * Hydr. Depth (ft)      *          *    3.36  *          *
* Conv. Total (cfs)      * 15753.8  * Conv. (cfs)           *          * 15753.8  *          *
* Length Wtd. (ft)       *  250.00  * Wetted Per. (ft)      *          *   31.14  *          *
* Min Ch El (ft)         * 1630.88  * Shear (lb/sq ft)      *          *    0.50  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    5.26  *          *
* Frctn Loss (ft)        *    0.76  * Cum Volume (acre-ft)  *   13.45  *   31.50  *    0.93  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)        *    2.66  *    5.91  *    0.19  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 3200

INPUT
Description:
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1037.67 1635.33 1037.67 1627.33    1050 1627.08 1062.33 1627.33 1062.33 1635.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1037.67 1062.33              400     400     400             .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1632.27  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.70  * Wt. n-Val.            *          *    0.015  *          *
* W.S. Elev (ft)         * 1630.57  * Reach Len. (ft)       *  400.00  *  400.00  *  400.00  *
* Crit W.S. (ft)         * 1630.57  * Flow Area (sq ft)     *          *   82.90  *          *
* E.G. Slope (ft/ft)     *0.003021  * Area (sq ft)          *          *   82.90  *          *
* Q Total (cfs)          *  867.00  * Flow (cfs)            *          *  867.00  *          *
* Top Width (ft)         *   24.66  * Top Width (ft)        *          *   24.66  *          *
* Vel Total (ft/s)       *   10.46  * Avg. Vel. (ft/s)      *          *   10.46  *          *
* Max Chl Dpth (ft)      *    3.49  * Hydr. Depth (ft)      *          *    3.36  *          *
* Conv. Total (cfs)      * 15774.5  * Conv. (cfs)           *          * 15774.5  *          *
```

* Length Wtd. (ft)	* 400.00	* Wetted Per. (ft)	*	*	31.14	*		*
* Min Ch El (ft)	* 1627.08	* Shear (lb/sq ft)	*	*	0.50	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	5.25	*		*
* Frctn Loss (ft)	* 1.21	* Cum Volume (acre-ft)	*	36.30	* 32.30	*	1.17	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	9.49	* 7.43	*	0.40	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1632.27	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 1.70	* Wt. n-Val.	*		* 0.015	*		*
* W.S. Elev (ft)	* 1630.57	* Reach Len. (ft)	*	400.00	* 400.00	*	400.00	*
* Crit W.S. (ft)	* 1630.57	* Flow Area (sq ft)	*		* 82.90	*		*
* E.G. Slope (ft/ft)	*0.003021	* Area (sq ft)	*		* 82.90	*		*
* Q Total (cfs)	* 867.00	* Flow (cfs)	*		* 867.00	*		*
* Top Width (ft)	* 24.66	* Top Width (ft)	*		* 24.66	*		*
* Vel Total (ft/s)	* 10.46	* Avg. Vel. (ft/s)	*		* 10.46	*		*
* Max Chl Dpth (ft)	* 3.49	* Hydr. Depth (ft)	*		* 3.36	*		*
* Conv. Total (cfs)	* 15774.5	* Conv. (cfs)	*		* 15774.5	*		*
* Length Wtd. (ft)	* 400.00	* Wetted Per. (ft)	*		* 31.14	*		*
* Min Ch El (ft)	* 1627.08	* Shear (lb/sq ft)	*		* 0.50	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 5.25	*		*
* Frctn Loss (ft)	* 1.21	* Cum Volume (acre-ft)	*	13.45	* 31.02	*	0.93	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	2.66	* 5.77	*	0.19	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3100

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1629.25	1037.67	1621.25	1050	1621	1062.33	1621.25	1062.33	1629.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	40	40	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1626.19	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 1.70	* Wt. n-Val.	*		* 0.015	*		*
* W.S. Elev (ft)	* 1624.48	* Reach Len. (ft)	*	40.00	* 40.00	*	40.00	*
* Crit W.S. (ft)	* 1624.48	* Flow Area (sq ft)	*		* 82.84	*		*
* E.G. Slope (ft/ft)	*0.003027	* Area (sq ft)	*		* 82.84	*		*
* Q Total (cfs)	* 867.00	* Flow (cfs)	*		* 867.00	*		*
* Top Width (ft)	* 24.66	* Top Width (ft)	*		* 24.66	*		*
* Vel Total (ft/s)	* 10.47	* Avg. Vel. (ft/s)	*		* 10.47	*		*
* Max Chl Dpth (ft)	* 3.48	* Hydr. Depth (ft)	*		* 3.36	*		*
* Conv. Total (cfs)	* 15758.0	* Conv. (cfs)	*		* 15758.0	*		*
* Length Wtd. (ft)	* 40.00	* Wetted Per. (ft)	*		* 31.13	*		*
* Min Ch El (ft)	* 1621.00	* Shear (lb/sq ft)	*		* 0.50	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 5.26	*		*
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	*	36.30	* 31.54	*	1.17	*
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	*	9.49	* 7.20	*	0.40	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1626.19	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 1.70	* Wt. n-Val.	*		* 0.015	*		*
* W.S. Elev (ft)	* 1624.48	* Reach Len. (ft)	*	40.00	* 40.00	*	40.00	*
* Crit W.S. (ft)	* 1624.48	* Flow Area (sq ft)	*		* 82.84	*		*
* E.G. Slope (ft/ft)	*0.003027	* Area (sq ft)	*		* 82.84	*		*
* Q Total (cfs)	* 867.00	* Flow (cfs)	*		* 867.00	*		*
* Top Width (ft)	* 24.66	* Top Width (ft)	*		* 24.66	*		*
* Vel Total (ft/s)	* 10.47	* Avg. Vel. (ft/s)	*		* 10.47	*		*
* Max Chl Dpth (ft)	* 3.48	* Hydr. Depth (ft)	*		* 3.36	*		*
* Conv. Total (cfs)	* 15758.0	* Conv. (cfs)	*		* 15758.0	*		*
* Length Wtd. (ft)	* 40.00	* Wetted Per. (ft)	*		* 31.13	*		*
* Min Ch El (ft)	* 1621.00	* Shear (lb/sq ft)	*		* 0.50	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 5.26	*		*
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	*	13.45	* 30.26	*	0.93	*

* C & E Loss (ft)	* 0.18	* Cum SA (acres)	* 2.66	* 5.55	* 0.19	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3080

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 127.2 127.2 127.2 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1628.49

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1629.29	1628.49	1062.33	1629.29	1628.49

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1625.88	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.10	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1624.78	* Reach Len. (ft)	* 0.10	* 0.10	* 0.10 *
* Crit W.S. (ft)	* 1623.94	* Flow Area (sq ft)	*	* 102.99	* *
* E.G. Slope (ft/ft)	*0.002126	* Area (sq ft)	*	* 102.99	* *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 867.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 8.42	* Avg. Vel. (ft/s)	*	* 8.42	* *
* Max Chl Dpth (ft)	* 4.29	* Hydr. Depth (ft)	*	* 4.29	* *
* Conv. Total (cfs)	* 18801.6	* Conv. (cfs)	*	* 18801.6	* *
* Length Wtd. (ft)	* 0.10	* Wetted Per. (ft)	*	* 41.16	* *
* Min Ch El (ft)	* 1620.49	* Shear (lb/sq ft)	*	* 0.33	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.80	* *
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	* 36.30	* 31.45	* 1.17 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 9.49	* 7.18	* 0.40 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1625.88	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.10	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1624.78	* Reach Len. (ft)	* 0.10	* 0.10	* 0.10 *
* Crit W.S. (ft)	* 1623.94	* Flow Area (sq ft)	*	* 102.99	* *
* E.G. Slope (ft/ft)	*0.002126	* Area (sq ft)	*	* 102.99	* *
* Q Total (cfs)	* 867.00	* Flow (cfs)	*	* 867.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 8.42	* Avg. Vel. (ft/s)	*	* 8.42	* *
* Max Chl Dpth (ft)	* 4.29	* Hydr. Depth (ft)	*	* 4.29	* *
* Conv. Total (cfs)	* 18801.6	* Conv. (cfs)	*	* 18801.6	* *
* Length Wtd. (ft)	* 0.10	* Wetted Per. (ft)	*	* 41.16	* *
* Min Ch El (ft)	* 1620.49	* Shear (lb/sq ft)	*	* 0.33	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.80	* *
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	* 13.45	* 30.17	* 0.93 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.66	* 5.52	* 0.19 *

Warning: Divided flow computed for this cross-section.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3050

INPUT
Description: Bertha Howe Avenue Bridge
Distance from Upstream XS = .1
Deck/Roadway Width = 127
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1633.33	1627.69	1062.33	1633.33	1627.69

Upstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       1037.67 1062.33             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
*************************
 1049.67 1050.33 1628.49

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
*************************************************
 1037.67 1633.33 1626.67 1062.33 1633.33 1626.67

Downstream Bridge Cross Section Data
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*************************************************************************************
 1037.67 1627.47 1037.67 1619.47    1050 1619.47 1062.33 1619.47 1062.33 1627.47

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Coeff Contr.   Expan.
       1037.67 1062.33             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 1049.67 1050.33 1627.47

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=    1050    Downstream=    1050
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1619.38     .67 1629.38
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1619.38     .67 1629.38

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. US. (ft)           *    1625.88  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)           *    1624.78  * E.G. Elev (ft)        *    1625.88  *    1625.59  *
* Q Total (cfs)           *     867.00  * W.S. Elev (ft)        *    1624.78  *    1624.91  *
* Q Bridge (cfs)          *     867.00  * Crit W.S. (ft)        *    1623.92  *    1622.91  *
* Q Weir (cfs)            *             * Max Chl Dpth (ft)     *       4.29  *       5.44  *
* Weir Sta Lft (ft)       *             * Vel Total (ft/s)      *       8.43  *       6.65  *
* Weir Sta Rgt (ft)       *             * Flow Area (sq ft)     *     102.89  *     130.44  *
* Weir Submerg            *             * Froude # Chl          *       0.72  *       0.50  *
* Weir Max Depth (ft)     *             * Specif Force (cu ft)  *     447.53  *     533.58  *
* Min El Weir Flow (ft)   *    1633.34  * Hydr Depth (ft)       *       4.29  *       5.44  *
* Min El Prs (ft)         *    1627.69  * W.P. Total (ft)       *      36.86  *      40.30  *
* Delta EG (ft)           *      -1.73  * Conv. Total (cfs)     *    20208.1  *    28272.9  *
* Delta WS (ft)           *      -0.13  * Top Width (ft)        *      23.99  *      23.99  *
* BR Open Area (sq ft)    *     172.73  * Frctn Loss (ft)       *       0.16  *       0.00  *
* BR Open Vel (ft/s)      *       8.43  * C & E Loss (ft)       *       0.12  *       0.00  *
* Coef of Q               *             * Shear Total (lb/sq ft) *      0.32  *       0.19  *
* Br Sel Method           *Energy only  * Power Total (lb/ft s)  *      2.70  *       1.26  *
*************************************************************************************************

Warning: Critical depth could not be determined within the specified number of iterations.  The program
         used the iteration with the lowest energy.

BRIDGE OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. US. (ft)           *    1625.88  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)           *    1624.78  * E.G. Elev (ft)        *    1625.88  *    1625.59  *
* Q Total (cfs)           *     867.00  * W.S. Elev (ft)        *    1624.78  *    1624.91  *
* Q Bridge (cfs)          *     867.00  * Crit W.S. (ft)        *    1623.92  *    1622.91  *
* Q Weir (cfs)            *             * Max Chl Dpth (ft)     *       4.29  *       5.44  *
* Weir Sta Lft (ft)       *             * Vel Total (ft/s)      *       8.43  *       6.65  *
* Weir Sta Rgt (ft)       *             * Flow Area (sq ft)     *     102.89  *     130.44  *
```

* Weir Submerg	*	* Froude # Chl	* 0.72	* 0.50	*
* Weir Max Depth (ft)	*	* Specif Force (cu ft)	* 447.53	* 533.58	*
* Min El Weir Flow (ft)	* 1633.34	* Hydr Depth (ft)	* 4.29	* 5.44	*
* Min El Prs (ft)	* 1627.69	* W.P. Total (ft)	* 36.86	* 40.30	*
* Delta EG (ft)	* -1.73	* Conv. Total (cfs)	* 20208.1	* 28272.9	*
* Delta WS (ft)	* -0.13	* Top Width (ft)	* 23.99	* 23.99	*
* BR Open Area (sq ft)	* 172.73	* Frctn Loss (ft)	* 0.16	* 0.00	*
* BR Open Vel (ft/s)	* 8.43	* C & E Loss (ft)	* 0.12	* 0.00	*
* Coef of Q	*	* Shear Total (lb/sq ft)	* 0.32	* 0.19	*
* Br Sel Method	*Energy only	* Power Total (lb/ft s)	* 2.70	* 1.26	*

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3020

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1627.47	1037.67	1619.47	1050	1619.47	1062.33	1619.47	1062.33	1627.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	150	150	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.47

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1628.27	1627.47	1062.33	1628.27	1627.47

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1627.61	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1624.91	* Reach Len. (ft)	* 150.00	* 150.00	* 150.00 *
* Crit W.S. (ft)	* 1624.91	* Flow Area (sq ft)	*	* 130.50	* *
* E.G. Slope (ft/ft)	*0.004391	* Area (sq ft)	*	* 130.50	* *
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 13.20	* Avg. Vel. (ft/s)	*	* 13.20	* *
* Max Chl Dpth (ft)	* 5.44	* Hydr. Depth (ft)	*	* 5.44	* *
* Conv. Total (cfs)	* 26001.2	* Conv. (cfs)	*	* 26001.2	* *
* Length Wtd. (ft)	* 150.00	* Wetted Per. (ft)	*	* 45.75	* *
* Min Ch El (ft)	* 1619.47	* Shear (lb/sq ft)	*	* 0.78	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.32	* *
* Frctn Loss (ft)	* 0.66	* Cum Volume (acre-ft)	* 36.30	* 31.11	* 1.17 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 9.49	* 7.11	* 0.40 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1627.61	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1624.91	* Reach Len. (ft)	* 150.00	* 150.00	* 150.00 *
* Crit W.S. (ft)	* 1624.91	* Flow Area (sq ft)	*	* 130.50	* *
* E.G. Slope (ft/ft)	*0.004391	* Area (sq ft)	*	* 130.50	* *
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 13.20	* Avg. Vel. (ft/s)	*	* 13.20	* *
* Max Chl Dpth (ft)	* 5.44	* Hydr. Depth (ft)	*	* 5.44	* *
* Conv. Total (cfs)	* 26001.2	* Conv. (cfs)	*	* 26001.2	* *
* Length Wtd. (ft)	* 150.00	* Wetted Per. (ft)	*	* 45.75	* *
* Min Ch El (ft)	* 1619.47	* Shear (lb/sq ft)	*	* 0.78	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.32	* *
* Frctn Loss (ft)	* 0.66	* Cum Volume (acre-ft)	* 13.45	* 29.83	* 0.93 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.66	* 5.45	* 0.19 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3000

```
INPUT
Description:
Station Elevation Data    num=       5
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*********************************************************************************
 1037.67 1626.27 1037.67 1618.27    1050 1618.27 1062.33 1618.27 1062.33 1626.27

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1037.67 1062.33              350     350     350             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 1049.67 1050.33 1627.07
Cross Section Lid
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
************************************************
 1037.67 1627.07 1626.27 1062.33 1627.07 1626.27

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1626.41  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.71  * Wt. n-Val.             *         *    0.015 *          *
* W.S. Elev (ft)         * 1623.71  * Reach Len. (ft)       *  350.00 *  350.00  *  350.00  *
* Crit W.S. (ft)         * 1623.71  * Flow Area (sq ft)     *         *  130.50  *          *
* E.G. Slope (ft/ft)     *0.004391  * Area (sq ft)          *         *  130.50  *          *
* Q Total (cfs)          * 1723.00  * Flow (cfs)            *         * 1723.00  *          *
* Top Width (ft)         *   24.00  * Top Width (ft)        *         *   24.00  *          *
* Vel Total (ft/s)       *   13.20  * Avg. Vel. (ft/s)      *         *   13.20  *          *
* Max Chl Dpth (ft)      *    5.44  * Hydr. Depth (ft)      *         *    5.44  *          *
* Conv. Total (cfs)      * 26000.5  * Conv. (cfs)           *         * 26000.5  *          *
* Length Wtd. (ft)       *  350.00  * Wetted Per. (ft)      *         *   45.75  *          *
* Min Ch El (ft)         * 1618.27  * Shear (lb/sq ft)      *         *    0.78  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   10.33  *          *
* Frctn Loss (ft)        *    1.54  * Cum Volume (acre-ft)   *  36.30  *   30.66  *    1.17  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   9.49  *    7.02  *    0.40  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1626.41  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.71  * Wt. n-Val.             *         *    0.015 *          *
* W.S. Elev (ft)         * 1623.71  * Reach Len. (ft)       *  350.00 *  350.00  *  350.00  *
* Crit W.S. (ft)         * 1623.71  * Flow Area (sq ft)     *         *  130.50  *          *
* E.G. Slope (ft/ft)     *0.004391  * Area (sq ft)          *         *  130.50  *          *
* Q Total (cfs)          * 1723.00  * Flow (cfs)            *         * 1723.00  *          *
* Top Width (ft)         *   24.00  * Top Width (ft)        *         *   24.00  *          *
* Vel Total (ft/s)       *   13.20  * Avg. Vel. (ft/s)      *         *   13.20  *          *
* Max Chl Dpth (ft)      *    5.44  * Hydr. Depth (ft)      *         *    5.44  *          *
* Conv. Total (cfs)      * 26000.5  * Conv. (cfs)           *         * 26000.5  *          *
* Length Wtd. (ft)       *  350.00  * Wetted Per. (ft)      *         *   45.75  *          *
* Min Ch El (ft)         * 1618.27  * Shear (lb/sq ft)      *         *    0.78  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   10.33  *          *
* Frctn Loss (ft)        *    1.54  * Cum Volume (acre-ft)   *  13.45  *   29.38  *    0.93  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *   2.66  *    5.37  *    0.19  *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 2900

INPUT
Description:
Station Elevation Data    num=       5
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*********************************************************************************
 1037.67 1623.47 1037.67 1615.47    1050 1615.47 1062.33 1615.47 1062.33 1623.47

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1037.67 1062.33              290     290     290             .1       .3
Blocked Obstructions     num=       1
   Sta L   Sta R    Elev
************************
 1049.67 1050.33 1623.47
Cross Section Lid
```

```
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
************************************************
 1037.67 1624.27 1623.47 1062.33 1624.27 1623.47

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1623.61  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.71  * Wt. n-Val.             *         *    0.015 *          *
* W.S. Elev (ft)        * 1620.91  * Reach Len. (ft)        *  290.00 *   290.00 *   290.00 *
* Crit W.S. (ft)        * 1620.91  * Flow Area (sq ft)      *         *   130.50 *          *
* E.G. Slope (ft/ft)    *0.004391  * Area (sq ft)           *         *   130.50 *          *
* Q Total (cfs)         * 1723.00  * Flow (cfs)             *         *  1723.00 *          *
* Top Width (ft)        *   24.00  * Top Width (ft)         *         *    24.00 *          *
* Vel Total (ft/s)      *   13.20  * Avg. Vel. (ft/s)       *         *    13.20 *          *
* Max Chl Dpth (ft)     *    5.44  * Hydr. Depth (ft)       *         *     5.44 *          *
* Conv. Total (cfs)     * 26001.2  * Conv. (cfs)            *         *  26001.2 *          *
* Length Wtd. (ft)      *  290.00  * Wetted Per. (ft)       *         *    45.75 *          *
* Min Ch El (ft)        * 1615.47  * Shear (lb/sq ft)       *         *     0.78 *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *    10.32 *          *
* Frctn Loss (ft)       *    1.27  * Cum Volume (acre-ft)   *   36.30 *    29.61 *     1.17 *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)         *    9.49 *     6.83 *     0.40 *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)        * 1623.61  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.71  * Wt. n-Val.             *         *    0.015 *          *
* W.S. Elev (ft)        * 1620.91  * Reach Len. (ft)        *  290.00 *   290.00 *   290.00 *
* Crit W.S. (ft)        * 1620.91  * Flow Area (sq ft)      *         *   130.50 *          *
* E.G. Slope (ft/ft)    *0.004391  * Area (sq ft)           *         *   130.50 *          *
* Q Total (cfs)         * 1723.00  * Flow (cfs)             *         *  1723.00 *          *
* Top Width (ft)        *   24.00  * Top Width (ft)         *         *    24.00 *          *
* Vel Total (ft/s)      *   13.20  * Avg. Vel. (ft/s)       *         *    13.20 *          *
* Max Chl Dpth (ft)     *    5.44  * Hydr. Depth (ft)       *         *     5.44 *          *
* Conv. Total (cfs)     * 26001.2  * Conv. (cfs)            *         *  26001.2 *          *
* Length Wtd. (ft)      *  290.00  * Wetted Per. (ft)       *         *    45.75 *          *
* Min Ch El (ft)        * 1615.47  * Shear (lb/sq ft)       *         *     0.78 *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *    10.32 *          *
* Frctn Loss (ft)       *    1.27  * Cum Volume (acre-ft)   *   13.45 *    28.34 *     0.93 *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)         *    2.66 *     5.18 *     0.19 *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 2800

INPUT
Description:
Station Elevation Data    num=       5
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1037.67 1621.15 1037.67 1613.15    1050 1613.15 1062.33 1613.15 1062.33 1621.15

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
*************************************************
 1037.67    .015 1037.67    .015 1062.33    .015

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1037.67 1062.33             250     250     250             .1       .3
Blocked Obstructions      num=       1
   Sta L    Sta R     Elev
************************
 1049.67 1050.33 1621.15
Cross Section Lid
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
************************************************
 1037.67 1621.95 1621.15 1062.33 1621.95 1621.15

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)        * 1621.29  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)         *    2.71  * Wt. n-Val.             *         *    0.015 *          *
* W.S. Elev (ft)        * 1618.59  * Reach Len. (ft)        *  250.00 *   250.00 *   250.00 *
* Crit W.S. (ft)        * 1618.59  * Flow Area (sq ft)      *         *   130.50 *          *
* E.G. Slope (ft/ft)    *0.004391  * Area (sq ft)           *         *   130.50 *          *
* Q Total (cfs)         * 1723.00  * Flow (cfs)             *         *  1723.00 *          *
* Top Width (ft)        *   24.00  * Top Width (ft)         *         *    24.00 *          *
* Vel Total (ft/s)      *   13.20  * Avg. Vel. (ft/s)       *         *    13.20 *          *
* Max Chl Dpth (ft)     *    5.44  * Hydr. Depth (ft)       *         *     5.44 *          *
* Conv. Total (cfs)     * 26000.5  * Conv. (cfs)            *         *  26000.5 *          *
* Length Wtd. (ft)      *  250.00  * Wetted Per. (ft)       *         *    45.75 *          *
* Min Ch El (ft)        * 1613.15  * Shear (lb/sq ft)       *         *     0.78 *          *
* Alpha                 *    1.00  * Stream Power (lb/ft s) *         *    10.33 *          *
```

* Frctn Loss (ft)	* 1.10	* Cum Volume (acre-ft)	* 36.30	* 28.75	* 1.17	*		
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 9.49	* 6.67	* 0.40	*		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1621.29	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1618.59	* Reach Len. (ft)	* 250.00	* 250.00	* 250.00 *
* Crit W.S. (ft)	* 1618.59	* Flow Area (sq ft)	*	* 130.50	* *
* E.G. Slope (ft/ft)	*0.004391	* Area (sq ft)	*	* 130.50	* *
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 13.20	* Avg. Vel. (ft/s)	*	* 13.20	* *
* Max Chl Dpth (ft)	* 5.44	* Hydr. Depth (ft)	*	* 5.44	* *
* Conv. Total (cfs)	* 26000.5	* Conv. (cfs)	*	* 26000.5	* *
* Length Wtd. (ft)	* 250.00	* Wetted Per. (ft)	*	* 45.75	* *
* Min Ch El (ft)	* 1613.15	* Shear (lb/sq ft)	*	* 0.78	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.33	* *
* Frctn Loss (ft)	* 1.10	* Cum Volume (acre-ft)	* 13.45	* 27.47	* 0.93 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.66	* 5.02	* 0.19 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2700

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1619.15	1037.67	1611.15	1050	1611.15	1062.33	1611.15	1062.33	1619.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 381.4 381.4 381.4 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1619.15

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1619.95	1619.15	1062.33	1619.95	1619.15

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1619.29	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1616.59	* Reach Len. (ft)	* 381.40	* 381.40	* 381.40 *
* Crit W.S. (ft)	* 1616.59	* Flow Area (sq ft)	*	* 130.50	* *
* E.G. Slope (ft/ft)	*0.004391	* Area (sq ft)	*	* 130.50	* *
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	* *
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	* *
* Vel Total (ft/s)	* 13.20	* Avg. Vel. (ft/s)	*	* 13.20	* *
* Max Chl Dpth (ft)	* 5.44	* Hydr. Depth (ft)	*	* 5.44	* *
* Conv. Total (cfs)	* 26000.5	* Conv. (cfs)	*	* 26000.5	* *
* Length Wtd. (ft)	* 381.40	* Wetted Per. (ft)	*	* 45.75	* *
* Min Ch El (ft)	* 1611.15	* Shear (lb/sq ft)	*	* 0.78	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.33	* *
* Frctn Loss (ft)	* 1.68	* Cum Volume (acre-ft)	* 36.30	* 28.00	* 1.17 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 9.49	* 6.53	* 0.40 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1619.29	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	* *
* W.S. Elev (ft)	* 1616.59	* Reach Len. (ft)	* 381.40	* 381.40	* 381.40 *
* Crit W.S. (ft)	* 1616.59	* Flow Area (sq ft)	*	* 130.50	* *
* E.G. Slope (ft/ft)	*0.004391	* Area (sq ft)	*	* 130.50	* *

* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	*	*		
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	*	*		
* Vel Total (ft/s)	* 13.20	* Avg. Vel. (ft/s)	*	* 13.20	*	*		
* Max Chl Dpth (ft)	* 5.44	* Hydr. Depth (ft)	*	* 5.44	*	*		
* Conv. Total (cfs)	* 26000.5	* Conv. (cfs)	*	* 26000.5	*	*		
* Length Wtd. (ft)	* 381.40	* Wetted Per. (ft)	*	* 45.75	*	*		
* Min Ch El (ft)	* 1611.15	* Shear (lb/sq ft)	*	* 0.78	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.33	*	*		
* Frctn Loss (ft)	* 1.68	* Cum Volume (acre-ft)	*	13.45	*	26.72	*	0.93 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	2.66	*	4.88	*	0.19 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2600

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1616.13	1037.67	1608.13	1050	1608.13	1062.33	1608.13	1062.33	1616.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 6.4 6.4 6.4 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1615.54

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1616.37	1615.54	1062.33	1616.37	1615.54

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1616.27	* Element	* Left OB	* Channel	* Right OB *			
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	*	*		
* W.S. Elev (ft)	* 1613.56	* Reach Len. (ft)	* 6.40	* 6.40	* 6.40 *			
* Crit W.S. (ft)	* 1613.56	* Flow Area (sq ft)	*	* 130.37	*	*		
* E.G. Slope (ft/ft)	*0.004403	* Area (sq ft)	*	* 130.37	*	*		
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	*	*		
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	*	*		
* Vel Total (ft/s)	* 13.22	* Avg. Vel. (ft/s)	*	* 13.22	*	*		
* Max Chl Dpth (ft)	* 5.43	* Hydr. Depth (ft)	*	* 5.43	*	*		
* Conv. Total (cfs)	* 25967.4	* Conv. (cfs)	*	* 25967.4	*	*		
* Length Wtd. (ft)	* 6.40	* Wetted Per. (ft)	*	* 45.73	*	*		
* Min Ch El (ft)	* 1608.13	* Shear (lb/sq ft)	*	* 0.78	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.36	*	*		
* Frctn Loss (ft)	* 0.03	* Cum Volume (acre-ft)	* 36.30	* 26.85	* 1.17 *			
* C & E Loss (ft)	* 0.41	* Cum SA (acres)	* 9.49	* 6.32	* 0.40 *			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1616.27	* Element	* Left OB	* Channel	* Right OB *			
* Vel Head (ft)	* 2.71	* Wt. n-Val.	*	* 0.015	*	*		
* W.S. Elev (ft)	* 1613.56	* Reach Len. (ft)	* 6.40	* 6.40	* 6.40 *			
* Crit W.S. (ft)	* 1613.56	* Flow Area (sq ft)	*	* 130.37	*	*		
* E.G. Slope (ft/ft)	*0.004403	* Area (sq ft)	*	* 130.37	*	*		
* Q Total (cfs)	* 1723.00	* Flow (cfs)	*	* 1723.00	*	*		
* Top Width (ft)	* 24.00	* Top Width (ft)	*	* 24.00	*	*		
* Vel Total (ft/s)	* 13.22	* Avg. Vel. (ft/s)	*	* 13.22	*	*		
* Max Chl Dpth (ft)	* 5.43	* Hydr. Depth (ft)	*	* 5.43	*	*		
* Conv. Total (cfs)	* 25967.4	* Conv. (cfs)	*	* 25967.4	*	*		
* Length Wtd. (ft)	* 6.40	* Wetted Per. (ft)	*	* 45.73	*	*		
* Min Ch El (ft)	* 1608.13	* Shear (lb/sq ft)	*	* 0.78	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.36	*	*		
* Frctn Loss (ft)	* 0.04	* Cum Volume (acre-ft)	*	13.45	*	25.58	*	0.93 *
* C & E Loss (ft)	* 0.37	* Cum SA (acres)	*	2.66	*	4.67	*	0.19 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2590

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1620	1001.7	1619	1003.5	1618	1005.3	1617	1007.15	1616
1011.55	1615	1029.4	1614	1030.79	1613	1032.35	1612	1033.81	1611
1036.09	1610	1038.6	1609	1041.03	1608	1096.94	1608	1099.19	1609
1101.26	1610	1103.5	1611	1105.42	1612	1106.67	1613	1107.78	1614
1108.53	1615	1108.92	1617	1117.09	1618	1119.76	1619	1134.31	1620

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1029.4	.025	1108.92	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1029.4	1108.92	226	210	201	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1612.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.95	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.95	Flow Area (sq ft)		185.10	
E.G. Slope (ft/ft)	*0.006797	Area (sq ft)		185.10	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	69.47	Top Width (ft)		69.47	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	2.95	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	20899.7	Conv. (cfs)		20899.7	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		70.70	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		10.34	
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	36.30	26.83	1.17
C & E Loss (ft)	0.16	Cum SA (acres)	9.49	6.32	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1612.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.98	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.98	Flow Area (sq ft)		176.22	
E.G. Slope (ft/ft)	*0.007089	Area (sq ft)		176.22	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	60.00	Top Width (ft)		60.00	
Vel Total (ft/s)	9.78	Avg. Vel. (ft/s)		9.78	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.94	
Conv. Total (cfs)	20464.2	Conv. (cfs)		20464.2	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		64.52	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		11.82	
Frctn Loss (ft)	0.95	Cum Volume (acre-ft)	13.45	25.55	0.93
C & E Loss (ft)	0.20	Cum SA (acres)	2.66	4.66	0.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2500

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1618	1001.47	1618	1006.41	1619	1007.75	1619	1009.23	1618
1010.68	1617	1012.11	1616	1013.57	1615	1015.06	1614	1017.29	1613
1023.14	1612	1030.12	1611	1031.16	1610	1032.29	1609	1033.34	1608

1034.47	1607	1035.75	1606	1037.49	1605	1039.23	1604	1041.39	1603
1069.02	1603	1072.56	1604	1078.76	1605	1081.62	1606	1085.08	1607
1089.07	1608	1093.13	1609	1097.18	1610	1101.44	1611	1104.59	1612
1108.07	1613	1112.23	1614	1120.7	1615	1121.77	1616	1123.24	1617

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1037.49	.025	1078.76	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1030.12	1112.23	186.68	179.72	182.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.08	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.08	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.45	
Conv. Total (cfs)	34602.3	Conv. (cfs)		34602.3	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	36.30	25.73	1.17
C & E Loss (ft)	0.10	Cum SA (acres)	9.49	6.00	0.40

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.07	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.07	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.44	
Conv. Total (cfs)	34599.9	Conv. (cfs)		34599.9	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	13.45	24.48	0.93
C & E Loss (ft)	0.10	Cum SA (acres)	2.66	4.37	0.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2400

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.07	1608	1293.09	1608	1300.45	1607	1302.46	1606	1304.44	1605
1306.36	1604	1308.28	1603	1310.28	1602	1335.97	1602	1338.24	1603
1339.94	1604	1342.44	1605	1345.57	1606	1348.73	1607	1351.86	1608
1354.95	1609	1357.99	1610	1360.9	1611	1363.87	1612	1366.81	1613
1369.72	1614	1372.78	1615	1375.77	1616	1378.9	1617	1381.7	1618
1384.56	1619								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1291.07	.025	1338.24	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1293.09	1384.56	57	71	87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.82	
E.G. Slope (ft/ft)	0.008171	Area (sq ft)		179.82	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21815.6	Conv. (cfs)		21815.6	
Length Wtd. (ft)	70.77	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.83	
Alpha	1.00	Stream Power (lb/ft s)		20.02	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	36.30	24.81	1.17
C & E Loss (ft)	0.17	Cum SA (acres)	9.49	5.78	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.84	
E.G. Slope (ft/ft)	*0.008169	Area (sq ft)		179.84	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21818.5	Conv. (cfs)		21818.5	
Length Wtd. (ft)	70.60	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.82	
Alpha	1.00	Stream Power (lb/ft s)		20.01	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	13.45	23.55	0.93
C & E Loss (ft)	0.25	Cum SA (acres)	2.66	4.15	0.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2350

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1001.37	1615	1002.74	1614	1004.1	1613	1005.55	1612
1009.41	1611	1016.33	1610.26	1018.74	1610	1030.03	1610	1034.36	1611
1049.32	1611	1052.39	1610	1054.54	1609	1057.69	1608	1059.67	1607
1086.56	1606	1115.51	1606	1119.27	1606	1120.19	1606	1130.23	1606
1132.99	1605	1135.85	1604	1138.89	1603	1141.9	1602	1146.76	1601
1165.03	1601	1167.57	1602	1170.34	1603	1173.61	1604	1176.83	1605
1180.02	1606	1183.27	1607	1186.49	1608	1189.52	1609	1192.43	1610
1195.36	1611	1196.13	1611.26	1198.3	1612	1201.25	1613	1204.21	1614
1207.17	1615	1210.1	1616	1213.04	1617	1216.66	1618	1220.41	1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1130.23	.025	1167.57	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1130.23 1220.41 64 63 63 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.29	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	1606.66	Reach Len. (ft)	64.00	63.00	63.00
Crit W.S. (ft)	1606.54	Flow Area (sq ft)	34.35	206.04	
E.G. Slope (ft/ft)	*0.005667	Area (sq ft)	34.35	206.04	
Q Total (cfs)	1972.00	Flow (cfs)	65.31	1906.69	
Top Width (ft)	113.19	Top Width (ft)	61.27	51.92	
Vel Total (ft/s)	8.20	Avg. Vel. (ft/s)	1.90	9.25	
Max Chl Dpth (ft)	5.65	Hydr. Depth (ft)	0.56	3.97	
Conv. Total (cfs)	26195.3	Conv. (cfs)	867.5	25327.8	
Length Wtd. (ft)	63.17	Wetted Per. (ft)	61.29	53.60	
Min Ch El (ft)	1601.00	Shear (lb/sq ft)	0.20	1.36	
Alpha	1.23	Stream Power (lb/ft s)	0.38	12.58	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	36.28	24.49	1.17
C & E Loss (ft)	0.26	Cum SA (acres)	9.45	5.70	0.40

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1608.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	1606.97	Reach Len. (ft)	64.00	63.00	63.00
Crit W.S. (ft)		Flow Area (sq ft)	48.06	222.72	
E.G. Slope (ft/ft)	*0.004332	Area (sq ft)	48.06	222.72	
Q Total (cfs)	1972.00	Flow (cfs)	112.99	1859.01	
Top Width (ft)	103.18	Top Width (ft)	50.23	52.95	
Vel Total (ft/s)	7.28	Avg. Vel. (ft/s)	2.35	8.35	
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.96	4.21	
Conv. Total (cfs)	29960.1	Conv. (cfs)	1716.6	28243.5	
Length Wtd. (ft)	63.15	Wetted Per. (ft)	50.96	54.69	

* Min Ch El (ft)	* 1601.00	* Shear (lb/sq ft)	*	0.26	*	1.10	*		*		
* Alpha	* 1.24	* Stream Power (lb/ft s)	*	0.60	*	9.19	*		*		
* Frctn Loss (ft)	* 0.23	* Cum Volume (acre-ft)	*	13.42	*	23.22	*	0.93	*		
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	*	2.63	*	4.07	*	0.19	*		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2330

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1046.51	1616	1063.63	1615	1065.45	1614	1067.24	1613
1069.01	1612	1070.85	1611	1073.95	1610	1078.23	1609	1080.88	1608
1083.23	1607	1089.39	1606	1115.44	1605.7	1174.84	1605	1183.19	1605
1200.07	1605	1203.77	1605	1233.21	1606	1239.59	1606	1240.83	1606
1244.52	1607	1246.08	1607	1248.05	1606	1249.9	1605	1251.82	1604
1253.68	1603	1255.52	1602	1257.81	1601	1281.08	1601	1282.63	1602
1285.54	1603	1288.64	1604	1291.75	1605	1294.85	1606	1295.24	1606.12
1297.98	1607	1301.06	1608	1304.02	1609	1306.74	1610	1309.48	1611
1312.22	1612	1315.02	1613	1317.72	1614	1320.5	1615	1323.24	1616
1325.92	1617	1328.33	1618	1330.73	1619				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1249.9	.025	1282.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1244.52	1330.73	235	240	222	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1607.45	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.42	* Wt. n-Val.	* 0.040	* 0.031	*	*
* W.S. Elev (ft)	* 1607.03	* Reach Len. (ft)	* 235.00	* 240.00	* 222.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 246.95	* 223.50	*	*
* E.G. Slope (ft/ft)	*0.002583	* Area (sq ft)	* 246.95	* 223.50	*	*
* Q Total (cfs)	* 1972.00	* Flow (cfs)	* 618.50	* 1353.50	*	*
* Top Width (ft)	* 214.90	* Top Width (ft)	* 161.35	* 53.54	*	*
* Vel Total (ft/s)	* 4.19	* Avg. Vel. (ft/s)	* 2.50	* 6.06	*	*
* Max Chl Dpth (ft)	* 6.03	* Hydr. Depth (ft)	* 1.53	* 4.17	*	*
* Conv. Total (cfs)	* 38804.9	* Conv. (cfs)	* 12170.7	* 26634.1	*	*
* Length Wtd. (ft)	* 238.03	* Wetted Per. (ft)	* 161.60	* 56.09	*	*
* Min Ch El (ft)	* 1601.00	* Shear (lb/sq ft)	* 0.25	* 0.64	*	*
* Alpha	* 1.54	* Stream Power (lb/ft s)	* 0.62	* 3.89	*	*
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 36.07	* 24.18	* 1.17	*
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 9.28	* 5.62	* 0.40	*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1607.62	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.54	* Wt. n-Val.	* 0.040	* 0.031	*	*
* W.S. Elev (ft)	* 1607.09	* Reach Len. (ft)	* 235.00	* 240.00	* 222.00	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 165.71	* 226.67	*	*
* E.G. Slope (ft/ft)	*0.002999	* Area (sq ft)	* 165.71	* 226.67	*	*
* Q Total (cfs)	* 1972.00	* Flow (cfs)	* 483.55	* 1488.45	*	*
* Top Width (ft)	* 148.25	* Top Width (ft)	* 94.52	* 53.73	*	*
* Vel Total (ft/s)	* 5.03	* Avg. Vel. (ft/s)	* 2.92	* 6.57	*	*
* Max Chl Dpth (ft)	* 6.09	* Hydr. Depth (ft)	* 1.75	* 4.22	*	*
* Conv. Total (cfs)	* 36008.0	* Conv. (cfs)	* 8829.5	* 27178.6	*	*
* Length Wtd. (ft)	* 238.61	* Wetted Per. (ft)	* 96.47	* 56.28	*	*
* Min Ch El (ft)	* 1601.00	* Shear (lb/sq ft)	* 0.32	* 0.75	*	*
* Alpha	* 1.37	* Stream Power (lb/ft s)	* 0.94	* 4.95	*	*
* Frctn Loss (ft)	* 0.25	* Cum Volume (acre-ft)	* 13.26	* 22.90	* 0.93	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 2.52	* 3.99	* 0.19	*

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2300

INPUT
Description:
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1619	1001.97	1618	1003.2	1617	1004.55	1616	1005.95	1615
1007.27	1614	1008.69	1613	1010.3	1612	1011.97	1611	1014.13	1610
1018.32	1609	1023.5	1608	1030.44	1607	1039.16	1606	1041.19	1605.6
1044.19	1605	1058.41	1604.13	1060.6	1604	1072.49	1603	1079.21	1603
1084.11	1604	1087.79	1605	1100.7	1605	1125.34	1604	1149.33	1604
1149.99	1604	1187.47	1604	1199.06	1604	1271.41	1604	1273.45	1604
1283.01	1603.19	1285.22	1603	1289.39	1602	1293.61	1602	1296.06	1602
1297.59	1601	1299.25	1600	1303.67	1599	1328.29	1599	1330.08	1600
1332.14	1601	1334.2	1602	1336.96	1603	1340.58	1604	1344.03	1605
1347.34	1606	1351.43	1607	1354.48	1608	1357.2	1609	1359.82	1610
1362.46	1611	1365.05	1612	1367.61	1613	1369.69	1613.8	1370.2	1614

1372.75 1615 1375.34 1616 1378.01 1617 1380.61 1618 1383.27 1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1293.61	.025	1330.08	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1271.41 1383.27 320.42 311.55 310.65 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.040	0.034	
W.S. Elev (ft)	1607.12	Reach Len. (ft)	320.42	311.55	310.65
Crit W.S. (ft)		Flow Area (sq ft)	701.71	437.00	
E.G. Slope (ft/ft)	*0.000313	Area (sq ft)	701.71	437.00	
Q Total (cfs)	1972.00	Flow (cfs)	936.40	1035.60	
Top Width (ft)	322.16	Top Width (ft)	241.78	80.38	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	1.33	2.37	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	2.90	5.44	
Conv. Total (cfs)	*111542.0	Conv. (cfs)	52965.6	58576.4	
Length Wtd. (ft)	316.91	Wetted Per. (ft)	242.27	82.69	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.06	0.10	
Alpha	1.27	Stream Power (lb/ft s)	0.08	0.24	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	33.51	22.36	1.17
C & E Loss (ft)	0.02	Cum SA (acres)	8.20	5.25	0.40

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.040	0.034	
W.S. Elev (ft)	1607.12	Reach Len. (ft)	320.42	311.55	310.65
Crit W.S. (ft)		Flow Area (sq ft)	337.02	437.48	
E.G. Slope (ft/ft)	*0.000539	Area (sq ft)	337.02	437.48	
Q Total (cfs)	1972.00	Flow (cfs)	609.49	1362.51	
Top Width (ft)	188.31	Top Width (ft)	107.91	80.40	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	1.81	3.11	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	3.12	5.44	
Conv. Total (cfs)	84918.0	Conv. (cfs)	26245.9	58672.1	
Length Wtd. (ft)	314.68	Wetted Per. (ft)	111.03	82.70	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.10	0.18	
Alpha	1.19	Stream Power (lb/ft s)	0.18	0.55	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	11.90	21.07	0.93
C & E Loss (ft)	0.02	Cum SA (acres)	1.98	3.62	0.19

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2200

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1609	1005.16	1608	1011.92	1607	1047.35	1607	1060.8	1607
1071.4	1606	1077.87	1605	1084.57	1604	1094.26	1603	1116.03	1602
1121.81	1601	1126.68	1600	1175.32	1600	1181.31	1601	1195.36	1601
1199.05	1600	1255.45	1600	1370.28	1601	1372.38	1601	1454	1601
1493.38	1601	1502.82	1601	1504.64	1600	1506.13	1599	1507.62	1598
1513.26	1597	1549.68	1597	1552.37	1598	1554.96	1599	1557.69	1600
1562.2	1601	1566.73	1602	1570.63	1603	1573.43	1604	1576.11	1605
1578.73	1606	1581.03	1607	1583.23	1608	1585.37	1609	1587.38	1610
1589.2	1611	1590.63	1612	1592.04	1613	1593.42	1614	1594.9	1615

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1502.82	.025	1549.68	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1502.82 1594.9 383.01 328.57 273.85 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.040	0.032	
W.S. Elev (ft)	1607.14	Reach Len. (ft)	383.01	328.57	273.85
Crit W.S. (ft)		Flow Area (sq ft)	2718.63	625.61	
E.G. Slope (ft/ft)	*0.000021	Area (sq ft)	2718.63	625.61	
Q Total (cfs)	1972.00	Flow (cfs)	1445.62	526.38	
Top Width (ft)	570.34	Top Width (ft)	491.83	78.51	
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.53	0.84	
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)	5.53	7.97	
Conv. Total (cfs)	*430287.5	Conv. (cfs)	*315431.3	*114856.2	
Length Wtd. (ft)	358.84	Wetted Per. (ft)	492.52	81.13	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.01	0.01	
Alpha	1.14	Stream Power (lb/ft s)	0.00	0.01	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	20.93	18.56	1.17
C & E Loss (ft)	0.00	Cum SA (acres)	5.50	4.68	0.40

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.040	0.032	
W.S. Elev (ft)	1607.11	Reach Len. (ft)	383.01	328.57	273.85
Crit W.S. (ft)		Flow Area (sq ft)	628.34	623.56	
E.G. Slope (ft/ft)	*0.000108	Area (sq ft)	628.34	623.56	
Q Total (cfs)	1972.00	Flow (cfs)	781.71	1190.29	
Top Width (ft)	181.27	Top Width (ft)	102.82	78.45	
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	1.24	1.91	
Max Chl Dpth (ft)	10.11	Hydr. Depth (ft)	6.11	7.95	
Conv. Total (cfs)	*189388.8	Conv. (cfs)	75074.7	*114314.1	
Length Wtd. (ft)	349.07	Wetted Per. (ft)	108.93	81.07	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.04	0.05	
Alpha	1.13	Stream Power (lb/ft s)	0.05	0.10	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	8.35	17.27	0.93
C & E Loss (ft)	0.00	Cum SA (acres)	1.20	3.05	0.19

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2100

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
953	1608	1000	1601	1013.06	1600	1023.83	1599	1033.3	1598
1040.2	1597	1043.2	1596	1046.03	1595	1051.25	1594	1053.88	1594
1056.33	1595	1058.94	1596	1059.94	1597	1060.67	1598	1075.29	1598.83
1078.2	1599	1087.56	1600	1091.95	1600	1103.88	1599	1107.13	1598
1109.23	1597	1111.33	1596	1116.75	1596	1120.48	1597	1120.85	1597
1124.02	1596	1125.68	1595	1127.35	1594	1132.29	1593	1155.55	1593
1159.58	1593	1160.63	1594	1161.73	1595	1163.48	1596	1167.18	1597
1170.02	1598	1172.71	1599	1175.2	1600	1177.42	1601	1179.65	1602
1182.05	1603	1184.57	1604	1187.21	1605	1189.98	1606	1192.78	1607
1195.62	1608	1198.5	1609	1201.39	1610	1206.95	1611		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
953	.04	1120.48	.025	1163.48	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1120.48	1161.73	67.6	97.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.11	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1199.04	557.99	189.27
E.G. Slope (ft/ft)	*0.000028	Area (sq ft)	1199.04	557.99	189.27
Q Total (cfs)	1972.00	Flow (cfs)	878.15	963.65	130.20
Top Width (ft)	234.08	Top Width (ft)	161.48	41.25	31.35
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)	0.73	1.73	0.69
Max Chl Dpth (ft)	14.11	Hydr. Depth (ft)	7.43	13.53	6.04
Conv. Total (cfs)	*375679.6	Conv. (cfs)	*167292.8	*183582.6	24804.2
Length Wtd. (ft)	88.05	Wetted Per. (ft)	164.73	42.85	33.66
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.68	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.71	14.10	0.58
C & E Loss (ft)	0.06	Cum SA (acres)	2.63	4.23	0.30

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.10	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1004.77	557.85	189.16
E.G. Slope (ft/ft)	*0.000030	Area (sq ft)	1004.77	557.85	189.16
Q Total (cfs)	1972.00	Flow (cfs)	839.02	998.16	134.83
Top Width (ft)	182.51	Top Width (ft)	109.92	41.25	31.34
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	0.84	1.79	0.71
Max Chl Dpth (ft)	14.10	Hydr. Depth (ft)	9.14	13.52	6.04
Conv. Total (cfs)	*362545.2	Conv. (cfs)	*154250.0	*183508.1	24787.1
Length Wtd. (ft)	88.35	Wetted Per. (ft)	119.60	42.85	33.65
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.02	0.02	0.01
Alpha	1.54	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.17	12.82	0.33
C & E Loss (ft)	0.06	Cum SA (acres)	0.27	2.60	0.09

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2000.1

```
INPUT
Description:
Station Elevation Data    num=       8
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
   990.1     1607 1012.59     1604 1044.29 1601.77 1044.29 1591.77 1056.29 1591.77
 1056.29 1601.69 1094.79     1606 1094.79  1606.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
   990.1    .025 1044.29    .015 1056.29    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1044.29 1056.29                1       1       1            .1      .1

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1607.07  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.63  * Wt. n-Val.            *   0.025  *   0.015  *   0.025  *
* W.S. Elev (ft)         * 1606.43  * Reach Len. (ft)       *    1.00  *    1.00  *    1.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *  134.73  *  175.97  *   99.69  *
* E.G. Slope (ft/ft)     *0.000594  * Area (sq ft)          *  134.73  *  175.97  *   99.69  *
* Q Total (cfs)          * 1972.00  * Flow (cfs)            *  376.96  * 1325.86  *  269.18  *
* Top Width (ft)         *  100.45  * Top Width (ft)        *   49.95  *   12.00  *   38.50  *
* Vel Total (ft/s)       *    4.81  * Avg. Vel. (ft/s)      *    2.80  *    7.53  *    2.70  *
* Max Chl Dpth (ft)      *   14.66  * Hydr. Depth (ft)      *    2.70  *   14.66  *    2.59  *
* Conv. Total (cfs)      * 80911.3  * Conv. (cfs)           * 15466.7  * 54400.2  * 11044.3  *
* Length Wtd. (ft)       *    1.00  * Wetted Per. (ft)      *   50.19  *   31.92  *   39.17  *
* Min Ch El (ft)         * 1591.77  * Shear (lb/sq ft)      *    0.10  *    0.20  *    0.09  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) *    0.28  *    1.54  *    0.25  *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)  *    2.68  *   13.27  *    0.25  *
* C & E Loss (ft)        *    0.06  * Cum SA (acres)        *    2.46  *    4.17  *    0.22  *
*************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1607.07  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.63  * Wt. n-Val.            *   0.025  *   0.015  *   0.025  *
* W.S. Elev (ft)         * 1606.43  * Reach Len. (ft)       *    1.00  *    1.00  *    1.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *  134.73  *  175.97  *   99.69  *
* E.G. Slope (ft/ft)     *0.000594  * Area (sq ft)          *  134.73  *  175.97  *   99.69  *
* Q Total (cfs)          * 1972.00  * Flow (cfs)            *  376.97  * 1325.84  *  269.19  *
* Top Width (ft)         *  100.45  * Top Width (ft)        *   49.95  *   12.00  *   38.50  *
* Vel Total (ft/s)       *    4.81  * Avg. Vel. (ft/s)      *    2.80  *    7.53  *    2.70  *
* Max Chl Dpth (ft)      *   14.66  * Hydr. Depth (ft)      *    2.70  *   14.66  *    2.59  *
* Conv. Total (cfs)      * 80913.8  * Conv. (cfs)           * 15467.7  * 54401.0  * 11045.1  *
* Length Wtd. (ft)       *    1.00  * Wetted Per. (ft)      *   50.19  *   31.92  *   39.17  *
* Min Ch El (ft)         * 1591.77  * Shear (lb/sq ft)      *    0.10  *    0.20  *    0.09  *
* Alpha                  *    1.76  * Stream Power (lb/ft s) *    0.28  *    1.54  *    0.25  *
* Frctn Loss (ft)        *    0.00  * Cum Volume (acre-ft)  *    0.29  *   11.99  *    0.01  *
* C & E Loss (ft)        *    0.06  * Cum SA (acres)        *    0.14  *    2.54  *    0.01  *
*************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 2000

INPUT
Description:
Station Elevation Data    num=       7
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*********************************************************************************
   990.1     1607 1012.59     1604 1044.29 1601.77 1044.29 1591.77 1056.29 1591.77
 1056.29 1601.69 1094.79     1606

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
   990.1    .025 1044.29    .015 1056.29    .025

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1044.29 1056.29          320.07  319.85  303.13            .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   990.1 1044.29    1608       F
 1056.29 1094.79    1608       F

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1607.01  * Element                * Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.23  * Wt. n-Val.            *          *   0.015  *          *
* W.S. Elev (ft)         * 1605.77  * Reach Len. (ft)       *    0.01  *    0.01  *    0.01  *
* Crit W.S. (ft)         * 1599.63  * Flow Area (sq ft)     *          *  168.01  *          *
* E.G. Slope (ft/ft)     *0.000885  * Area (sq ft)          *  103.25  *  168.01  *   74.40  *
* Q Total (cfs)          * 1498.00  * Flow (cfs)            *          * 1498.00  *          *
* Top Width (ft)         *   93.44  * Top Width (ft)        *   44.98  *   12.00  *   36.46  *
* Vel Total (ft/s)       *    8.92  * Avg. Vel. (ft/s)      *          *    8.92  *          *
* Max Chl Dpth (ft)      *   14.00  * Hydr. Depth (ft)      *          *   14.00  *          *
* Conv. Total (cfs)      * 50362.6  * Conv. (cfs)           *          * 50362.6  *          *
* Length Wtd. (ft)       *    0.01  * Wetted Per. (ft)      *          *   31.92  *          *
* Min Ch El (ft)         * 1591.77  * Shear (lb/sq ft)      *          *    0.29  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    2.59  *          *
```

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	2.67	13.27	0.25
* C & E Loss (ft)	*	* Cum SA (acres)	*	2.46	4.17	0.22

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1607.01	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.23	* Wt. n-Val.	*	* 0.015	*
* W.S. Elev (ft)	* 1605.77	* Reach Len. (ft)	* 0.01	* 0.01	* 0.01
* Crit W.S. (ft)	* 1599.63	* Flow Area (sq ft)	*	* 168.01	*
* E.G. Slope (ft/ft)	*0.001195	* Area (sq ft)	*	* 168.01	*
* Q Total (cfs)	* 1498.00	* Flow (cfs)	*	* 1498.00	*
* Top Width (ft)	* 12.00	* Top Width (ft)	*	* 12.00	*
* Vel Total (ft/s)	* 8.92	* Avg. Vel. (ft/s)	*	* 8.92	*
* Max Chl Dpth (ft)	* 14.00	* Hydr. Depth (ft)	*	* 14.00	*
* Conv. Total (cfs)	* 43327.0	* Conv. (cfs)	*	* 43327.0	*
* Length Wtd. (ft)	* 0.01	* Wetted Per. (ft)	*	* 40.00	*
* Min Ch El (ft)	* 1591.77	* Shear (lb/sq ft)	*	* 0.31	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.79	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.29	* 11.99	* 0.01
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.14	* 2.54	* 0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 1950

INPUT
Description: I- 15 Bridge
Distance from Upstream XS = .01
Deck/Roadway Width = 319.83
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 6

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
990.1	1606.72 1585.08	1044.29	1606.72 1585.08	1044.29	1606.72 1601.77
1056.29	1606.72 1601.77	1056.29	1606.72 1585.08	1104.82	1606.72 1585.08

Upstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990.1	1607	1012.59	1604	1044.29	1601.77	1044.29	1591.77	1056.29	1591.77
1056.29	1601.69	1094.79	1606						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990.1	.025	1044.29	.015	1056.29	.025

Bank Sta: Left Right Coeff Contr. Expan.
1044.29 1056.29 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
990.1	1044.29	1608	F
1056.29	1094.79	1608	F

Downstream Deck/Roadway Coordinates
num= 6

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1606.72 1601.77	1104.82	1606.72 1601.77	1193.33	1606.72 1595.08
1205.33	1606.72 1595.08	1221.37	1606.72 1596.89	1251.33	1606.72 1601

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1179.43	1599	1193.33	1595.08	1193.33	1585.08	1205.33	1585.08	1205.33	1595.08
1251.33	1601								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1179.43	.025	1193.33	.015	1205.33	.025

Bank Sta: Left Right Coeff Contr. Expan.
1193.33 1205.33 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1606.72
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Energy

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd =.8164966

Max Low Cord = 1601.77

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

E.G. US. (ft)	1607.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1605.77	E.G. Elev (ft)	1607.01	1606.80
Q Total (cfs)	1498.00	W.S. Elev (ft)	1605.77	1605.77
Q Bridge (cfs)	1493.05	Crit W.S. (ft)	1599.63	1592.93
Q Weir (cfs)	4.95	Max Chl Dpth (ft)	14.00	20.69
Weir Sta Lft (ft)	1044.29	Vel Total (ft/s)	0.00	10.66
Weir Sta Rgt (ft)	1056.29	Flow Area (sq ft)		140.54
Weir Submerg	0.00	Froude # Chl	0.59	0.48
Weir Max Depth (ft)	0.29	Specif Force (cu ft)	1660.89	2463.70
Min El Weir Flow (ft)	1606.73	Hydr Depth (ft)		
Min El Prs (ft)	1601.77	W.P. Total (ft)	44.00	44.00
Delta EG (ft)	9.65	Conv. Total (cfs)		
Delta WS (ft)	12.51	Top Width (ft)		
BR Open Area (sq ft)	120.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	12.44	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

BRIDGE OUTPUT Profile #PF 2

E.G. US. (ft)	1607.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1605.77	E.G. Elev (ft)	1607.01	1606.98
Q Total (cfs)	1498.00	W.S. Elev (ft)	1605.77	1605.77
Q Bridge (cfs)	1493.05	Crit W.S. (ft)	1599.63	1592.93
Q Weir (cfs)	4.95	Max Chl Dpth (ft)	14.00	20.69
Weir Sta Lft (ft)	1044.29	Vel Total (ft/s)	0.00	0.00
Weir Sta Rgt (ft)	1056.29	Flow Area (sq ft)		
Weir Submerg	0.00	Froude # Chl	0.59	0.48
Weir Max Depth (ft)	0.29	Specif Force (cu ft)	1660.89	2463.70
Min El Weir Flow (ft)	1606.73	Hydr Depth (ft)		
Min El Prs (ft)	1601.77	W.P. Total (ft)	44.00	44.00
Delta EG (ft)	9.59	Conv. Total (cfs)		
Delta WS (ft)	11.94	Top Width (ft)		
BR Open Area (sq ft)	120.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	12.44	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1900

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1179.43	1599	1193.33	1595.08	1193.33	1585.08	1205.33	1585.08	1205.33	1595.08
1251.33	1601								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1179.43	.025	1193.33	.015	1205.33	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1193.33 1205.33 38.8 38.8 38.8 .3 .5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1597.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.10	Wt. n-Val.		0.015	
W.S. Elev (ft)	1593.26	Reach Len. (ft)	38.80	38.80	38.80
Crit W.S. (ft)	1593.26	Flow Area (sq ft)		98.16	
E.G. Slope (ft/ft)	*0.005139	Area (sq ft)		98.16	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	

* Vel Total (ft/s)	* 16.25	* Avg. Vel. (ft/s)	*	* 16.25	*	*		
* Max Chl Dpth (ft)	* 8.18	* Hydr. Depth (ft)	*	* 8.18	*	*		
* Conv. Total (cfs)	* 22249.0	* Conv. (cfs)	*	* 22249.0	*	*		
* Length Wtd. (ft)	* 38.80	* Wetted Per. (ft)	*	* 28.36	*	*		
* Min Ch El (ft)	* 1585.08	* Shear (lb/sq ft)	*	* 1.11	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 18.04	*	*		
* Frctn Loss (ft)	* 0.21	* Cum Volume (acre-ft)	*	2.67	*	12.39	*	0.25 *
* C & E Loss (ft)	* 1.51	* Cum SA (acres)	*	2.46	*	4.17	*	0.22 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1597.41	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	* 3.58	* Wt. n-Val.	*		*	0.015	*	*
* W.S. Elev (ft)	* 1593.83	* Reach Len. (ft)	*	38.80	*	38.80	*	38.80 *
* Crit W.S. (ft)	* 1593.24	* Flow Area (sq ft)	*		*	105.05	*	*
* E.G. Slope (ft/ft)	*0.004321	* Area (sq ft)	*		*	105.05	*	*
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*		*	1595.00	*	*
* Top Width (ft)	* 12.00	* Top Width (ft)	*		*	12.00	*	*
* Vel Total (ft/s)	* 15.18	* Avg. Vel. (ft/s)	*		*	15.18	*	*
* Max Chl Dpth (ft)	* 8.75	* Hydr. Depth (ft)	*		*	8.75	*	*
* Conv. Total (cfs)	* 24263.2	* Conv. (cfs)	*		*	24263.2	*	*
* Length Wtd. (ft)	* 38.80	* Wetted Per. (ft)	*		*	29.51	*	*
* Min Ch El (ft)	* 1585.08	* Shear (lb/sq ft)	*		*	0.96	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		*	14.58	*	*
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	*	0.29	*	11.11	*	0.01 *
* C & E Loss (ft)	* 0.71	* Cum SA (acres)	*	0.14	*	2.54	*	0.01 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1800

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1604	1017.58	1603	1024.71	1602	1031.18	1601	1034.87	1600
1036.64	1599	1038.41	1598	1040.44	1597	1043.07	1596	1046.27	1595
1050.71	1594	1054.41	1593.59	1059.85	1593	1115.02	1592	1116.24	1591
1117.33	1590	1148.63	1590	1150.75	1591	1152.41	1592	1153.93	1593
1155.42	1594	1156.91	1595	1158.3	1596	1160.68	1597	1167.6	1597.96
1167.88	1598	1176.94	1599	1181.79	1600	1190.38	1601	1204.71	1602
1220.3	1603	1235.32	1604						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1115.02	.025	1148.63	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1115.02 1160.68 173.79 170.93 148.02 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1595.03	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	* 1.09	* Wt. n-Val.	*	0.040	*	0.028	*	*
* W.S. Elev (ft)	* 1593.94	* Reach Len. (ft)	*	173.79	*	170.93	*	148.02 *
* Crit W.S. (ft)	* 1593.94	* Flow Area (sq ft)	*	83.70	*	144.36	*	*
* E.G. Slope (ft/ft)	*0.005719	* Area (sq ft)	*	83.70	*	144.36	*	*
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	281.61	*	1313.39	*	*
* Top Width (ft)	* 104.11	* Top Width (ft)	*	63.80	*	40.32	*	*
* Vel Total (ft/s)	* 6.99	* Avg. Vel. (ft/s)	*	3.36	*	9.10	*	*
* Max Chl Dpth (ft)	* 3.94	* Hydr. Depth (ft)	*	1.31	*	3.58	*	*
* Conv. Total (cfs)	* 21091.1	* Conv. (cfs)	*	3723.8	*	17367.3	*	*
* Length Wtd. (ft)	* 171.71	* Wetted Per. (ft)	*	63.86	*	42.15	*	*
* Min Ch El (ft)	* 1590.00	* Shear (lb/sq ft)	*	0.47	*	1.22	*	*
* Alpha	* 1.43	* Stream Power (lb/ft s)	*	1.57	*	11.13	*	*
* Frctn Loss (ft)	* 0.88	* Cum Volume (acre-ft)	*	2.64	*	12.28	*	0.25 *
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	*	2.43	*	4.15	*	0.22 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1596.48	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	* 2.15	* Wt. n-Val.	*		*	0.025	*	*
* W.S. Elev (ft)	* 1594.33	* Reach Len. (ft)	*	173.79	*	170.93	*	148.02 *
* Crit W.S. (ft)	* 1594.33	* Flow Area (sq ft)	*		*	135.49	*	*
* E.G. Slope (ft/ft)	*0.007701	* Area (sq ft)	*		*	135.49	*	*
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*		*	1595.00	*	*
* Top Width (ft)	* 31.30	* Top Width (ft)	*		*	31.30	*	*

* Vel Total (ft/s)	* 11.77	* Avg. Vel. (ft/s)	*	* 11.77	*	*		
* Max Chl Dpth (ft)	* 4.33	* Hydr. Depth (ft)	*	* 4.33	*	*		
* Conv. Total (cfs)	* 18176.1	* Conv. (cfs)	*	* 18176.1	*	*		
* Length Wtd. (ft)	* 170.99	* Wetted Per. (ft)	*	* 39.96	*	*		
* Min Ch El (ft)	* 1590.00	* Shear (lb/sq ft)	*	* 1.63	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 19.19	*	*		
* Frctn Loss (ft)	* 1.22	* Cum Volume (acre-ft)	*	0.29	*	11.00	*	0.01 *
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	*	0.14	*	2.52	*	0.01 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1750

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1606	1003.52	1605.53	1007.44	1605	1014.27	1604	1020.21	1603
1022.71	1602	1025.14	1601	1027.53	1600	1029.98	1599	1032.42	1598
1034.75	1597	1037.08	1596	1039.84	1595	1043.65	1594	1048.74	1593
1078.87	1592.12	1082.85	1592	1139.68	1591	1210.43	1590	1214.54	1590
1232.62	1590	1285.16	1590	1286.97	1589	1291.48	1588	1318.26	1588
1319.5	1589	1320.31	1590	1321.08	1591	1321.91	1592	1322.72	1593
1323.62	1594	1325.25	1595	1327	1596	1328.9	1597	1330.81	1598
1332.7	1599	1334.57	1600	1336.57	1601	1338.39	1602	1340.86	1603
1343.68	1604	1346.59	1605	1349.5	1606	1352.46	1607	1359.2	1608

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1285.16	.025	1320.31	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1285.16	1352.46	171.49	169.33	179.87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1592.34	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.73	* Wt. n-Val.	* 0.040	* 0.026	* *
* W.S. Elev (ft)	* 1591.61	* Reach Len. (ft)	* 171.49	* 169.33	* 179.87 *
* Crit W.S. (ft)	* 1591.61	* Flow Area (sq ft)	* 209.42	* 121.10	* *
* E.G. Slope (ft/ft)	*0.004592	* Area (sq ft)	* 209.42	* 121.10	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	* 582.81	* 1012.19	* *
* Top Width (ft)	* 216.57	* Top Width (ft)	* 180.15	* 36.43	* *
* Vel Total (ft/s)	* 4.83	* Avg. Vel. (ft/s)	* 2.78	* 8.36	* *
* Max Chl Dpth (ft)	* 3.61	* Hydr. Depth (ft)	* 1.16	* 3.32	* *
* Conv. Total (cfs)	* 23537.2	* Conv. (cfs)	* 8600.5	* 14936.7	* *
* Length Wtd. (ft)	* 170.23	* Wetted Per. (ft)	* 180.16	* 38.40	* *
* Min Ch El (ft)	* 1588.00	* Shear (lb/sq ft)	* 0.33	* 0.90	* *
* Alpha	* 2.03	* Stream Power (lb/ft s)	* 0.93	* 7.56	* *
* Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	* 2.05	* 11.76	* 0.25 *
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 1.95	* 4.00	* 0.22 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1594.15	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.93	* Wt. n-Val.	* 0.040	* 0.025	* *
* W.S. Elev (ft)	* 1592.22	* Reach Len. (ft)	* 171.49	* 169.33	* 179.87 *
* Crit W.S. (ft)	* 1592.22	* Flow Area (sq ft)	* 15.51	* 134.68	* *
* E.G. Slope (ft/ft)	*0.006672	* Area (sq ft)	* 15.51	* 134.68	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	* 66.63	* 1528.37	* *
* Top Width (ft)	* 40.09	* Top Width (ft)	* 6.99	* 33.10	* *
* Vel Total (ft/s)	* 10.62	* Avg. Vel. (ft/s)	* 4.30	* 11.35	* *
* Max Chl Dpth (ft)	* 4.22	* Hydr. Depth (ft)	* 2.22	* 4.07	* *
* Conv. Total (cfs)	* 19526.7	* Conv. (cfs)	* 815.7	* 18711.0	* *
* Length Wtd. (ft)	* 169.51	* Wetted Per. (ft)	* 9.21	* 37.69	* *
* Min Ch El (ft)	* 1588.00	* Shear (lb/sq ft)	* 0.70	* 1.49	* *
* Alpha	* 1.10	* Stream Power (lb/ft s)	* 3.01	* 16.89	* *
* Frctn Loss (ft)	* 1.01	* Cum Volume (acre-ft)	* 0.26	* 10.47	* 0.01 *
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 0.13	* 2.39	* 0.01 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there

is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1700

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1597	1002.28	1596	1005.58	1595	1012.08	1594	1037.72	1593
1096.14	1592	1104.18	1591.88	1165.67	1591	1234.36	1590	1301	1589
1345.94	1588.26	1361.37	1588	1363.83	1588	1410.67	1589	1430.15	1589
1432.44	1588	1434.69	1587	1464.52	1587	1468.96	1588	1473.24	1589
1476.62	1590	1480.53	1591	1483.69	1592	1486.72	1593	1489.52	1594
1492.76	1595	1496	1596	1499.24	1597	1502.4	1598	1504.92	1599
1506.8	1600	1508.64	1601	1510.47	1602	1512.25	1603	1514.06	1604
1515.81	1605	1517.41	1606	1519	1607				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1430.15	.025	1464.52	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1430.15	1519	163.66	161.13	154.63	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1590.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.040	0.029	
W.S. Elev (ft)	1590.18	Reach Len. (ft)	163.66	161.13	154.63
Crit W.S. (ft)		Flow Area (sq ft)	255.02	126.25	
E.G. Slope (ft/ft)	*0.004825	Area (sq ft)	255.02	126.25	
Q Total (cfs)	1595.00	Flow (cfs)	753.19	841.81	
Top Width (ft)	255.42	Top Width (ft)	208.24	47.18	
Vel Total (ft/s)	4.18	Avg. Vel. (ft/s)	2.95	6.67	
Max Chl Dpth (ft)	3.18	Hydr. Depth (ft)	1.22	2.68	
Conv. Total (cfs)	22961.7	Conv. (cfs)	10842.9	12118.8	
Length Wtd. (ft)	162.08	Wetted Per. (ft)	208.27	47.99	
Min Ch El (ft)	1587.00	Shear (lb/sq ft)	0.37	0.79	
Alpha	1.58	Stream Power (lb/ft s)	1.09	5.28	
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	1.14	11.28	0.25
C & E Loss (ft)	0.03	Cum SA (acres)	1.18	3.84	0.22

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1592.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.41	Wt. n-Val.	0.040	0.025	
W.S. Elev (ft)	1591.16	Reach Len. (ft)	163.66	161.13	154.63
Crit W.S. (ft)		Flow Area (sq ft)	47.64	138.27	
E.G. Slope (ft/ft)	*0.005305	Area (sq ft)	47.64	138.27	
Q Total (cfs)	1595.00	Flow (cfs)	202.04	1392.96	
Top Width (ft)	56.44	Top Width (ft)	22.07	34.37	
Vel Total (ft/s)	8.58	Avg. Vel. (ft/s)	4.24	10.07	
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)	2.16	4.02	
Conv. Total (cfs)	21898.8	Conv. (cfs)	2774.0	19124.8	
Length Wtd. (ft)	161.32	Wetted Per. (ft)	24.28	38.95	
Min Ch El (ft)	1587.00	Shear (lb/sq ft)	0.65	1.18	
Alpha	1.24	Stream Power (lb/ft s)	2.76	11.85	
Frctn Loss (ft)	0.96	Cum Volume (acre-ft)	0.13	9.94	0.01
C & E Loss (ft)	0.04	Cum SA (acres)	0.07	2.26	0.01

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1650

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1611	1008.24	1610	1015.08	1609	1020.16	1608	1023.18	1607
1025.9	1606	1027.82	1605	1029.73	1604	1031.65	1603	1033.58	1602
1035.52	1601	1037.42	1600	1039.38	1599	1041.29	1598	1043.24	1597
1048.3	1596	1056.24	1595	1078.47	1594	1140.38	1593	1199.86	1592
1212.73	1591.78	1258.28	1591	1320.25	1590	1390.53	1589	1471.72	1588
1520.79	1587.04	1523.08	1587	1523.91	1587	1525.73	1588	1527.64	1588
1541.86	1588	1563.09	1588	1574.76	1587	1576.76	1586	1582.3	1585
1600.56	1585	1603.67	1586	1609.52	1587	1614.51	1588	1617.16	1589
1619.96	1590	1622.21	1591	1624.38	1592	1626.5	1593	1628.43	1594
1631.3	1595	1634.46	1596	1654.44	1597	1662.17	1597		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1563.09	.025	1600.56	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1563.09	1634.46	190.68	175.57	185.82	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1589.69	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.69	Wt. n-Val.	0.040	0.030		
W.S. Elev (ft)	1589.01	Reach Len. (ft)	190.68	175.57	185.82	
Crit W.S. (ft)	1589.01	Flow Area (sq ft)	160.49	149.57		
E.G. Slope (ft/ft)	*0.006317	Area (sq ft)	160.49	149.57		
Q Total (cfs)	1595.00	Flow (cfs)	450.32	1144.68		
Top Width (ft)	227.05	Top Width (ft)	172.96	54.09		
Vel Total (ft/s)	5.14	Avg. Vel. (ft/s)	2.81	7.65		
Max Chl Dpth (ft)	4.01	Hydr. Depth (ft)	0.93	2.77		
Conv. Total (cfs)	20068.4	Conv. (cfs)	5665.9	14402.4		
Length Wtd. (ft)	177.70	Wetted Per. (ft)	173.24	54.98		
Min Ch El (ft)	1585.00	Shear (lb/sq ft)	0.37	1.07		
Alpha	1.67	Stream Power (lb/ft s)	1.03	8.21		
Frctn Loss (ft)	1.67	Cum Volume (acre-ft)	0.36	10.77	0.25	
C & E Loss (ft)	0.03	Cum SA (acres)	0.47	3.65	0.22	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1591.57	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.82	Wt. n-Val.	0.040	0.025		
W.S. Elev (ft)	1589.75	Reach Len. (ft)	190.68	175.57	185.82	
Crit W.S. (ft)	1589.75	Flow Area (sq ft)	9.27	142.91		
E.G. Slope (ft/ft)	*0.006723	Area (sq ft)	9.27	142.91		
Q Total (cfs)	1595.00	Flow (cfs)	33.89	1561.11		
Top Width (ft)	42.78	Top Width (ft)	5.31	37.47		
Vel Total (ft/s)	10.48	Avg. Vel. (ft/s)	3.65	10.92		
Max Chl Dpth (ft)	4.75	Hydr. Depth (ft)	1.75	3.81		
Conv. Total (cfs)	19452.8	Conv. (cfs)	413.4	19039.4		
Length Wtd. (ft)	175.73	Wetted Per. (ft)	7.06	42.59		
Min Ch El (ft)	1585.00	Shear (lb/sq ft)	0.55	1.41		
Alpha	1.07	Stream Power (lb/ft s)	2.02	15.39		
Frctn Loss (ft)	1.59	Cum Volume (acre-ft)	0.03	9.42	0.01	
C & E Loss (ft)	0.04	Cum SA (acres)	0.02	2.13	0.01	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1600

INPUT
Description:
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1593	1056.43	1592	1122.58	1591	1188.64	1590	1249.15	1589
1313.23	1588	1394.68	1587	1398.17	1586	1398.88	1586	1401.29	1587
1448.19	1587	1451.06	1586	1453.96	1585	1462.44	1584	1483.55	1584
1520.36	1585	1546.05	1585.71	1556.34	1586	1562.87	1586.3	1578.37	1587
1580.19	1588	1582.08	1589	1583.99	1590	1585.95	1591	1587.5	1592
1589.07	1593	1590.62	1594	1592.14	1595	1593.7	1596	1595.17	1597
1596.58	1598	1600.83	1599	1606.01	1600	1611.1	1601	1614.69	1602
1616.93	1603								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1453.96	.025	1483.55	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1448.19	1562.87	157	142	133	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1556.34	1616.93	1587	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1394.68	1401.29	1587

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1587.65	Element		Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.			0.036	
W.S. Elev (ft)	1586.70	Reach Len. (ft)		157.00	142.00	133.00
Crit W.S. (ft)	1586.70	Flow Area (sq ft)			203.85	
E.G. Slope (ft/ft)	*0.015504	Area (sq ft)			207.43	1.75
Q Total (cfs)	1595.00	Flow (cfs)			1595.00	
Top Width (ft)	122.63	Top Width (ft)			113.81	8.81
Vel Total (ft/s)	7.82	Avg. Vel. (ft/s)			7.82	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)			1.90	
Conv. Total (cfs)	12809.9	Conv. (cfs)			12809.9	
Length Wtd. (ft)	142.00	Wetted Per. (ft)			107.66	
Min Ch El (ft)	1584.00	Shear (lb/sq ft)			1.83	

* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 14.34	*	*		
* Frctn Loss (ft)	* 0.23	* Cum Volume (acre-ft)	* 0.00	* 10.05	* 0.25	*		
* C & E Loss (ft)	* 0.23	* Cum SA (acres)	* 0.09	* 3.31	* 0.20	*		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1589.22	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.67	* Wt. n-Val.	*	* 0.033	* *
* W.S. Elev (ft)	* 1587.54	* Reach Len. (ft)	* 157.00	* 142.00	* 133.00 *
* Crit W.S. (ft)	* 1587.54	* Flow Area (sq ft)	*	* 153.73	* *
* E.G. Slope (ft/ft)	*0.012808	* Area (sq ft)	*	* 153.73	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	* 1595.00	* *
* Top Width (ft)	* 45.70	* Top Width (ft)	*	* 45.70	* *
* Vel Total (ft/s)	* 10.38	* Avg. Vel. (ft/s)	*	* 10.38	* *
* Max Chl Dpth (ft)	* 3.54	* Hydr. Depth (ft)	*	* 3.36	* *
* Conv. Total (cfs)	* 14093.3	* Conv. (cfs)	*	* 14093.3	* *
* Length Wtd. (ft)	* 142.00	* Wetted Per. (ft)	*	* 52.13	* *
* Min Ch El (ft)	* 1584.00	* Shear (lb/sq ft)	*	* 2.36	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 24.47	* *
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 0.01	* 8.82	* 0.01 *
* C & E Loss (ft)	* 0.45	* Cum SA (acres)	* 0.01	* 1.96	* 0.01 *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1500

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1588	1013.71	1587	1025.92	1586	1041.5	1585	1045.93	1584
1051.42	1583	1084.18	1582	1090.64	1581	1096.18	1580	1100.98	1579
1117.37	1578	1146.16	1578	1147.44	1579	1148.27	1580	1148.93	1581
1149.7	1582	1150.44	1583	1151.12	1584	1151.82	1585	1152.39	1586

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1041.5	.025	1146.16	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1041.5	1152.39	125	113	101	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1584.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.19	* Wt. n-Val.	*	* 0.026	* *
* W.S. Elev (ft)	* 1584.67	* Reach Len. (ft)	* 125.00	* 113.00	* 101.00 *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	* 459.80	* *
* E.G. Slope (ft/ft)	*0.000576	* Area (sq ft)	*	* 459.80	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	* 1595.00	* *
* Top Width (ft)	* 108.62	* Top Width (ft)	*	* 108.62	* *
* Vel Total (ft/s)	* 3.47	* Avg. Vel. (ft/s)	*	* 3.47	* *
* Max Chl Dpth (ft)	* 6.67	* Hydr. Depth (ft)	*	* 4.23	* *
* Conv. Total (cfs)	* 66483.7	* Conv. (cfs)	*	* 66483.7	* *
* Length Wtd. (ft)	* 113.00	* Wetted Per. (ft)	*	* 112.32	* *
* Min Ch El (ft)	* 1578.00	* Shear (lb/sq ft)	*	* 0.15	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.51	* *
* Frctn Loss (ft)	* 0.17	* Cum Volume (acre-ft)	* 0.00	* 8.96	* 0.25 *
* C & E Loss (ft)	* 0.22	* Cum SA (acres)	* 0.09	* 2.95	* 0.19 *

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1584.85	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.19	Wt. n-Val.		0.026		
W.S. Elev (ft)	1584.67	Reach Len. (ft)	125.00	113.00	101.00	
Crit W.S. (ft)		Flow Area (sq ft)		458.45		
E.G. Slope (ft/ft)	*0.000566	Area (sq ft)		458.45		
Q Total (cfs)	1595.00	Flow (cfs)		1595.00		
Top Width (ft)	105.59	Top Width (ft)		105.59		
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)		3.48		
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		4.34		
Conv. Total (cfs)	67058.3	Conv. (cfs)		67058.3		
Length Wtd. (ft)	113.00	Wetted Per. (ft)		109.89		
Min Ch El (ft)	1578.00	Shear (lb/sq ft)		0.15		
Alpha	1.00	Stream Power (lb/ft s)		0.51		
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.01	7.83	0.01	
C & E Loss (ft)	0.22	Cum SA (acres)	0.01	1.72	0.01	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1400

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.53	1587	1297.66	1586	1302.32	1585	1311.27	1584	1312.95	1583
1313.61	1582	1314.1	1581	1314.53	1580	1314.93	1579	1315.93	1578
1317.87	1577	1320.08	1576	1332.34	1576	1334.31	1577	1335.72	1578
1336.83	1579	1338.1	1580	1339.32	1581	1340.5	1582	1341.8	1583
1343.02	1584	1344.27	1585	1345.71	1586				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1291.53	.04	1311.27	.025	1332.34	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1291.53 1345.71 122.02 161.58 190.42 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1584.47	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.38	Wt. n-Val.		0.030		
W.S. Elev (ft)	1582.09	Reach Len. (ft)	122.02	161.58	190.42	
Crit W.S. (ft)	1582.09	Flow Area (sq ft)		128.81		
E.G. Slope (ft/ft)	*0.009907	Area (sq ft)		128.81		
Q Total (cfs)	1595.00	Flow (cfs)		1595.00		
Top Width (ft)	27.06	Top Width (ft)		27.06		
Vel Total (ft/s)	12.38	Avg. Vel. (ft/s)		12.38		
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)		4.76		
Conv. Total (cfs)	16024.7	Conv. (cfs)		16024.7		
Length Wtd. (ft)	161.58	Wetted Per. (ft)		31.98		
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		2.49		
Alpha	1.00	Stream Power (lb/ft s)		30.85		
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	0.00	8.20	0.25	
C & E Loss (ft)	0.13	Cum SA (acres)	0.09	2.77	0.19	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1584.47	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.39	Wt. n-Val.		0.030		
W.S. Elev (ft)	1582.08	Reach Len. (ft)	122.02	161.58	190.42	
Crit W.S. (ft)	1582.08	Flow Area (sq ft)		128.68		
E.G. Slope (ft/ft)	*0.009933	Area (sq ft)		128.68		
Q Total (cfs)	1595.00	Flow (cfs)		1595.00		
Top Width (ft)	27.05	Top Width (ft)		27.05		
Vel Total (ft/s)	12.40	Avg. Vel. (ft/s)		12.40		
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)		4.76		
Conv. Total (cfs)	16003.4	Conv. (cfs)		16003.4		
Length Wtd. (ft)	161.58	Wetted Per. (ft)		31.96		
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		2.50		
Alpha	1.00	Stream Power (lb/ft s)		30.94		
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)	0.01	7.06	0.01	
C & E Loss (ft)	0.31	Cum SA (acres)	0.01	1.54	0.01	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1300

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1630.46	1582	1632.6	1581	1634.55	1580	1636.49	1579	1638.34	1578
1639.9	1577	1641.33	1576	1642.75	1575	1644.42	1574	1646.14	1573
1656.34	1573	1658.07	1574	1659.77	1575	1661.13	1576	1662.51	1577
1663.8	1578	1665.15	1579	1666.47	1580	1667.71	1581	1668.93	1582
1670.11	1583	1671.28	1584						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1630.46	.04	1642.75	.025	1659.77	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1630.46 1671.28 198.91 176.37 153.42 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1581.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.		0.033	
W.S. Elev (ft)	1579.82	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)	1579.54	Flow Area (sq ft)		142.61	
E.G. Slope (ft/ft)	*0.009488	Area (sq ft)		142.61	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	31.34	Top Width (ft)		31.34	
Vel Total (ft/s)	11.18	Avg. Vel. (ft/s)		11.18	
Max Chl Dpth (ft)	6.82	Hydr. Depth (ft)		4.55	
Conv. Total (cfs)	16375.0	Conv. (cfs)		16375.0	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		35.40	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		2.39	
Alpha	1.00	Stream Power (lb/ft s)		26.69	
Frctn Loss (ft)	1.28	Cum Volume (acre-ft)	0.00	7.70	0.25
C & E Loss (ft)	0.36	Cum SA (acres)	0.09	2.66	0.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1582.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.033	
W.S. Elev (ft)	1580.71	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)		Flow Area (sq ft)		170.96	
E.G. Slope (ft/ft)	*0.005824	Area (sq ft)		170.96	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	32.60	Top Width (ft)		32.60	
Vel Total (ft/s)	9.33	Avg. Vel. (ft/s)		9.33	
Max Chl Dpth (ft)	7.71	Hydr. Depth (ft)		5.24	
Conv. Total (cfs)	20900.4	Conv. (cfs)		20900.4	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		37.80	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		1.64	
Alpha	1.00	Stream Power (lb/ft s)		15.34	
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	0.01	6.51	0.01
C & E Loss (ft)	0.06	Cum SA (acres)	0.01	1.43	0.01

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1200

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1624.95	1580	1626.44	1579	1627.97	1578	1629.5	1577	1630.7	1576
1631.99	1575	1633.31	1574	1634.65	1573	1636.15	1572	1646.88	1572
1648.31	1573	1649.99	1574	1651.83	1575	1653.82	1576	1675.3	1577
1680.92	1578	1683	1578.66	1684.06	1579	1687.77	1580	1691.11	1581

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1624.95	.04	1636.15	.025	1646.88	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1624.95 1691.11 111.55 110.23 110.23 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1580.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.038	
W.S. Elev (ft)	1579.38	Reach Len. (ft)	111.55	110.23	110.23
Crit W.S. (ft)		Flow Area (sq ft)		228.18	
E.G. Slope (ft/ft)	*0.005691	Area (sq ft)		228.18	

Q Total (cfs)	1595.00	Flow (cfs)			1595.00			
Top Width (ft)	59.57	Top Width (ft)			59.57			
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)			6.99			
Max Chl Dpth (ft)	7.37	Hydr. Depth (ft)			3.83			
Conv. Total (cfs)	21143.0	Conv. (cfs)			21143.0			
Length Wtd. (ft)	110.23	Wetted Per. (ft)			63.35			
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.28			
Alpha	1.00	Stream Power (lb/ft s)			8.95			
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		0.00	6.95		0.25	
C & E Loss (ft)	0.00	Cum SA (acres)		0.09	2.48		0.19	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1580.96	Element	Left OB		Channel		Right OB	
Vel Head (ft)	1.14	Wt. n-Val.			0.036			
W.S. Elev (ft)	1579.82	Reach Len. (ft)	111.55		110.23		110.23	
Crit W.S. (ft)		Flow Area (sq ft)			186.27			
E.G. Slope (ft/ft)	0.005934	Area (sq ft)			186.27			
Q Total (cfs)	1595.00	Flow (cfs)			1595.00			
Top Width (ft)	34.25	Top Width (ft)			34.25			
Vel Total (ft/s)	8.56	Avg. Vel. (ft/s)			8.56			
Max Chl Dpth (ft)	7.82	Hydr. Depth (ft)			5.44			
Conv. Total (cfs)	20705.3	Conv. (cfs)			20705.3			
Length Wtd. (ft)	110.23	Wetted Per. (ft)			41.41			
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.67			
Alpha	1.00	Stream Power (lb/ft s)			14.27			
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)		0.01	5.79		0.01	
C & E Loss (ft)	0.01	Cum SA (acres)		0.01	1.30		0.01	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1100

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1619.57	1580	1621.29	1579	1622.97	1578	1624.61	1577	1626.31	1576
1628.02	1575	1629.57	1574	1630.8	1573	1632	1572	1645.32	1572
1647.11	1573	1648.89	1574	1650.95	1575	1663.2	1575	1664.69	1575
1667.66	1576	1670.65	1577	1672.81	1578	1675.07	1579	1677.38	1580

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1619.57	.04	1632	.025	1645.32	.04	1677.38	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1619.57 1677.38 102.45 103.7 103.7 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1579.54	Element	Left OB		Channel		Right OB	
Vel Head (ft)	0.80	Wt. n-Val.			0.037			
W.S. Elev (ft)	1578.74	Reach Len. (ft)	102.45		103.70		103.70	
Crit W.S. (ft)		Flow Area (sq ft)			222.50			
E.G. Slope (ft/ft)	0.005023	Area (sq ft)			222.50			
Q Total (cfs)	1595.00	Flow (cfs)			1595.00			
Top Width (ft)	52.77	Top Width (ft)			52.77			
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)			7.17			
Max Chl Dpth (ft)	6.74	Hydr. Depth (ft)			4.22			
Conv. Total (cfs)	22504.2	Conv. (cfs)			22504.2			
Length Wtd. (ft)	103.70	Wetted Per. (ft)			56.26			
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.24			
Alpha	1.00	Stream Power (lb/ft s)			8.89			
Frctn Loss (ft)	0.65	Cum Volume (acre-ft)		0.00	6.38		0.25	
C & E Loss (ft)	0.01	Cum SA (acres)		0.09	2.34		0.19	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1580.26	Element	Left OB		Channel		Right OB	
Vel Head (ft)	1.25	Wt. n-Val.			0.036			
W.S. Elev (ft)	1579.00	Reach Len. (ft)	102.45		103.70		103.70	
Crit W.S. (ft)		Flow Area (sq ft)			177.44			
E.G. Slope (ft/ft)	0.006563	Area (sq ft)			177.44			
Q Total (cfs)	1595.00	Flow (cfs)			1595.00			
Top Width (ft)	34.25	Top Width (ft)			34.25			
Vel Total (ft/s)	8.99	Avg. Vel. (ft/s)			8.99			
Max Chl Dpth (ft)	7.00	Hydr. Depth (ft)			5.18			
Conv. Total (cfs)	19687.7	Conv. (cfs)			19687.7			
Length Wtd. (ft)	103.70	Wetted Per. (ft)			41.11			
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.77			
Alpha	1.00	Stream Power (lb/ft s)			15.90			
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)		0.01	5.33		0.01	
C & E Loss (ft)	0.06	Cum SA (acres)		0.01	1.21		0.01	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1000

```
INPUT
Description:
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1619.06    1579  1620.6    1578 1622.05    1577 1623.54    1576 1625.04    1575
 1626.53    1574 1628.01    1573  1629.5    1572 1647.23    1572 1649.07    1573
 1650.89    1574 1652.74    1575 1669.86    1576 1674.48    1577  1677.9    1578
 1681.44    1579

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1619.06     .04 1647.23    .025 1649.07     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1619.06 1681.44           116.93  118.27  121.55            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1578.87  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    0.93  * Wt. n-Val.            *         *   0.040 *          *
* W.S. Elev (ft)         * 1577.95  * Reach Len. (ft)       *  116.93 *  118.27 *  121.55  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *         *  206.30 *          *
* E.G. Slope (ft/ft)     *0.008131  * Area (sq ft)          *         *  206.30 *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)            *         * 1595.00 *          *
* Top Width (ft)         *   57.04  * Top Width (ft)        *         *   57.04 *          *
* Vel Total (ft/s)       *    7.73  * Avg. Vel. (ft/s)      *         *    7.73 *          *
* Max Chl Dpth (ft)      *    5.95  * Hydr. Depth (ft)      *         *    3.62 *          *
* Conv. Total (cfs)      * 17688.9  * Conv. (cfs)           *         * 17688.9 *          *
* Length Wtd. (ft)       *  118.27  * Wetted Per. (ft)      *         *   59.89 *          *
* Min Ch El (ft)         * 1572.00  * Shear (lb/sq ft)      *         *    1.75 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   13.52 *          *
* Frctn Loss (ft)        *    0.97  * Cum Volume (acre-ft)   *    0.00 *    5.86 *    0.25  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *    0.09 *    2.21 *    0.19  *
*************************************************************************************************

Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1579.50  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.05  * Wt. n-Val.            *         *   0.039 *          *
* W.S. Elev (ft)         * 1578.46  * Reach Len. (ft)       *  116.93 *  118.27 *  121.55  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *         *  194.27 *          *
* E.G. Slope (ft/ft)     *0.006780  * Area (sq ft)          *         *  194.27 *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)            *         * 1595.00 *          *
* Top Width (ft)         *   39.42  * Top Width (ft)        *         *   39.42 *          *
* Vel Total (ft/s)       *    8.21  * Avg. Vel. (ft/s)      *         *    8.21 *          *
* Max Chl Dpth (ft)      *    6.46  * Hydr. Depth (ft)      *         *    4.93 *          *
* Conv. Total (cfs)      * 19370.1  * Conv. (cfs)           *         * 19370.1 *          *
* Length Wtd. (ft)       *  118.27  * Wetted Per. (ft)      *         *   45.24 *          *
* Min Ch El (ft)         * 1572.00  * Shear (lb/sq ft)      *         *    1.82 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   14.92 *          *
* Frctn Loss (ft)        *    0.86  * Cum Volume (acre-ft)   *    0.01 *    4.88 *    0.01  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *    0.01 *    1.12 *    0.01  *
*************************************************************************************************

Note:    Manning's n values were composited to a single value in the main channel.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 900

INPUT
Description:
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1601.29    1579 1615.48    1578 1617.19    1577 1618.89    1576 1620.39    1575
 1621.56    1574  1622.7    1573 1623.85    1572  1627.4    1570 1636.36    1570
 1639.19    1572 1644.13    1573 1649.05    1574 1666.38    1575  1667.9    1576
 1669.58    1577  1672.3    1578

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 1601.29     .04  1627.4    .025 1636.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1601.29  1672.3           102.08  103.62  108.33            .1      .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1577.89  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.05  * Wt. n-Val.            *         *   0.038 *          *
* W.S. Elev (ft)         * 1576.84  * Reach Len. (ft)       *  102.08 *  103.62 *  108.33  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)     *         *  193.53 *          *
* E.G. Slope (ft/ft)     *0.008288  * Area (sq ft)          *         *  193.53 *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)            *         * 1595.00 *          *
* Top Width (ft)         *   51.83  * Top Width (ft)        *         *   51.83 *          *
* Vel Total (ft/s)       *    8.24  * Avg. Vel. (ft/s)      *         *    8.24 *          *
* Max Chl Dpth (ft)      *    6.84  * Hydr. Depth (ft)      *         *    3.73 *          *
* Conv. Total (cfs)      * 17519.9  * Conv. (cfs)           *         * 17519.9 *          *
* Length Wtd. (ft)       *  103.62  * Wetted Per. (ft)      *         *   55.40 *          *
* Min Ch El (ft)         * 1570.00  * Shear (lb/sq ft)      *         *    1.81 *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *         *   14.90 *          *
* Frctn Loss (ft)        *    0.62  * Cum Volume (acre-ft)   *    0.00 *    5.32 *    0.25  *
* C & E Loss (ft)        *    0.13  * Cum SA (acres)         *    0.09 *    2.06 *    0.19  *
*************************************************************************************************

Note:    Manning's n values were composited to a single value in the main channel.
```

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1578.62	Element	Left OB	Channel	Right OB		
Vel Head (ft)	1.32	Wt. n-Val.		0.037			
W.S. Elev (ft)	1577.30	Reach Len. (ft)	102.08	103.62	108.33		
Crit W.S. (ft)		Flow Area (sq ft)		172.99			
E.G. Slope (ft/ft)	*0.007747	Area (sq ft)		172.99			
Q Total (cfs)	1595.00	Flow (cfs)		1595.00			
Top Width (ft)	34.76	Top Width (ft)		34.76			
Vel Total (ft/s)	9.22	Avg. Vel. (ft/s)		9.22			
Max Chl Dpth (ft)	7.30	Hydr. Depth (ft)		4.98			
Conv. Total (cfs)	18121.1	Conv. (cfs)		18121.1			
Length Wtd. (ft)	103.62	Wetted Per. (ft)		41.07			
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		2.04			
Alpha	1.00	Stream Power (lb/ft s)		18.79			
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	0.01	4.38	0.01		
C & E Loss (ft)	0.15	Cum SA (acres)	0.01	1.02	0.01		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 800

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1601.95	1578	1603.41	1577	1604.87	1576	1606.28	1575	1607.03	1574
1607.49	1573	1607.94	1572	1610.31	1570	1622.39	1570	1627.75	1572
1630.97	1573	1649.72	1573	1656.19	1573	1659.75	1574	1663.07	1575
1666.04	1576	1668.67	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1601.95	.04	1610.31	.025	1622.39	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1601.95 1668.67 134 133 133 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1577.14	Element	Left OB	Channel	Right OB		
Vel Head (ft)	0.63	Wt. n-Val.		0.038			
W.S. Elev (ft)	1576.51	Reach Len. (ft)	134.00	133.00	133.00		
Crit W.S. (ft)		Flow Area (sq ft)		249.67			
E.G. Slope (ft/ft)	*0.004536	Area (sq ft)		249.67			
Q Total (cfs)	1595.00	Flow (cfs)		1595.00			
Top Width (ft)	63.25	Top Width (ft)		63.25			
Vel Total (ft/s)	6.39	Avg. Vel. (ft/s)		6.39			
Max Chl Dpth (ft)	6.51	Hydr. Depth (ft)		3.95			
Conv. Total (cfs)	23681.9	Conv. (cfs)		23681.9			
Length Wtd. (ft)	133.00	Wetted Per. (ft)		67.30			
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.05			
Alpha	1.00	Stream Power (lb/ft s)		6.71			
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	0.00	4.79	0.25		
C & E Loss (ft)	0.05	Cum SA (acres)	0.09	1.92	0.19		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1577.86	Element	Left OB	Channel	Right OB		
Vel Head (ft)	0.83	Wt. n-Val.		0.037			
W.S. Elev (ft)	1577.03	Reach Len. (ft)	134.00	133.00	133.00		
Crit W.S. (ft)		Flow Area (sq ft)		218.50			
E.G. Slope (ft/ft)	*0.004705	Area (sq ft)		218.50			
Q Total (cfs)	1595.00	Flow (cfs)		1595.00			
Top Width (ft)	43.47	Top Width (ft)		43.47			
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30			
Max Chl Dpth (ft)	7.03	Hydr. Depth (ft)		5.03			
Conv. Total (cfs)	23254.1	Conv. (cfs)		23254.1			
Length Wtd. (ft)	133.00	Wetted Per. (ft)		51.17			
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.25			
Alpha	1.00	Stream Power (lb/ft s)		9.16			
Frctn Loss (ft)	0.61	Cum Volume (acre-ft)	0.01	3.92	0.01		
C & E Loss (ft)	0.00	Cum SA (acres)	0.01	0.93	0.01		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 700

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1594.24	1578	1595.79	1577	1597.29	1576	1598.78	1575	1600.22	1574
1601.71	1573	1603.56	1572	1607.53	1570	1622.94	1570	1628.9	1572
1641.44	1573	1655.8	1573	1658.53	1572	1662.47	1572	1665.1	1573
1667.19	1574	1668.72	1575	1670.24	1576	1671.81	1577		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

1594.24 .04 1607.53 .025 1622.94 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1594.24 1671.81 109 119 125 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1576.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.037	
W.S. Elev (ft)	1576.15	Reach Len. (ft)	109.00	119.00	125.00
Crit W.S. (ft)		Flow Area (sq ft)		296.04	
E.G. Slope (ft/ft)	*0.003012	Area (sq ft)		296.04	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	73.41	Top Width (ft)		73.41	
Vel Total (ft/s)	5.39	Avg. Vel. (ft/s)		5.39	
Max Chl Dpth (ft)	6.15	Hydr. Depth (ft)		4.03	
Conv. Total (cfs)	29061.7	Conv. (cfs)		29061.7	
Length Wtd. (ft)	119.51	Wetted Per. (ft)		76.71	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		0.73	
Alpha	1.00	Stream Power (lb/ft s)		3.91	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	0.00	3.96	0.25
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	1.71	0.19

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1577.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.036	
W.S. Elev (ft)	1576.41	Reach Len. (ft)	109.00	119.00	125.00
Crit W.S. (ft)		Flow Area (sq ft)		217.51	
E.G. Slope (ft/ft)	*0.004423	Area (sq ft)		217.51	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	44.77	Top Width (ft)		44.77	
Vel Total (ft/s)	7.33	Avg. Vel. (ft/s)		7.33	
Max Chl Dpth (ft)	6.41	Hydr. Depth (ft)		4.86	
Conv. Total (cfs)	23984.2	Conv. (cfs)		23984.2	
Length Wtd. (ft)	119.00	Wetted Per. (ft)		50.33	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.19	
Alpha	1.00	Stream Power (lb/ft s)		8.75	
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.01	3.25	0.01
C & E Loss (ft)	0.07	Cum SA (acres)	0.01	0.79	0.01

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 600

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1567.15	1577	1581.21	1576	1582.7	1575	1584.21	1574	1585.7	1573
1587.59	1572	1591.73	1570	1593.77	1569	1610.31	1569	1617.2	1570
1622.17	1572	1623.98	1572.99	1624	1573	1625.86	1574	1627.65	1575
1661.89	1575	1664.15	1574	1666.35	1573	1668.81	1572	1671.47	1571
1675.87	1571	1679.03	1572	1681.85	1573	1683.37	1574	1684.93	1575
1686.5	1576	1688.2	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1567.15	.04	1591.73	.025	1610.31	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1581.21 1627.65 65.6 65.6 65.6 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1576.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.035	0.040
W.S. Elev (ft)	1575.90	Reach Len. (ft)	65.60	65.60	65.60
Crit W.S. (ft)		Flow Area (sq ft)		241.75	110.75
E.G. Slope (ft/ft)	*0.001959	Area (sq ft)		241.75	110.75
Q Total (cfs)	1595.00	Flow (cfs)		1323.02	271.98
Top Width (ft)	104.98	Top Width (ft)		46.29	58.69
Vel Total (ft/s)	4.52	Avg. Vel. (ft/s)		5.47	2.46
Max Chl Dpth (ft)	6.90	Hydr. Depth (ft)		5.22	1.89
Conv. Total (cfs)	36033.3	Conv. (cfs)		29888.8	6144.5
Length Wtd. (ft)	65.60	Wetted Per. (ft)		49.33	60.68
Min Ch El (ft)	1569.00	Shear (lb/sq ft)		0.60	0.22
Alpha	1.26	Stream Power (lb/ft s)		3.28	0.55
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.00	3.23	0.09
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	1.55	0.11

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1576.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.		0.035	
W.S. Elev (ft)	1576.18	Reach Len. (ft)	65.60	65.60	65.60
Crit W.S. (ft)		Flow Area (sq ft)		254.98	
E.G. Slope (ft/ft)	*0.002509	Area (sq ft)		254.98	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	46.44	Top Width (ft)		46.44	
Vel Total (ft/s)	6.26	Avg. Vel. (ft/s)		6.26	

* Max Chl Dpth (ft)	* 7.18	* Hydr. Depth (ft)	*	* 5.49	*	*		
* Conv. Total (cfs)	* 31843.5	* Conv. (cfs)	*	* 31843.5	*	*		
* Length Wtd. (ft)	* 65.60	* Wetted Per. (ft)	*	* 50.88	*	*		
* Min Ch El (ft)	* 1569.00	* Shear (lb/sq ft)	*	* 0.78	*	*		
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.91	*	*		
* Frctn Loss (ft)	* 0.04	* Cum Volume (acre-ft)	*	0.01	*	2.61	*	0.01 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	0.01	*	0.67	*	0.01 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 580

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
857.5	1576.11	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1187.34	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
857.5	.025	1000	.015	1037.34	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1000 1037.34 102.1 102.1 102.1 .3 .5

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1576.24	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.53	* Wt. n-Val.	* 0.025 *	0.015 *	0.025 *
* W.S. Elev (ft)	* 1575.71	* Reach Len. (ft)	* 0.01 *	0.01 *	0.01 *
* Crit W.S. (ft)	* 1572.24	* Flow Area (sq ft)	* 1.82 *	272.40 *	1.05 *
* E.G. Slope (ft/ft)	*0.000381	* Area (sq ft)	* 1.82 *	272.40 *	1.05 *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	* 0.31 *	1594.51 *	0.18 *
* Top Width (ft)	* 87.06	* Top Width (ft)	* 31.54 *	37.34 *	18.17 *
* Vel Total (ft/s)	* 5.79	* Avg. Vel. (ft/s)	* 0.17 *	5.85 *	0.17 *
* Max Chl Dpth (ft)	* 7.30	* Hydr. Depth (ft)	* 0.06 *	7.30 *	0.06 *
* Conv. Total (cfs)	* 81730.2	* Conv. (cfs)	* 16.1 *	81704.8 *	9.3 *
* Length Wtd. (ft)	* 0.01	* Wetted Per. (ft)	* 31.54 *	51.70 *	18.17 *
* Min Ch El (ft)	* 1568.41	* Shear (lb/sq ft)	* 0.00 *	0.13 *	0.00 *
* Alpha	* 1.02	* Stream Power (lb/ft s)	* 0.00 *	0.73 *	0.00 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.00 *	2.84 *	0.00 *
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.06 *	1.49 *	0.05 *

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1576.70	* Element	* Left OB *	Channel *	Right OB *
* Vel Head (ft)	* 0.46	* Wt. n-Val.	* 0.025 *	0.015 *	0.025 *
* W.S. Elev (ft)	* 1576.24	* Reach Len. (ft)	* 0.01 *	0.01 *	0.01 *
* Crit W.S. (ft)	* 1572.24	* Flow Area (sq ft)	* 3.23 *	292.53 *	3.19 *
* E.G. Slope (ft/ft)	*0.000299	* Area (sq ft)	* 3.23 *	292.53 *	3.19 *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	* 2.28 *	1590.47 *	2.25 *
* Top Width (ft)	* 47.34	* Top Width (ft)	* 5.00 *	37.34 *	5.00 *
* Vel Total (ft/s)	* 5.34	* Avg. Vel. (ft/s)	* 0.71 *	5.44 *	0.70 *
* Max Chl Dpth (ft)	* 7.83	* Hydr. Depth (ft)	* 0.65 *	7.83 *	0.64 *
* Conv. Total (cfs)	* 92275.4	* Conv. (cfs)	* 132.1 *	92013.2 *	130.1 *
* Length Wtd. (ft)	* 0.01	* Wetted Per. (ft)	* 5.64 *	51.70 *	5.62 *
* Min Ch El (ft)	* 1568.41	* Shear (lb/sq ft)	* 0.01 *	0.11 *	0.01 *
* Alpha	* 1.04	* Stream Power (lb/ft s)	* 0.01 *	0.57 *	0.01 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.00 *	2.20 *	0.00 *
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.01 *	0.61 *	0.01 *

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 550

INPUT
Description: Hafen Lane Bridge

Distance from Upstream XS = .01
Deck/Roadway Width = 102
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1575.59	1572.41	1037.34	1575.59	1572.41

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
857.5	1576.11	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1187.34	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
857.5	.025	1000	.015	1037.34	.015

Bank Sta: Left Right Coeff Contr. Expan.
1000 1037.34 .3 .5

```
Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
************************************************
    1000 1575.59 1571.36 1037.34 1575.59 1571.36

Downstream Bridge Cross Section Data
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
     900 1576.11    1000 1575.59    1000 1571.36    1000 1567.36 1037.34 1567.36
 1037.34 1571.36 1037.34 1575.59 1231.44 1576.54

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
************************************************
     900    .025    1000    .015 1037.34    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1000 1037.34             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         = 1575.55
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  2

Pier Data
Pier Station     Upstream= 1012.34    Downstream= 1012.34
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1569.51     .67    1575
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1569.51     .67    1575

Pier Data
Pier Station     Upstream=    1025    Downstream=    1025
Upstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1569.51     .67    1575
Downstream     num=       2
    Width   Elev    Width   Elev
*********************************
     .67 1569.51     .67    1575

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Yarnell                KVal =    1.25
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =.8164966
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1
*********************************************************************************************
* E.G. US. (ft)          *    1576.24  * Element               *Inside BR US *Inside BR DS *
* W.S. US. (ft)          *    1575.71  * E.G. Elev (ft)        *    1576.24  *    1576.24  *
* Q Total (cfs)          *    1595.00  * W.S. Elev (ft)        *    1575.71  *    1575.71  *
* Q Bridge (cfs)         *    1395.78  * Crit W.S. (ft)        *    1572.34  *    1571.29  *
* Q Weir (cfs)           *     199.22  * Max Chl Dpth (ft)     *       7.30  *       8.35  *
* Weir Sta Lft (ft)      *     857.50  * Vel Total (ft/s)      *       6.22  *       6.39  *
* Weir Sta Rgt (ft)      *    1139.49  * Flow Area (sq ft)     *     256.34  *     249.61  *
* Weir Submerg           *       0.00  * Froude # Chl          *       0.69  *       0.64  *
* Weir Max Depth (ft)    *       0.65  * Specif Force (cu ft)  *    1293.59  *    1445.30  *
* Min El Weir Flow (ft)  *    1575.60  * Hydr Depth (ft)       *       2.94  *       3.01  *
* Min El Prs (ft)        *    1572.41  * W.P. Total (ft)       *     183.06  *     178.99  *
* Delta EG (ft)          *       3.12  * Conv. Total (cfs)     *             *             *
* Delta WS (ft)          *       4.52  * Top Width (ft)        *      87.06  *      82.99  *
* BR Open Area (sq ft)   *     144.00  * Frctn Loss (ft)       *             *             *
* BR Open Vel (ft/s)     *       9.69  * C & E Loss (ft)       *             *             *
* Coef of Q              *             * Shear Total (lb/sq ft) *             *             *
* Br Sel Method          * Press/Weir  * Power Total (lb/ft s)  *             *             *
*********************************************************************************************

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical
         depth.  The Yarnell solution has been disregarded.
Note:    Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
         The Yarnell answer has been disregarded.
Note:    Momentum answer is not valid if the water surface is above the low chord or if there is weir
         flow.  The momentum answer has been disregarded.
Note:    The downstream water surface is below the minimum elevation for pressure flow.  The sluice
         gate equations were used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
```

Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

BRIDGE OUTPUT Profile #PF 2

E.G. US. (ft)	1576.70	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1576.24	E.G. Elev (ft)	1576.70	1576.70
Q Total (cfs)	1595.00	W.S. Elev (ft)	1576.24	1576.24
Q Bridge (cfs)	1448.17	Crit W.S. (ft)	1572.34	1571.29
Q Weir (cfs)	146.83	Max Chl Dpth (ft)	7.83	8.88
Weir Sta Lft (ft)	995.00	Vel Total (ft/s)	8.14	0.00
Weir Sta Rgt (ft)	1042.34	Flow Area (sq ft)	195.93	
Weir Submerg	0.00	Froude # Chl	0.58	0.56
Weir Max Depth (ft)	1.11	Specif Force (cu ft)	1308.13	1468.40
Min El Weir Flow (ft)	1575.60	Hydr Depth (ft)	4.14	
Min El Prs (ft)	1572.41	W.P. Total (ft)	144.60	133.34
Delta EG (ft)	3.58	Conv. Total (cfs)		
Delta WS (ft)	5.05	Top Width (ft)	47.34	37.34
BR Open Area (sq ft)	144.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.06	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical depth. The Yarnell solution has been disregarded.
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 500

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	1576.11	1000	1575.59	1000	1571.36	1000	1567.36	1037.34	1567.36
1037.34	1571.36	1037.34	1575.59	1231.44	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.025	1000	.015	1037.34	.025

Bank Sta: Left 1000 Right 1037.34 Lengths: Left Channel Right 40.6 40.6 40.6 Coeff Contr. .3 Expan. .5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1573.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.		0.015	
W.S. Elev (ft)	1571.19	Reach Len. (ft)	40.60	40.60	40.60
Crit W.S. (ft)	1571.19	Flow Area (sq ft)		142.93	
E.G. Slope (ft/ft)	*0.002718	Area (sq ft)		142.93	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	11.16	Avg. Vel. (ft/s)		11.16	
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)		3.83	
Conv. Total (cfs)	30595.4	Conv. (cfs)		30595.4	
Length Wtd. (ft)	40.60	Wetted Per. (ft)		45.00	
Min Ch El (ft)	1567.36	Shear (lb/sq ft)		0.54	
Alpha	1.00	Stream Power (lb/ft s)		6.01	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		2.49	
C & E Loss (ft)	0.30	Cum SA (acres)		1.40	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1573.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.		0.015	
W.S. Elev (ft)	1571.19	Reach Len. (ft)	40.60	40.60	40.60
Crit W.S. (ft)	1571.19	Flow Area (sq ft)		142.99	
E.G. Slope (ft/ft)	*0.002714	Area (sq ft)		142.99	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	11.15	Avg. Vel. (ft/s)		11.15	
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)		3.83	
Conv. Total (cfs)	30615.1	Conv. (cfs)		30615.1	

* Length Wtd. (ft)	* 40.60	* Wetted Per. (ft)	*	* 45.00	* *
* Min Ch El (ft)	* 1567.36	* Shear (lb/sq ft)	*	* 0.54	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 6.01	* *
* Frctn Loss (ft)	* 0.20	* Cum Volume (acre-ft)	*	* 1.80	* *
* C & E Loss (ft)	* 0.17	* Cum SA (acres)	*	* 0.52	* *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 400

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1401.03	1573	1416.44	1572	1433.23	1571	1455.07	1570	1472.49	1569
1487.08	1568	1492.83	1567	1496.2	1566	1499.92	1565	1507.96	1564
1515.18	1564	1521.97	1564	1526.3	1565	1530.56	1566	1535.1	1567
1540.51	1568	1546.78	1569	1554.77	1570	1571.65	1571	1596.55	1572
1609.08	1573								

Manning's n Values num= 1

Sta	n Val
1401.03	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1401.03 1609.08 132.08 134.41 158.2 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 1569.93	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.33	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1568.60	* Reach Len. (ft)	* 132.08	* 134.41	* 158.20 *
* Crit W.S. (ft)	* 1568.60	* Flow Area (sq ft)	*	* 172.57	* *
* E.G. Slope (ft/ft)	*0.009839	* Area (sq ft)	*	* 172.57	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	* 1595.00	* *
* Top Width (ft)	* 65.95	* Top Width (ft)	*	* 65.95	* *
* Vel Total (ft/s)	* 9.24	* Avg. Vel. (ft/s)	*	* 9.24	* *
* Max Chl Dpth (ft)	* 4.60	* Hydr. Depth (ft)	*	* 2.62	* *
* Conv. Total (cfs)	* 16079.8	* Conv. (cfs)	*	* 16079.8	* *
* Length Wtd. (ft)	* 134.41	* Wetted Per. (ft)	*	* 66.88	* *
* Min Ch El (ft)	* 1564.00	* Shear (lb/sq ft)	*	* 1.59	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 14.65	* *
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	*	* 2.35	* *
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	*	* 1.35	* *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1571.66	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.50	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1569.16	* Reach Len. (ft)	* 132.08	* 134.41	* 158.20 *
* Crit W.S. (ft)	* 1569.16	* Flow Area (sq ft)	*	* 125.69	* *
* E.G. Slope (ft/ft)	*0.011470	* Area (sq ft)	*	* 125.69	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	* 1595.00	* *
* Top Width (ft)	* 25.38	* Top Width (ft)	*	* 25.38	* *
* Vel Total (ft/s)	* 12.69	* Avg. Vel. (ft/s)	*	* 12.69	* *
* Max Chl Dpth (ft)	* 5.16	* Hydr. Depth (ft)	*	* 4.95	* *
* Conv. Total (cfs)	* 14892.9	* Conv. (cfs)	*	* 14892.9	* *
* Length Wtd. (ft)	* 134.41	* Wetted Per. (ft)	*	* 33.97	* *
* Min Ch El (ft)	* 1564.00	* Shear (lb/sq ft)	*	* 2.65	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 33.62	* *
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	* 1.68	* *
* C & E Loss (ft)	* 0.20	* Cum SA (acres)	*	* 0.49	* *

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 300

```
INPUT
Description:
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1326.59    1566 1398.97    1565  1411.4    1564  1429.8    1563 1447.74    1562
 1478.25    1562 1494.89    1563 1505.16    1564 1508.73 1564.29  1517.3    1565
 1546.71    1566

Manning's n Values        num=       1
     Sta   n Val
*****************
 1326.59     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1326.59 1546.71           364.63  352.07  359.83            .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1565.69  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.92  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 1564.77  * Reach Len. (ft)        *  364.63  *  352.07  *  359.83  *
* Crit W.S. (ft)         * 1564.77  * Flow Area (sq ft)      *          *  207.18  *          *
* E.G. Slope (ft/ft)     *0.010764  * Area (sq ft)           *          *  207.18  *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)             *          * 1595.00  *          *
* Top Width (ft)         *  112.79  * Top Width (ft)         *          *  112.79  *          *
* Vel Total (ft/s)       *    7.70  * Avg. Vel. (ft/s)       *          *    7.70  *          *
* Max Chl Dpth (ft)      *    2.77  * Hydr. Depth (ft)       *          *    1.84  *          *
* Conv. Total (cfs)      * 15373.4  * Conv. (cfs)            *          * 15373.4  *          *
* Length Wtd. (ft)       *  352.07  * Wetted Per. (ft)       *          *  112.99  *          *
* Min Ch El (ft)         * 1562.00  * Shear (lb/sq ft)       *          *    1.23  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    9.49  *          *
* Frctn Loss (ft)        *    3.96  * Cum Volume (acre-ft)   *          *    1.76  *          *
* C & E Loss (ft)        *    0.05  * Cum SA (acres)         *          *    1.08  *          *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION OUTPUT  Profile #PF 2
*************************************************************************************************
* E.G. Elev (ft)         * 1567.51  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.82  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 1565.69  * Reach Len. (ft)        *  364.63  *  352.07  *  359.83  *
* Crit W.S. (ft)         * 1565.69  * Flow Area (sq ft)      *          *  147.19  *          *
* E.G. Slope (ft/ft)     *0.010504  * Area (sq ft)           *          *  147.19  *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)             *          * 1595.00  *          *
* Top Width (ft)         *   40.37  * Top Width (ft)         *          *   40.37  *          *
* Vel Total (ft/s)       *   10.84  * Avg. Vel. (ft/s)       *          *   10.84  *          *
* Max Chl Dpth (ft)      *    3.68  * Hydr. Depth (ft)       *          *    3.65  *          *
* Conv. Total (cfs)      * 15562.9  * Conv. (cfs)            *          * 15562.9  *          *
* Length Wtd. (ft)       *  352.07  * Wetted Per. (ft)       *          *   47.19  *          *
* Min Ch El (ft)         * 1562.00  * Shear (lb/sq ft)       *          *    2.05  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   22.16  *          *
* Frctn Loss (ft)        *    3.71  * Cum Volume (acre-ft)   *          *    1.26  *          *
* C & E Loss (ft)        *    0.10  * Cum SA (acres)         *          *    0.39  *          *
*************************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 200

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*********************************************************************************
 1408.98    1562 1430.03    1561 1443.63    1560 1456.15    1559 1483.33    1558
 1511.65    1558 1529.54    1558 1535.63    1557 1591.46    1557 1598.86    1558
 1605.41    1559 1611.46    1560 1616.72    1561 1621.82    1562 1626.85    1563
 1633.43    1564 1640.24    1565 1646.85    1566 1659.32    1567

Manning's n Values        num=       1
     Sta   n Val
*****************
 1408.98     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       1408.98 1659.32             0       0       0            .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*************************************************************************************************
* E.G. Elev (ft)         * 1559.98  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.76  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 1559.22  * Reach Len. (ft)        *          *           *          *
* Crit W.S. (ft)         * 1559.22  * Flow Area (sq ft)      *          *  228.23  *          *
* E.G. Slope (ft/ft)     *0.011742  * Area (sq ft)           *          *  228.23  *          *
* Q Total (cfs)          * 1595.00  * Flow (cfs)             *          * 1595.00  *          *
* Top Width (ft)         *  153.34  * Top Width (ft)         *          *  153.34  *          *
* Vel Total (ft/s)       *    6.99  * Avg. Vel. (ft/s)       *          *    6.99  *          *
* Max Chl Dpth (ft)      *    2.22  * Hydr. Depth (ft)       *          *    1.49  *          *
```

* Conv. Total (cfs)	* 14719.3	* Conv. (cfs)	*	* 14719.3	*	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 153.61	*	*
* Min Ch El (ft)	* 1557.00	* Shear (lb/sq ft)	*	* 1.09	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.61	*	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 1561.41	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.48	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 1559.93	* Reach Len. (ft)	*	*	* *
* Crit W.S. (ft)	* 1559.93	* Flow Area (sq ft)	*	* 163.48	* *
* E.G. Slope (ft/ft)	*0.010579	* Area (sq ft)	*	* 163.48	* *
* Q Total (cfs)	* 1595.00	* Flow (cfs)	*	* 1595.00	* *
* Top Width (ft)	* 55.83	* Top Width (ft)	*	* 55.83	* *
* Vel Total (ft/s)	* 9.76	* Avg. Vel. (ft/s)	*	* 9.76	* *
* Max Chl Dpth (ft)	* 2.93	* Hydr. Depth (ft)	*	* 2.93	* *
* Conv. Total (cfs)	* 15507.2	* Conv. (cfs)	*	* 15507.2	* *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	*	* 61.69	* *
* Min Ch El (ft)	* 1557.00	* Shear (lb/sq ft)	*	* 1.75	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 17.08	* *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	* *
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	* *

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3	n4
Reach-1	3800	.04	.025	.04	
Reach-1	3700	.024	.025	.04	
Reach-1	3660	.04	.015	.04	
Reach-1	3650	Bridge			
Reach-1	3640	.04	.015	.04	
Reach-1	3600	.025	.04		
Reach-1	3500	.025	.04		
Reach-1	3400	.025	.04		
Reach-1	3300	.025	.04		
Reach-1	3280	.04	.025	.04	
Reach-1	3275	.015	.015	.015	
Reach-1	3270	.015	.015	.015	
Reach-1	3200	.015	.015	.015	
Reach-1	3100	.015	.015	.015	
Reach-1	3080	.015	.015	.015	
Reach-1	3050	Bridge			
Reach-1	3020	.015	.015	.015	
Reach-1	3000	.015	.015	.015	
Reach-1	2900	.015	.015	.015	
Reach-1	2800	.015	.015	.015	
Reach-1	2700	.015	.015	.015	
Reach-1	2600	.015	.015	.015	
Reach-1	2590	.04	.025	.04	
Reach-1	2500	.04	.025	.04	
Reach-1	2400	.025	.04		
Reach-1	2350	.04	.025	.04	
Reach-1	2330	.04	.025	.04	
Reach-1	2300	.04	.025	.04	
Reach-1	2200	.04	.025	.04	
Reach-1	2100	.04	.025	.04	
Reach-1	2000.1	.025	.015	.025	
Reach-1	2000	.025	.015	.025	
Reach-1	1950	Bridge			
Reach-1	1900	.025	.015	.025	
Reach-1	1800	.04	.025	.04	
Reach-1	1750	.04	.025	.04	
Reach-1	1700	.04	.025	.04	
Reach-1	1650	.04	.025	.04	
Reach-1	1600	.04	.025	.04	
Reach-1	1500	.04	.025	.04	
Reach-1	1400	.04	.025	.04	
Reach-1	1300	.04	.025	.04	
Reach-1	1200	.04	.025	.04	
Reach-1	1100	.04	.025	.04	.04
Reach-1	1000	.04	.025	.04	
Reach-1	900	.04	.025	.04	
Reach-1	800	.04	.025	.04	
Reach-1	700	.04	.025	.04	
Reach-1	600	.04	.025	.04	
Reach-1	580	.025	.015	.025	
Reach-1	550	Bridge			
Reach-1	500	.025	.015	.025	
Reach-1	400	.03			
Reach-1	300	.03			
Reach-1	200	.03			

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	3800	580	566	553
Reach-1	3700	222.1	225	219.5
Reach-1	3660	42.6	42.6	42.6
Reach-1	3650	Bridge		
Reach-1	3640	143.1	143.1	143.1
Reach-1	3600	366.01	370	383

*Reach-1	*	3500	*	392*	394*	393*
*Reach-1	*	3400	*	347*	344*	345*
*Reach-1	*	3300	*	49*	51*	53*
*Reach-1	*	3280	*	17.5*	17.5*	17.5*
*Reach-1	*	3275	*	33*	33*	33*
*Reach-1	*	3270	*	250*	250*	250*
*Reach-1	*	3200	*	400*	400*	400*
*Reach-1	*	3100	*	40*	40*	40*
*Reach-1	*	3080	*	127.2*	127.2*	127.2*
*Reach-1	*	3050	*Bridge	*	*	*
*Reach-1	*	3020	*	150*	150*	150*
*Reach-1	*	3000	*	350*	350*	350*
*Reach-1	*	2900	*	290*	290*	290*
*Reach-1	*	2800	*	250*	250*	250*
*Reach-1	*	2700	*	381.4*	381.4*	381.4*
*Reach-1	*	2600	*	6.4*	6.4*	6.4*
*Reach-1	*	2590	*	226*	210*	201*
*Reach-1	*	2500	*	186.68*	179.72*	182.96*
*Reach-1	*	2400	*	57*	71*	87*
*Reach-1	*	2350	*	64*	63*	63*
*Reach-1	*	2330	*	235*	240*	222*
*Reach-1	*	2300	*	320.42*	311.55*	310.65*
*Reach-1	*	2200	*	383.01*	328.57*	273.85*
*Reach-1	*	2100	*	67.6*	97.6*	97.6*
*Reach-1	*	2000.1	*	1*	1*	1*
*Reach-1	*	2000	*	320.07*	319.85*	303.13*
*Reach-1	*	1950	*Bridge	*	*	*
*Reach-1	*	1900	*	38.8*	38.8*	38.8*
*Reach-1	*	1800	*	173.79*	170.93*	148.02*
*Reach-1	*	1750	*	171.49*	169.33*	179.87*
*Reach-1	*	1700	*	163.66*	161.13*	154.63*
*Reach-1	*	1650	*	190.68*	175.57*	185.82*
*Reach-1	*	1600	*	157*	142*	133*
*Reach-1	*	1500	*	125*	113*	101*
*Reach-1	*	1400	*	122.02*	161.58*	190.42*
*Reach-1	*	1300	*	198.91*	176.37*	153.42*
*Reach-1	*	1200	*	111.55*	110.23*	110.23*
*Reach-1	*	1100	*	102.45*	103.7*	103.7*
*Reach-1	*	1000	*	116.93*	118.27*	121.55*
*Reach-1	*	900	*	102.08*	103.62*	108.33*
*Reach-1	*	800	*	134*	133*	133*
*Reach-1	*	700	*	109*	119*	125*
*Reach-1	*	600	*	65.6*	65.6*	65.6*
*Reach-1	*	580	*	102.1*	102.1*	102.1*
*Reach-1	*	550	*Bridge	*	*	*
*Reach-1	*	500	*	40.6*	40.6*	40.6*
*Reach-1	*	400	*	132.08*	134.41*	158.2*
*Reach-1	*	300	*	364.63*	352.07*	359.83*
*Reach-1	*	200	*	0*	0*	0*

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER-1

Reach	River Sta.	Contr.	Expan.
*Reach-1	* 3800	* .1*	.3*
*Reach-1	* 3700	* .1*	.3*
*Reach-1	* 3660	* .3*	.5*
*Reach-1	* 3650	*Bridge *	*
*Reach-1	* 3640	* .3*	.5*
*Reach-1	* 3600	* .1*	.3*
*Reach-1	* 3500	* .1*	.3*
*Reach-1	* 3400	* .1*	.3*
*Reach-1	* 3300	* .1*	.3*
*Reach-1	* 3280	* .1*	.3*
*Reach-1	* 3275	* .1*	.3*
*Reach-1	* 3270	* .1*	.3*
*Reach-1	* 3200	* .1*	.3*
*Reach-1	* 3100	* .1*	.3*
*Reach-1	* 3080	* .1*	.3*
*Reach-1	* 3050	*Bridge *	*
*Reach-1	* 3020	* .1*	.3*
*Reach-1	* 3000	* .1*	.3*
*Reach-1	* 2900	* .1*	.3*
*Reach-1	* 2800	* .1*	.3*
*Reach-1	* 2700	* .1*	.3*
*Reach-1	* 2600	* .1*	.3*
*Reach-1	* 2590	* .1*	.3*
*Reach-1	* 2500	* .1*	.3*
*Reach-1	* 2400	* .1*	.3*
*Reach-1	* 2350	* .1*	.3*
*Reach-1	* 2330	* .1*	.3*
*Reach-1	* 2300	* .1*	.3*
*Reach-1	* 2200	* .1*	.3*
*Reach-1	* 2100	* .1*	.3*
*Reach-1	* 2000.1	* .1*	.1*
*Reach-1	* 2000	* .3*	.5*
*Reach-1	* 1950	*Bridge *	*
*Reach-1	* 1900	* .3*	.5*
*Reach-1	* 1800	* .1*	.3*
*Reach-1	* 1750	* .1*	.3*
*Reach-1	* 1700	* .1*	.3*
*Reach-1	* 1650	* .1*	.3*
*Reach-1	* 1600	* .1*	.3*
*Reach-1	* 1500	* .1*	.3*
*Reach-1	* 1400	* .1*	.3*
*Reach-1	* 1300	* .1*	.3*
*Reach-1	* 1200	* .1*	.3*
*Reach-1	* 1100	* .1*	.3*
*Reach-1	* 1000	* .1*	.3*
*Reach-1	* 900	* .1*	.3*
*Reach-1	* 800	* .1*	.3*

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*Reach-1          *    700      *        .1*       .3*
*Reach-1          *    600      *        .1*       .3*
*Reach-1          *    580      *        .3*       .5*
*Reach-1          *    550      *Bridge   *         *
*Reach-1          *    500      *        .3*       .5*
*Reach-1          *    400      *        .1*       .3*
*Reach-1          *    300      *        .1*       .3*
*Reach-1          *    200      *        .1*       .3*
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Profile Output Table - CHECKRAS
************************************************************************************************************************************************************************************
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* Reach       * River Sta     * Froude # Chl * Top Wdth Act * Conv. Total * Prof Delta WS * Left Sta Eff * Enc Sta L * Center Station * Enc Sta R * Rght Sta Eff * Min Ch El * Left Stagn * Right Stagn *
*             *               *             *         (ft) *       (cfs) *          (ft) *         (ft) *       (ft) *           (ft) *         (ft) *         (ft) *       (ft) *          (ft) *
************************************************************************************************************************************************************************************
************************************************************
* Reach-1     * 3800          *       0.99 *       230.33 *      8738.2 *               *      1095.27 *          *        1253.25 *      1325.60 *      1654.00 *
* Reach-1     * 3800          *       0.99 *       230.33 *      8738.2 *          0.00 *      1095.27 *          *        1253.25 *      1325.60 *      1654.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3700          *       0.20 *       190.24 *     54487.9 *               *      1280.37 *          *        1381.31 *      1470.61 *      1650.00 *
* Reach-1     * 3700          *       0.20 *       190.24 *     54487.9 *          0.00 *      1280.37 *          *        1381.31 *      1470.61 *      1650.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3660          *       0.21 *       130.19 *     38449.6 *               *       961.80 *          *        1026.96 *      1091.99 *      1647.91 *
* Reach-1     * 3660          *       0.21 *       130.19 *     38449.6 *          0.00 *       961.80 *          *        1026.96 *      1091.99 *      1647.91 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3650    BR U  *       0.32 *       112.36 *             *               *       961.80 *          *        1026.96 *      1074.16 *      1647.91 *
* Reach-1     * 3650    BR U  *       0.32 *       112.36 *             *          0.00 *       961.80 *          *        1026.96 *      1074.16 *      1647.91 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3650    BR D  *       0.37 *       100.12 *             *               *       956.10 *          *        1015.16 *      1056.22 *      1647.78 *
* Reach-1     * 3650    BR D  *       0.37 *       100.12 *             *          0.00 *       956.10 *          *        1015.16 *      1056.22 *      1647.78 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3640          *       0.77 *        94.08 *     10746.1 *               *       956.10 *          *        1015.16 *      1050.18 *      1647.78 *
* Reach-1     * 3640          *       0.77 *        94.08 *     10746.1 *          0.00 *       956.10 *          *        1015.16 *      1050.18 *      1647.78 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3600          *       1.00 *        54.66 *      9929.1 *               *      1195.29 *          *        1216.27 *      1249.95 *      1646.00 *
* Reach-1     * 3600          *       1.00 *        54.66 *      9929.1 *          0.00 *      1195.29 *          *        1216.27 *      1249.95 *      1646.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3500          *       1.01 *        68.89 *      9652.1 *               *      1203.83 *          *        1229.21 *      1272.72 *      1643.00 *
* Reach-1     * 3500          *       1.01 *        68.89 *      9652.1 *          0.00 *      1203.83 *          *        1229.21 *      1272.72 *      1643.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3400          *       1.01 *        65.00 *      9739.3 *               *      1204.18 *          *        1222.27 *      1269.18 *      1638.00 *
* Reach-1     * 3400          *       1.01 *        65.00 *      9739.3 *          0.00 *      1204.18 *          *        1222.27 *      1269.18 *      1638.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3300          *       0.38 *        54.64 *     28624.3 *               *      1162.53 *          *        1197.65 *      1244.32 *      1633.00 *
* Reach-1     * 3300          *       0.38 *        54.64 *     28624.3 *          0.00 *      1162.53 *          *        1197.65 *      1244.32 *      1633.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3280          *       1.00 *        27.50 *     10675.8 *               *      1205.39 *          *        1250.56 *      1232.89 *      1632.00 *
* Reach-1     * 3280          *       1.00 *        27.50 *     10675.8 *          0.00 *      1205.39 *          *        1250.56 *      1232.89 *      1632.00 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3275          *       1.00 *        24.66 *     15777.2 *               *      1037.67 *          *        1050.00 *      1062.33 *      1631.49 *
* Reach-1     * 3275          *       1.00 *        24.66 *     15777.2 *          0.00 *      1037.67 *          *        1050.00 *      1062.33 *      1631.49 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3270          *       1.01 *        24.66 *     15753.8 *               *      1037.67 *          *        1050.00 *      1062.33 *      1630.88 *
* Reach-1     * 3270          *       1.01 *        24.66 *     15753.8 *          0.00 *      1037.67 *          *        1050.00 *      1062.33 *      1630.88 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3200          *       1.01 *        24.66 *     15774.5 *               *      1037.67 *          *        1050.00 *      1062.33 *      1627.08 *
* Reach-1     * 3200          *       1.01 *        24.66 *     15774.5 *          0.00 *      1037.67 *          *        1050.00 *      1062.33 *      1627.08 *
*             *               *            *              *             *               *              *          *                *              *              *
* Reach-1     * 3100          *       1.01 *        24.66 *     15758.0 *               *      1037.67 *          *        1050.00 *      1062.33 *      1621.00 *
* Reach-1     * 3100          *       1.01 *        24.66 *     15758.0 *          0.00 *      1037.67 *          *        1050.00 *
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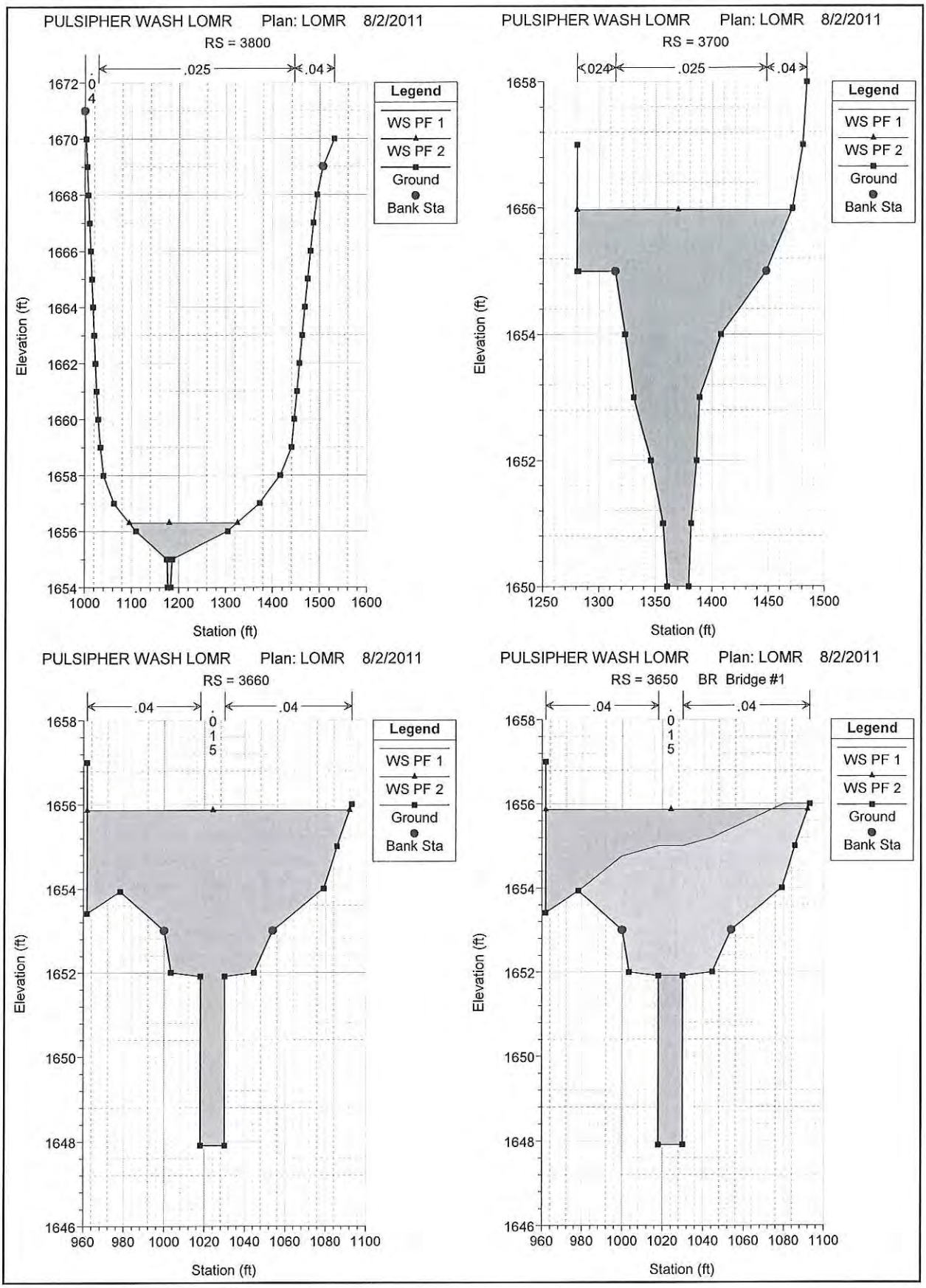
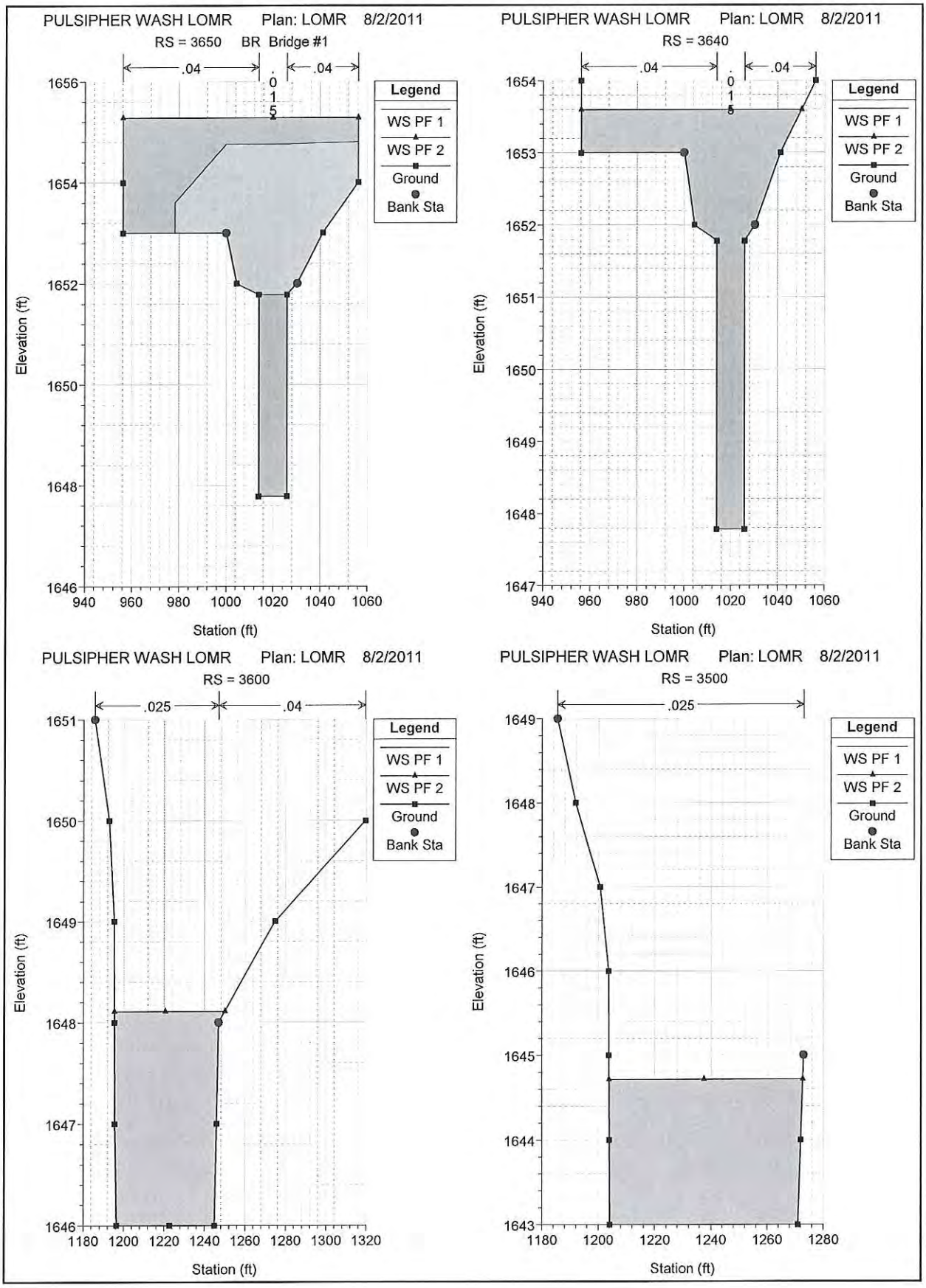
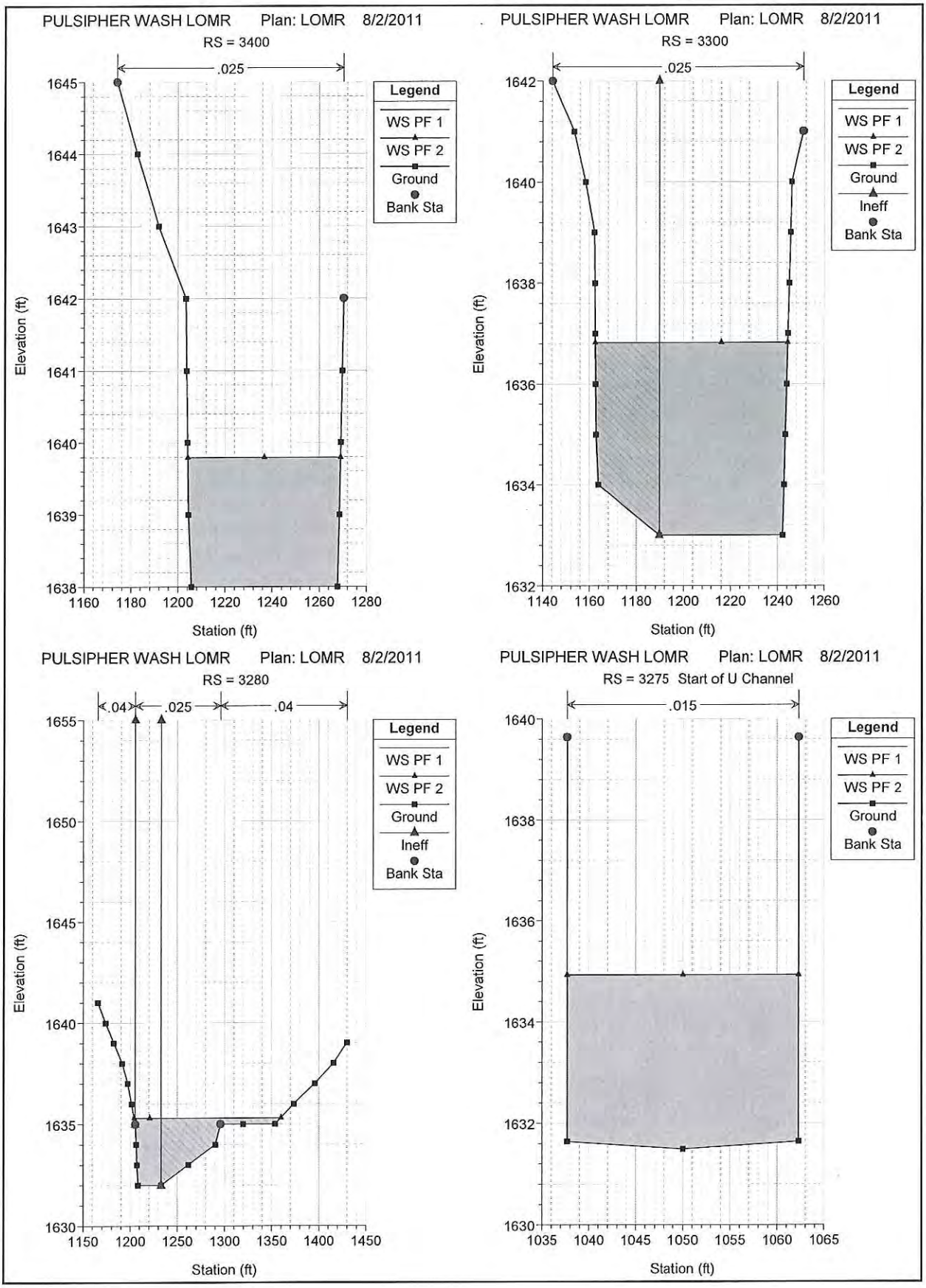
	1062.33	1621.00								
Reach-1	3080		0.72	24.00	18801.6		1037.67			1050.00
	1062.33	1620.49								
Reach-1	3080		0.72	24.00	18801.6	0.00	1037.67			1050.00
	1062.33	1620.49								
Reach-1	3050	BR U	0.72	23.99	20208.1		1037.67			1050.00
	1062.33	1620.49								
Reach-1	3050	BR U	0.72	23.99	20208.1	0.00	1037.67			1050.00
	1062.33	1620.49								
Reach-1	3050	BR D	0.50	23.99	28272.9		1037.67			1050.00
	1062.33	1619.47								
Reach-1	3050	BR D	0.50	23.99	28272.9	0.00	1037.67			1050.00
	1062.33	1619.47								
Reach-1	3020		1.00	24.00	26001.2		1037.67			1050.00
	1062.33	1619.47								
Reach-1	3020		1.00	24.00	26001.2	0.00	1037.67			1050.00
	1062.33	1619.47								
Reach-1	3000		1.00	24.00	26000.5		1037.67			1050.00
	1062.33	1618.27								
Reach-1	3000		1.00	24.00	26000.5	0.00	1037.67			1050.00
	1062.33	1618.27								
Reach-1	2900		1.00	24.00	26001.2		1037.67			1050.00
	1062.33	1615.47								
Reach-1	2900		1.00	24.00	26001.2	0.00	1037.67			1050.00
	1062.33	1615.47								
Reach-1	2800		1.00	24.00	26000.5		1037.67			1050.00
	1062.33	1613.15								
Reach-1	2800		1.00	24.00	26000.5	0.00	1037.67			1050.00
	1062.33	1613.15								
Reach-1	2700		1.00	24.00	26000.5		1037.67			1050.00
	1062.33	1611.15								
Reach-1	2700		1.00	24.00	26000.5	0.00	1037.67			1050.00
	1062.33	1611.15								
Reach-1	2600		1.00	24.00	25967.4		1037.67			1050.00
	1062.33	1608.13								
Reach-1	2600		1.00	24.00	25967.4	0.00	1037.67	1037.67		1050.00
1062.33	1062.33	1608.13								
Reach-1	2590		1.00	69.47	20899.7		1033.92			1069.16
	1103.39	1608.00								
Reach-1	2590		1.01	60.00	20464.2	0.03	1040.00	1040.00		1069.16
1100.00	1100.00	1608.00								
Reach-1	2500		0.61	60.76	34602.3		1032.31			1071.18
	1093.07	1603.00								
Reach-1	2500		0.61	60.76	34599.9	0.00	1032.31	1030.12		1071.18
1106.13	1093.07	1603.00								
Reach-1	2400		1.00	48.09	21815.6		1300.53			1338.83
	1348.61	1602.00								
Reach-1	2400		1.00	48.09	21818.5	0.00	1300.53	1293.09		1338.83
1384.56	1348.61	1602.00								
Reach-1	2350		0.82	113.19	26195.3		1068.96			1175.32
	1182.15	1601.00								
Reach-1	2350		0.72	103.18	29960.1	0.32	1080.00	1080.00		1175.32
1220.41	1183.18	1601.00								
Reach-1	2330		0.52	214.90	38804.9		1083.17			1287.63
	1298.06	1601.00								
Reach-1	2330		0.56	148.25	36008.0	0.06	1150.00	1150.00		1287.63
1330.73	1298.25	1601.00								
Reach-1	2300		0.18	322.16	111542.0		1029.63			1327.34
	1351.79	1599.00								
Reach-1	2300		0.24	188.31	84918.0	0.01	1163.50	1163.50		1327.34
1383.27	1351.81	1599.00								
Reach-1	2200		0.05	570.34	430287.5		1010.99			1548.86
	1581.33	1597.00								
Reach-1	2200		0.12	181.27	189388.8	-0.03	1400.00	1400.00		1548.86
1594.90	1581.27	1597.00								
Reach-1	2100		0.08	234.08	375679.6		959.00			1141.11
	1193.08	1593.00								
Reach-1	2100		0.09	182.51	362545.2	0.00	1010.56	1010.56		1141.11
1206.95	1193.07	1593.00								
Reach-1	2000.1		0.35	100.45	80911.3		994.34			1050.29

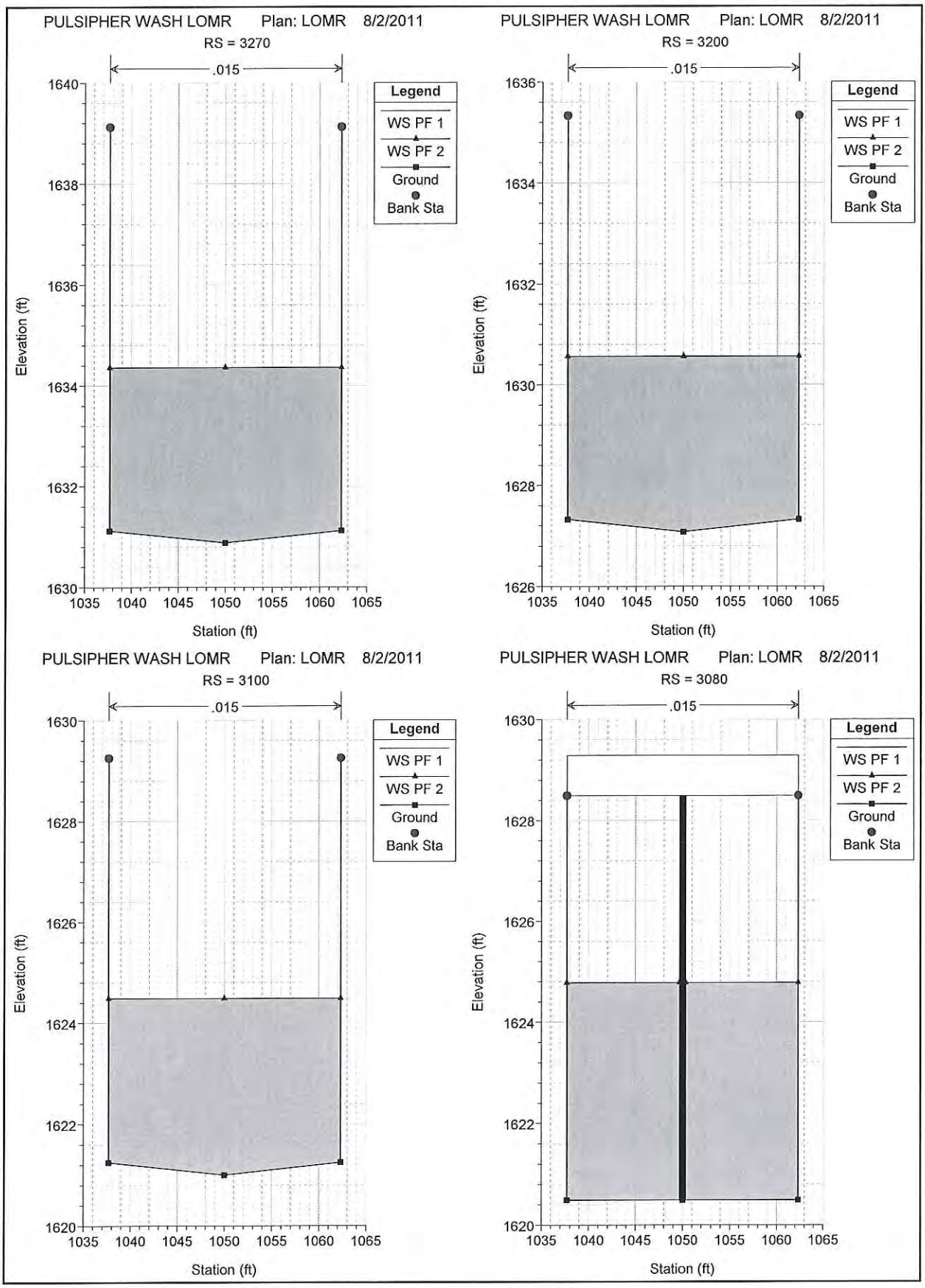
	1094.79	1591.77								
Reach-1	2000.1		0.35	100.45	80913.8	0.00	994.34	990.10	1050.29	
1094.79	1094.79	1591.77								
Reach-1	2000		0.42	12.00	50362.6		1044.29		1050.29	
	1056.29	1591.77								
Reach-1	2000		0.42	12.00	43327.0	0.00	1044.29	1044.29	1050.29	
1056.29	1056.29	1591.77								
Reach-1	1950	BR U	0.59				1044.29		1050.29	
	1056.29	1591.77								
Reach-1	1950	BR U	0.59			0.00	1044.29	1044.29	1050.29	
1056.29	1056.29	1591.77								
Reach-1	1950	BR D	0.48				1193.33		1199.33	
	1205.33	1585.08								
Reach-1	1950	BR D	0.48			0.00	1193.33	1193.33	1199.33	
1205.33	1205.33	1585.08								
Reach-1	1900		1.00	12.00	22249.0		1193.33		1199.33	
	1205.33	1585.08								
Reach-1	1900		0.90	12.00	24263.2	0.57	1193.33	1193.33	1199.33	
1205.33	1205.33	1585.08								
Reach-1	1800		0.85	104.11	21091.1		1051.22		1137.85	
	1155.34	1590.00								
Reach-1	1800		1.00	31.30	18176.1	0.39	1117.33	1117.33	1137.85	
1148.63	1148.63	1590.00								
Reach-1	1750		0.81	216.57	23537.2		1105.02		1318.81	
	1321.59	1588.00								
Reach-1	1750		0.99	40.09	19526.7	0.61	1278.17	1278.17	1318.81	
1318.26	1318.26	1588.00								
Reach-1	1700		0.72	255.42	22961.7		1221.91		1474.58	
	1477.33	1587.00								
Reach-1	1700		0.89	56.44	21898.8	0.97	1408.08	1408.08	1474.58	
1464.52	1464.52	1587.00								
Reach-1	1650		0.81	227.05	20068.4		1390.13		1598.78	
	1617.18	1585.00								
Reach-1	1650		0.99	42.78	19452.8	0.74	1557.78	1557.78	1598.78	
1600.56	1600.56	1585.00								
Reach-1	1600		1.00	107.28	12809.9		1449.06		1505.53	
	1556.34	1584.00								
Reach-1	1600		1.00	45.70	14093.3	0.85	1462.44	1462.44	1505.53	
1508.14	1508.14	1584.00								
Reach-1	1500		0.30	108.62	66483.7		1042.97		1096.95	
	1151.59	1578.00								
Reach-1	1500		0.29	105.59	67058.3	0.00	1046.00	1046.00	1096.95	
1152.39	1151.59	1578.00								
Reach-1	1400		1.00	27.06	16024.7		1313.55		1318.62	
	1340.61	1576.00								
Reach-1	1400		1.00	27.05	16003.4	0.00	1313.56	1311.27	1318.62	
1345.71	1340.61	1576.00								
Reach-1	1300		0.92	31.34	16375.0		1634.90		1650.87	
	1666.23	1573.00								
Reach-1	1300		0.72	32.60	20900.4	0.89	1634.75	1634.75	1650.87	
1667.65	1667.35	1573.00								
Reach-1	1200		0.63	59.57	21143.0		1625.88		1658.03	
	1685.45	1572.00								
Reach-1	1200		0.65	34.25	20705.3	0.44	1625.22	1624.95	1658.03	
1659.47	1659.47	1572.00								
Reach-1	1100		0.62	52.77	22504.2		1621.72		1648.48	
	1674.49	1572.00								
Reach-1	1100		0.70	34.25	19687.7	0.26	1621.29	1619.57	1648.48	
1655.53	1655.53	1572.00								
Reach-1	1000		0.72	57.04	17688.9		1620.68		1650.25	
	1677.72	1572.00								
Reach-1	1000		0.65	39.42	19370.1	0.51	1619.90	1619.06	1650.25	
1659.32	1659.32	1572.00								
Reach-1	900		0.75	51.83	17519.9		1617.47		1636.80	
	1669.30	1570.00								
Reach-1	900		0.73	34.76	18121.1	0.46	1616.68	1615.48	1636.80	
1651.44	1651.44	1570.00								
Reach-1	800		0.57	63.25	23681.9		1604.13		1635.31	
	1667.38	1570.00								
Reach-1	800		0.57	43.47	23254.1	0.52	1603.37	1601.95	1635.31	
1646.84	1646.84	1570.00								

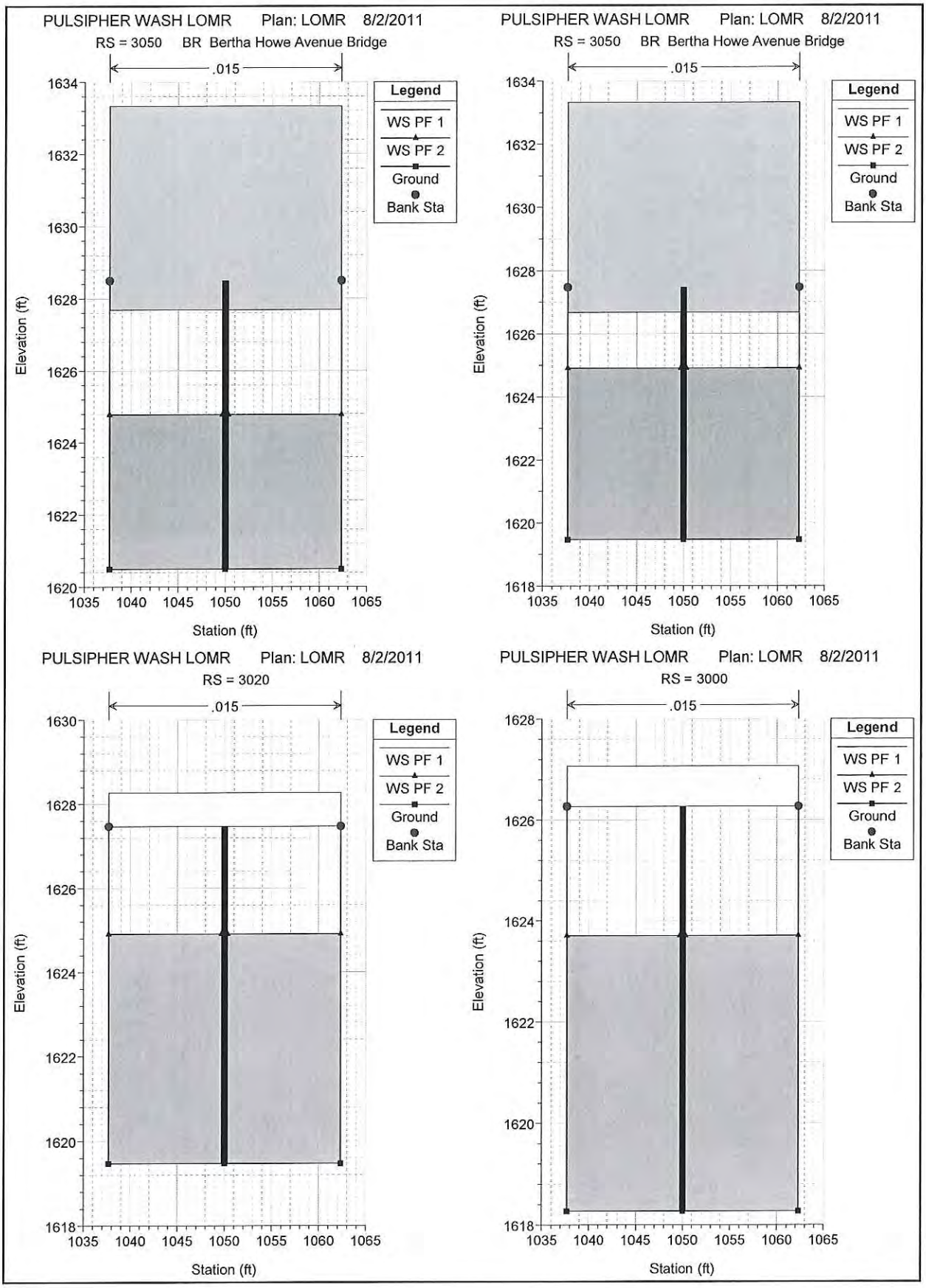
Reach-1	700		0.47	73.41	29061.7		1597.06		1633.03	
	1670.48	1570.00								
Reach-1	700		0.59	44.77	23984.2	0.26	1596.67	1594.24	1633.03	
1641.44	1641.44	1570.00								
Reach-1	600		0.42	104.98	36033.3		1581.36		1604.43	
	1686.34	1569.00								
Reach-1	600		0.47	46.44	31843.5	0.29	1581.21	1581.21	1604.43	
1627.65	1627.65	1569.00								
Reach-1	580		0.38	87.06	81730.2		968.46		1018.67	
	1055.51	1568.41								
Reach-1	580		0.34	47.34	92275.4	0.54	995.00	995.00	1018.67	
1042.34	1042.34	1568.41								
Reach-1	550	BR U	0.69	87.06			968.46		1018.67	
	1055.51	1568.41								
Reach-1	550	BR U	0.58	47.34		0.54	995.00	995.00	1018.67	
1042.34	1042.34	1568.41								
Reach-1	550	BR D	0.64	82.99			977.86		1018.67	
	1060.86	1567.36								
Reach-1	550	BR D	0.56	37.34		0.54	1000.00	1000.00	1018.67	
1037.34	1037.34	1567.36								
Reach-1	500		1.01	37.34	30595.4		1000.00		1018.67	
	1037.34	1567.36								
Reach-1	500		1.00	37.34	30615.1	0.00	1000.00	1000.00	1018.67	
1037.34	1037.34	1567.36								
Reach-1	400		1.01	65.95	16079.8		1478.32		1505.06	
	1544.27	1564.00								
Reach-1	400		1.00	25.38	14892.9	0.56	1501.15	1501.15	1505.06	
1526.53	1526.53	1564.00								
Reach-1	300		1.00	112.79	15373.4		1401.78		1436.65	
	1514.57	1562.00								
Reach-1	300		1.00	40.37	15562.9	0.91	1441.01	1441.01	1436.65	
1481.38	1481.38	1562.00								
Reach-1	200		1.01	153.34	14719.3		1453.40		1534.15	
	1606.74	1557.00								
Reach-1	200		1.00	55.83	15507.2	0.71	1535.63	1535.63	1534.15	
1591.46	1591.46	1557.00								

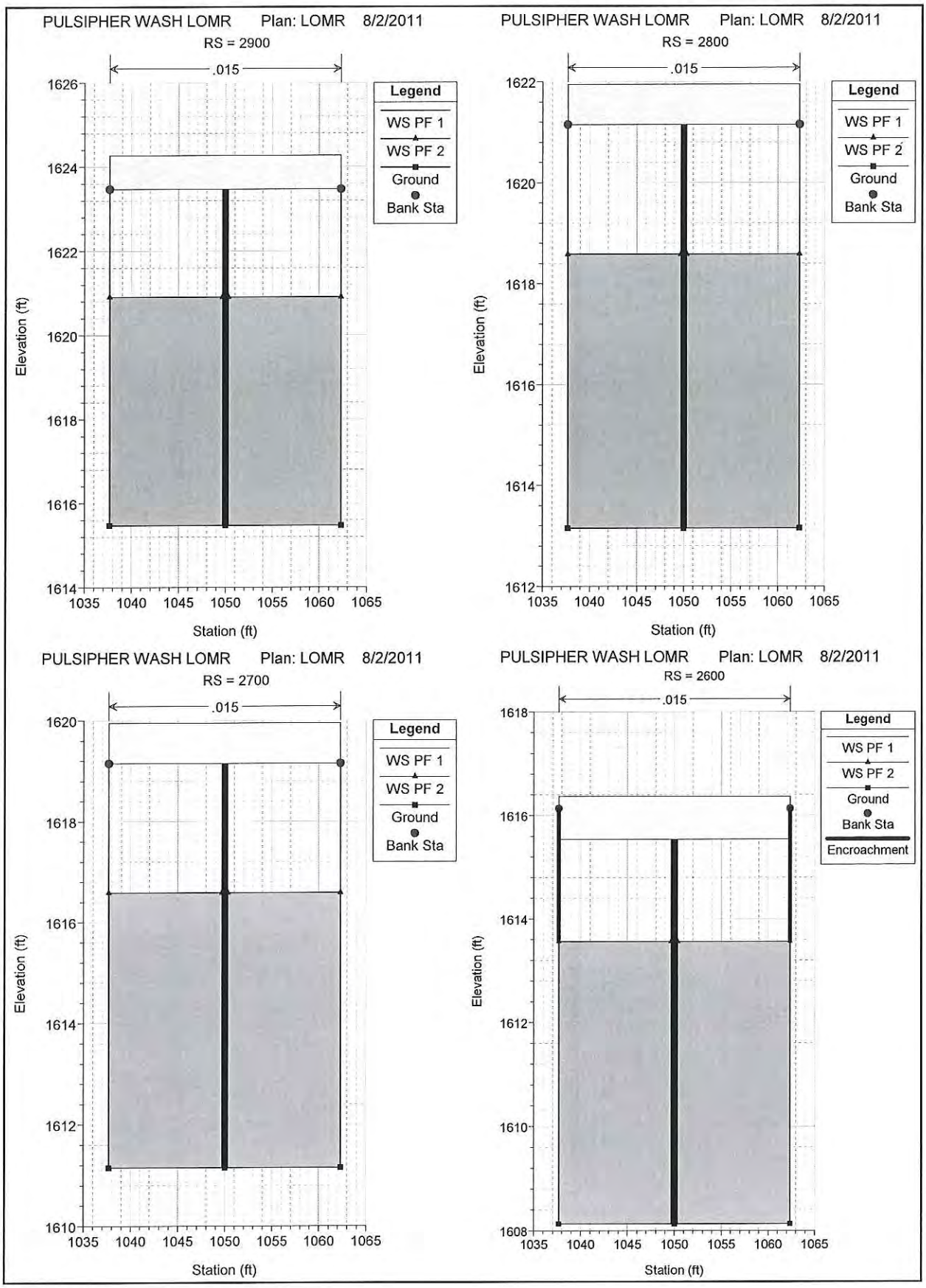

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3800
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3700
.024
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3660
.04
.015
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3650 BR Bridge #1
.04
.015
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

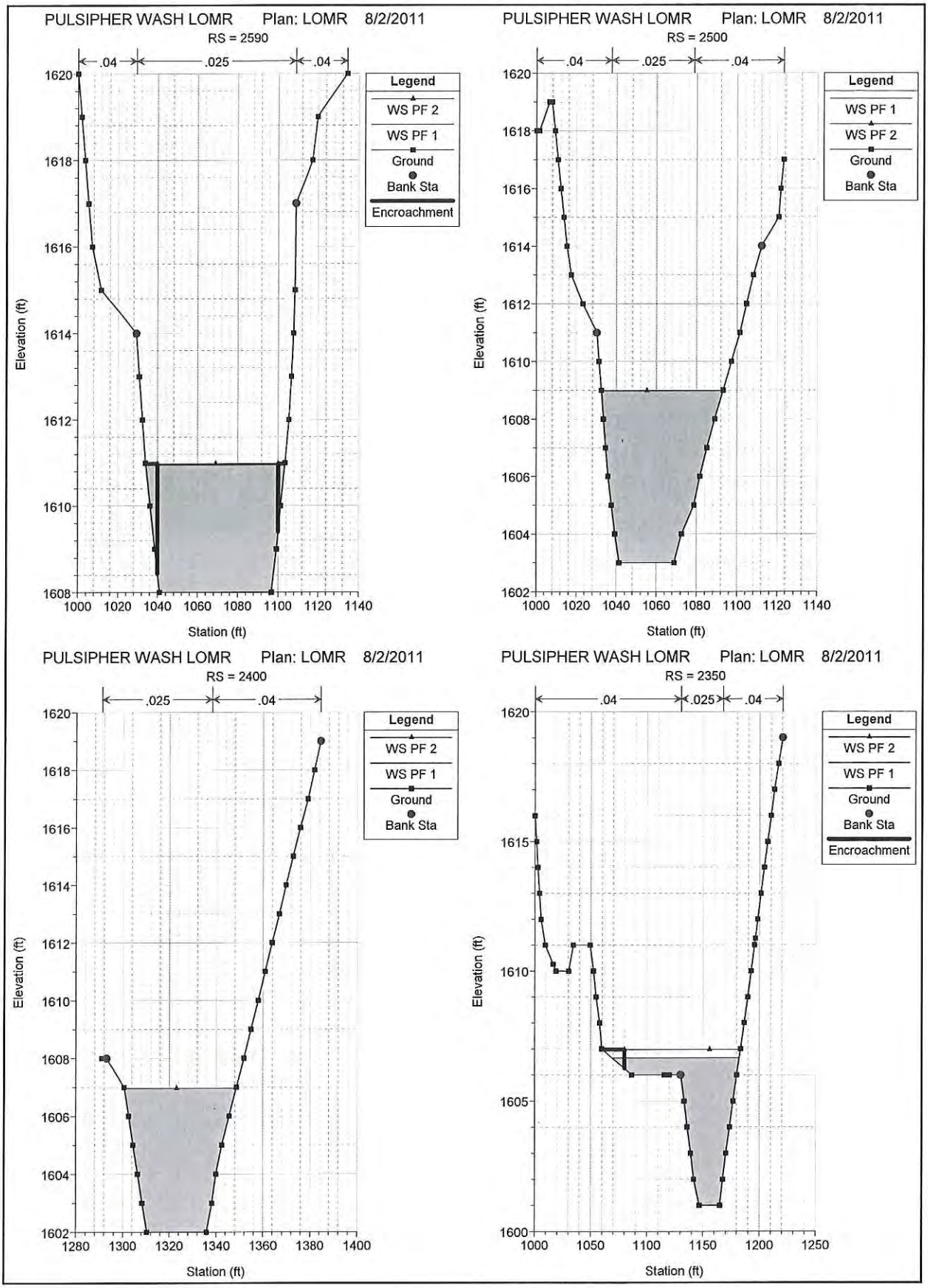

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3650 BR Bridge #1
.04
.04
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3640
.04
.04
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3600
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3500
.025
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

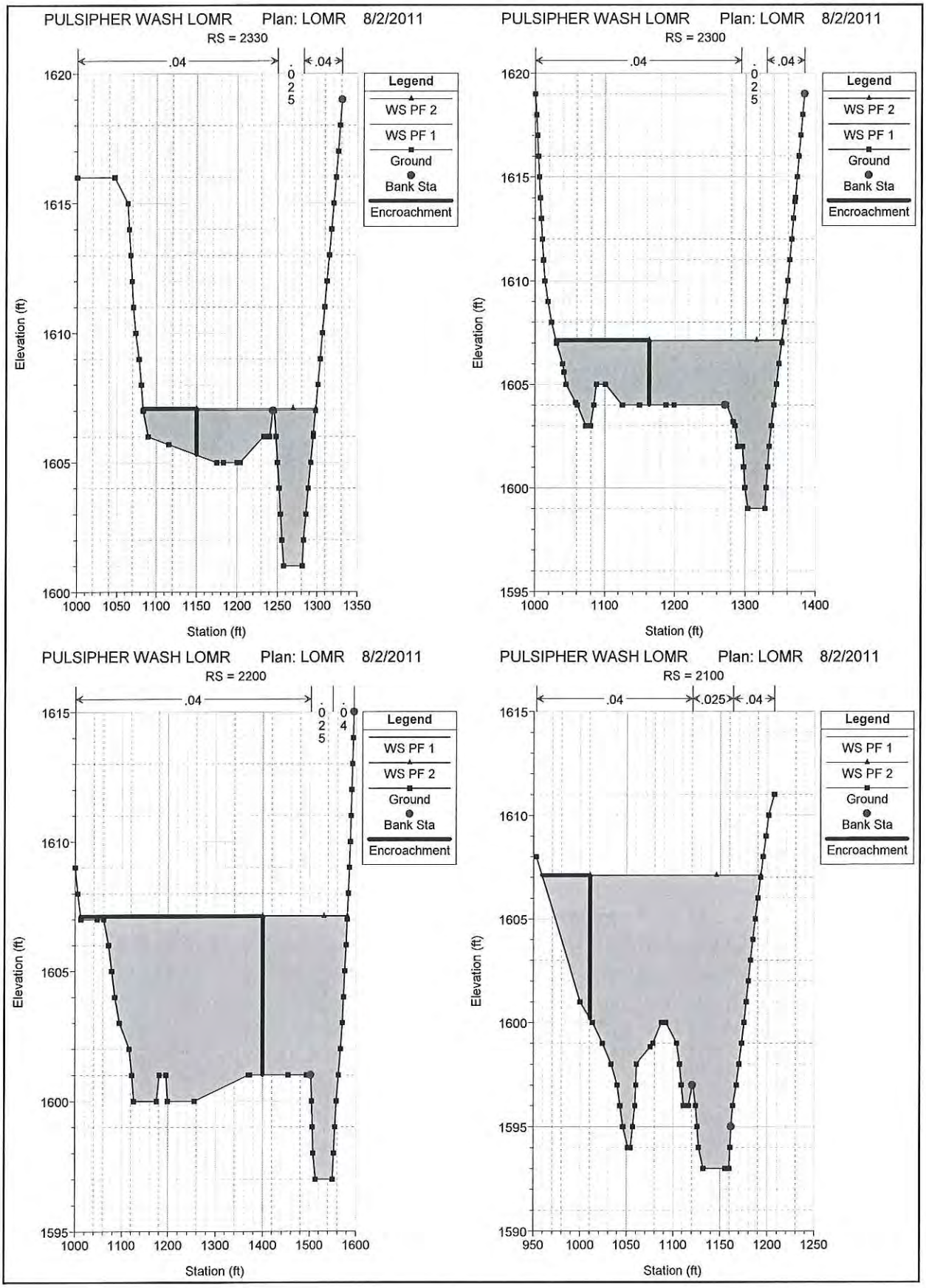

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3400
.025
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3300
.025
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3280
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3275 Start of U Channel
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

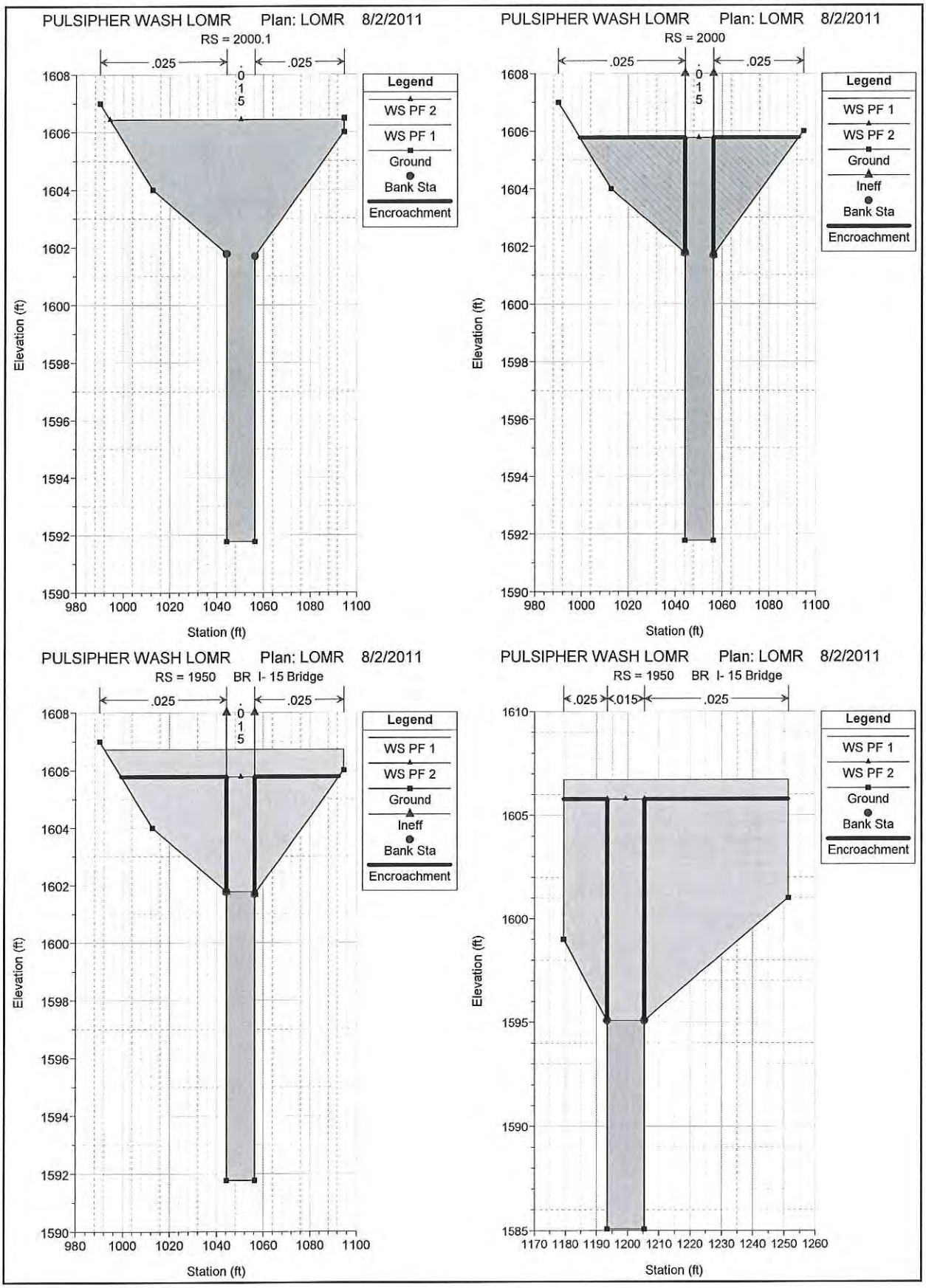

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3270
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3200
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3100
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3080
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

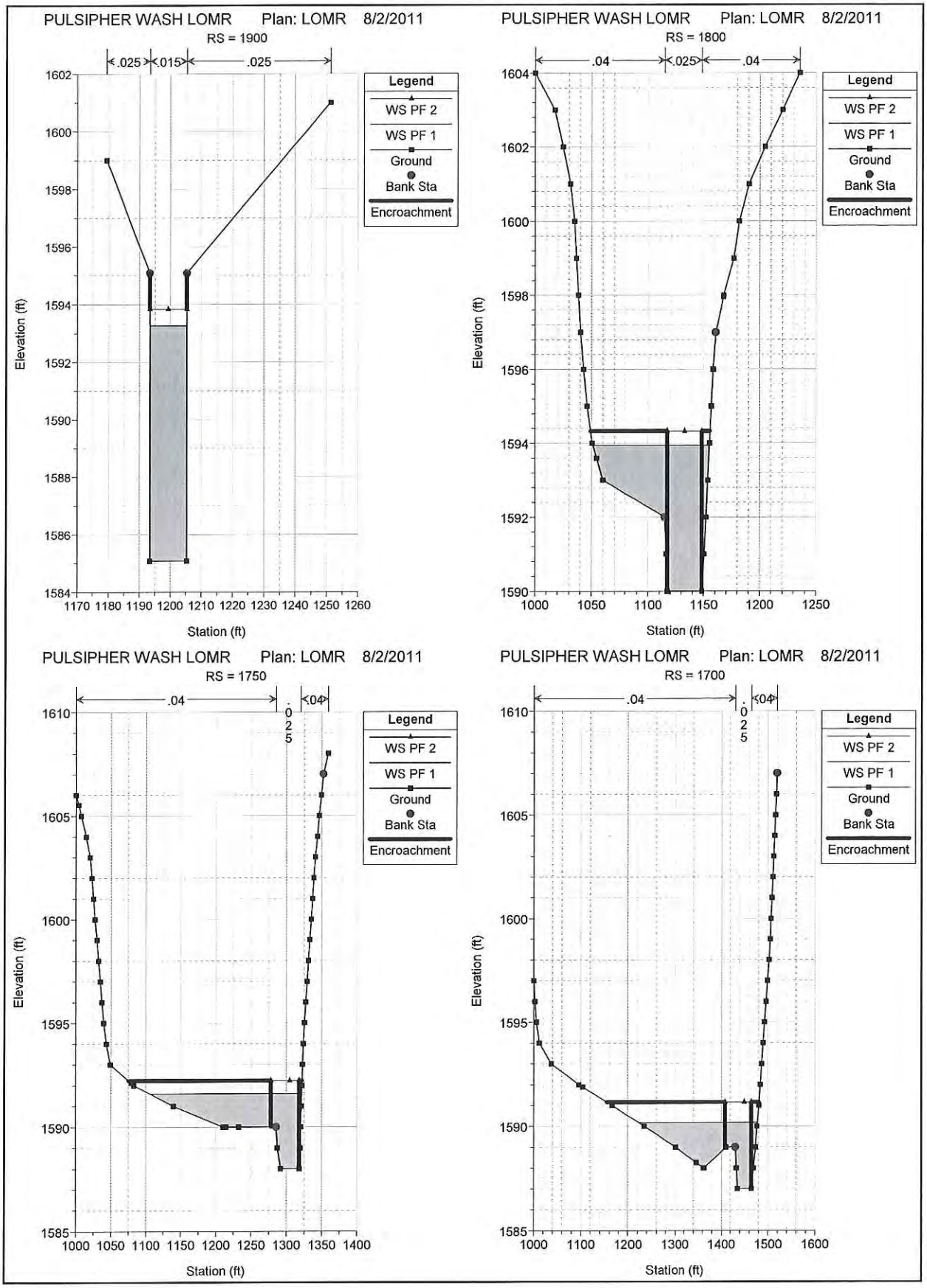

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3020
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 3000
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

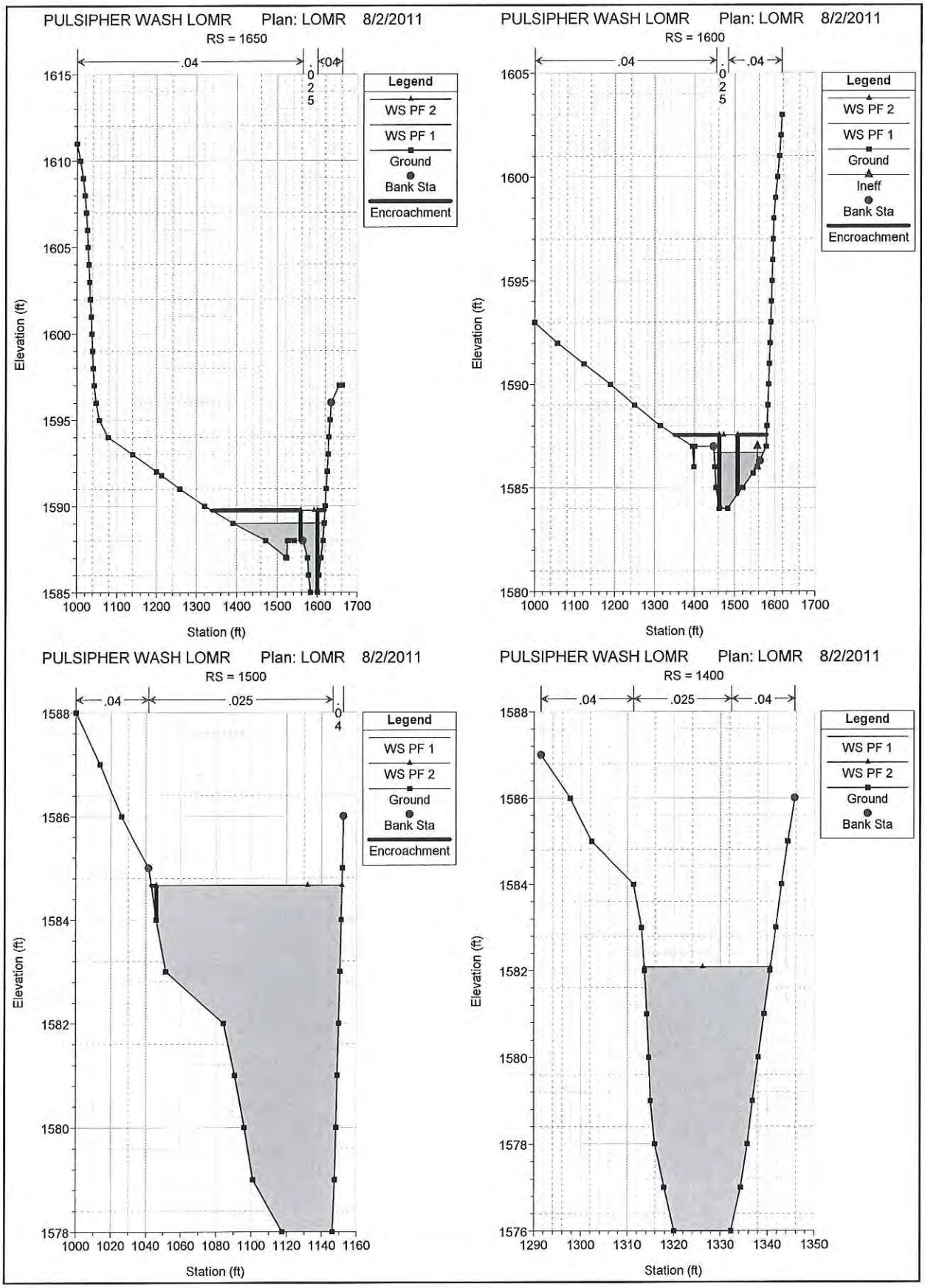

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2900
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2800
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2700
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2600
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

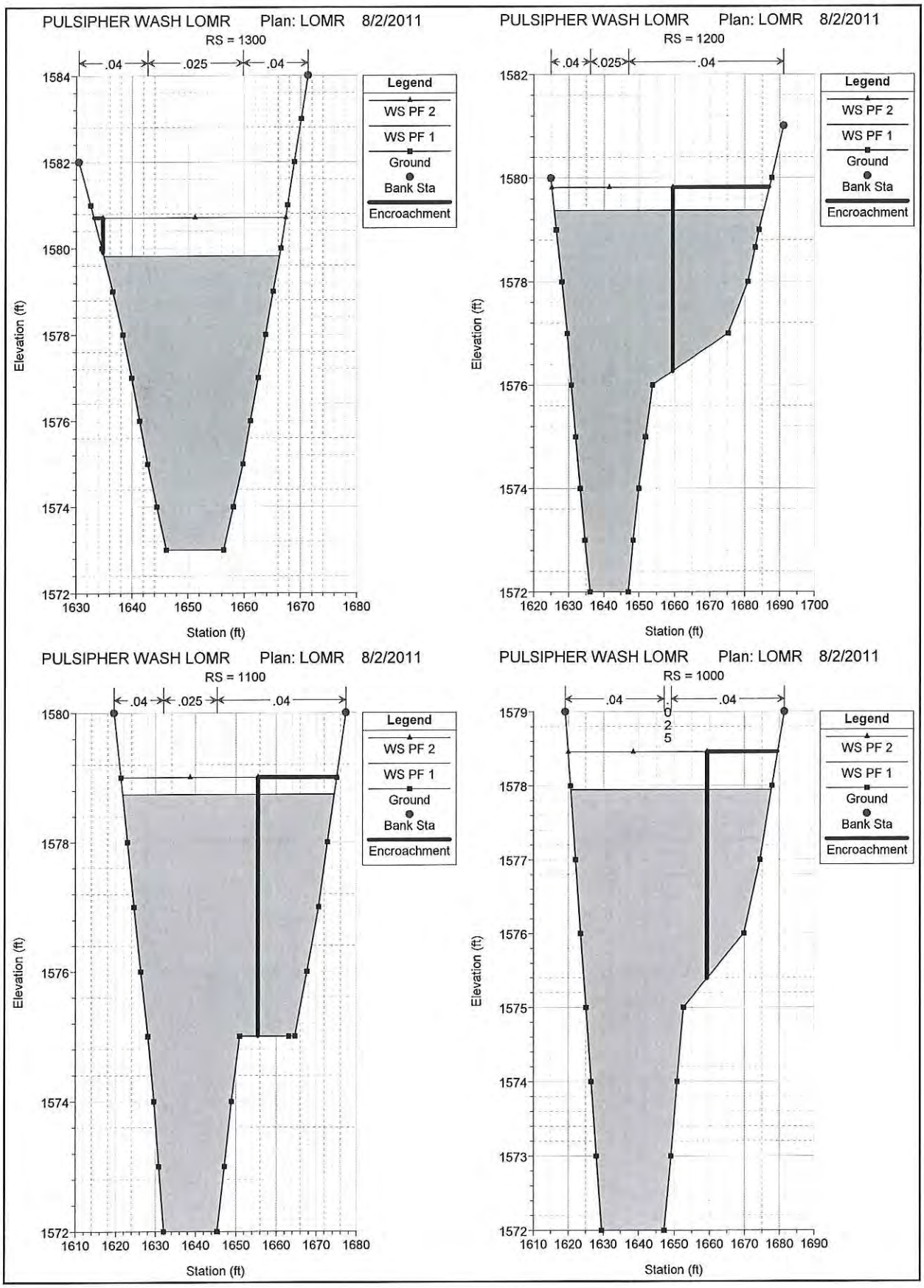

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2590
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2500
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2400
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2350
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

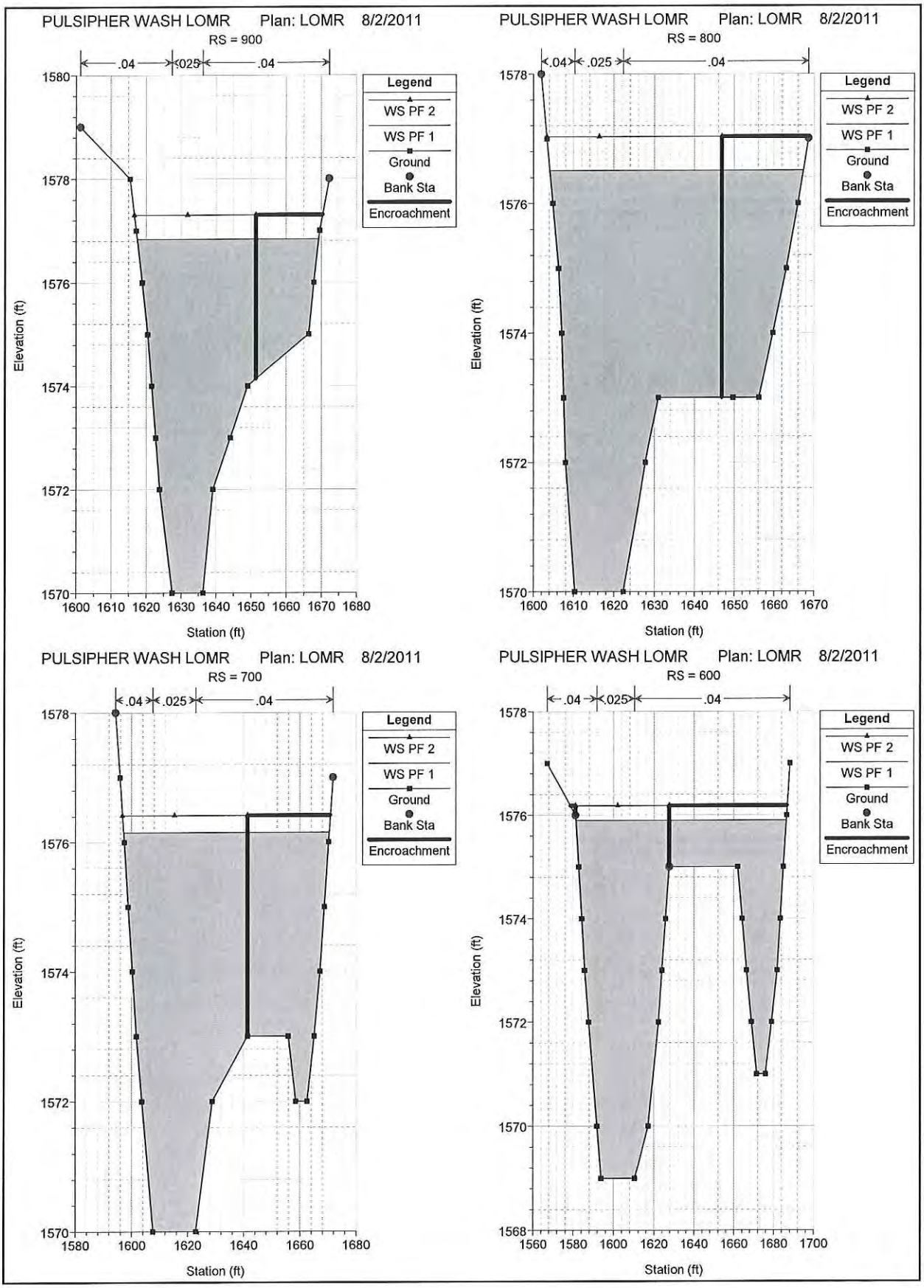

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2330
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2300
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2200
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2100
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

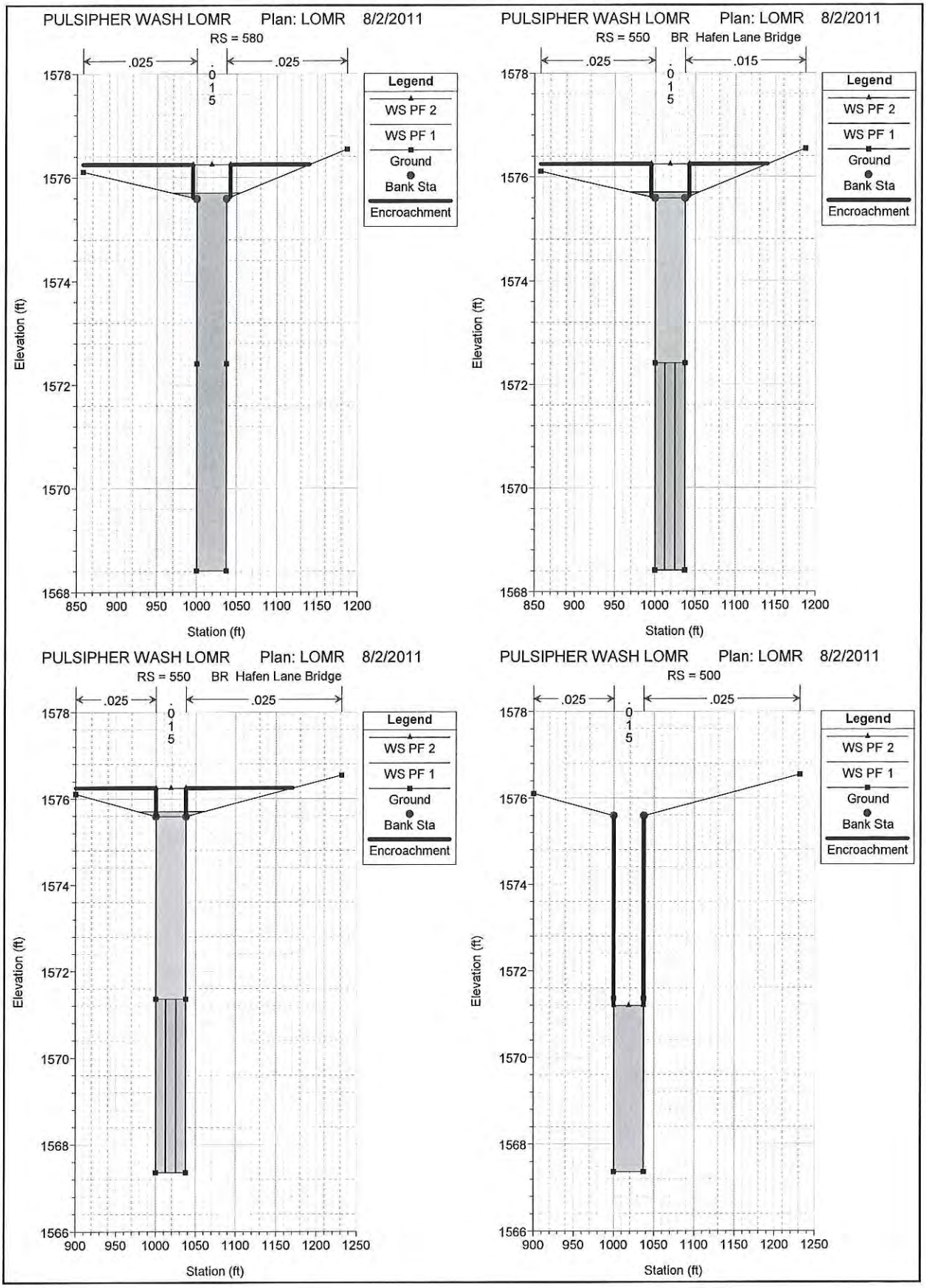

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2000.1
.025
.015
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 2000
.025
.015
.025
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1950 BR I- 15 Bridge
.025
.015
.025
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1950 BR I- 15 Bridge
.025
.015
.025
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

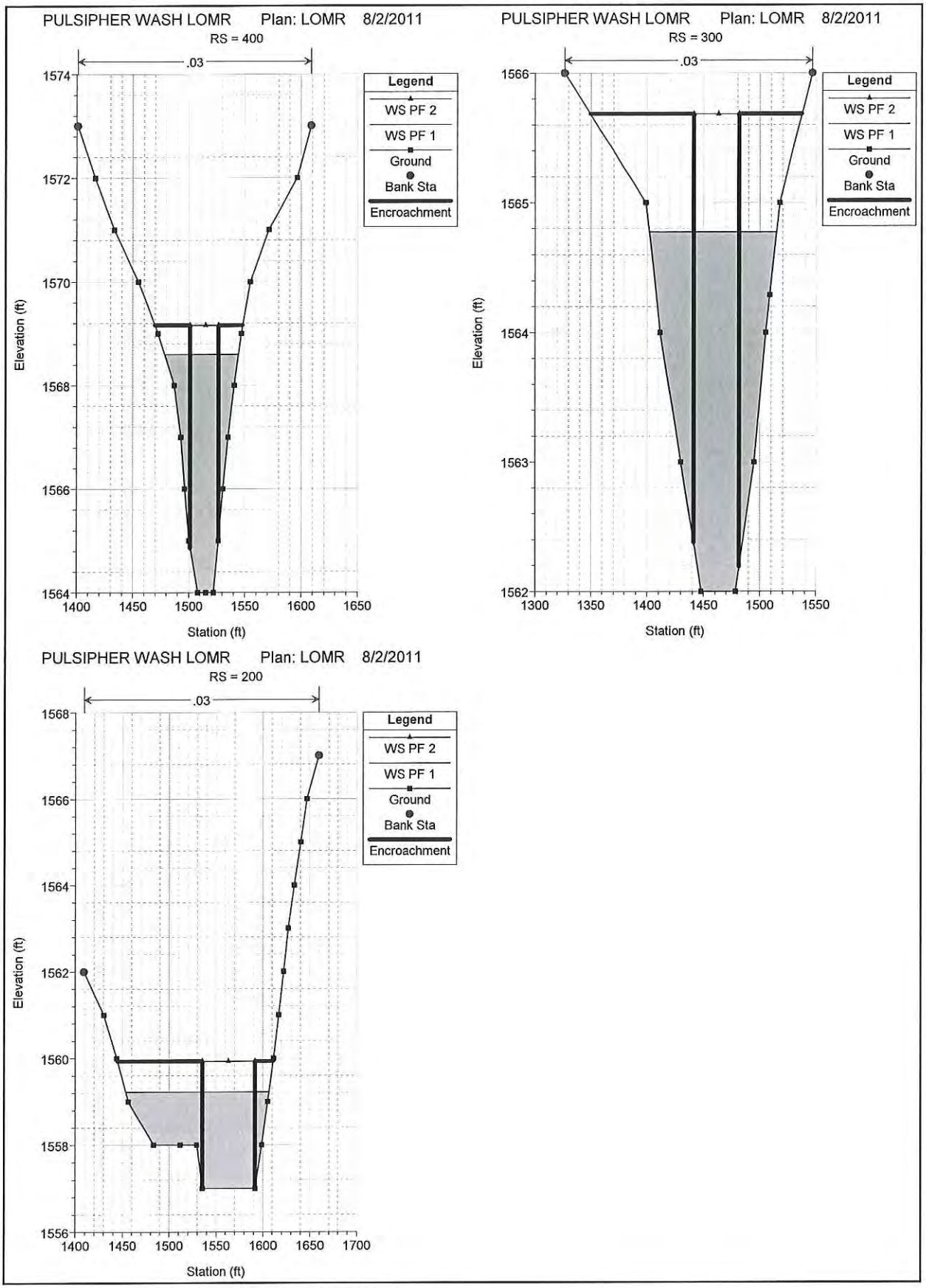

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1900
.025
.015
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1800
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1750
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1700
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1650
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1600
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1500
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1400
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1300
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1200
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1100
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 1000
.04
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 900
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 800
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 700
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 600


PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 580
.025
.025
.015
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 550 BR Hafen Lane Bridge
.025
.015
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 550 BR Hafen Lane Bridge
.025
.025
.015
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 500
.025
.025
.015
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 400
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 300
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 8/2/2011
RS = 200
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

HEC-RAS Plan: LOMR River: RIVER-1 Reach: Reach-1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	3800	867	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3800	867	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3700	867	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3700	867	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3660	867	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3660	867	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3650	Bridge									
Reach-1	3640	867	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3640	867	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3600	867	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3600	867	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3500	867	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3500	867	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3400	867	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3400	867	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3300	867	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3300	867	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3280	867	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3280	867	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3275	867	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3275	867	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3270	867	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3270	867	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3200	867	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3200	867	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3100	867	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3100	867	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3080	867	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3080	867	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3050	Bridge									
Reach-1	3020	1723	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3020	1723	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3000	1723	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	3000	1723	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	2900	1723	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2900	1723	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2800	1723	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2800	1723	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	1723	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	1723	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2600	1723	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2600	1723	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2590	1723	1608.0	1611.0	1611.0	1612.3	0.006797	9.3	185.1	69	1.00
Reach-1	2590	1723	1608.0	1611.0	1611.0	1612.5	0.007089	9.8	176.2	60	1.01
Reach-1	2500	1972	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2500	1972	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2400	1972	1602.0	1607.0	1607.0	1608.8	0.008171	11.0	179.8	48	1.00
Reach-1	2400	1972	1602.0	1607.0	1607.0	1608.8	0.008169	11.0	179.8	48	1.00
Reach-1	2350	1972	1601.0	1606.7	1606.5	1607.9	0.005667	9.3	240.4	113	0.82

HEC-RAS Plan: LOMR River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	2350	1972	1601.0	1607.0		1608.0	0.004332	8.3	270.8	103	0.72
Reach-1	2330	1972	1601.0	1607.0		1607.4	0.002583	6.1	470.4	215	0.52
Reach-1	2330	1972	1601.0	1607.1		1607.6	0.002999	6.6	392.4	148	0.56
Reach-1	2300	1972	1599.0	1607.1		1607.2	0.000313	2.4	1138.7	322	0.18
Reach-1	2300	1972	1599.0	1607.1		1607.2	0.000539	3.1	774.5	188	0.24
Reach-1	2200	1972	1597.0	1607.1		1607.1	0.000021	0.8	3344.2	570	0.05
Reach-1	2200	1972	1597.0	1607.1		1607.2	0.000108	1.9	1251.9	181	0.12
Reach-1	2100	1972	1593.0	1607.1		1607.1	0.000028	1.7	1946.3	234	0.08
Reach-1	2100	1972	1593.0	1607.1		1607.1	0.000030	1.8	1751.8	183	0.09
Reach-1	2000.1	1972	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000.1	1972	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000	1498	1591.8	1605.8	1599.6	1607.0	0.000885	8.9	168.0	93	0.42
Reach-1	2000	1498	1591.8	1605.8	1599.6	1607.0	0.001195	8.9	168.0	12	0.42
Reach-1	1950	Bridge									
Reach-1	1900	1595	1585.1	1593.3	1593.3	1597.4	0.005139	16.2	98.2	12	1.00
Reach-1	1900	1595	1585.1	1593.8	1593.2	1597.4	0.004321	15.2	105.1	12	0.90
Reach-1	1800	1595	1590.0	1593.9	1593.9	1595.0	0.005719	9.1	228.1	104	0.85
Reach-1	1800	1595	1590.0	1594.3	1594.3	1596.5	0.007701	11.8	135.5	31	1.00
Reach-1	1750	1595	1588.0	1591.6	1591.6	1592.3	0.004592	8.4	330.5	217	0.81
Reach-1	1750	1595	1588.0	1592.2	1592.2	1594.1	0.006672	11.3	150.2	40	0.99
Reach-1	1700	1595	1587.0	1590.2		1590.6	0.004825	6.7	381.3	255	0.72
Reach-1	1700	1595	1587.0	1591.2		1592.6	0.005305	10.1	185.9	56	0.89
Reach-1	1650	1595	1585.0	1589.0	1589.0	1589.7	0.006317	7.7	310.1	227	0.81
Reach-1	1650	1595	1585.0	1589.7	1589.7	1591.6	0.006723	10.9	152.2	43	0.99
Reach-1	1600	1595	1584.0	1586.7	1586.7	1587.6	0.015504	7.8	203.9	123	1.00
Reach-1	1600	1595	1584.0	1587.5	1587.5	1589.2	0.012808	10.4	153.7	46	1.00
Reach-1	1500	1595	1578.0	1584.7		1584.9	0.000576	3.5	459.8	109	0.30
Reach-1	1500	1595	1578.0	1584.7		1584.9	0.000566	3.5	458.4	106	0.29
Reach-1	1400	1595	1576.0	1582.1	1582.1	1584.5	0.009907	12.4	128.8	27	1.00
Reach-1	1400	1595	1576.0	1582.1	1582.1	1584.5	0.009933	12.4	128.7	27	1.00
Reach-1	1300	1595	1573.0	1579.8	1579.5	1581.8	0.009488	11.2	142.6	31	0.92
Reach-1	1300	1595	1573.0	1580.7		1582.1	0.005824	9.3	171.0	33	0.72
Reach-1	1200	1595	1572.0	1579.4		1580.1	0.005691	7.0	228.2	60	0.63
Reach-1	1200	1595	1572.0	1579.8		1581.0	0.005934	8.6	186.3	34	0.65
Reach-1	1100	1595	1572.0	1578.7		1579.5	0.005023	7.2	222.5	53	0.62
Reach-1	1100	1595	1572.0	1579.0		1580.3	0.006563	9.0	177.4	34	0.70
Reach-1	1000	1595	1572.0	1577.9		1578.9	0.008131	7.7	206.3	57	0.72
Reach-1	1000	1595	1572.0	1578.5		1579.5	0.006780	8.2	194.3	39	0.65
Reach-1	900	1595	1570.0	1576.8		1577.9	0.008288	8.2	193.5	52	0.75
Reach-1	900	1595	1570.0	1577.3		1578.6	0.007747	9.2	173.0	35	0.73
Reach-1	800	1595	1570.0	1576.5		1577.1	0.004536	6.4	249.7	63	0.57
Reach-1	800	1595	1570.0	1577.0		1577.9	0.004705	7.3	218.5	43	0.57
Reach-1	700	1595	1570.0	1576.2		1576.6	0.003012	5.4	296.0	73	0.47
Reach-1	700	1595	1570.0	1576.4		1577.2	0.004423	7.3	217.5	45	0.59
Reach-1	600	1595	1569.0	1575.9		1576.3	0.001959	5.5	352.5	105	0.42
Reach-1	600	1595	1569.0	1576.2		1576.8	0.002509	6.3	255.0	46	0.47
Reach-1	580	1595	1568.4	1575.7	1572.2	1576.2	0.000381	5.9	275.3	87	0.38
Reach-1	580	1595	1568.4	1576.2	1572.2	1576.7	0.000299	5.4	298.9	47	0.34
Reach-1	550	Bridge									

HEC-RAS Plan: LOMR River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	500	1595	1567.4	1571.2	1571.2	1573.1	0.002718	11.2	142.9	37	1.01
Reach-1	500	1595	1567.4	1571.2	1571.2	1573.1	0.002714	11.2	143.0	37	1.00
Reach-1	400	1595	1564.0	1568.6	1568.6	1569.9	0.009839	9.2	172.6	66	1.01
Reach-1	400	1595	1564.0	1569.2	1569.2	1571.7	0.011470	12.7	125.7	25	1.00
Reach-1	300	1595	1562.0	1564.8	1564.8	1565.7	0.010764	7.7	207.2	113	1.00
Reach-1	300	1595	1562.0	1565.7	1565.7	1567.5	0.010504	10.8	147.2	40	1.00
Reach-1	200	1595	1557.0	1559.2	1559.2	1560.0	0.011742	7.0	228.2	153	1.01
Reach-1	200	1595	1557.0	1559.9	1559.9	1561.4	0.010579	9.8	163.5	56	1.00

PULSIPHER WASH LOMR Plan: LOMR 8/2/2011

RIVER-1 Reach-1

Legend

WS PF 2

WS PF 1

Ground

Elevation (ft)

1660
1640
1620
1600
1580
1560
1540

0
2000
4000
6000
8000
10000

Main Channel Distance (ft)

300 400 550 700 800 900 1000 1100 1200 1300 1400 1500 1600 1650 1700 1750 1800 1950 2100 2200 2300 2330 2400 2500 2590 2700 2800 2900 3000 3020 3050 3200 3270 3300 3400 3500 3600 3640 3700 3800

CHECK-RAS Program: NT Check
Manning's n Value and Transition Loss Coefficient Review

Project File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.prj
Plan File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.p02
Geometry File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02
Flow File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07
Report File: F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.nt
Selected profiles: PF 1;PF 2
Date: 8/2/2011
Time: 10:51:22 AM

SECNO	STRUCTURE	NLOB	NCHL	NROB	CNTR	EXP
RIVER-1,Reach-1						
3800		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
3700		0.024	0.025	0.04	0.1	0.3
3660		0.04	0.04	-----	0.3	0.5
		-----	0.015	-----		
		-----	0.04	-----		
3650	Bridge-Up	0.04	0.04	-----	0.3	0.5
		-----	0.015	-----		
		-----	0.04	-----		
3650	Bridge-Dn	0.04	0.04	-----	0.3	0.5
		-----	0.015	-----		
		-----	0.04	-----		
3640		0.04	0.04	-----	0.3	0.5
		-----	0.015	-----		
		-----	0.04	-----		
3600		-----	0.025	0.04	0.1	0.3
3500		-----	0.025	0.04	0.1	0.3
3400		-----	0.025	0.04	0.1	0.3
3300		-----	0.025	0.04	0.1	0.3
3280		0.04	0.025	0.04	0.1	0.3
3275		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3270		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3200		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3100		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3080		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3050	Bridge-Up	-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3050	Bridge-Dn	-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3020		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
3000		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
2900		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
2800		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
2700		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
2600		-----	0.015	0.015	0.1	0.3
		-----	0.015	-----		
2590		0.04	0.025	0.04	0.1	0.3
2500		0.04	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
2400		0.025	0.025	-----	0.1	0.3
		-----	0.04	-----		
2350		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
2330		0.04	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
2300		0.04	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
2200		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
2100		0.04	0.025	0.025	0.1	0.3
		-----	-----	0.04		
2000.1		0.025	0.015	0.025	0.1	0.1
2000		0.025	0.015	0.025	0.3	0.5
1950	Bridge-Up	0.025	0.015	0.025	0.3	0.5
1950	Bridge-Dn	0.025	0.015	0.025	0.3	0.5
1900		0.025	0.015	0.025	0.3	0.5
1800		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
1750		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
1700		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
1650		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
1600		0.04	0.04	-----	0.1	0.3

		-----	0.025	-----		
		-----	0.04	-----		
1500		0.04	0.025	-----	0.1	0.3
		-----	0.04	-----		
1400		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1300		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1200		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1100		-----	0.04	0.04	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
1000		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
900		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
800		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
700		-----	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
600		0.04	0.04	-----	0.1	0.3
		-----	0.025	-----		
		-----	0.04	-----		
580		0.025	0.015	0.025	0.3	0.5
550	Bridge-Up	0.025	0.015	0.015	0.3	0.5
550	Bridge-Dn	0.025	0.015	0.025	0.3	0.5
500		0.025	0.015	0.025	0.3	0.5
400		-----	0.03	-----	0.1	0.3
300		-----	0.03	-----	0.1	0.3
		-----	0.03	-----		

---Summary of Statistics---

	Minimum	Maximum
Left Overbank n Value:	0.024	0.04
Right Overbank n Value:	0.015	0.04
Channel n Value:	0.015	0.04
Contraction Coefficient:	0.1	0.3
Expansion Coefficient:	0.1	0.5

ROUGHNESS COEFFICIENT CHECK

RS: 3700
NT RC 01 Left overbank n value is less than 0.035
The n value for overbank is usually larger then 0.035.
The n value should be reevaluated.

RS: 3700
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3600
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3500
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3400
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3300
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3280
NT RC 03 Channel n value is equal to or less than 0.025
The n value of the channel is usually larger than 0.025.
The n value should be reevaluated it if is not representing a
concrete lined channel.

RS: 3275

```
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3275
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3270
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3270
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3200
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3200
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3100
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3100
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3080
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3080
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3050
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3050
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3050
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3050
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3020
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3020
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      3000
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       3000
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
```

```
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2900
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2900
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2800
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2800
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2700
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2700
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2600
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2600
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       2590
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2400
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2100
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2000.1
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:      2000.1
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2000.1
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:      2000
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:      2000
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       2000
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.
```

```
RS:       1950
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1950
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        1950
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       1950
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1950
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        1950
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       1900
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       1900
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        1900
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       580
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       580
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        580
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       550
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       550
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        550
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.

RS:       550
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       550
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:        550
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
```

```
         concrete lined channel.

RS:      500
NT RC 01 Left overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:      500
NT RC 01 Right overbank n value is less than 0.035
         The n value for overbank is usually larger then 0.035.
         The n value should be reevaluated.

RS:       500
NT RC 03 Channel n value is equal to or less than 0.025
         The n value of the channel is usually larger than 0.025.
         The n value should be reevaluated it if is not representing a
         concrete lined channel.
```

Reply (TYPICAL): Channel 'n' have been referenced from approved FIS and field verified.

```
TRANSITION LOSS COEFFICIENT CHECK
---------------------------------

RS:      3700
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         Hydraulic depth ratio is 0.01
         Froude Number ratio is 0.77
         Expansion loss coefficient is  0.3
         It is outside the range of -0.23 and 0.17 computed by the equations
         from HEC-RAS Hydraulics Reference Manual.

RS:      3700
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         Width ratio is 0.07
         Contraction loss coefficient is 0.1
         It is outside the range of 0.3 and 0.5 from
         the Table B.4 of HEC-RAS hydraulics Reference Manual.

RS:      3100
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      3080
NT TL 01 This is section 3
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      3050
NT TL 01 This is section Bridge-Up
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      3050
NT TL 01 This is section Bridge-Dn
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      3020
NT TL 01 This is section 2
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.

RS:      2000.1
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.1
         Width ratio is 0.12
         Contraction loss coefficient is 0.1
         It is outside the range of 0.3 and 0.5 from
         the Table B.4 of HEC-RAS hydraulics Reference Manual.

RS:      600
NT TL 01 This is section 4
         Contraction and expansion loss coefficients are 0.1 and 0.3
         They should be equal to 0.3 and 0.5 respectively.
```

Reply: The transitions are gradual.

```
ROUGHNESS COEFFICIENT AT STRUCTURES
-----------------------------------

RS:      3640
NT RS 01 This is Section 2.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 1.

RS:      3660
```

```
NT RS 01 This is Section 3.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 4.

RS:      3650
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      3650
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

RS:      3050
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      3050
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

RS:      1900
NT RS 01 This is Section 2.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 1.

RS:      1950
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      1950
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

RS:      500
NT RS 01 This is Section 2.
         Channel n value of 0.015 is less than the channel n value of 0.03
         at Section 1.

RS:      580
NT RS 01 This is Section 3.
         Channel n value of 0.015 is less than the channel n value of 0.025
         at Section 4.

RS:      550
NT RS 02 The channel n value of 0.015 for the upstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 3.
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 3.
         The selection of the n value(s) should be reevaluated.

RS:      550
NT RS 02 The channel n value of 0.015 for the downstream internal bridge opening
         section is equal or larger than the channel n value of 0.015 at Section 2
         Usually, the channel n value of the bridge opening section is
         less than the channel n value of Section 2.
         The selection of the n value(s) should be reevaluated.

---END---

                      CHECK-RAS Program, XS Check
                Cross Section Location and Alignment Review


Project File:   F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.prj
Plan File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.p02
Geometry File:  F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02
Flow File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07
Report File:    F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.xs
Selected profiles: PF 1;PF 2
Date: 8/2/2011
Time: 10:51:23 AM


SECNO     Len Lob   Len Chl   Len Rob   TopWdthAct     Q Total   Flow Code
-------------------------------------------------------------------------
RIVER-1,Reach-1
3800      580       566       553       230.33         867       C
```

3700	222.1	225	219.5	190.24	867	
3660	42.6	42.6	42.6	130.19	867	
3650	Bridge #1-Up					
3650	Bridge #1-Dn					
3640	143.1	143.1	143.1	94.08	867	C
3600	366.01	370	383	54.66	867	C
3500	392	394	393	68.89	867	C
3400	347	344	345	65	867	C
3300	49	51	53	54.64	867	D
3280	17.5	17.5	17.5	27.5	867	C
3275	33	33	33	24.66	867	C
3270	250	250	250	24.66	867	C
3200	400	400	400	24.66	867	C
3100	40	40	40	24.66	867	C
3080	127.2	127.2	127.2	24	867	D,B
3050	Bridge #1-Up					
3050	Bridge #1-Dn					
3020	150	150	150	24	1723	D,C,B
3000	350	350	350	24	1723	D,C,B
2900	290	290	290	24	1723	D,C,B
2800	250	250	250	24	1723	D,C,B
2700	381.4	381.4	381.4	24	1723	D,C,B
2600	6.4	6.4	6.4	24	1723	D,C,B
2590	226	210	201	69.47	1723	C
2500	186.68	179.72	182.96	60.76	1972	
2400	57	71	87	48.09	1972	C
2350	64	63	63	113.19	1972	
2330	235	240	222	214.9	1972	
2300	320.42	311.55	310.65	322.16	1972	
2200	383.01	328.57	273.85	570.34	1972	
2100	67.6	97.6	97.6	234.08	1972	
2000.1	1	1	1	100.45	1972	
2000	320.07	319.85	303.13	12	1498	
1950	Bridge #1-Up					
1950	Bridge #1-Dn					
1900	38.8	38.8	38.8	12	1595	C
1800	173.79	170.93	148.02	104.11	1595	C
1750	171.49	169.33	179.87	216.57	1595	C
1700	163.66	161.13	154.63	255.42	1595	
1650	190.68	175.57	185.82	227.05	1595	C
1600	157	142	133	107.28	1595	C,B
1500	125	113	101	108.62	1595	
1400	122.02	161.58	190.42	27.06	1595	C
1300	198.91	176.37	153.42	31.34	1595	
1200	111.55	110.23	110.23	59.57	1595	
1100	102.45	103.7	103.7	52.77	1595	
1000	116.93	118.27	121.55	57.04	1595	
900	102.08	103.62	108.33	51.83	1595	
800	134	133	133	63.25	1595	
700	109	119	125	73.41	1595	
600	65.6	65.6	65.6	104.98	1595	
580	102.1	102.1	102.1	87.06	1595	
550	Bridge #1-Up					
550	Bridge #1-Dn					
500	40.6	40.6	40.6	37.34	1595	C
400	132.08	134.41	158.2	65.95	1595	C
300	364.63	352.07	359.83	112.79	1595	C
200	0	0	0	153.34	1595	C

B=blocked obstruction XS SC 05
C=critial depth XS SC 03
D=divided flow XS SC 01
E=cross section extended XS SC 02
K=known water-surface XS SC 04

DISTANCE CHECK

SPACING CHECK

INEFFECTIVE FLOW CHECK

DISCHARGE CHECK

RS: 3020
XS DC 03 Discharge is different between the upstream side and downstream side of the structure

RS: 2000
XS DC 01 Discharge decreases in the downstream direction.

RS: 1900
XS DC 03 Discharge is different between the upstream side and downstream side of the structure

LOCATION CHECK

```
---------------

RS:      3640
XS LC 01 Lenchl Up/TopwdthAct Dn = 2.62
         MaxChlDpth Up/MaxChlDpth Dn = 2.76
         TopwdthAct Up/TopwdthAct Dn = 1.72
         This cross section is located too far upstream from the
         critical depth cross section.

RS:      3300
XS LC 01 Lenchl Up/TopwdthAct Dn = 1.85
         MaxChlDpth Up/MaxChlDpth Dn = 1.16
         TopwdthAct Up/TopwdthAct Dn = 1.99
         This cross section is located too far upstream from the
         critical depth cross section.

RS:      2500
XS LC 01 Lenchl Up/TopwdthAct Dn = 3.74
         MaxChlDpth Up/MaxChlDpth Dn = 1.21
         TopwdthAct Up/TopwdthAct Dn = 1.26
         This cross section is located too far upstream from the
         critical depth cross section.

RS:      1650
XS LC 01 Lenchl Up/TopwdthAct Dn = 1.64
         MaxChlDpth Up/MaxChlDpth Dn = 1.49
         TopwdthAct Up/TopwdthAct Dn = 2.12
         This cross section is located too far upstream from the
         critical depth cross section.


BOUNDARY CONDITION CHECK
------------------------

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Critical is specified as the downstream boundary
         for profile PF 1

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Critical is specified as the upstream boundary
         for profile PF 1

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Critical is specified as the downstream boundary
         for profile PF 2

XS BC 02 The name of the stream is RIVER-1,Reach-1
         Critical is specified as the upstream boundary
         for profile PF 2

XS BC 03 Maximum number of iterations is 0
         It should not be less than 20.
```

Reply: Maximum number of iteration is 20 as verified in the model.

```
LATERAL WEIRS CHECK
-----------------------

---END---
                                CHECK-RAS Program: Floodway Check
    Encroachment Method, Starting WSEL, Floodway Width, and Surcharge Review

Project File:   F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.prj
Plan File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.p02
Geometry File:  F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02
Flow File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07
Report File:    F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.fw
Selected profiles: PF 1;PF 2
Date: 8/2/2011
Time: 10:51:27 AM
```

SECNO	Method	Surcharge	EncStaL	EncStaR	LStaEff	RStaEff	Structure
RIVER-1,Reach-1							
3800					1095.27	1325.6	
3800	0	0	0	0	1095.27	1325.6	
3700					1280.37	1470.61	
3700	0	0	0	0	1280.37	1470.61	
3660					961.8	1091.99	
3660	0	0	0	0	961.8	1091.99	
3650					961.8	1074.16	Bridge #1-Up
3650					956.1	1056.22	Bridge #1-Dn
3650	0	0	0	0	961.8	1074.16	Bridge #1-Up
3650	0	0	0	0	956.1	1056.22	Bridge #1-Dn
3640					956.1	1050.18	
3640	0	0	0	0	956.1	1050.18	
3600					1195.29	1249.95	
3600	0	0	0	0	1195.29	1249.95	
3500					1203.83	1272.72	
3500	0	0	0	0	1203.83	1272.72	
3400					1204.18	1269.18	
3400	0	0	0	0	1204.18	1269.18	

3300					1162.53	1244.32	
3300	0	0	0	0	1162.53	1244.32	
3280					1205.39	1232.89	
3280	0	0	0	0	1205.39	1232.89	
3275					1037.67	1062.33	
3275	0	0	0	0	1037.67	1062.33	
3270					1037.67	1062.33	
3270	0	0	0	0	1037.67	1062.33	
3200					1037.67	1062.33	
3200	0	0	0	0	1037.67	1062.33	
3100					1037.67	1062.33	
3100	0	0	0	0	1037.67	1062.33	
3080					1037.67	1062.33	
3080	0	0	0	0	1037.67	1062.33	
3050					1037.67	1062.33	Bridge #1-Up
3050					1037.67	1062.33	Bridge #1-Dn
3050	0	0	0	0	1037.67	1062.33	Bridge #1-Up
3050	0	0	0	0	1037.67	1062.33	Bridge #1-Dn
3020					1037.67	1062.33	
3020	0	0	0	0	1037.67	1062.33	
3000					1037.67	1062.33	
3000	0	0	0	0	1037.67	1062.33	
2900					1037.67	1062.33	
2900	0	0	0	0	1037.67	1062.33	
2800					1037.67	1062.33	
2800	0	0	0	0	1037.67	1062.33	
2700					1037.67	1062.33	
2700	0	0	0	0	1037.67	1062.33	
2600					1037.67	1062.33	
2600	11	0	1037.67	1062.33	1037.67	1062.33	
2590					1033.92	1103.39	
2590	1	0.03	1040	1100	1040	1100	
2500					1032.31	1093.07	
2500	11	0	1030.12	1106.13	1032.31	1093.07	
2400					1300.53	1348.61	
2400	11	0	1293.09	1384.56	1300.53	1348.61	
2350					1068.96	1182.15	
2350	1	0.32	1080	1220.41	1080	1183.18	
2330					1083.17	1298.06	
2330	1	0.06	1150	1330.73	1150	1298.25	
2300					1029.63	1351.79	
2300	1	0.01	1163.5	1383.27	1163.5	1351.81	
2200					1010.99	1581.33	
2200	1	-0.03	1400	1594.9	1400	1581.27	
2100					959	1193.08	
2100	11	0	1010.56	1206.95	1010.56	1193.07	
2000.1					994.34	1094.79	
2000.1	1	0	990.1	1094.79	994.34	1094.79	
2000					1044.29	1056.29	
2000	11	0	1044.29	1056.29	1044.29	1056.29	
1950					1044.29	1056.29	Bridge #1-Up
1950					1193.33	1205.33	Bridge #1-Dn
1950	0	0	1044.29	1056.29	1044.29	1056.29	Bridge #1-Up
1950	0	0	1193.33	1205.33	1193.33	1205.33	Bridge #1-Dn
1900					1193.33	1205.33	
1900	11	0.57	1193.33	1205.33	1193.33	1205.33	
1800					1051.22	1155.34	
1800	11	0.39	1117.33	1148.63	1117.33	1148.63	
1750					1105.02	1321.59	
1750	11	0.61	1278.17	1318.26	1278.17	1318.26	
1700					1221.91	1477.33	
1700	11	0.97	1408.08	1464.52	1408.08	1464.52	
1650					1390.13	1617.18	
1650	11	0.74	1557.78	1600.56	1557.78	1600.56	
1600					1449.06	1556.34	
1600	11	0.85	1462.44	1508.14	1462.44	1508.14	
1500					1042.97	1151.59	
1500	1	0	1046	1152.39	1046	1151.59	
1400					1313.55	1340.61	
1400	11	0	1311.27	1345.71	1313.56	1340.61	
1300					1634.9	1666.23	
1300	11	0.89	1634.75	1667.65	1634.75	1667.35	
1200					1625.88	1685.45	
1200	11	0.44	1624.95	1659.47	1625.22	1659.47	
1100					1621.72	1674.49	
1100	11	0.26	1619.57	1655.53	1621.29	1655.53	
1000					1620.68	1677.72	
1000	11	0.51	1619.06	1659.32	1619.9	1659.32	
900					1617.47	1669.3	
900	11	0.46	1615.48	1651.44	1616.68	1651.44	
800					1604.13	1667.38	
800	11	0.52	1601.95	1646.84	1603.37	1646.84	
700					1597.06	1670.48	
700	11	0.26	1594.24	1641.44	1596.67	1641.44	
600					1581.36	1686.34	
600	11	0.29	1581.21	1627.65	1581.21	1627.65	
580					968.46	1055.51	
580	1	0.54	995	1042.34	995	1042.34	
550					968.46	1055.51	Bridge #1-Up
550					977.86	1060.86	Bridge #1-Dn
550	0	0.54	995	1042.34	995	1042.34	Bridge #1-Up
550	0	0.54	1000	1037.34	1000	1037.34	Bridge #1-Dn
500					1000	1037.34	
500	1	0	1000	1037.34	1000	1037.34	
400					1478.32	1544.27	

400	11	0.56	1501.15	1526.53	1501.15	1526.53
300					1401.78	1514.57
300	11	0.91	1441.01	1481.38	1441.01	1481.38
200					1453.4	1606.74
200	11	0.71	1535.63	1591.46	1535.63	1591.46

ENCROACHMENT METHOD CHECK

RS: 3800
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3700
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3660
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3650
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3640
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3600
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3500
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3400
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3300
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3280
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3275
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3270
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3200
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3100
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3080
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3050
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3020
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 3000
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 2900
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 2800
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 2700
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 1950
FW EM 01 Floodway encroachment method is not selected at this section.

RS: 550
FW EM 01 Floodway encroachment method is not selected at this section.

FLOODWAY WIDTH CHECK

RS: 3800
FW FW 05 The 1% annual chance flood is contained within the channel.
Left encroachment station 0 is outside the channel.
Left channel bank station is 1000
Left encroachment station and/or left channel bank station should be adjusted.

RS: 3800
FW FW 06 The left station effective of 1095.27 for the floodway profile is more
than the left channel bank station of 1000
The left side of the floodway boundary is within the channel.
The left encroachment station of 0 is less than the left channel

bank station.
The left encroachment station should be the same as the left
channel bank station.

RS: 3700
FW FW 03 The right channel bank station may not be at the proper
location.

RS: 3600
FW FW 06 The left station effective of 1195.29 for the floodway profile is more
than the left channel bank station of 1185.66
The left side of the floodway boundary is within the channel.
The left encroachment station of 0 is less than the left channel
bank station.
The left encroachment station should be the same as the left
channel bank station.

RS: 3500
FW FW 05 The 1% annual chance flood is contained within the channel.
Left encroachment station 0 is outside the channel.
Left channel bank station is 1185.43
Left encroachment station and/or left channel bank station should be adjusted.

RS: 3500
FW FW 06 The left station effective of 1203.83 for the floodway profile is more
than the left channel bank station of 1185.43
The left side of the floodway boundary is within the channel.
The left encroachment station of 0 is less than the left channel
bank station.
The left encroachment station should be the same as the left
channel bank station.

RS: 3400
FW FW 05 The 1% annual chance flood is contained within the channel.
Left encroachment station 0 is outside the channel.
Left channel bank station is 1174.01
Left encroachment station and/or left channel bank station should be adjusted.

RS: 3400
FW FW 06 The left station effective of 1204.18 for the floodway profile is more
than the left channel bank station of 1174.01
The left side of the floodway boundary is within the channel.
The left encroachment station of 0 is less than the left channel
bank station.
The left encroachment station should be the same as the left
channel bank station.

RS: 3300
FW FW 05 The 1% annual chance flood is contained within the channel.
Left encroachment station 0 is outside the channel.
Left channel bank station is 1144.3
Left encroachment station and/or left channel bank station should be adjusted.

RS: 3300
FW FW 06 The left station effective of 1162.53 for the floodway profile is more
than the left channel bank station of 1144.3
The left side of the floodway boundary is within the channel.
The left encroachment station of 0 is less than the left channel
bank station.
The left encroachment station should be the same as the left
channel bank station.

RS: 2590
FW FW 01 Left encroachment station 1040 is more than left channel bank
station 1029.4 and less than the right channel bank station 1108.92
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 2590
FW FW 01 Right encroachment station 1100 is less than right channel bank
station 1108.92 and greater than the left channel bank station 1029.4
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 2500
FW FW 01 Right encroachment station 1106.13 is less than right channel bank
station 1112.23 and greater than the left channel bank station 1030.12
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 2100
FW FW 03 The Left channel bank station may not be at the proper
location.

RS: 2100
FW FW 04 The right station effective of 1193.08 for 1% annual chance floodplain
is greater than the right channel bank station (1161.73).
The 1% annual chance floodplain is outside the channel.
However, the right encroachment station (1206.95) is outside of 1% annual
chance floodplain.
The right encroachment station should be adjusted.

RS: 2000.1
FW FW 03 The Left channel bank station may not be at the proper
location.

RS: 2000.1
FW FW 04 The left station effective of 994.34 for 1% annual chance floodplain is less than the left channel bank station 1044.29
The 1% annual chance floodplain is outside the channel.
However, the left encroachment station (990.1) is outside of 1% annual chance floodplain.
The left encroachment station should be adjusted.

RS: 2000
FW FW 03 The Left channel bank station may not be at the proper location.

RS: 1800
FW FW 01 Left encroachment station 1117.33 is more than left channel bank station 1115.02 and less than the right channel bank station 1160.68
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1800
FW FW 01 Right encroachment station 1148.63 is less than right channel bank station 1160.68 and greater than the left channel bank station 1115.02
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1750
FW FW 01 Right encroachment station 1318.26 is less than right channel bank station 1352.46 and greater than the left channel bank station 1285.16
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1700
FW FW 01 Right encroachment station 1464.52 is less than right channel bank station 1519 and greater than the left channel bank station 1430.15
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1650
FW FW 01 Right encroachment station 1600.56 is less than right channel bank station 1634.46 and greater than the left channel bank station 1563.09
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1600
FW FW 01 Left encroachment station 1462.44 is more than left channel bank station 1448.19 and less than the right channel bank station 1562.87
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1600
FW FW 01 Right encroachment station 1508.14 is less than right channel bank station 1562.87 and greater than the left channel bank station 1448.19
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1500
FW FW 01 Left encroachment station 1046 is more than left channel bank station 1041.5 and less than the right channel bank station 1152.39
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1400
FW FW 01 Left encroachment station 1311.27 is more than left channel bank station 1291.53 and less than the right channel bank station 1345.71
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1300
FW FW 01 Left encroachment station 1634.75 is more than left channel bank station 1630.46 and less than the right channel bank station 1671.28
Left encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1300
FW FW 01 Right encroachment station 1667.65 is less than right channel bank station 1671.28 and greater than the left channel bank station 1630.46
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1200
FW FW 01 Right encroachment station 1659.47 is less than right channel bank station 1691.11 and greater than the left channel bank station 1624.95
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1100
FW FW 01 Right encroachment station 1655.53 is less than right channel bank station 1677.38 and greater than the left channel bank station 1619.57
Right encroachment station is within the channel.
The encroachment station or channel bank station should be adjusted.

RS: 1000
FW FW 01 Right encroachment station 1659.32 is less than right channel bank station 1681.44 and greater than the left channel bank station 1619.06
Right encroachment station is within the channel.

```
          The encroachment station or channel bank station should be adjusted.

RS:       900
FW FW 01  Left encroachment station 1615.48 is more than left channel bank
          station 1601.29 and less than the right channel bank station 1672.3
          Left encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       900
FW FW 01  Right encroachment station 1651.44 is less than right channel bank
          station 1672.3 and greater than the left channel bank station 1601.29
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       800
FW FW 01  Right encroachment station 1646.84 is less than right channel bank
          station 1668.67 and greater than the left channel bank station 1601.95
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       700
FW FW 01  Right encroachment station 1641.44 is less than right channel bank
          station 1671.81 and greater than the left channel bank station 1594.24
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       580
FW FW 03  The Left channel bank station may not be at the proper
          location.

RS:       400
FW FW 01  Left encroachment station 1501.15 is more than left channel bank
          station 1401.03 and less than the right channel bank station 1609.08
          Left encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       400
FW FW 01  Right encroachment station 1526.53 is less than right channel bank
          station 1609.08 and greater than the left channel bank station 1401.03
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       300
FW FW 01  Left encroachment station 1441.01 is more than left channel bank
          station 1326.59 and less than the right channel bank station 1546.71
          Left encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       300
FW FW 01  Right encroachment station 1481.38 is less than right channel bank
          station 1546.71 and greater than the left channel bank station 1326.59
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       200
FW FW 01  Left encroachment station 1535.63 is more than left channel bank
          station 1408.98 and less than the right channel bank station 1659.32
          Left encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.

RS:       200
FW FW 01  Right encroachment station 1591.46 is less than right channel bank
          station 1659.32 and greater than the left channel bank station 1408.98
          Right encroachment station is within the channel.
          The encroachment station or channel bank station should be adjusted.
```

Reply (Typical): Encroachment Stations are checked and verified.

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SURCHARGE CHECK
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DISCHARGE CHECK
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STARTING WATER-SURFACE ELEVATION CHECK
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---END---
                        CHECK-RAS Program: Structure Check

Project File:   F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.prj
Plan File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.p02
Geometry File:  F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.g02
Flow File:      F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.f07
Report File:    F:\Projects\500\550-048\Division\Fctl\Calcs\HEC-RAS-PUL\PULSWASH.br
Selected profiles: PF 1;PF 2
Date: 8/2/2011
Time: 10:51:28 AM


RS       MaxLoChord     MnTpRd    EGEL      WSEL      MinChEl   Structure
```

```
--------------------------------------------------------------------------------
RIVER-1,Reach-1
 3800                           1656.68   1656.3    1654
 3700                           1656.03   1655.97   1650
 3660                           1655.96   1655.87   1647.91
 3650    1651.92        1653.41 1655.95   1655.87   1647.91  Bridge #1-Up
 3650    1651.78        1653    1655.95   1655.28   1647.78  Bridge #1-Dn
 3640                           1654.47   1653.6    1647.78
 3600                           1649.14   1648.11   1646
 3500                           1645.58   1644.72   1643
 3400                           1640.68   1639.79   1638
 3300                           1637.1    1636.82   1633
 3280                           1636.87   1635.3    1632
 3275                           1636.63   1634.93   1631.49
 3270                           1636.06   1634.36   1630.88
 3200                           1632.27   1630.57   1627.08
 3100                           1626.19   1624.48   1621
 3080                           1625.88   1624.78   1620.49  Lid
 3050    1627.69        1633.33 1625.88   1624.78   1620.49  Bridge #1-Up
 3050    1626.67        1633.33 1625.59   1624.91   1619.47  Bridge #1-Dn
 3020                           1627.61   1624.91   1619.47  Lid
 3000                           1626.41   1623.71   1618.27  Lid
 2900                           1623.61   1620.91   1615.47  Lid
 2800                           1621.29   1618.59   1613.15  Lid
 2700                           1619.29   1616.59   1611.15  Lid
 2600                           1616.27   1613.56   1608.13  Lid
 2590                           1612.3    1610.95   1608
 2500                           1609.81   1608.98   1603
 2400                           1608.83   1606.96   1602
 2350                           1607.94   1606.66   1601
 2330                           1607.45   1607.03   1601
 2300                           1607.18   1607.12   1599
 2200                           1607.14   1607.14   1597
 2100                           1607.13   1607.11   1593
 2000.1                         1607.07   1606.43   1591.77
 2000                           1607.01   1605.77   1591.77
 1950    1601.77        1606.72 1607.01   1605.77   1591.77  Bridge #1-Up
 1950    1595.08        1606.72 1606.8    1605.77   1585.08  Bridge #1-Dn
 1900                           1597.36   1593.26   1585.08
 1800                           1595.03   1593.94   1590
 1750                           1592.34   1591.61   1588
 1700                           1590.61   1590.18   1587
 1650                           1589.69   1589.01   1585
 1600                           1587.65   1586.7    1584
 1500                           1584.86   1584.67   1578
 1400                           1584.47   1582.09   1576
 1300                           1581.76   1579.82   1573
 1200                           1580.13   1579.38   1572
 1100                           1579.54   1578.74   1572
 1000                           1578.87   1577.95   1572
 900                            1577.89   1576.84   1570
 800                            1577.14   1576.51   1570
 700                            1576.6    1576.15   1570
 600                            1576.3    1575.9    1569
 580                            1576.24   1575.71   1568.41
 550     1572.41        1568.41 1576.24   1575.71   1568.41  Bridge #1-Up
 550     1571.36        1567.36 1576.24   1575.71   1567.36  Bridge #1-Dn
 500                            1573.12   1571.19   1567.36
 400                            1569.93   1568.6    1564
 300                            1565.69   1564.77   1562
 200                            1559.98   1559.22   1557
--------------------------------------------------------------------------------

River Station:  2900
ST GD 08  'Cross Section Lid' option is used for this section.
          Instead, Bridge or Culvert option should be used.
          Cross section Lid option may be used to model small obstructions,
          such as pipe crossing, or the type of flow through the lid sections
          and the main stream is in supercritical flow.

River Station:  2800
ST GD 08  'Cross Section Lid' option is used for this section.
          Instead, Bridge or Culvert option should be used.
          Cross section Lid option may be used to model small obstructions,
          such as pipe crossing, or the type of flow through the lid sections
          and the main stream is in supercritical flow.

River Station:  2700
ST GD 08  'Cross Section Lid' option is used for this section.
          Instead, Bridge or Culvert option should be used.
          Cross section Lid option may be used to model small obstructions,
          such as pipe crossing, or the type of flow through the lid sections
          and the main stream is in supercritical flow.

River Station:  2600
ST GD 08  'Cross Section Lid' option is used for this section.
          Instead, Bridge or Culvert option should be used.
          Cross section Lid option may be used to model small obstructions,
          such as pipe crossing, or the type of flow through the lid sections
          and the main stream is in supercritical flow.


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RIVER/REACH:       RIVER-1, Reach-1
RIVER STATION:     3650
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TYPE OF STRUCTURE: Bridge

Description:	Bridge #1
Distance from Upstream XS:	0.05
Deck/Roadway Width:	42.5
Weir Coefficient:	2.6
Maximum allowable submergence for weir flow:	0.98
Elevation at which weir flow begins:	0
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	3700	225.00	1655.97	0	1656.03	190.24	
4	3700	225.00	1655.97	0	1656.03	190.24	
3	3660	42.60	1655.87	0	1655.96	130.19	
3	3660	42.60	1655.87	0	1655.96	130.19	
	3650	42.50	1655.87	0	1655.95	112.36	Bridge #1-Up
	3650	0.05	1655.28	0	1655.95	100.12	Bridge #1-Dn
	3650	42.50	1655.87	0	1655.95	112.36	Bridge #1-Up
	3650	0.05	1655.28	0	1655.95	100.12	Bridge #1-Dn
2	3640	143.10	1653.6	0	1654.47	94.08	
2	3640	143.10	1653.6	0	1654.47	94.08	
1	3600	370.00	1648.11	0	1649.14	54.66	
1	3600	370.00	1648.11	0	1649.14	54.66	

Ineffective Flow, Section 3			Ineffective Flow, Section 2		
Sta L	Sta R	Elev	Sta L	Sta R	Elev

BRIDGE:
Bridge Name: Bridge #1
LowFlowMethod: Highest Energy Answer
Momentum Cd: 0
HighFlowMethod: Pressure and Weir flow
SluiceGate Cd: 0 Submerged Cd: 0.8

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

MaxLowChord:	1652	MinTopRd:	1653.42	MinElPrs:	1652
	1652		1653.42		1652

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Bridge							U
							D
			0	0			U
			0	0			D

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Bridge #1	1016.36	1030.00	1653.41	1655.00	1653.41	1651.92	U
	1013.95	1025.95	1653.00	1654.76	1653.00	1651.78	D
	1016.36	1030.00	1653.41	1655.00	1653.41	1651.92	U
	1013.95	1025.95	1653.00	1654.76	1653.00	1651.78	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Bridge #1	867	472.6	394.4	Press/Weir	Submerged Pressure and Weir Flow
	867	472.6	394.4	Press/Weir	Submerged Pressure and Weir Flow

GEOMETRIC CHECK

RS: 3650
ST GD 04 There is only one bridge. This is upstream bridge section.
However, the low chord line crosses the ground line at more than
two locations.
CHECKRAS can not check other messages.
The ground and deck/roadway data should be checked.

RS: 3650
ST GD 03 The end station of 1200 from downstream road/weir data
is greater than the end station of 1056.22 from downstream internal
section.

```
          The high chord elevation of 1655 for the end road/weir station is
          greater than the ground elevation of 1654 for the end ground station.
          The EGEL at section 3 of 1655.96 is greater than the ground elevation.
          The road/weir data should be included in the ground data

RS:       3650
ST GD 03  The starting station of 978.2 from downstream road/weir data
          is greater than the starting station of 956.1 from downstream internal
          section.
          The high chord elevation of 1653.6 for the starting road/weir station is
          greater than the ground elevation of 1653 for the same ground station.
          The road/weir profile may need to be extended.
```

RIVER/REACH: RIVER-1, Reach-1
RIVER STATION: 3050
TYPE OF STRUCTURE: Bridge

Description:	Bertha Howe Avenue Bridge
Distance from Upstream XS:	0.1
Deck/Roadway Width:	127
Weir Coefficient:	2.6
Maximum allowable submergence for weir flow:	0.98
Elevation at which weir flow begins:	0
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	3100	40.00	1624.48	0	1626.19	24.66	
4	3100	40.00	1624.48	0	1626.19	24.66	
3	3080	127.20	1624.78	0	1625.88	24	
3	3080	127.20	1624.78	0	1625.88	24	
	3050	127.00	1624.78	0	1625.88	23.99	Bridge #1-Up
	3050	0.10	1624.91	0	1625.59	23.99	Bridge #1-Dn
	3050	127.00	1624.78	0	1625.88	23.99	Bridge #1-Up
	3050	0.10	1624.91	0	1625.59	23.99	Bridge #1-Dn
2	3020	150.00	1624.91	0	1627.61	24	
2	3020	150.00	1624.91	0	1627.61	24	
1	3000	350.00	1623.71	0	1626.41	24	
1	3000	350.00	1623.71	0	1626.41	24	

Ineffective Flow, Section 3			Ineffective Flow, Section 2		
Sta L	Sta R	Elev	Sta L	Sta R	Elev

BRIDGE:
Bridge Name: Bridge #1
LowFlowMethod: Highest Energy Answer
Momentum Cd: 0
HighFlowMethod: Energy Only
SluiceGate Cd: 0 Submerged Cd: 0

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

---

MaxLowChord:	1627.69	MinTopRd:	1633.34	MinElPrs:	1627.69
	1627.69		1633.34		1627.69

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Bridge							U
							D
			0	0			U
			0	0			D

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Bridge #1	1037.67	1062.33	1633.33	1633.33	1633.33	1627.69	U
	1037.67	1062.33	1633.33	1633.33	1633.33	1626.67	D
	1037.67	1062.33	1633.33	1633.33	1633.33	1627.69	U
	1037.67	1062.33	1633.33	1633.33	1633.33	1626.67	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Bridge #1	867	867	0	Energy only	Low Flow

```
             867       867       0         Energy only         Low Flow
--------------------------------------------------------------------------------

GEOMETRIC CHECK
-----------------

RS:       3000
ST GD 08  'Cross Section Lid' option is used for this section.
          Cross section lid data must be removed from this section,
          unless the structure is modeled as culverts in series.

RS:       3020
ST GD 08  'Cross Section Lid' option is used for this section.
          Cross section lid data must be removed from this section,
          unless the structure is modeled as culverts in series.

RS:       3080
ST GD 08  'Cross Section Lid' option is used for this section.
          Cross section lid data must be removed from this section,
          unless the structure is modeled as culverts in series.

TYPE OF FLOW CHECK
------------------

RS:       3050 This is Bridge #1
BR LF 01  Type of flow is low flow because,
          1. EGEL 3 of 1625.88 is equal to or less than MinTopRd of 1633.3.
          2. EGEL 3 of 1625.88 is less than MxLoCdU of 1627.7.

RS:       3050 This is Bridge #1
BR LF 01  Type of flow is low flow because,
          1. EGEL 3 of 1625.88 is equal to or less than MinTopRd of 1633.3.
          2. EGEL 3 of 1625.88 is less than MxLoCdU of 1627.7.

DISTANCE CHECK
---------------

RS:       3050 This is Bridge #1
ST DT 01  'Distance from Upstream XS' of 0.10 is less than the height of the
          bridge opening of  7.20
          Section 3 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4 & 3, and 'Distance from Upstream XS' should
          be adjusted.


RS:       3050 This is Bridge #1
ST DT 02  The channel distance of 9.999695E-02 at Downstream Internal Section is less than
          the height of the bridge opening of 8.22
          Section 2 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4, 3 & 2 should be adjusted.


INEFFECTIVE FLOW CHECK
----------------------

FLOODWAY CHECK
---------------


--------------------------------------------------------------------------------
RIVER/REACH:       RIVER-1, Reach-1
RIVER STATION:     1950
TYPE OF STRUCTURE: Bridge
--------------------------------------------------------------------------------
Description:                                        I- 15 Bridge
Distance from Upstream XS:                           0.01
Deck/Roadway Width:                                  319.83
Weir Coefficient:                                    2.7
Maximum allowable submergence for weir flow:         0.98
Elevation at which weir flow begins:                 1606.72
Weir crest shape:                                   Broad Crested
--------------------------------------------------------------------------------


Sec  River    Length   WSEL      Surch.    EGEL      TopWidth
     Station  Channel                                Actual
--------------------------------------------------------------------------------
 4   2000.1    1.00    1606.43   0         1607.07   100.45
 4   2000.1    1.00    1606.43   0         1607.07   100.45
 3   2000      319.85  1605.77   0         1607.01   12
 3   2000      319.85  1605.77   0         1607.01   12
     1950      319.83  1605.77   0         1607.01   0         Bridge #1-Up
     1950      0.01    1605.77   0         1606.8    0         Bridge #1-Dn
     1950      319.83  1605.77   0         1607.01   0         Bridge #1-Up
     1950      0.01    1605.77   0         1606.98   0         Bridge #1-Dn
 2   1900      38.80   1593.26   0         1597.36   12
 2   1900      38.80   1593.83   0.57      1597.41   12
 1   1800      170.93  1593.94   0         1595.03   104.11
 1   1800      170.93  1594.33   0.39      1596.48   31.3
--------------------------------------------------------------------------------

        Ineffective Flow, Section 3            Ineffective Flow, Section 2
```

	Sta L	Sta R	Elev	Sta L	Sta R	Elev
1	990.1	1044.29	1608			
2	1056.29	1094.79	1608			

BRIDGE:
Bridge Name: Bridge #1
LowFlowMethod: Energy
Momentum Cd: 0
HighFlowMethod: Pressure and Weir flow
SluiceGate Cd: 0 Submerged Cd: 0.8164966

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

MaxLowChord:	1601.77	MinTopRd:	1606.73	MinElPrs:	1601.77
	1601.77		1606.73		1601.77

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS	
Bridge					1044.29	1056.29	U
							D
			1044.29	1056.29			U
			1044.29	1056.29			D

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Bridge #1	1044.29	1056.29	1606.72	1606.72	1606.72	1601.77	U
	1193.33	1205.33	1606.72	1606.72	1606.72	1595.08	D
	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	-9999.00	U
	1193.33	1205.33	1606.72	1606.72	1606.72	1595.08	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Bridge #1	1498	1493.05	4.95	Press/Weir	Sluicegate Pressure and Weir Flow
	1498	1493.05	4.95	Press/Weir	UNKNOWN

GEOMETRIC CHECK

RS: 1950
ST GD 03 The end station of 1104.82 from upstream road/weir data
is greater than the end station of 1094.79 from upstream internal
section/section 3.
The high chord elevation of 1606.72 for the end road/weir station is
greater than the ground elevation of 1606 for the end ground station.
The EGEL at section 3 of 1607.01 is greater than the ground elevation.
The road/weir data should be included in the ground data

RS: 1950
ST GD 04 There is only one bridge. This is upstream bridge section.
However, the low chord line crosses the ground line at more than
two locations.
CHECKRAS can not check other messages.
The ground and deck/roadway data should be checked.

RS: 1950
ST GD 03 The starting station of 1000 from downstream road/weir data
is less than the starting station of 1179.43 from downstream internal
section.
The high chord elevation of 1606.72 for the starting road/weir station is
greater than the ground elevation of 1599 for the starting ground station.
The EGEL at section 3 of 1607.01 is greater than the ground elevation.
The road/weir data should be included in the ground data

RIVER/REACH: RIVER-1, Reach-1
RIVER STATION: 550
TYPE OF STRUCTURE: Bridge

Description:	Hafen Lane Bridge
Distance from Upstream XS:	0.01
Deck/Roadway Width:	102
Weir Coefficient:	2.7
Maximum allowable submergence for weir flow:	0.98
Elevation at which weir flow begins:	1575.55
Weir crest shape:	Broad Crested

Sec	River Station	Length Channel	WSEL	Surch.	EGEL	TopWidth Actual	
4	600	65.60	1575.9	0	1576.3	104.98	
4	600	65.60	1576.18	0.29	1576.79	46.44	
3	580	102.10	1575.71	0	1576.24	87.06	
3	580	102.10	1576.24	0.54	1576.7	47.34	
	550	102.00	1575.71	0	1576.24	87.06	Bridge #1-Up
	550	0.09	1575.71	0	1576.24	82.99	Bridge #1-Dn
	550	102.00	1576.24	0.54	1576.7	47.34	Bridge #1-Up
	550	0.09	1576.24	0.54	1576.7	37.34	Bridge #1-Dn
2	500	40.60	1571.19	0	1573.12	37.34	
2	500	40.60	1571.19	0	1573.12	37.34	
1	400	134.41	1568.6	0	1569.93	65.95	
1	400	134.41	1569.16	0.56	1571.66	25.38	

Ineffective Flow, Section 3			Ineffective Flow, Section 2		
Sta L	Sta R	Elev	Sta L	Sta R	Elev

BRIDGE:
Bridge Name: Bridge #1
LowFlowMethod: Yarnell
Momentum Cd: 0
HighFlowMethod: Pressure and Weir flow
SluiceGate Cd: 0 Submerged Cd: 0.8164966

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

MaxLowChord:	1572.41	MinTopRd:	1575.6	MinElPrs:	1572.41
	1572.41		1575.6		1572.41

Opening Type	StagStaL	StagStaR	EncStaL	EncStaR	LIfStaS	RIfStaS
Bridge						U
						D
			995	1042.34		U
			995	1042.34		D

	LAbutSt	RAbutSt	LMnTpRd	RMnTpRd	MnTpRd	MxLoCd	
Bridge #1	1000.00	1037.34	1568.41	1568.41	1568.41	1572.41	U
	1000.00	1037.34	1567.36	1567.36	1567.36	1571.36	D
	1000.00	1037.34	1568.41	1568.41	1568.41	1572.41	U
	1000.00	1037.34	1567.36	1567.36	1567.36	1571.36	D

Name	Q Total.	Q Struc	Q Weir	Selected Method	Flow Type
Bridge #1	1595	1395.78	199.22	Press/Weir	Sluicegate Pressure and Weir Flow
	1595	1448.17	146.83	Press/Weir	Sluicegate Pressure and Weir Flow

GEOMETRIC CHECK

RS: 550
ST GD 03 The starting station of 1000 from upstream road/weir data
is greater than the starting station of 857.5 from upstream internal
section/ secion 3.
The high chord elevation of 1575.59 for the starting road/weir station is
greater than the ground elevation of 1568.41 for the same ground station.
The road/weir profile may need to be extended.

RS: 550
ST GD 03 The end station of 1037.34 from upstream road/weir data
is less than the end station of 1187.34 from upstream internal
section/section 3.
The high chord elevation of 1575.59 for the end road/weir station is
greater than the ground elevation of 1568.41 for the same ground station.
The road/weir profile may need to be extended.

RS: 550
ST GD 03 The starting station of 1000 from downstream road/weir data
is greater than the starting station of 900 from downstream internal
section.
The high chord elevation of 1575.59 for the starting road/weir station is
greater than the ground elevation of 1567.36 for the same ground station.

```
          The road/weir profile may need to be extended.

RS:       550
ST GD 03  The end station of 1037.34 from downstream road/weir data
          is less than the end station of 1231.44 from downstream internal
          section.
          The high chord elevation of 1575.59 for the end road/weir station is
          greater than the ground elevation of 1567.36 for the same ground station.
          The road/weir profile may need to be extended.

TYPE OF FLOW CHECK
------------------

RS:       550 This is Bridge #1
BR PW 01  Type of sluicegate pressure and weir flow because,
          1. EGEL 3 of 1576.24 is greater than MinTopRd of 1575.60.
          2. EGEL 3 of 1576.24 is equal to or greater than MxLoCdU of 1572.41.
          3. WSEL 2 of 1571.19 is less than MxLoCdD of 1571.36.

RS:       550 This is Bridge #1
BR PW 01  Type of sluicegate pressure and weir flow because,
          1. EGEL 3 of 1576.70 is greater than MinTopRd of 1575.60.
          2. EGEL 3 of 1576.70 is equal to or greater than MxLoCdU of 1572.41.
          3. WSEL 2 of 1571.19 is less than MxLoCdD of 1571.36.

DISTANCE CHECK
--------------

RS:       550 This is Bridge #1
ST DT 01  'Distance from Upstream XS' of 0.01 is less than the height of the
          bridge opening of  4.00
          Section 3 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4 & 3, and 'Distance from Upstream XS' should
          be adjusted.


RS:       550 This is Bridge #1
ST DT 02  The channel distance of 8.999848E-02 at Downstream Internal Section is less than
          the height of the bridge opening of 5.05
          Section 2 should be placed at the foot of the road embankment or
          wing walls.
          Distances at Sections 4, 3 & 2 should be adjusted.


INEFFECTIVE FLOW CHECK
----------------------

RS:       580 This is section 3
ST GD 05  Weir flow occurs at Bridge
          The velocity head at Section 3 is more than 0.5 foot and more than
          the velocity head at Section 4.
          Section 3 should be recoded to represent the natural valley
          cross section.

RS:       500 This is section 2
ST GD 05  Weir flow occurs at Bridge
          The velocity head at Section 2 is more than 0.5 foot and more than
          the velocity head at Section 1.
          Section 2 should be recoded to represent the natural valley
          cross section.

FLOODWAY CHECK
--------------

RS:       550 This is Bridge
ST FW 01  Encroachment Method was not specified at this river station.
          For flood insurance studies Encroachment Methods 4 and 1
          should be used.
```

Reply (Typical): No Encroachment at Bridge Stations.

```
---END
```

PULSIPHER WASH
HYDRAULIC CALCULATIONS

BOX CULVERT

Pulsipher Wash DB Upstream: 2 (14X10 RCBs) HARDY WAY CULVERT

INPUT

Width of Box	14.00	ft
Height of Box	10.00	ft
Number of Barrels	2	
Length	250.00	ft
Slope	1.50	%
Manning's 'n'	0.015	
Flow "Q"	1912	cfs
Entrance Coef.	0.35	
Tail Water	0	ft

INLET

45d WWall	8.36	ft
Sq. Edge	8.89	ft
Beveled	8.27	ft
Tapered	7.94	ft

OUTLET

Head Water	N/A	ft
Critical	8.34	ft
Velocity	6.83	ft/s

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

WSE = 1670 (invert) + 9' (depth) = 1679'

Cross Section for Copy of STD 100' ROW-Falcon Ridge

Project Description

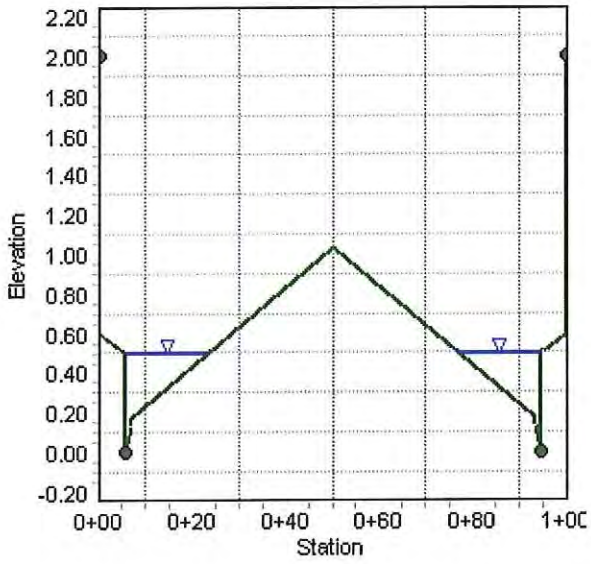
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Normal Depth	0.50	ft
Discharge	20.00	ft³/s

Capacity of Falcon Ridge @ curb height

Cross Section Image



Worksheet for Copy of STD 100' ROW-Falcon Ridge

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	1.00	%
Discharge	20.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	2.000
0+00.0	0.600
0+05.0	0.500
0+05.5	0.500
0+05.5	0.000
0+07.0	0.130
0+07.0	0.170
0+50.0	1.030
0+93.0	0.170
0+93.0	0.130
0+94.5	0.000
0+94.5	0.500
0+95.0	0.500
1+00.0	0.600
1+00.0	2.000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 2.000)	(0+05.5, 0.000)	0.013
(0+05.5, 0.000)	(0+94.5, 0.000)	0.016
(0+94.5, 0.000)	(1+00.0, 2.000)	0.013

Results

Normal Depth	0.50	ft

Worksheet for Copy of STD 100' ROW-Falcon Ridge

Results

Elevation Range	0.00 to 2.00 ft		
Flow Area		6.69	ft²
Wetted Perimeter		36.91	ft
Top Width		35.83	ft
Normal Depth		0.50	ft
Critical Depth		0.54	ft
Critical Slope		0.00669	ft/ft
Velocity		2.99	ft/s
Velocity Head		0.14	ft
Specific Energy		0.64	ft
Froude Number		1.22	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.54	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00669	ft/ft

Messages

Notes	P-1

WEIR FLOW @ I-15 BREAKOUT

WSE=	1606.45	at RS 2000.1
Weir Invert=	1603.75	
H=	2.7	
L	24.7	
Q=	329	

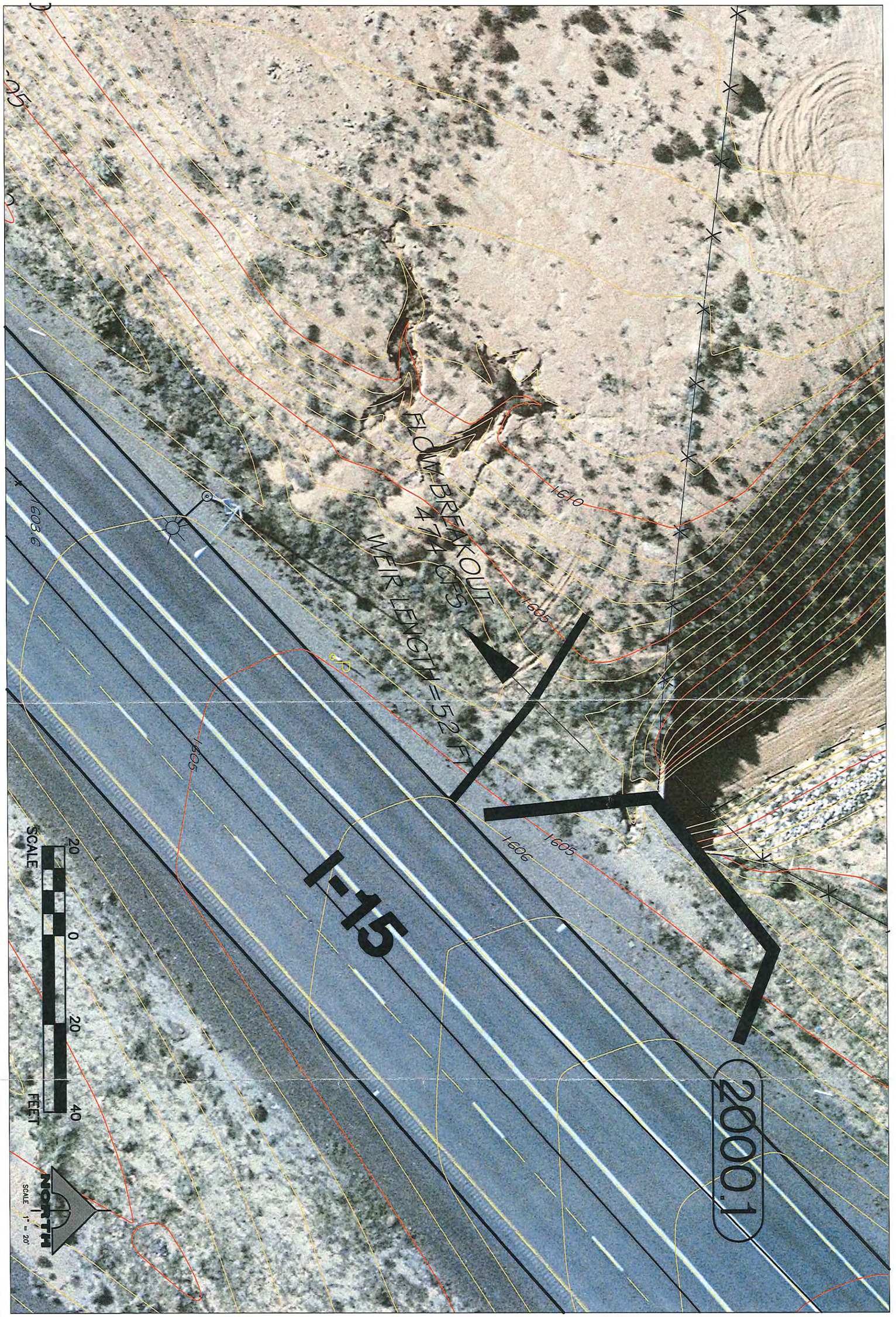
WSE=	1606.45	at RS 2000.1
Weir Invert=	1604.50	
H=	1.95	
L	12.9	
Q=	105	

WSE=	1606.45	at RS 2000.1
Weir Invert=	1605.50	
H=	0.95	
L	14.4	
Q=	40	

Total Weir Length	52	feet
Q TOTAL	**474**	cfs

This flow goes out from Pulsipher Wash and does not come back.

BGautam 05-20-11 09:03:08 F:\Projects\500\550-048\Division\Fctl\Exhibits\I-15 Breakout Exhibit-11x17.dwg



SHEET I-15 EXH SHTOF SHTS	CLARK COUNTY, NEVADA REGIONAL FLOOD CONTROL DISTRICT PULSIPHER WASH LOMR I-15 BREAKOUT EXHIBIT	G. C. WALLACE COMPANIES ENGINEERS | PLANNERS | SURVEYORS 1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146 T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

TABLE 2: PULSIPHER WASH ZONE AE BFE COMPARISON TABLE

River Station	Study Name	Effective BFE (1929 Datum)	Effetvie BFE (1988 Datum)	Current BFE (1988 Datum)	Difference	Note	Note
2300	LOMR	1605.4	1608.2	1607.1	-1.1		Datum Difference 2.84
2200	LOMR	1605.4	1608.2	1607.1	-1.1		Datum Difference 2.84
2100	FIS	1605.8	1608.1	1607.1	-1.0		Datum Difference 2.29
2000	FIS	1599.5	1601.8	1605.8	4.0	Differnce in HEC-2 and HEC-RAS Bridge Modeling	Datum Difference 2.29
1900	FIS	1592.7	1595.0	1593.3	-1.7		Datum Difference 2.29
1800	FIS	1590.5	1592.8	1593.9	1.1	Section Different, Higher Invert of Wash	Datum Difference 2.29
1750	FIS	1589.2	1591.5	1591.6	0.1	Section Different, Higher Invert of Wash	Datum Difference 2.29
1650	FIS	1588.2	1590.5	1590.2	-0.3		Datum Difference 2.29
1700	FIS	1587.3	1589.6	1589.0	-0.6		Datum Difference 2.29
1600	FIS	1585.7	1588.0	1586.7	-1.3		Datum Difference 2.29
1500	FIS	1585.5	1587.8	1584.7	-3.1		Datum Difference 2.29
1400	FIS	1584.2	1586.5	1582.1	-4.4		Datum Difference 2.29
1300	FIS	1579.5	1581.8	1579.8	-2.0		Datum Difference 2.29
1200	FIS	1578.5	1580.8	1579.4	-1.4		Datum Difference 2.29
1100	FIS	1578.1	1580.4	1578.7	-1.7		Datum Difference 2.29
1000	FIS	1577.0	1579.3	1577.9	-1.4		Datum Difference 2.29
900	FIS	1576.0	1578.3	1576.8	-1.5		Datum Difference 2.29
800	FIS	1575.4	1577.7	1576.5	-1.2		Datum Difference 2.29
700	FIS	1573.9	1576.2	1576.2	0.0		Datum Difference 2.29
600	FIS	1568.7	1571.0	1575.9	4.9	Differnce in HEC-2 and HEC-RAS Bridge Modeling, Higher Q	Datum Difference 2.29
500	FIS	1567.1	1569.4	1571.2	1.8	Higher Q	Datum Difference 2.29
400	FIS	1563.2	1565.5	1568.6	3.1	Higher Q	Datum Difference 2.29
300	FIS	1560.6	1562.9	1564.8	1.9	Higher Q	Datum Difference 2.29
200	FIS	1555.7	1558.0	1559.2	1.2	Higher Q	Datum Difference 2.29

TABLE 3: ABBOTT WASH HYDRAULIC MODELING SUMMARY

FOR BOTH FLOODPLAIN ANALYSES, SUBCRITICAL RUN RESULTS USED FOR ALL SECTIONS.
FLOODWAY HAS NOT BEEN PROPOSED FOR ABBOTT WASH.
LEGEND
DISTANCE = DISTANCE IN FEEET ABOVE THE START OF THE MESQUITE VISTAS CHANNEL
Q = 100-YEAR FLOW RATE, CFS.
WSE = WATER SURFACE ELEVATION, FT. FOR FLOODPLAIN MODEL, WSE IS SAME AS BASE FLOOD ELEVATION (BFE).
D = FLOW DEPTH, FT.
V = AVERAGE FLOW VELOCITY, FPS.
TW = TOP WIDTH OF WATER SURFACE, FT.

HEC-RAS	HEC-RAS		LOCATION/	FLOW REGIME		DISTANCE	FLOODPLAIN MODELING SUMMARY				
MODEL XS	PROJECT	PLAN	DESCRIPTION	ACTUAL	USED		Q	WSE	D	V	TW
1152	ABBOTTWASH	LOMR	Abbott Wash DB D/S	SUB	SUB	2199	992	1664.7	8.7	0.4	398
1150	ABBOTTWASH	LOMR		SUB	SUB	2103	992	1664.7	8.7	0.4	393
1145	ABBOTTWASH	LOMR		SUB	SUB	1987	992	1664.7	8.7	0.5	337
1140	ABBOTTWASH	LOMR		SUB	SUB	1721	992	1664.5	9.5	3.6	122
1135	ABBOTTWASH	LOMR	Horizon Blvd U/S	SUB	SUB	1533	992	1661.8	8.8	12.3	57
1130	ABBOTTWASH	LOMR	Horizon Blvd D/S	SUB	SUB	1249	992	1657.8	7.2	15.3	9
1125	ABBOTTWASH	LOMR		SUPER	SUB	1123	992	1655.4	5.4	6.2	38
1120	ABBOTTWASH	LOMR		SUB	SUB	893	992	1654.4	5.4	7.3	38
1115	ABBOTTWASH	LOMR		SUB	SUB	707	992	1652.5	3.5	9.2	42
1112	ABBOTTWASH	LOMR		SUB	SUB	594	992	1651.4	3.4	6.3	59
1110	ABBOTTWASH	LOMR		SUB	SUB	532	992	1650.6	2.6	8.1	57
1105	ABBOTTWASH	LOMR		SUB	SUB	370	992	1650.7	3.7	4.4	71
1100	ABBOTTWASH	LOMR	Hardy Way U/S	SUB	SUB	94	1820	1649.3	4.8	8.9	43
1098	ABBOTTWASH	LOMR	Hardy Way D/S	SUB	SUB	0	1820	1649.0	5.2	8.1	43
1095	ABBOTTWASH	LOMR	Concrete Channel	SUPER	SUB	0	1820	1648.1	5.1	10.2	56
1090	ABBOTTWASH	LOMR	Concrete Channel	SUPER	SUB	0	1820	1646.0	5.0	10.4	52

TABLE 4: PULSIPHER WASH HYDRAULIC MODELING SUMMARY

FOR BOTH FLOODPLAIN AND FLOODWAY ANALYSES, SUBCRITICAL RUN RESULTS USED FOR ALL SECTIONS.

LEGEND

DISTANCE = DISTANCE IN FEEET ABOVE THE VIRGIN RIVER TIE-IN

Q = 100-YEAR FLOW RATE, CFS.

WSE = WATER SURFACE ELEVATION, FT. FOR FLOODPLAIN MODEL, WSE IS SAME AS BASE FLOOD ELEVATION (BFE).

D = FLOW DEPTH, FT.

V = AVERAGE FLOW VELOCITY, FPS.

TW = TOP WIDTH OF WATER SURFACE, FT.

INCREASE = INCREASE IN DEPTH BETWEEN FLOODWAY AND FLOODPLAIN WATER SURFACE ELEVATIONS

N/A = FLOODWAY HAS NOT BEEN PROPOSED IN THESE SECTIONS.

HEC-RAS	HEC-RAS		LOCATION/	FLOW REGIME		DISTANCE	FLOODPLAIN MODELING SUMMARY					FLOODWAY MODELING SUMMARY					INCREASE
MODEL XS	PROJECT	PLAN	DESCRIPTION	ACTUAL	USED		Q	WSE	D	V	TW	Q	WSE	D	V	TW	
3800	PULWASH	LOMR	Pulsipher Wash DB D/S	SUB	SUB	9095	867	1656.3	2.3	4.9	230	N/A	N/A	N/A	N/A	N/A	N/A
3700	PULWASH	LOMR		SUB	SUB	8529	867	1656.0	6.0	2.0	190	N/A	N/A	N/A	N/A	N/A	N/A
3660	PULWASH	LOMR	Access Road U/S	SUB	SUB	8304	867	1655.9	8.0	2.6	130	N/A	N/A	N/A	N/A	N/A	N/A
3640	PULWASH	LOMR	Access Road D/S	SUB	SUB	8261	867	1653.6	5.8	7.9	94	N/A	N/A	N/A	N/A	N/A	N/A
3600	PULWASH	LOMR		SUPER	SUB	8118	867	1648.1	2.1	8.2	55	N/A	N/A	N/A	N/A	N/A	N/A
3500	PULWASH	LOMR		SUPER	SUB	7748	867	1644.7	1.7	7.4	69	N/A	N/A	N/A	N/A	N/A	N/A
3400	PULWASH	LOMR		SUPER	SUB	7354	867	1639.8	1.8	7.6	65	N/A	N/A	N/A	N/A	N/A	N/A
3300	PULWASH	LOMR		SUB	SUB	7010	867	1636.8	3.8	4.2	82	N/A	N/A	N/A	N/A	N/A	N/A
3280	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6959	867	1635.3	3.3	10.1	156	N/A	N/A	N/A	N/A	N/A	N/A
3275	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6942	867	1634.9	3.4	10.4	25	N/A	N/A	N/A	N/A	N/A	N/A
3270	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6909	867	1634.4	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3200	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6659	867	1630.6	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3100	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6259	867	1624.5	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3080	PULWASH	LOMR	Bertha Howe U/S	SUPER	SUB	6219	867	1624.8	4.3	8.4	24	N/A	N/A	N/A	N/A	N/A	N/A
3020	PULWASH	LOMR	Bertha Howe D/S	SUB	SUB	6091	1723	1624.9	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
3000	PULWASH	LOMR	RCB	SUPER	SUB	5941	1723	1623.7	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2900	PULWASH	LOMR	RCB	SUPER	SUB	5591	1723	1620.8	5.3	13.1	25	N/A	N/A	N/A	N/A	N/A	N/A
2800	PULWASH	LOMR	RCB	SUPER	SUB	5301	1723	1618.6	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2700	PULWASH	LOMR	RCB	SUPER	SUB	5051	1723	1616.6	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2600	PULWASH	LOMR	RCB	SUPER	SUB	4670	1723	1613.6	5.4	13.2	24	1723	1613.6	5.4	13.2	24	0.0
2590	PULWASH	LOMR		SUPER	SUB	4664	1723	1611.0	3.0	9.3	69	1723	1611.0	3.0	9.8	60	0.0
2500	PULWASH	LOMR		SUB	SUB	4454	1972	1609.0	6.0	7.3	61	1972	1609.0	6.0	7.3	61	0.0
2400	PULWASH	LOMR		SUB	SUB	4274	1972	1607.0	5.0	11.0	48	1972	1607.0	5.0	11.0	48	0.0
2350	PULWASH	LOMR		SUPER	SUB	4203	1972	1606.7	5.7	9.3	113	1972	1607.0	6.0	8.3	103	0.3
2330	PULWASH	LOMR		SUB	SUB	4140	1972	1607.0	6.0	6.1	215	1972	1607.1	6.1	6.6	148	0.1
2300	PULWASH	LOMR		SUB	SUB	3900	1972	1607.1	8.1	2.4	322	1972	1607.1	8.1	3.1	188	0.0
2200	PULWASH	LOMR		SUB	SUB	3588	1972	1607.1	10.1	0.8	570	1972	1607.1	10.1	1.9	181	0.0
2100	PULWASH	LOMR		SUB	SUB	3260	1972	1607.1	14.1	1.7	234	1972	1607.1	14.1	1.8	183	0.0
2000.1	PULWASH	LOMR		SUB	SUB	3162	1972	1606.4	14.7	7.5	100	1972	1606.4	14.7	7.5	100	0.0
2000	PULWASH	LOMR	I-15 U/S	SUB	SUB	3161	1498	1605.8	14.0	8.9	93	1498	1605.8	14.0	8.9	12	0.0
1900	PULWASH	LOMR	I-15 D/S	SUB	SUB	2841	1595	1593.3	8.2	16.2	12	1595	1593.8	8.8	15.2	12	0.5
1800	PULWASH	LOMR		SUPER	SUB	2803	1595	1593.9	3.9	9.1	104	1595	1594.3	4.3	11.8	31	0.4
1750	PULWASH	LOMR		SUPER	SUB	2632	1595	1591.6	3.6	8.4	217	1595	1592.2	4.2	11.3	40	0.6
1700	PULWASH	LOMR		SUB	SUB	2462	1595	1590.2	3.2	6.7	255	1595	1591.2	4.2	10.1	56	0.97
1650	PULWASH	LOMR		SUB	SUB	2301	1595	1589.0	4.0	7.7	227	1595	1589.7	4.7	10.9	43	0.7
1600	PULWASH	LOMR		SUPER	SUB	2126	1595	1586.7	2.7	7.8	123	1595	1587.5	3.5	10.4	46	0.8
1500	PULWASH	LOMR		SUB	SUB	1984	1595	1584.7	6.7	3.5	109	1595	1584.7	6.7	3.5	106	0.0
1400	PULWASH	LOMR		SUB	SUB	1871	1595	1582.1	6.1	12.4	27	1595	1582.1	6.1	12.4	27	0.0
1300	PULWASH	LOMR		SUB	SUB	1709	1595	1579.8	6.8	11.2	31	1595	1580.7	7.7	9.3	33	0.9
1200	PULWASH	LOMR		SUB	SUB	1533	1595	1579.4	7.4	7.0	60	1595	1579.8	7.8	8.6	34	0.4
1100	PULWASH	LOMR		SUB	SUB	1422	1595	1578.7	6.7	7.2	53	1595	1579.0	7.0	9.0	34	0.3
1000	PULWASH	LOMR		SUB	SUB	1319	1595	1577.9	5.9	7.7	57	1595	1578.5	6.5	8.2	39	0.6
900	PULWASH	LOMR		SUB	SUB	1200	1595	1576.8	6.8	8.2	52	1595	1577.3	7.3	9.2	35	0.5
800	PULWASH	LOMR		SUB	SUB	1097	1595	1576.5	6.5	6.4	63	1595	1577.0	7.0	7.3	43	0.5
700	PULWASH	LOMR		SUB	SUB	964	1595	1576.2	6.2	5.4	73	1595	1576.4	6.4	7.3	45	0.2
600	PULWASH	LOMR		SUB	SUB	845	1595	1575.9	6.9	5.5	105	1595	1576.2	7.2	6.3	46	0.3

HEC-RAS	HEC-RAS		LOCATION/	FLOW REGIME		DISTANCE	FLOODPLAIN MODELING SUMMARY					FLOODWAY MODELING SUMMARY					INCREASE
MODEL XS	PROJECT	PLAN	DESCRIPTION	ACTUAL	USED		Q	WSE	D	V	TW	Q	WSE	D	V	TW	
580	PULWASH	LOMR	Hafen Ln U/S	SUB	SUB	779	1595	1575.7	7.3	5.9	87	1595	1576.2	7.8	5.4	47	0.5
500	PULWASH	LOMR	Hafen Ln D/S	SUPER	SUB	677	1595	1571.2	3.8	11.2	37	1595	1571.2	3.8	11.2	37	0.0
400	PULWASH	LOMR		SUPER	SUB	636	1595	1568.6	4.6	9.2	66	1595	1569.2	5.2	12.7	25	0.6
300	PULWASH	LOMR		SUPER	SUB	502	1595	1564.8	2.8	7.7	113	1595	1565.7	3.7	10.8	40	0.9
200	PULWASH	LOMR		SUB	SUB	150	1595	1559.2	2.2	7.0	153	1595	1559.9	2.9	9.8	56	0.7

3.3 ADDITIONAL GRADING FOR SEDIMENT VOLUME

Text
Calculation

ADDITIONAL GRADING FOR SEDIMENT CAPACITY

The hydrologic models provided show that the existing detention basins volumes are large enough to contain the clear water tributary runoff during the 100-year storm event. However, additional grading within the detention basins was required in order to achieve the volumes necessary to contain the sediment loads in addition to the clear water during the 100-year storm event. The provided grading plan for the detention basins show that the additional volumes can be obtained by flattening the detention basin bottom and maintaining the existing 3 to 1 side slopes.

The existing Abbott Wash detention basin has a peak storage volume of 235.4 ac-ft and will receive 226 ac-ft of clear water runoff during the 100-year storm event and results in a peak water surface elevation of 1674.96 ft, which is 0.44 feet below the spillway crest elevation of 1675.4 ft and provides 8.5 ac-ft of storage volume. It was recommended to excavate 10.7 ac-ft of dirt to account for the calculated sediment load of 19.2 ac-ft (8.5+10.7=19.2).

The existing Pulsipher Wash detention basin has a peak storage volume of 135.0 ac-ft and will receive 133 ac-ft of clear water runoff during the 100-year storm event and results in a peak water surface elevation of 1673.56 ft, which is 0.14 feet below the spillway crest elevation of 1673.7 ft and provides 0.7 ac-ft of storage volume. It was recommended to excavate 9.5 ac-ft of dirt to account for the calculated sediment load of 10.2 ac-ft (0.7+9.5=10.2). Refer to the attached sediment calculation

COM finished the required grading in Abbott Wash and Pulsipher Wash detention basins on August 22, 2011. GCW performed a site visit and surveyed the additional grading work on August 26, 2011. GCW confirmed that the new grading substantially conforms to the grading plan and the required sediment volume has been provided. The hydrologic models have not been revised to account for this grading as sediment will fill up this additional volume. COM will carry out maintenance for the detention basins at regular intervals and after major storm events.

The grading plan exhibit has been included in Appendix 6. The sediment calculations have been attached. Site visit photos have also been provided in Appendix 3.4.

DETENTION BASIN VOLUME CALCULATIONS

Abbott Wash Detention Basin

Storage Required at 1675.4 (Spillway Crest Elevation)

= 226.0 ac-ft (Clear Water Volume from HEC-1 Output) + 19.2 ac-ft (Referenced Sediment Volume)

= 245.2 ac-ft

Storage Provided at 1675.4 (Spillway Crest Elevation)

= 235.35 ac-ft (From Surveyed As-Built Stage Storage) + 10.69 ac-ft (Surveyed New Grading)

= 246.04 ac-ft

Storage Provided > Storage Required OK

Pulsipher Wash Detention Basin

Storage Required at 1673.7 (Spillway Crest Elevation)

= 133.0 ac-ft (Clear Water Volume from HEC-1 Output) + 10.2 ac-ft (Referenced Sediment Volume)

= 143.2 ac-ft

Storage Provided at 1673.7 (Spillway Crest Elevation)

= 134.99 ac-ft (From Surveyed As-Built Stage Storage) + 9.46 ac-ft (Surveyed New Grading)

= 144.45 ac-ft

Storage Provided > Storage Required OK

4. SUPPORTING INFORMATION

Site Investigation Photographs
Field Survey
Operation and Maintenance Plan

ABBOTT WASH

Abbot Detention Basin - Downstream facing north

Abbot Detention Basin - Downstream facing northwest

Abbot Detention Basin - Downstream facing northeast

Abbott Detention Basin - Downstream facing north

Abbott Wash

Horizon Ridge RCB Crossing - Upstream facing west embankment

Horizon Ridge RCB Crossing - Upstream facing south

Horizon Ridge RCB Crossing - Upstream facing west embankment

Horizon Ridge RCB Crossing - Upstream facing east embankment

Abbott Wash

Hardy Way Bridge Crossing - Upstream facing northwest

Hardy Way Bridge Crossing - Upstream facing north

Hardy Way Bridge Crossing - Upstream facing west

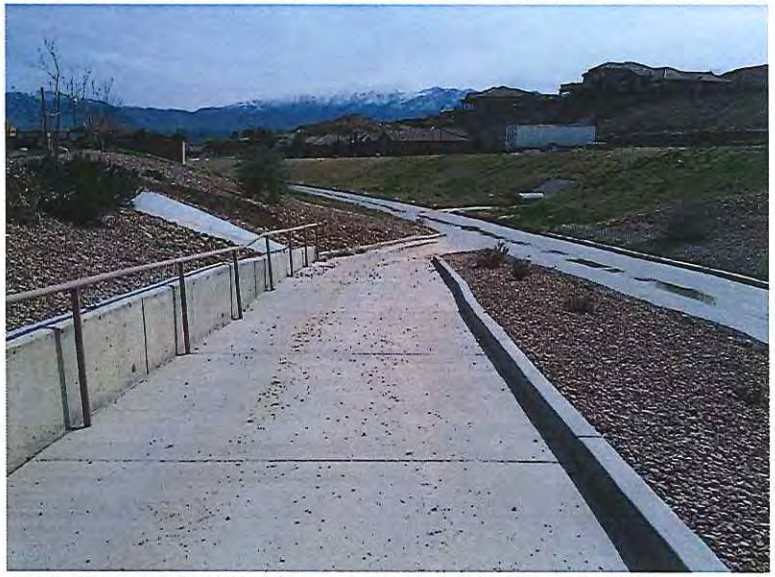
Hardy Way Bridge Crossing - Upstream east embankment

Abbott Wash

Hardy Way Bridge Crossing - Downstream facing northeast

Hardy Way Bridge Crossing - Downstream facing northwest

Hardy Way Bridge Crossing - Downstream facing south



Hardy Way Bridge Crossing - Downstream facing southwest

Abbott Wash

Abbott Wash Additional Grading - facing east

Abbott Wash Additional Grading - facing north

Abbott Wash Additional Grading - facing southwest

Abbott Wash Additional Grading - facing northeast

PULSIPHER WASH

Pulsipher Wash Detention Basin - facing northeast

Pulsipher Wash Detention Basin - facing northwest

Pulsipher Wash Detention Basin - Spillway

Pulsipher Wash Detention Basin - South of DB facing upstream

Pulsipher Wash

Pulsipher Wash - Downstream of DB facing RCB box culvert crossing

Pulsipher Wash – Facing north upstream toward Detention Basin

RCB Crossing - Upstream stream facing south

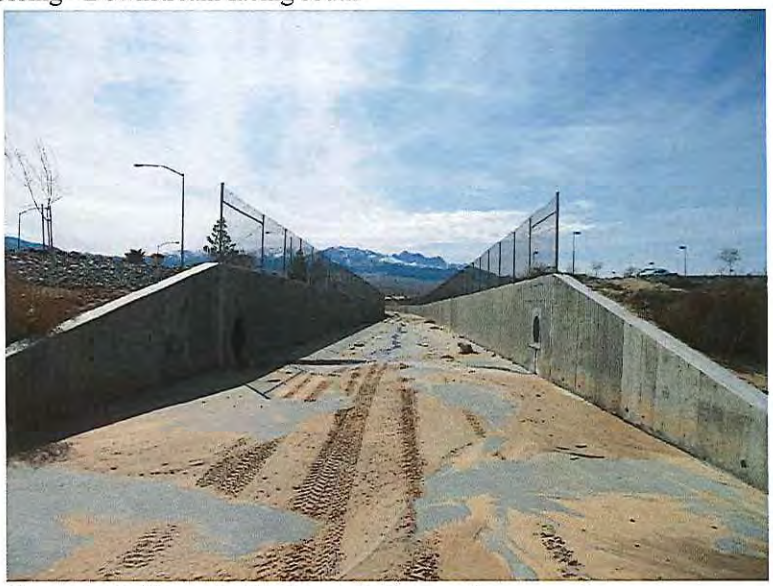
RCB Crossing - Downstream facing north

Pulsipher Wash

RCB Crossing - Inside the culvert, downstream facing north

RCB Crossing - Downstream facing south

Concrete U Channel - Upstream facing west embankment



Concrete U Channel - Upstream facing south

Pulsipher Wash

Concrete U Channel - Upstream facing north, east embankment

Concrete U Channel - Upstream facing north

RCB - At west embankment facing downstream

RCB - At west embankment facing upstream

RCB – Downstream at west embankment facing east

RCB – Downstream at west embankment facing southeast

Adjacent to Leavitt Lane- Facing upstream

Adjacent to Leavitt Lane- Facing downstream

Hafen Crossing – North of bridge facing downstream

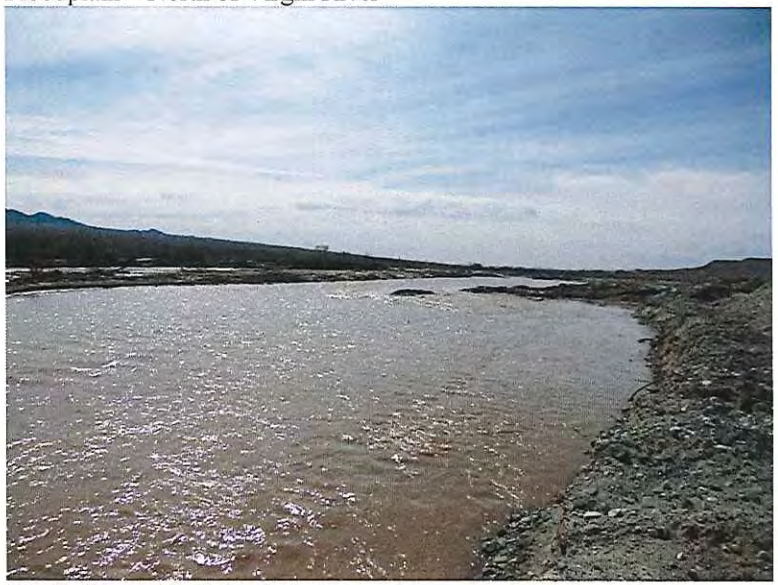
Hafen Crossing – North of bridge facing west

Hafen Crossing – South of bridge facing east embankment

Hafen Crossing – South of bridge facing downstream

Floodplain – North of Virgin River

Floodplain – North of Virgin River



Virgin River- North bank facing west

Virgin River- North bank facing east

Pulsipher Wash

Pulsipher Wash Additional Grading - facing west

Pulsipher Wash Additional Grading - facing east

Pulsipher Wash Additional Grading - facing northeast

Pulsipher Wash Additional Grading - facing north

ABBOTT WASH

ABBOTT WASH

1/21/22

E20.248

MESQUITE, NEVADA

ABBOTT & PULSIPHER WASHES

T13S R71E SEC. 1, 12, 13, 24

T13S R72E SEC. 5, 6, 7, 8, 18

CONVENTIONAL

SCALE FACTOR 1.0022

FILE PJ1083a

24 MAR 2011

RAWSON EAST

GRASSMANN TS

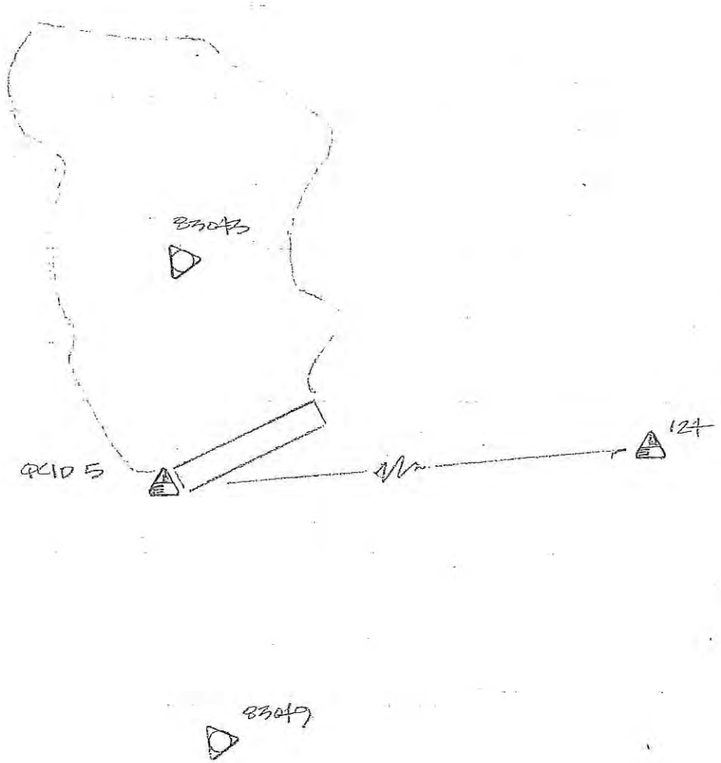
CLB

GOOD

BASED

E50:048 ABBOTT & PULSIFIER WASHES
CONVENTIONAL SURVEY TS60# TS12 P: 4.92,16.35
FILE PU1008A SCALE FACTOR 1.000

TOOK SHOTS AT TOE IN BASIN



24 MAR 2011 1321.23

T & QC10 5 5.82 PK NAIL IN CONC. TOP OF BERM
N: 54782.785 E: 45536.707 EL: 1682.852

BS @ 124 5.18 1½" ALCAP 4CN CONTROL HV PANEL #24
N: 54736.507 E: 44509.062 EL: 1707.549

HZ 77°32'42" HORIZ ERROR 0.02 VERT ERROR 0.016
FS TOPO SHOTS #83000-83049)

#83007 85 72" RCP WITH STEEL PLATE COVER WITH 60" OPENING HIGHER UPSTREAM INLET AT BERM

#83008 85 36" RCP IN HEADWALL LOWER UPSTREAM INLET AT BERM

#83025 85 72" RCP WITH CONC. FLANGE HIGHER DOWN STREAM OUTLET

#83026 85 36" RCP IN HEADWALL LOWER DOWNSTREAM OUTLET

SET OUT WORK POINT #83043 2"X2" WOOD HUB W/ TACK
N: 55364.593 E: 43850.665 EL: 1682.006

#83044 85 53" PLASTIC PIPE W/ CONC COLLAR WITH 8" HEADWALLS

SET OUT WORK POINT #83049 2"X2" WOOD HUB W/ TACK
N: 53949.681 E: 44076.823 EL: 1677.455

EB0.043 ABBOTT & PILGRIM WASHES

T6 B3043 5.10

BS @ QL105 5.62

AZ 172°43'10 @ 786.52'
FS TOPO #B3050 - B3060

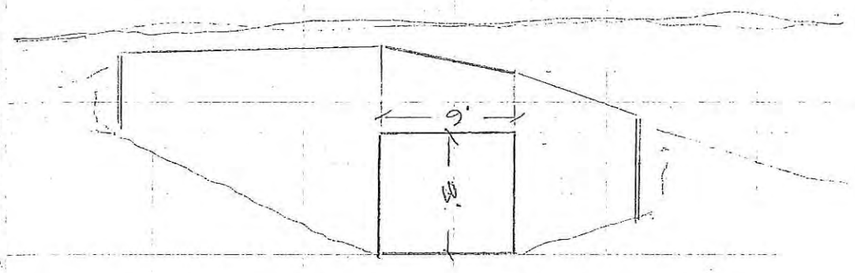
#B3051 BS 24" PLASTIC IN CONC. WITH 3" HEADWALLS

24 MAR 2021 13:21:24

T6 B3043 5.44

BS @ QL105 5.62

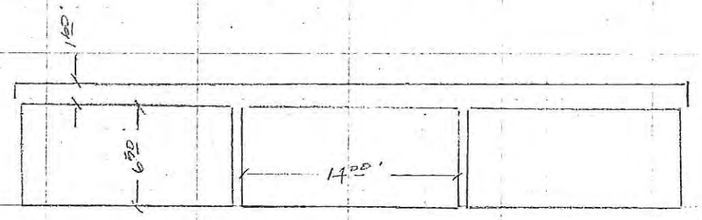
AZ 222°15'18 @ 800.64'
FS TOPO # B3064 - B3107



9' x 9' RCB WITH HEADWALLS
LOOKING DOWNSTREAM

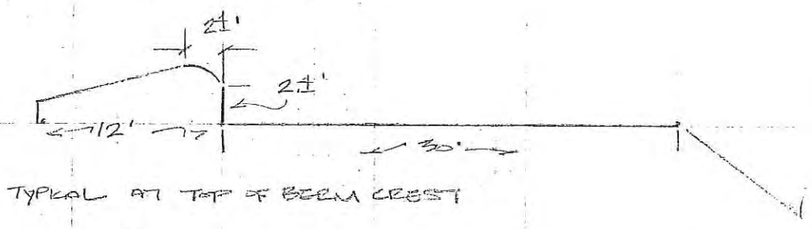
550.045		ABBOTT # PUSHPIER WASHER
TO28003		1½" ALCAP ILL. IN A/C 2L OF HARDY N: 52604.090 E: 48426.216 EL: 1685.857
BS @ 125	5.31	PK NAIL IN A/C HV.25 NORTH SIDE OF HARDY N: 52745.606 E: 48466.645 EL: 1710.805

AZ 280°04'34" @ 303.147'
FS TAPE CLOSURE @ 83108 - 83171



THREE 14' x 6.5' RCBS WITH HEADWALLS (3")
LOOKING DOWNSTREAM

24 MAR 2011 1321.257



TYPICAL AT TOP OF BERM CREST

PULSIPHER WASH

PULSIPHER WASH

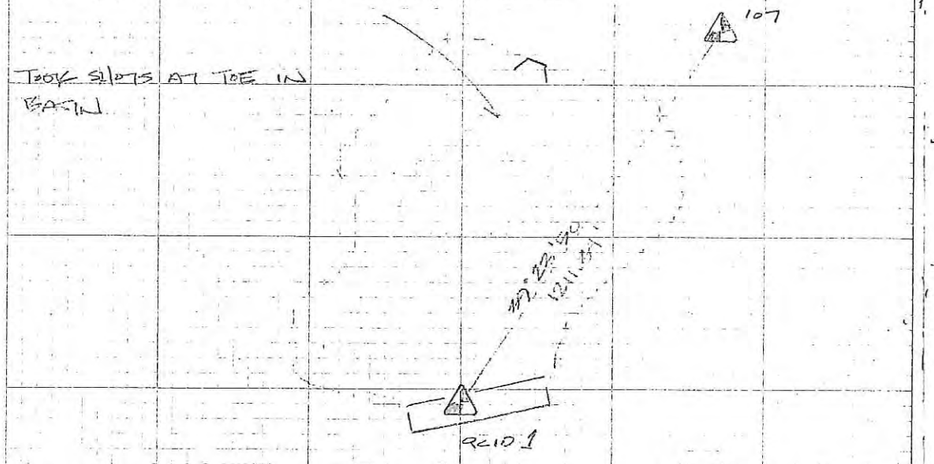
1321.17

ESRI GIS
MESQUITE, NEVADA
ABBOTT & PULSIPHER WASHES
T18S R70E SEC 1, 12, 13, 24
T18S R71E SEC 5, 6, 7, 8, 18
CONVENTIONAL
SCALE FACTOR 1.0003
FILE PJ1109RA
CONTROL ABBOTT PULSIPHER

23 MAR 2011
RJAMISON
4 KASSAFIELD
GLO

SDD.043 ABBOTT & TULSIPHER WASHES
CONVENTIONAL SURVEY TP603 TSLR N=4,92,4.35
FILE RJ110624 SCALE FACTOR 1.0000

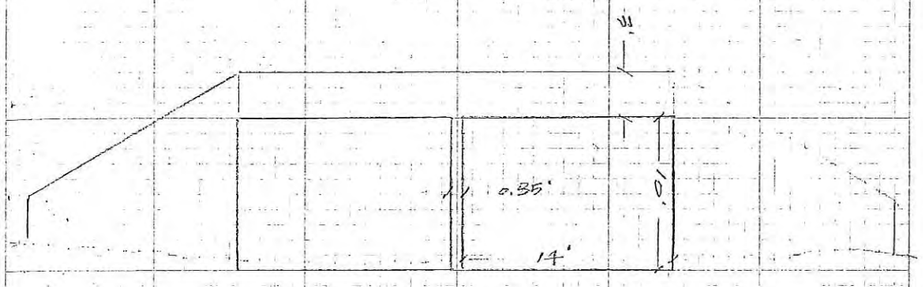
CALC. CHANNEL BURIED 4" +/- IN SAND
UNABLE TO DETERMINE END, CORNERS



23 MAR 2011 DRAIN

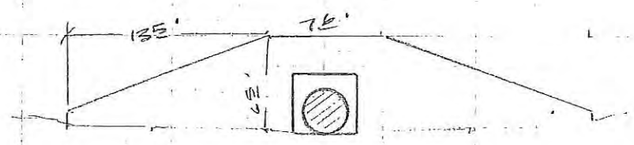
TC RC10.1	6.10	PK NAIL IN SLURRY CONC. TOP OF DET. BASIN BERM N: 516661.183 E: 2975[illegible].02 EL: 1610.32'	
BS @ 127	5.37	PK NAIL IN A/C NORTH SIDE OF HARLEY WAY 200' +/- WEST OF BOLTON ROAD N: 521602.217 E: 2983[illegible].952 EL: 1611.500'	

AZ 39°25'50" @ 1211.34' HORIZ ERROR: 0.07' VERT ERROR: 0.13'
RE TBM #82002: 82071

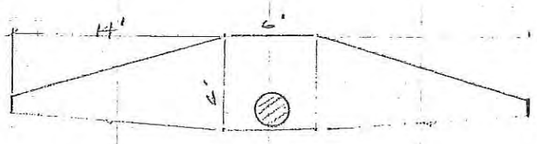


TWO 14' x 10' RCB POINTS #82015 - 82016
AT NORTH OF DETENTION BASIN

550.048 ABBOTT & PLUSIFER WASHES



#82057 48" RCP WITH STEEL PLATE COVER WITH 36" SPECIALLY HIGHER UPSTREAM INLET AT BERM



#82058 24" RCP LOWER UPSTREAM INLET AT BERM

#82066 48" RCP WITH CONC. FLUME HIGHER DOWNSTREAM OUTLET AT BERM

#82067 24" RCP WITH CONC. HEADWALL LOWER DOWNSTREAM OUTLET AT BERM

23 MAR 2011 1324.19

TO 103 5.48 1½" ALLAP GLM CONTROL HV-10 AT MESQUITE WATER RESERVOIR
N: 50795.083 E: 83754.516 EL: 1656.82 ft

BS @ 7266 5.70 1½" ALLAP PLS 1142A IN O/C AT CL BIRDIE LN. AND FALCON RIDGE
N: 49275.587 E: 83077.279 EL: 1641.95 ft

AZ 168°00'28" HORIZ ERROR 0.03 VERT ERROR 0.03

FS TOPO #82072 - 82111

★ POINTS #8210-8210A SHOT WITH INCREASED ROD HT. P: 9.14 TO 4': 4.72 CORRECTED IN JOB FILE

#82093-82100 12' x 4' RCPB WITH HEADWALLS OR WINGWALLS

550.048 ABBOTT & FLUSHING WATERS

TC 2.126 5.17

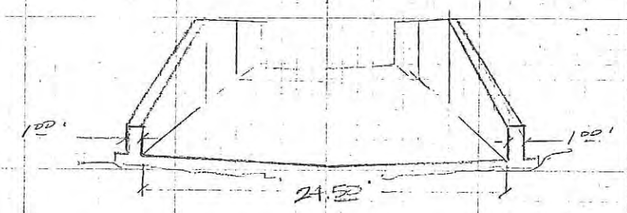
BS 108 5.28

AZ 348°00'28 HORIZ ERROR 0.004 VERT ERROR 0.21

FS TOPS # 82112 - 82118

FIELD SHOT ATH 110 PK NAIL IN A/C 1W 10

ΔH' 0.02 x 0.02 ΔV' 0.004



LOOKING DOWNSTREAM CHANNEL EAST OF HOSPITAL

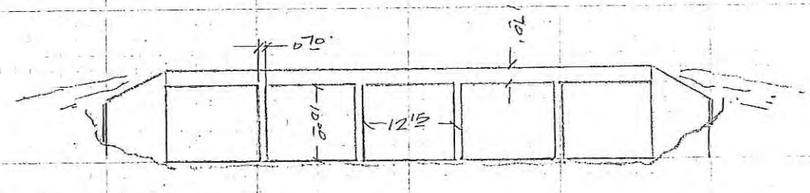
28 MAR 2011 1321.20

TC 27.41 5.32 1½" ALCAP ILL IN A/C CL OF PIONEER BLVD AND FALCON RIDGE PKWY.
N:47489.880 E:33564.287 EL 624.124

BS @ 112 5.44 PK IN A/C NEAR CL OF PIONEER BLVD 300'+/- EAST OF FALCON RIDGE PKWY
N:47682.540 E:33607.857 EL 7032.955

AZ 51°21'19 & 383.651

FS TOPS # 82117 - 82119



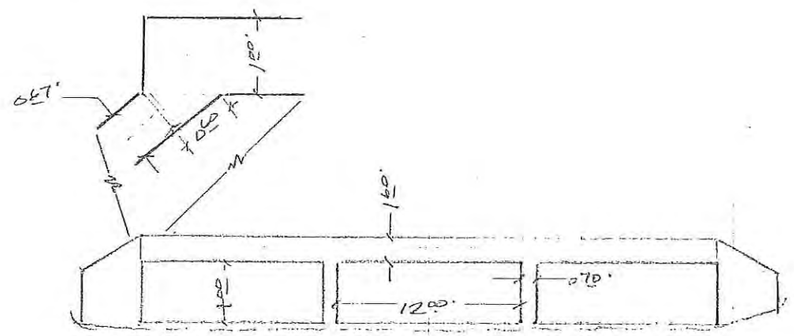
LOOKING UPSTREAM
FIVE 12.5' x 10.00' RCBC WITH 1.00' THICK HEADWALL AND 0.67 THICK WINGWALLS

550.048 ABBOTT & PULSIPHER WASHES
T@ 28X47 2" BRASS DISC PLS 11424 TRACT CR AP 44-4
AP 47-1 2011 SOUTH OF HAGEN LN.
N:44044.628 E:40144.503 EL:1574.077

BS@ QR4D3 4.92 PK IN A/C I.V PANEL CL SERVICE DR.
SOUTH OF LEAVITT LN, NORTH OF HAGEN LN.
N:44677.433 E:40027.014 EL:1550.084

AZ 349°28'55" @ 643.615
FS TOPO #B2150-B2300
REMOTE STA FROM BBS #233 ELEV: 1574.050
NEW ELEV. @ #28047 1574.277'

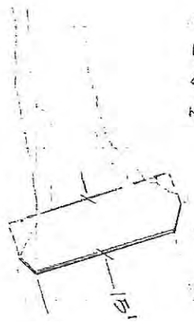
TOP OF HEAD/WINGWALL
ANGLE POINT



FOUND THREE 12' x 4' RCBs WITH 1.0' THICK HEADWALL AND 0.67' THICK WINGWALLS.

23 MAR 2011

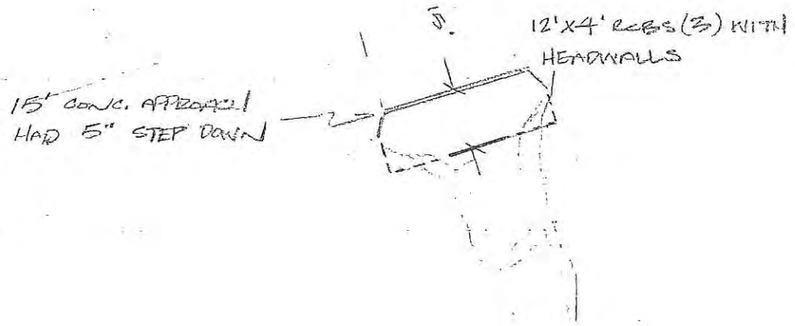
1321.21



15' CONC. APPROACH
UNABLE TO LOCATE CORNERS DUE TO MUD, ROCK

12'x4' RCBs (3) WITH HEADWALLS

HARDY LN.



1321.26

5-30-08
MESQUITE, NEVADA
ABBOTT & PULSIPHER HOMES
T13S R71E SEC 6,12
CONVENTIONAL
CONTROL: ABBOTT & PULSIPHER
FILE PH112338
- TOPO SHOTS & DETENTION
BASINS AFTER GRADING
ADJUSTMENTS PER
EXHIBITS

2W ALK 11
TRANSCON 100 T
4KASSAWHA TP
4LDY
4OT
CALM

5530.48 MESQUITE WASHES
CONVENTIONAL SURVEY
SG, TSCS 9-4.92, 6.35
CONTROL ABBOTT NULSPIER
FILE RM12330

- TOPO SHOTS VERIFYING DIRT GRADING AT DETENTION BASINS PER EXHIBITS
- MET WITH J. PRUITT ON-SITE TO CONFIRM DESIRED LOCATIONS

TC RCID5 5.53 PK IN CONC @ TOP OF SPILLWAY

BSC 124 5.05 1½" ALCAP IN DESERT HV-24

AZ 77°32'42 @ 944.57' HORIZ 0.05 VERT 0.10

- TOPO SHOTS #238001-238006

TC RCID1 5.63 PK IN CONC. @ TOP OF SPILLWAY

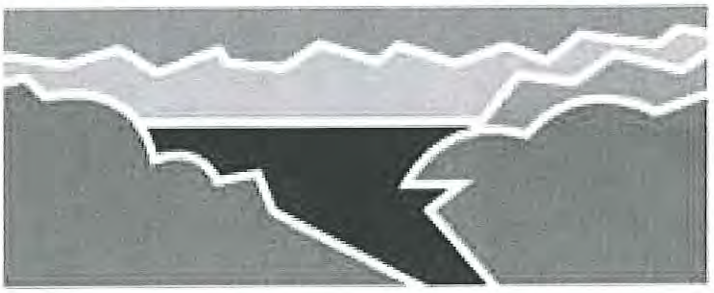
BS @ 107 5.35 PK IN N/C HV-7

AZ 39°23'50 @ 1211.34' HORIZ 0.05 VERT 0.01

- TOPO SHOTS #238007-238012

2L-AUG 11 B21-27

REGIONAL FLOOD CONTROL DISTRICT



OPERATIONS AND MAINTENANCE MANUAL

Adopted
September 9, 2010

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

OPERATIONS AND MAINTENANCE MANUAL

GALE WM. FRASER, II, P.E.
GENERAL MANAGER / CHIEF ENGINEER

www.regionalflood.org

The Operations and Maintenance Manual has been updated in accordance with Regional Flood Control District Board action on September 9, 2010. The Board adopted amendments to Chapter 1, Section 1.10 – Executive Summary: Maintenance Procedures and Inventory Procedures, Chapter 2, Section 2.20 – Authority, Section 2.30 – Responsibility, and Section 2.50 – Definitions, Chapter 3, Section 3.20 – Policies, Chapter 4, Section 4.25 – Certification of Compliance, 4.32 – Activities, Section 4.42 – Physical System, Performance Standards, Forms, and Appendix A and Appendix B.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

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CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

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CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

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CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 1
EXECUTIVE SUMMARY

1.10 EXECUTIVE SUMMARY

The Clark County Regional Flood Control District (District) was created under NRS 543 with responsibility to plan, construct and maintain drainage and flood control facilities throughout Clark County. In order to comply with NRS 543.340(4), this **Operations and Maintenance Manual** has been prepared through the cooperation and support of all of the affected member entities, which include Clark County and the incorporated cities within Clark County. The document sets forth both policies and procedures by which the maintenance of the drainage and flood control facilities will be achieved to assure their proper working order at the time of need. The overall goal of the maintenance program as adopted by the District Board is as follows:

> COMPLY WITH THE PROVISIONS OF NRS 543.340(4) AND ASSURE THAT FACILITIES IN THE MASTER PLAN ARE MAINTAINED IN A MANNER THAT MAXIMIZES THEIR USEFUL LIFE AND ENSURES THEIR OPERATION AT DESIGN CAPACITY DURING A STORM EVENT.

Nineteen policy statements have been adopted to support the above goal.

In order to achieve the goal, and to comply with the adopted policies, the following procedures have been developed in an open and very participatory manner.

Funding Procedure – Provides for a means by which the member entities can be paid for activities associated with maintenance of drainage and flood control facilities on the Master Plan provided they meet criteria as set forth in the manual.

Administrative Procedure – Provides for establishing standards and levels of service by which maintenance will be achieved. This procedure includes the steps and schedule by which an annual work plan is established and adopted by the District Board. It also provides for the certification of performance by each member entity in accordance with the annual interlocal contract. The ability for the member entity to contract maintenance activities to private contractors is also authorized under this procedure.

Maintenance Procedures – This procedure provides the specific activities under which the maintenance program is to be carried out as listed below:

ACTIVITY NUMBER	ACTIVITY NAME	WORK MEASURE UNIT
03	Facility Assessment and Inventory	Labor Hours
05	Inspect Channels	Miles
06	Inspect Levees/Detention and Debris Basins	Miles/Each
08	Species Survey and Removal	Labor Hours
10	Clean and Reshape Channels/Levees	Cubic Yards
15	Repair Lined Channel	Each
20	Erosion Control and Repair	Square Feet
21	Provide/Maintain Dust Control	Acres
25	Clean Detention/Debris Basins	Cubic Yards
35	Fence Repair	Linear Feet
40	Vegetation Control – Chemical	Acres
45	Vegetation Control – Mechanical	Acres
50	Maintain Access Road	Miles
55	Clean and Inspect Inlet/Outlet Structures	Each
60	Repair Inlet/Outlet Structures	Each
65	Clean Storm Sewer Lines	Linear Feet
70	Storm Sewer Repair	Repairs
75	Clean/Flush Culverts & Bridges	Each
80	Miscellaneous Work Activities	Labor Hours
85	Engineering	Labor Hours

A specific performance standard has been developed for each activity setting forth the following elements:

- The most effective crew size.
- The kinds and number of equipment required.
- The major types of material that should be used.
- Recommended procedures for performing the work.
- An estimate of expected average daily accomplishment with standard crew size, equipment, and procedures.
- Authorization and scheduling criteria.

Inventory Procedures – A critical element of any maintenance program is the identification and condition of the overall drainage and flood control system. In the case of this program, the inventory also identifies those facilities that are "eligible" for payment of maintenance activities, provided the work is a part of the annual plan.

Maintenance is an ongoing and very dynamic function of a successful drainage and flood control program. This **Operations and Maintenance Manual** sets forth an initial set of policies and procedures, including the various actions required to achieve the maintenance goal. The manual will need to be updated on a regular basis to reflect fiscal implications and the experience gained as the District continues to grow and to serve the citizens and taxpayers of Clark County.

CHAPTER 2
INTRODUCTION

2.10 BACKGROUND

The Clark County Regional Flood Control District (District) was established in 1986 to plan, construct, and maintain drainage and flood control facilities throughout Clark County. These responsibilities focus on alleviating the potential for flooding and protecting the lives and property of existing residents, future residents and visitors within the District's Service Area. The initial phases of the District's program succeeded in preparing a Master Plan, uniform design criteria, regulatory standards, and constructing facilities. As these areas have progressed, the District, along with other agencies and member entities in the County, has oriented its efforts towards assuring adequate maintenance of flood control facilities and conveyance systems. This orientation is consistent with the vital role maintenance plays in all comprehensive flood control programs. This **Operations and Maintenance Manual** has been prepared through the District with the support and cooperation of each affected member entity. It represents a commitment to uniform flood control system standards and establishes a blueprint for a cost effective and consistent maintenance program throughout the District's service area.

2.20 AUTHORITY

Nevada Revised Statute (NRS) 543 mandates that the District shall undertake programs for both construction and maintenance of flood control facilities. A commitment to building and maintaining flood control facilities within Clark County is reiterated in the District's **Uniform Regulations for the Control of Drainage** (Uniform Regulations) which states that capital improvements, operation, and maintenance are all interrelated parts of the District's overall flood control program. In accordance with NRS 543.340(4) and the Uniform Regulations, the District prepared an **Operations and Maintenance Manual**, which was adopted by the District Board on November 8, 1990. To reflect fiscal implications and experience gained, the manual was updated in 1995, 1999, 2003, 2005, 2007, and 2010.

2.30 RESPONSIBILITY

The District was formed, in part, to fund and coordinate the construction and maintenance of facilities to alleviate flooding and protect the life and property of citizens within the boundaries of the District. It is the responsibility of the District to prepare and update the Master Plan for the control of floods, and manage the District funds for the Control of Floods in a manner consistent with NRS 543.

2.40 APPROACH

The maintenance program must assure that the flood control projects funded by the District are maintained at a level which maximizes their useful life and assures that facilities operate to design capacity. As an interconnected network of conveyances and structures, failure of any flood control facility to operate properly may affect the performance of the overall system within a specific watershed.

Flood control facilities require regular maintenance if they are to be functional, visually attractive, and last through their design life. Accordingly, the development of a maintenance program is just as critical to the overall success of a comprehensive flood control effort as basin planning and regulation enforcement. As stormwater and flood control programs begin to address nonpoint pollution/water quality issues, the maintenance program will play an even greater role by enabling cost effective reductions in pollutant loadings to receiving waters. Finally, visibility of the program to the public, which a comprehensive maintenance program affords, is an important factor in demonstrating that flood control management is truly a full-time commitment and not simply a priority only after a storm event. The primary objectives of the District's maintenance program are:

- To develop a complete physical feature inventory for the system.
- To establish overall policies and levels of service.
- To develop operating procedures.

It is also critical that ongoing inspection and reporting procedures continue to assure all systems are ready when needed.

Due to the multiple jurisdictions involved with maintenance of the flood control system, a commitment to this program from all member entities within the service area of the Regional Flood Control District was essential. This commitment was made through the Maintenance Technical Committee during the development of the manual in 1990. It was also recognized that coordination of this maintenance program with state transportation programs was critical. The level and consistency of the long range commitment has a direct impact on how effective the resulting maintenance system becomes. This commitment begins with a credible **Operations and Maintenance Manual**.

An essential building block for a successful flood control maintenance program in Clark County is a complete physical feature inventory of the system. It is also important to note that no maintenance program is ever truly "complete". Rather, these programs are constantly evolving as inventories are defined and standards/costs are further refined. A similar evolution is anticipated for this program. The flexibility to adjust to this evolutionary process has been built into this manual.

2.50 DEFINITIONS

In addition to the definitions of terms and phrases set forth in other District documents, the following apply to operation and maintenance:

Acceptance for Maintenance: "Acceptance for Maintenance" means that a project funded by the District, member entity, or other public/private funds is a part of the Master Plan and has been constructed in accordance with District standards and therefore eligible for maintenance funding by the District.

Annual Budget: "Annual Budget" means the anticipated costs associated with completion of each activity outlined within the annual work plan submitted by each of the member entities, and ultimately approved by the District Board of Directors prior to the start of each fiscal year.

Annual Work Plan: "Annual Work Plan" means a plan submitted by each of the member entities setting forth the type and quantity of maintenance to be performed during the ensuing budget year in a form prescribed by the District specifically requesting funds for budgeting purposes.

Certification: "Certification" means the documentation which evidences that required maintenance by a member entity has been completed in accordance with established standards.

Funding Eligibility: Projects eligible for District maintenance funding are those identified in the Regional Flood Control District's Master Plan and any revisions, amendments, and/or changes subsequently approved. Only those facilities that exist as Master Plan Facilities or exist in the same alignment as a proposed Master Plan facility, and appurtenant facilities constructed as part of a regional facility within one-quarter mile of a Master Plan facility are eligible.

Maintenance Program: The "Maintenance Program" has been established by the Board to provide funding of, and establish performance standards and guidelines for, the maintenance of flood control facilities located throughout Clark County and the incorporated areas. The Program provides funding to member entities to perform maintenance of eligible flood control facilities. Subsequently, the District works with the member entities annually to develop Maintenance Work Plans. The work plans undertaken through the Maintenance Program and budgets are funded through the annual interlocal contracts between each member entity and the District. No matching funds are required, except in those cases where an arrangement has been made to cooperatively fund a particular field activity. Work is performed using a combination of private contractors and member entity maintenance staff. The Maintenance Program contains three broad categories of work:

1. Routine and/or Preventive Maintenance: "Routine and/or Preventive Maintenance" means work on existing facilities to keep them in proper working condition, including but not limited to, debris/sedimentation removal, vegetative control, and reshaping.

2. Restoration: "Restoration" means the repair to existing facilities after a storm event including erosion repair, fence replacement, repairing/replacing trash racks, inlets, storm sewer systems, major debris removal, and similar "one time" work activities.

3. Rehabilitation: "Rehabilitation" means rebuilding a facility and/or conveyance system after it is destroyed by an event or it has been determined that it is not operating according to the intent of the design documents on file at the District causing a safety or maintenance problem or it has deteriorated to the extent that it must be replaced "in kind" including replacing or modifying drop structures, reshaping channels, bank protection restoration, inlets, etc. In general, the rehabilitative projects are designed by consultants and the construction contracts are awarded through a bid process.

Maintenance Program Exclusions: "Exclusions" typically include local drainageway maintenance such as curb and gutter work, inlet maintenance, and repairs to small piped storm sewer systems, unless otherwise constructed as part of a regional facility and landscaping, irrigation systems, trails, bike paths, and other recreational or multi-use features that do not have a direct flood control or drainage function. Maintenance work exclusions also include repair or replacement of existing flood control Master Plan facilities which undergo catastrophic damage of more than one-half (1/2) mile. These types of catastrophic damages will generally be classified as capital improvements, and requests for capital improvement funds must be reprogrammed as a capital improvement project in accordance with District Policies and Procedures.

CHAPTER 3
POLICY STATEMENT

It is important that a maintenance policy statement be adopted which reflects the objectives of both the elected officials and the operations staff charged with its implementation. The initial policy document was prepared and reviewed by District staff and the Maintenance Committee. Following input from the group, it was reviewed by the respective Public Works Directors of all member entities and further revised to reflect their input. The document was then reviewed by the Technical Advisory Committee (TAC) and the Citizens Advisory Committee (CAC) before final adoption by the Board on November 8, 1990. To reflect fiscal implications and experience gained, the document is updated on a regular basis. The final adopted policy statement is as follows:

3.10 GOAL

Comply with the provisions of NRS 543.340 (4) and assure that facilities in the Master Plan are maintained in a manner that maximizes their useful life and ensures their operation at design capacity during a storm event.

3.20 POLICIES

1. Facilities eligible for maintenance funding shall be inspected on an annual basis, as a minimum, to assure proper maintenance has been provided.

2. In cases where funded maintenance by the lead member entity is not performed to the standards specified, the District shall perform or cause to be performed the maintenance necessary to assure proper operations of the facility. Costs incurred by the District shall be deducted from the amount authorized in the maintenance agreement between the lead member entity and the District.

3. Flood control facilities improved or constructed after adoption of this policy, must be designed in accordance with District criteria and standards to be eligible for maintenance funding.

4. Access to the facility must be guaranteed to the lead member entity and the District in order to be eligible for maintenance funding.

5. Maintenance and repairs to flood control facilities will be performed in a manner that will minimize the degradation of water quality.

6. The maintenance requirements applied to these facilities shall be based on the standards contained in the District's **Operations and Maintenance Manual**.

7. The lead member entity must develop an annual work plan to be eligible for maintenance funds. Upon completion of the work, the member entity must certify that the work was completed in accordance with the standards contained in the District's **Operations and Maintenance Manual**.

8. Maintenance funding is available only for repair, restoration, rehabilitation, or maintenance of existing facilities and is not intended to supplement the District's capital improvement program. For example, if the intent of the field activity is to increase the designed capacity of a facility or conveyance, then that function is capital in nature.

9. Copies of plans and specifications must be furnished to the District for review and approval prior to finalizing design when maintenance projects are awarded through a bid process or when maintenance projects will be to a design different from its original design. This review will be for the purpose of ensuring compliance with the District's Master Plan and regional objectives and will be used to update the inventory of existing facilities. As-built plans or record drawings will be provided to the District upon project completion and prior to project closeout.

10. Expenditures for repair and replacement of existing flood control Master Plan facilities which undergo catastrophic damage of one-half (1/2) mile or less will be classified as maintenance. These expenditures will be made from budgeted maintenance funds.

11. Expenditures for repair and replacement of existing flood control Master Plan facilities which undergo catastrophic damage of more than one-half (1/2) mile will generally be classified as capital improvements. Requests for capital improvement funds must be programmed as a capital improvement project in accordance with District Policies and Procedures.

12. Expenditures for removal of debris and sediment captured or deposited in a debris basin, detention basin or a linear flood control facility will be classified as maintenance. Necessary repairs to a debris or detention basin will also be classified as maintenance. These expenditures will be made from budgeted maintenance funds.

13. Expenditures for repair and replacement of non-improved or "earth lined" flood control facilities and features will be classified as maintenance. These expenditures will be made from budgeted maintenance funds.

14. A member entity may consider another option in lieu of repairing or rehabilitating facilities that have not been improved to Master Plan design specifications. This option is to build/implement the long-term solution for the damaged facility. Expediting the

implementation of the Master Plan may be a viable alternative that maximizes the use of available resources. This should be considered as an alternative if the long-term solution can be implemented in a timely manner. Requests for capital improvement funds to implement a Master Plan project must be programmed as a capital improvement project in accordance with District Policies and Procedures.

15. District funds may be provided for maintenance of Master Plan facilities by outside contractors under conditions when the use of such an approach is deemed the most efficient and cost effective by the lead member entity.

16. If a member entity receives funds from other sources for maintenance and repair of drainage and flood control facilities paid for by the District, the funds will be paid to the District. Examples of other sources include, but are not limited to, Federal Emergency Management Agency (FEMA) funds for repairs resulting from a designated disaster, and funding from developers for maintenance and repair of District facilities.

17. Member entities and their contractors are responsible for compliance with all local, state and federal laws in the execution of maintenance activities. The District will not be responsible for any fines and/or penalties caused by the actions or inactions of the member entity's employees, consultants, contractors, or agents.

18. Bridge structures, generally speaking, are not eligible for District funding unless it can be shown that the flood carrying aspects of the regional facility causes a safety or maintenance problem.

19. Member entities are responsible for maintenance of documentation demonstrating effective and diligent maintenance of levees accredited by FEMA as providing protection from a base flood in accordance with Title 44 Code of Federal Regulations (44CFR) part 65.10 and to make that documentation available to FEMA upon request should the levees need to be reaccredited.

CHAPTER 4
PROCEDURES

4.10 FUNDING PROCEDURES

4.11 Purpose

This element of the **Operations and Maintenance Manual** provides the member entities with procedures for the appropriation, expenditure and payment of funds to perform maintenance activities. A principle role of the District shall be to manage and disburse payments to the member entities for maintenance that is performed in compliance with the approved plans. (See Funding Flow Diagram.)

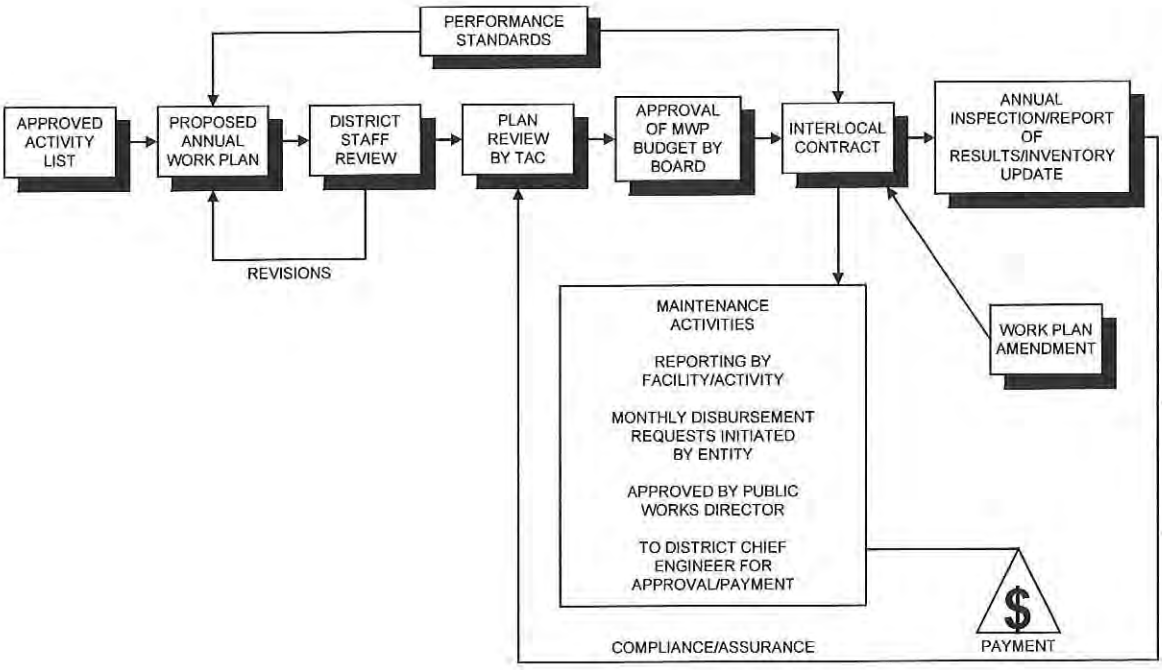
The District has authorized funding to assist the member entities with major drainageway maintenance in accordance with the priorities listed below:

- First priority: District owned facilities.
- Second priority: Facilities owned by member entities.
- Third priority: Facilities owned by other public agencies.
- Fourth priority: Facilities owned by others in which access has been guaranteed to the lead member entity and the District.
- Fifth priority: Unimproved drainageways.

4.12 Payment Procedures

Payment for work performed will be made in accordance with the annual interlocal contract executed as part of the approved work plan and the payment procedures outlined herein. The primary mechanism for payments shall occur through a purchase order established between the District and each member entity. In cases where the member entity directs the District to make payments to a contractor or supplier directly, the purchase orders will be established between the District and the contractor, consultant, or supplier, at the member entity's request. Unless otherwise contained within this manual, all District Policies and Procedures relating to disbursement of funds and payment to member entities apply.

Funding Flow Diagram



Disbursement requests (invoices) must be accompanied by a verification statement from the member entity that the work for which payment is due has been completed in accordance with the standards contained in this manual. The disbursement request must identify the Master Plan facility maintained, specific plan activity or activities for which payment is sought, and separately identify personnel, equipment, and other related costs. (See Disbursement / Amended Annual Budget Request Form, which can be obtained electronically from the District.) Administrative costs incurred by the member entity in the management of the interlocal contract are not payable to the member entity. Examples include cost accounting work, secretarial/clerical work, the preparation of requests for payment, and certification statements for work performed under the contract.

All invoices from the member entity requesting payment to the member entity or direct payment to the member entity contractor or vendor must first be submitted to and approved by the member entity's Public Works Director or other designated responsible person in charge of the project. The Chief Engineer or designated District staff will process and approve such payments within 30 days providing all invoices have appropriate backup, and the required approval has been obtained and terms of the interlocal contract have been satisfied.

Direct payments to contractors must originate from the member entity and include the following:

1. Invoice to the member entity from the contractor.
2. Certification of work performed by the contractor signed by the member entity, if applicable.
3. Disbursement / Amended Annual Budget Request Form.

Monthly and annual summaries of purchase order balances, budget status, and facility expenditures shall be prepared by the District as a part of the routine financial reporting procedures to the Board.

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM - FISCAL YEAR 20XX-XX

ENTITY: _____

[ ] **Disbursement Request**	
Vendor Name:	
Invoice Number:	
Amount Requested:	
RFCD Purchase Order #:	

[ ] **Amended Annual Budget Request**	
Approved:	
	General Manager/Chief Engineer — Date
	Clark County Regional Flood Control District

MWP Facility #:											
Facility Name:											
Master Plan Facility ID:											**ACTIVITY TOTAL**
03-Facility Assessment & Inv.											**0.00**
05-Chnl Insp											**0.00**
06-Levee/DB/Debris Insp.											**0.00**
08-Species Survey and Removal											**0.00**
10-Reshape Chnl/Levees											**0.00**
15-Chnl Repair											**0.00**
20-Erosion Control and Repair											**0.00**
21-Dust Control											**0.00**
25-Clean DB											**0.00**
35-Fence Repair											**0.00**
40-Vege Control - C											**0.00**
45-Vege Control - M											**0.00**
50-Access Rd											**0.00**
55-Clean In/Outlet											**0.00**
60-Repair In/Out											**0.00**
65-Clean Storm Drn											**0.00**
70-Sewer Repair											**0.00**
75-Clean Culverts											**0.00**
80-Misc Maint											**0.00**
85-Engr											**0.00**
Facility Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

I certify that the above described maintenance was/will be performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further, the information contained in this Request accurately reflects those costs incurred/to be incurred during the performance of this work.

_____
Project Manager — Date

4.20 ADMINISTRATIVE PROCEDURES

4.21 Purpose

The purpose of this element of the **Operations and Maintenance Manual** is to provide specific procedures for establishing standards and levels of service, preparing the annual work plan, administrating the planning, approval and enforcement elements, and updating the manual over time. The principal role of the District shall be to review and approve annual maintenance work plans and monitor the performance of work activities. The principal role of the member entities shall be development of annual work plans that are consistent with the District's approved maintenance activity list; performance of the maintenance work set forth in the approved work plans; and the submittal of quarterly reports that summarize work performance while certifying compliance with maintenance activity performance standards as set forth in the **Operations and Maintenance Manual.**

4.22 Annual Work Plans

In accordance with the schedule on the following page, each member entity shall submit a proposed annual maintenance work plan to the Chief Engineer containing the following components:

Part I:	Maintenance Work Plan Summary – Summary of overall work plan listing specific projects (physical system inventory) and associated costs attributable to each. (See Appendix B, Exhibit A.)
Part II:	Facility map(s) which identify location of projects (physical system inventory) and planned maintenance work by project.
Part III:	Maintenance Work Program Annual Budget – Individual maintenance projects (physical system inventory) broken into maintenance activities to be completed, including narrative, and associated budgeted costs for all projects identified in Part I. (See Appendix B, Exhibit A.)

District staff shall review the proposed plans and work with the member entities to resolve any discrepancies found with District maintenance standards and policy objectives. After the initial staff review, the plans shall be forwarded to the Technical Advisory Committee (TAC) and Citizens Advisory Committee (CAC). Lastly, the plans will be submitted to the Board for final approval.

The activities in the work plan shall be consistent with the District's approved activity list for maintenance of flood control and drainage facilities. Work plans should also describe locally funded work activities that may be linked to the District maintenance work activities to show overlapping areas of responsibility for personnel and equipment. Where local personnel and equipment are going to be used to perform both District funded activities and locally funded

activities, the member entity will describe how these resources are to be managed and the procedures for tracking costs related to both sets of activities.

Member entities may contract for the performance of maintenance work activities. The proposed work plan must specify that a contractor is to be utilized and the time frame for selection of a contractor. In the event that maintenance work is performed under contract, the contract must specify that the District has the authority to inspect all work performed under the contract and approve or deny payments to contractors based on inspection findings.

All work performed must comply with District approved maintenance activity performance standards as set forth in subsequent sections of this Manual. The member entity is required, as a minimum, to inspect Master Plan facilities annually; including any maintenance work performed by member entities on Master Plan Facilities, and shall notify the District prior to the annual inspection of completed maintenance work. Member entities shall facilitate the inspection of maintenance work by the District. The District may withhold funding, require additional maintenance work, or seek repayment of disbursed funds when an inspection reveals that work activities were not performed in conformance with activity performance standards. The annual maintenance work plan schedule follows:

February 1	-	Submittal of preliminary work plan proposal and tentative budget to District staff for review, recommendations, and coordination with member entities. This is important for the following reasons: 1) Fiscal Year Budget Authority submittal and approval. 2) Prioritization of maintenance funding activities.
April 1	-	Submittal of tentative annual work plans, budgets, and interlocal contracts to District staff for review, recommendations, and coordination with member entities.
May (TAC deadline)	-	Submittal of the member entity's final annual work plans, budgets, and interlocal contracts to the TAC and CAC for approval.
June (Board meeting)	-	After receiving approval from the TAC and CAC, member entities' final annual work plans, budgets, and interlocal contracts are submitted to the Board of Directors for approval.
July 1	-	Beginning of maintenance plan contract period, which ends June 30.

Each member entity will submit quarterly reports indicating the status of the work completed under the current fiscal year's program. (See Quarterly Status Report Form.) The reports are due 30 days after the close of the quarter, and will be submitted to the Board for review. Also, each member entity shall submit an annual certification to the District stating that all work contained in the work plan and paid through the interlocal contract has been performed to the specifications established in this manual.

Quarterly Status Report

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
QUARTERLY STATUS REPORT - FY 20XX-XX

MWP Facility #: _____ Entity: _____

Facility Name: _____ Date Prepared: _____

MP Facility ID: _____ Quarter: _____

Force Account/ Contract	Activity	Approved Work Plan Amount ($)	Amended Work Plan Amount ($)	Expended To Date ($)	Percent Complete	Scheduled Completion Date
	03 Facility Assessment and Inventory					
	05 Inspect Channels					
	06 Inspect Levees/Detention and Debris Basins					
	08 Species Survey and Removal					
	10 Clean and Reshape Channels/Levees					
	15 Repair Lined Channel					
	20 Erosion Control and Repair					
	21 Provide/Maintain Dust Control					
	25 Clean Detention Debris Basins					
	35 Fence Repair					
	40 Vegetation Control – Chemical					
	45 Vegetation Control – Mechanical					
	50 Maintain Access Road					
	55 Clean & Inspect Inlet/Outlet Structures					
	60 Repair Inlet/Outlet Structures					
	65 Clean Storm Sewer Lines					
	70 Storm Sewer Repair					
	75 Clean/Flush Culverts & Bridges					
	80 Miscellaneous Work Activities					
	85 Engineering					
	TOTALS	$0.00	$0.00	$0.00	0%	

Delays or problem areas:

Work completed during current quarter:

Work to be completed during next quarter:

Consultant/
Contractor: _____

Project
Manager: _____ Phone Number: _____

4.23 Approval of Annual Work Plan

The work plans received by the District will be reviewed and budget requests compiled into a summary showing the dollar amount by member entity for each of the priority areas set forth in Section 4.11. The Chief Engineer shall review the total maintenance budget requests against the District's proposed annual total budget for facility maintenance and make a recommendation to the District Board as to the amount of maintenance funds to be disbursed to each respective member entity based upon equity and need.

Once the Technical Advisory Committee has reviewed the maintenance work plans and budget appropriation recommendation, the Chief Engineer will forward the compiled summary to the Board for consideration and approval as a key element of the Annual District Budget.

The Chief Engineer's report to the District Board shall show both the budget requested by the member entity and the recommended amount to be appropriated, the report will also make comments on any adjustments made to the initial request.

4.24 Work Plan and Budget Amendments

Requests for amendments to approved work plans and budgets must be submitted to the Chief Engineer in writing. The amendment request must specify the work elements affected, describe the reasons for the amendment request, and describe the impact of the proposed amendment on the affected work plan objectives.

Formal approval of work plan and/or budget amendments requiring a reallocation of funds between facilities must be obtained from the Chief Engineer prior to submittal of payment requests. (See Disbursement / Amended Annual Budget Request Form.) The member entity shall also notify District staff of work plan and/or budget amendments within a facility. Requests requiring an increase in the overall work plan budget must be submitted to the Board for approval with a supplemental interlocal contract for the amended work in accordance with Chapter VI.A.2 of the District's **Policies and Procedures Manual.**

Amendment requests shall be reviewed by District staff and responded to in writing within 15 days of receipt of the original request.

4.25 Certification of Compliance

It is the intent of the District to rely to the maximum extent possible on the member entities to carry out the maintenance activities and comply with the procedures and standards set forth in this manual. The District shall from time to time inspect facilities funded by the District or those on the Master Plan to assure compliance with the interlocal contract. Each member entity shall submit an annual certification to the District stating that all work contained in the work plan and paid through the interlocal contract has been performed to the specifications established in this manual. This certification shall be signed by the person executing the interlocal contract or their designee. The certification should summarize proposed and actual plan accomplishments. It should also describe any major maintenance problems that have implications for the District as a whole, such as significant deterioration of major conveyance system components or the failure of system components to perform as intended, and suggest revisions to the activity list provisions. In addition, the certification will include a detailed maintenance report for debris basins, detention basins and levees (high hazard structures). The report will list all conditions requiring maintenance and how each was addressed accompanied by before and after photo documentation. For maintenance of levees accredited by FEMA as providing protection from the base flood, annual levee maintenance reports will be kept on file by the affected entity and made available to FEMA upon request demonstrating compliance with 44CFR part 65.10.

The certification and final payment requests shall be submitted to the District within 30 calendar days of the termination of the annual interlocal contract for maintenance funding.

Final Accounting Report

(ENTITY)
MAINTENANCE WORK PROGRAM
FINAL ACCOUNTING REPORT - FY 20XX-XX
As of (Current Date)

VENDOR	P.O. NUMBER	P.O. AMOUNT	TOTAL EXPENDED	P.O. BALANCE
Sample Vendor 1	1234567890 10	1,000.00	1,000.00	0.00
Sample Vendor 2	1234567890 20	1,000.00	500.00	500.00
Sample Vendor 3	1234567890 30	1,000.00	200.00	800.00
	Total	$3,000	$1,700	$1,300

FY XX-XX INTERLOCAL AMOUNT/BUDGET	4,000.00	Total Encumbered	3,000.00
Total Encumbered	3,000.00	Total Expended	1,700.00
Total Unencumbered	$1,000.00	Total Unexpended	$1,300.00

Total Authorized	**$4,000.00**
Expended	**$1,700.00**
REPROGRAM FOR MWP	**$2,300.00**

Regional Flood Control District **(Entity)**

RFCD Date Project Manager Date

I certify that the above described maintenance was performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further, the information contained in this Final Accounting Report accurately reflects those costs incurred during the performance of this work. If there are any maintenance problems that have implications for the District as a whole, such as significant deterioration of major conveyance system components or failure of system components to perform as intended, a detailed description will accompany this report as an attachment.

4.26 Interlocal Contract Document

The performance of work outlined in the approved maintenance plan shall be guided by an interlocal contract entered into annually between the District and each member entity. A sample contract is contained in Appendix B. Major provisions of the contract include: the adoption of the Board approved work plan as the document outlining the work to be performed; references to the performance standards, payment procedures, and plan amendment procedures outlined in this manual for governing maintenance work performance evaluations, and contract amendments; and a requirement for submittal of an annual certification of results.

4.27 Contract for Maintenance Performance

If, in the opinion of the member entity, it appears to be most cost effective (or due to an emergency) to utilize the services of private contractors to perform maintenance functions, the member entity shall solicit bids from qualified contractors in compliance with their statutory procedures for the necessary work. All contracts for maintenance services shall be bid on an annual basis or for a specific project location. The member entity will provide the District with copies of bid specifications and bid tabulations as well as copies of the respective contract documents. The member entity shall advise the District in advance that they intend to utilize a private contractor (may be included as part of annual work plan). They shall also provide a summary of work performed and a statement of inspection as part of the request for payment to the member entity or directly by the District to the contractor. All expenditures must comply with NRS 332, Local Government Purchasing Act, NRS 338, the Public Works Act, and all relevant statutes, rules, regulations, and policies.

4.30 MAINTENANCE PROCEDURES

4.31 Purpose

As a part of the overall operations and maintenance procedures adopted by the District, an outline for specific maintenance procedures has been developed. The accepted maintenance procedures are centered around specific elements of a management system for field maintenance, and include defined maintenance activities, standards, scheduling, and reporting procedures.

Due to the diversity in physical features among the various agencies involved, and the varied resources employed in maintenance activities, it is essential to treat these procedures as general guidelines which must be tailored to meet the situation at hand. It is also essential that these procedures remain dynamic, be actively reviewed, and periodically updated. An annual review is recommended.

4.32 Activities

Maintenance work activities identify all major maintenance work and include all activities which are performed frequently and in amounts that make them a significant part of the total work program. Each activity must be clearly defined so maintenance personnel at all levels of management uniformly understand the operation to be performed and the type of deficiency to be corrected.

Personnel who plan, schedule, perform, report, or evaluate maintenance work must know what each work activity means. Work activities are used for the following purposes:

- Planned maintenance work is identified in the annual maintenance work plan by activity name and number.
- Activity names and numbers are used for authorizing, assigning, and reporting work.
- Activity names and numbers are used on work scheduling guides and work performance summaries.

Work measurement units are established for the major maintenance activities. For example, "Acres Covered" is the work measurement unit for vegetation control while "Cubic Yards Removed" is the work unit for cleaning and reshaping channels. These measurement units are used to describe how much work is planned and to report how much work is accomplished for each activity.

For some activities, specific work measurement units--other than labor hours--would not be meaningful. For example, the miscellaneous maintenance activity includes a number of different operations. This activity cannot be measured by a common unit other than labor hours.

Following is the accepted maintenance Activity List for the District including work measure units.

ACTIVITY NUMBER	ACTIVITY NAME	WORK MEASURE UNIT
03	Facility Assessment and Inventory	Labor Hours
05	Inspect Channels	Miles
06	Inspect Levees/Detention and Debris Basins	Miles/Each
08	Species Survey and Removal	Labor Hours
10	Clean and Reshape Channels/Levees	Cubic Yards
15	Repair Lined Channel	Each
20	Erosion Control and Repair	Square Feet
21	Provide/Maintain Dust Control	Acres
25	Clean Detention/Debris Basins	Cubic Yards
35	Fence Repair	Linear Feet
40	Vegetation Control – Chemical	Acres
45	Vegetation Control – Mechanical	Acres
50	Maintain Access Road	Miles
55	Clean and Inspect Inlet/Outlet Structures	Each
60	Repair Inlet/Outlet Structures	Each
65	Clean Storm Sewer Lines	Linear Feet
70	Storm Sewer Repair	Repairs
75	Clean/Flush Culverts & Bridges	Each
80	Miscellaneous Work Activities	Labor Hours
85	Engineering	Labor Hours

4.33 Standards

"Performance Standards" have been established for each of the major maintenance work activities. These performance standards specify:

- The most effective crew size.
- The kinds and number of equipment required.
- The major types of material that should be used.
- Recommended procedures for performing the work.
- An estimate of expected average daily accomplishment with standard crew size, equipment and procedures.
- Authorization and scheduling criteria.

Following is an item-by-item description of the format of the performance standards.

1. Activity Identification/Date – The activity number and name are shown as well as the "effective date" of the performance standard--to be used when updating or replacing performance standards.

2. Description and Purpose – The Description and Purpose section of the performance standard explains the work activity and the kinds of defects to be corrected or reasons for doing the work.

3. Authorized By and Work Control Category – The level of management responsible for authorizing the work is identified. Certain activities requiring special equipment, coordination, or expertise are Engineer-authorized activities and should not be scheduled or performed without the Engineer's approval. The type of control to be placed on the quantity of work performed is identified. This control is unlimited or limited in terms of the amount of work done (accomplishment) or the amount of labor input (crew-day).

4. Performance Criteria – This section includes important information for the "scheduler" about when to schedule the work and for the crew leader to identify the work to be done.

5. Crew Size – The crew size outlines the numbers of personnel needed to do the work. The crew size is based on average conditions. Sometimes, there will be a need to add or delete people to satisfy special traffic safety conditions or hauling requirements.

6. Equipment – The basic requirements for major pieces of equipment are listed. Situations such as the breakdown or unavailability of equipment or special materials hauling requirements may require the addition, deletion or substitution of equipment.

7. Materials – The materials section includes a list of the major materials to be used for the activity.

8. Work Method – The work method outlines, step-by-step, the recommended procedures for performing the work. Each step should be performed in order to correctly maintain the feature as well as provide the quality of work desired.

9. Average Daily Production – The average daily production is an estimate of the amount of work a crew can accomplish during a day using the recommended crew size, equipment, materials and work method. This estimate is shown as a range and should be attainable over a period of time. Some days the accomplishment may be more or less than the estimate, but eventually, the average should fall in line.

10. Notes – Any other relevant, helpful information or instructions.

Use of Performance Standards

Maintenance supervisory personnel should become thoroughly familiar with these performance standards. It is important that the performance standards be used when making assignments and performing work. Some situations will require deviation from the performance standards--such as more or less flagmen or additional haul trucks. These situations are recognized, and crew leaders are expected to consider such situations when organizing and managing their activities.

Haul truck needs should be determined using factors such as haul distance and time estimates (spot, dump, load, and cycle times).

The performance standards also provide guidance and a measure for supervisors to use when evaluating work in progress and completed.

Field personnel are in the best position to identify new or better work methods or difficulties with the current performance standards. These suggestions for improvements or questions should be directed to the crew leader or supervisor.

The performance standards should be reviewed and updated annually. If other changes occur that require more frequent review and update or development, the performance standards can be changed to suit these needs.

4.34 Scheduling

The objectives of work scheduling are:

- To do the planned amount of work.
- To perform the work when it should be done.
- To do the work where it should be done.
- To use the proper people, equipment and supplies to do the work.
- To ensure to the extent possible that all flood control facilities are functioning at design capacity during a storm event, noting that Flash Flood Season is July through September.

Three tools are available to help supervisors meet these objectives. The WORK PROGRAM defines the estimated amount of work and the estimated labor-days required for each activity to provide the desired levels of service; a WORK CALENDAR helps to establish when the various activities should be done; and the PERFORMANCE STANDARDS provide information about quantity standards, personnel requirements and how much work can be done in a given time.

The annual work program establishes the kinds and amount of work to be done during the year and the resources that will be required to do that work. This annual plan needs to be broken into a monthly plan for effective scheduling of work and to permit timely evaluations of work program performance.

The process of "distributing" the annual work load throughout the year is done by allocating a part of the work (in labor-hours, by activity) to specific months. Some types of work -- emergency or service activities -- must be done throughout the year as the need arises. Other types of work must be done on a regularly scheduled basis -- such as preventive maintenance work. Finally, some types of work can be done during certain periods but can be shifted from one month to the other, and still other work can be done almost any time during the year.

These factors must be considered when distributing the different types of work. Preventive maintenance and other types of work which must be performed on a regularly scheduled basis are distributed so as to level labor power needs as much as possible. Finally, work which can be performed any time is distributed to those months with the fewest labor-days. In this way, staffing needs are kept as uniform as possible resulting in more efficient use of available labor power.

A work calendar lists -- activity by activity -- the labor-hours for each month. These labor-hours are used in conjunction with the work program annual work quantities for work scheduling and the preparation of periodic Activity Status Reports. (See Work Calendar Form.)

Once the work program and staffing levels have been set, the work load distribution can be finalized and the calendar prepared to summarize/communicate the planned monthly distribution of the work program.

Work scheduling is the process of using the work calendar and specific scheduling procedures to plan ahead, establish work priorities and accomplish the work.

The performance standards outlined in the previous sections apply to corrective and preventive maintenance activities. These procedures are not as rigid or foolproof as implied by the description. Equipment breakdowns, emergencies, or bad weather will disrupt a schedule -- but part of the scheduling process is to be aware that these situations will occur and to be prepared to respond with little or no difficulty. Because of these situations, supervisors should not expect to accomplish all of the work as scheduled. Generally, a supervisor can consider his/her scheduling efforts to be successful if 75 to 80 percent of the scheduled work is completed as planned.

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
WORK CALENDAR

MWP Facility #: _____ Entity: _____
Facility Name: _____ Fiscal Year: _____
MP Facility ID: _____ Date Prepared: _____

ACTIVITY No.	Description	Monthly Distribution of Time (in hours) JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Per Activity
03	Facility Assessment and Inventory													-
05	Inspect Channels													-
06	Inspect Levees/Detention and Debris Basins													-
08	Species Survey and Removel													-
10	Clean and Reshape Channels/Levees													-
15	Repair Lined Channel													-
20	Erosion Control and Repair													-
21	Provide/Maintain Dust Control													-
25	Clean Detention/Debris Basins													-
35	Fence Repair													-
40	Vegetation Control - Chemical													-
45	Vegetation Control - Mechanical													-
50	Maintain Access Road													-
55	Clean & Inspect Inlet/Outlet Structures													-
60	Repair Inlet/Outlet Structures													-
65	Clean Storm Sewer Lines													-
70	Storm Sewer Repair													-
75	Clean/Flush Culverts & Bridges													-
80	Miscellaneous Work Activities													-
85	Engineering													-
	Total Per Month	-	-	-	-	-	-	-	-	-	-	-	-	-

I certify that the above described maintenance will be performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further the information contained in this Work Calendar accurately reflects the time expected to be incurred during the performance of this work.

_____
Project Manager Date

Following are some additional hints or techniques to consider:

- It is not necessary to "formally schedule" the daily, routine activities. It is necessary, however, to regularly check the work reports and accomplishments to verify the distribution of work assignments. A periodic review and adjustment of the work assignments may be necessary to maintain a "balanced work load".
- It is usually best to prepare a schedule (and work assignments) assuming everything will work as planned -- no equipment breakdowns, no emergencies, etc. But make sure a backlog of "alternate" work is available so that little time is wasted when adjustments to the schedule must be made.
- Some guidelines for identifying alternate work:
    - Low priority work that needs to be done, but not necessarily during the next week or so.
    - Work that does not require special equipment or a lot of preparation time.
    - Preventive maintenance on light equipment.

Take time to estimate the amount of work needed and the number of hours required to do the work. Good estimates will improve the scheduling process significantly. The performance standards, inspections and sound judgment based on experience all help the estimating process.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
03	**FACILITY ASSESSMENT AND INVENTORY**	09/09/10

DESCRIPTION & PURPOSE

Assessment and inventory program to catalog existing facilities, assess condition of those facilities, and prioritize repairs.

AUTHORIZED BY	LIMITS ON WORK
Director of Public Works or designee	

PERFORMANCE CRITERIA

After completion of initial inventory, maintenance of database will be ongoing to keep records up to date and accurate. Continually assess system condition and maintenance priorities.

CREW SIZE	WORK METHOD
• Project Manager • Project Engineer • Survey Crew • CADD/GIS	1. Field locate existing RFCD facilities. 2. Assess condition and maintenance needs. 3. Catalog findings in a database. 4. Prioritize repairs based on assessment of needs.
EQUIPMENT	
• 1 Pickup • GPS Equipment • Traffic Control • Computer w/software • Video Inspection	
MATERIAL	AVERAGE DAILY PRODUCTION

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
05	**INSPECT CHANNELS**	**09/09/10**

DESCRIPTION & PURPOSE

Inspect both improved and unimproved flood channels for proper cross-section, sedimentation, debris accumulation and erosion damage, in order to schedule cleaning or repairs as needed.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Perform complete inspection of channels on an annual basis and after major storm events.

CREW SIZE	WORK METHOD
• 1 Crew Supervisor 1 **TOTAL**	1. Use safety devices, as required. 2. Visually inspect channels for cross-section, sediment, debris, erosion, and vegetation. 3. Prioritize a list of channels requiring maintenance. 4. Schedule cleaning of channels referring to prioritized list.
EQUIPMENT	
• 1 Pickup	
MATERIAL	AVERAGE DAILY PRODUCTION
	8 miles/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
06	**INSPECT LEVEES, DETENTION AND DEBRIS BASINS**	**09/09/10**

DESCRIPTION & PURPOSE

Inspect for proper cross-section, sedimentation, debris accumulation, erosion damage including piping, unwanted vegetation growth, depressions/rutting, bank caving, slope stability, and/or steepened slopes, cracking, animal burrowing, encroachments, and condition of erosion control measures in order to schedule cleaning or repairs as needed. Also perform post maintenance inspection to ensure all recommended maintenance was completed properly.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Perform complete inspection after major storm and earthquake events. Prepare complete findings and recommendations report, including characterization of all animal burrows found and supported by photographs of areas requiring maintenance. Report should also include results of post maintenance inspection.

CREW SIZE	WORK METHOD
• 1 Crew Supervisor 1 **TOTAL**	1. Use safety devices, as required. 2. Visually inspect for proper cross-section, sedimentation, debris accumulation, erosion damage including piping, unwanted vegetation growth, depressions/rutting, bank caving, slope stability, and/or steepened slopes, cracking, animal burrowing, encroachments, and condition of erosion control measures. 3. Photograph areas of distress identified in Part 2 with notation describing location on levee (e.g. stationing). 4. Prioritize a list of facilities requiring maintenance. 5. Schedule maintenance of levees referring to prioritized list.
EQUIPMENT	
• 1 Pickup	
MATERIAL	AVERAGE DAILY PRODUCTION
	8 miles/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
08	**SPECIES SURVEY AND REMOVAL**	**09/09/10**

DESCRIPTION & PURPOSE

In situations where maintenance activities could impact the desert tortoise or other protected species, a USFWS approved biologist will survey the work zone and recommend appropriate action for compliance with Biological Opinion 1-5-93-F-67R and all applicable laws.

Provides mitigation for potential embankment failure by piping through animal burrows.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Perform surveys/removals within 30 days prior to ground-disturbing activities. Burrows should be inspected by a qualified biologist to ensure that the burrow is not occupied, and then collapsed or filled in. Animal burrows that are identified should be thoroughly excavated and inspected, backfilled with compacted fill similar to material of the levee or other similar means (e.g.: pumped with flowable fill).

CREW SIZE	WORK METHOD
• 1 USFWS-approved biologist 1 **TOTAL**	1. Use safety devices, as required. 2. Visually inspect work areas for signs of protected species and burrows. 3. Ensure that burrows are not occupied then collapse or fill in burrow. 4. Tortoises shall be relocated to suitable habitat in accordance with Biological Opinion 1-5-93-F-67R and all applicable laws. 5. A brief report documenting the activities of the biologist will be prepared and submitted to RFCD with photo documentation.
EQUIPMENT	
• 1 Pickup • 1 fiber-optic scope	
MATERIAL	AVERAGE DAILY PRODUCTION
	1 work area/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
10	**CLEAN & RESHAPE CHANNELS/LEVEES**	**09/09/10**

DESCRIPTION & PURPOSE

Sediment and debris removal, and reshaping of unlined channels to restore adequate capacity. Reshaping of levee crests to eliminate depressions and rutting to eliminate potential to pond water and associated seepage damage. Reconstruction of areas where cracking of the embankment is evident and/or slope stability has been compromised.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Improved earth channels and levees should be scheduled for cleaning and re-profiling on an annual schedule, or as appropriate following a flood event. Natural channels on a 3-year cycle.

CREW SIZE	WORK METHOD
• 2 Equipment Operators • 1 Truck Driver • .5 Foreman 3.5 **TOTAL**	1. Set up safety devices as required. 2. Remove sediment and vegetation. 3. Load and haul removed material to proper disposal site. 4. Reshape channel/levee. 5. All fill should be compacted to a minimum of 95% of maximum dry density per ASTM D1557. Perform compaction tests following frequency guidelines in uniform Standard Specifications. 6. Clean up work site as necessary. 7. Remove safety devices.
EQUIPMENT	
• 1* 10 Wheel Dump Truck • 1 Scraper • 1 Gradall	
MATERIAL	AVERAGE DAILY PRODUCTION
• Disposal Fees	300 Cubic Yards/day

NOTES:

*Schedule sufficient trucks to insure maximum utilization of excavation equipment.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
15	**REPAIR LINED CHANNEL**	**09/09/10**

DESCRIPTION & PURPOSE

Repair of damaged concrete, rip rap, gabion, or other channel linings, retaining walls, etc., to restore to original condition and prevent further deterioration.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Repairs of channel linings, retaining walls, and other structures critical to the protection of a facility are to be scheduled immediately upon detection of damage.

CREW SIZE	WORK METHOD
• 1 Maintenance Foreman • 2 Maintenance Workers 3 **TOTAL**	1. Obtain safety equipment, materials, and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Clean and prepare damaged area. 4. Build and place forms as necessary. 5. Place and finish concrete. 6. Remove forms and back fill. 7. Clean up work site as necessary.
EQUIPMENT	
• Pickup • Flatbed Dump • Concrete Mixer	
MATERIAL	AVERAGE DAILY PRODUCTION
• Assorted lumber • 6-30 bags sacked concrete • 3-15 tons concrete gravel mix • 2-10 CY ready-mix concrete	1 Each/Day

NOTES:

Crew size and equipment may vary significantly depending on urgency, extent and complexity of repair.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
20	**EROSION CONTROL AND REPAIR**	**09/09/10**

DESCRIPTION & PURPOSE

Placement of rip rap, sand bags, or other erosion control materials and repair of damaged areas of erosion protection. The replacement and compaction of material removed by erosion, using hand tools or other methods, to restore flood control channels, supporting embankments, levees or access roads. This work is done to prevent further deterioration and eliminate potential erosion problems.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Work is to be scheduled when damage or deterioration is severe enough to present potential erosion problems and when damage has occurred which has affected or will affect the structural integrity of a channel embankment, levee, or access road. Erosion undercutting roadways, sidewalks, or prepared embankments/improvements shall be repaired immediately. Repair of undermined stabilizers shall be scheduled immediately.

CREW SIZE

- 2 Foreman
- 2 Equipment Operators
- 4 Maintenance Workers

8 **TOTAL**

EQUIPMENT

- 1 Truck Crane or Backhoe
- 1 Air Compressor w/compactor
- 1 1-Ton Dump Truck or Flatbed Truck
- 1 Pickup w/Water Tank or Auxiliary Spray Truck

WORK METHOD

1. Obtain safety equipment, materials and tools necessary for the day's work.
2. Begin applicable safety procedures and/or traffic control.
3. Shape work area to receive riprap, or other erosion control materials. Shape repair area to conform to adjacent areas.
4. Place material and grout where applicable. Place and compact fill material in lifts to a minimum of 95% of maximum dry density per ASTM D1557. Perform compaction tests following frequency guidelines in Uniform Standard Specifications.
5. Haul fill material from pre-determined source.
6. Remove debris and growth from damage location.
7. Back fill as necessary.
8. Clean up work site as necessary.

MATERIAL

- 20-50 Tons Rock for riprap (delivered)
- 5-12 yards ready mix concrete (if needed)
- 5,000-15,000 gal Water
- 15-30 Tons Select Fill Material

AVERAGE DAILY PRODUCTION

1,300 Square Feet/day
15 Cubic Yards

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
21	**PROVIDE / MAINTAIN DUST CONTROL**	**09/09/10**

DESCRIPTION & PURPOSE

Uniform application and maintenance of surface gravel, dust palliatives, or other alternative dust control measures to limit the emission of particulate matter into the ambient air.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Work is to be scheduled when loose sand, dust, or dust particles are found to exist in excess of acceptable limits. Select and apply approved dust control measure in a manner that will minimize the degradation of water quality.

CREW SIZE	WORK METHOD
• 1 Foreman – Part-time • 1 Driver • 1 Nozzle operator • 1 – 2 laborers to protect surrounding area from overspray 4 – 5 **TOTAL**	1. Obtain safety equipment, materials and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Prepare surface area to receive palliative or other dust control measures with motor grader and compactor if required. 4. Palliative with pre-emergent herbicide requires preparation of soil surface. 5. Apply dust palliative to prepared surface. 6. Clean up work site as necessary.
EQUIPMENT	
• 1 Spray Truck • 1 Flatbed truck for delivery of bulk materials • 1 Forklift to load bulk materials into tank on spray truck • 1 Motor grader • 1 Compactor	
MATERIAL	AVERAGE DAILY PRODUCTION
• Gravel • Dust palliative (i.e. gypsum, fiber mulch) • Water source • Other alternative dust control measure	6 acres/day – open areas (i.e. detention basin) 3 acres/day – strip areas with fence (i.e. channel)

NOTES:

Control measures shall be implemented to limit the disturbance of open areas.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
25	**CLEAN DETENTION/DEBRIS BASINS**	**09/09/10**

DESCRIPTION & PURPOSE

Inspection and removal, by loader (including hauling and disposal), of sediment and debris deposited in detention and debris basins to restore full capacity and original shape.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Remove sediment when debris basins or dams detention capacity is reduced. Clean out is normally justified when the sedimentation reaches 1 to 2 feet in depth or as established by the design.

CREW SIZE	WORK METHOD
• 1 Foreman • 3 Equipment Operators • 1 Maintenance Worker 5 **TOTAL**	1. Obtain safety equipment, materials and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Prepare removal and disposal sites for access. 4. Stockpile material for removal. 5. Load material and haul to proper disposal site. 6. Shape dam or basin to desired line and grade. 7. Grade disposal site as necessary. 8. Clean up work site as necessary.
EQUIPMENT	
• 1 Pickup • 1 Loader • 2* Dump Trucks	
MATERIAL	AVERAGE DAILY PRODUCTION
• Disposal Fees	1,000 Cubic Yards/day

NOTES:

*Schedule sufficient trucks to insure maximum utilization of excavation equipment.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
35	**FENCE REPAIR**	**09/09/10**

DESCRIPTION & PURPOSE

The repair and/or re-establishment of downed or damaged fences to restore fence to proper condition and to provide right-of-way control.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Repair of downed or open fence areas to be performed upon detection. Repairs to damaged locations that remain partially functional are to be scheduled in priority with other work.

CREW SIZE	WORK METHOD
• 2 Maintenance Workers 2 **TOTAL**	1. Obtain safety equipment, materials and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Perform necessary repairs to: • Posts • Fabric • Top rail 4. Clean up work site as necessary.
EQUIPMENT	
• 1 Fence Truck • 1 Concrete Mixer (if needed)	
MATERIAL	AVERAGE DAILY PRODUCTION
• 40-50 Linear Ft Fence Fabric • Miscellaneous Hardware • 5 bags "Ready Crete"	100 Linear Feet/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
40	**VEGETATION CONTROL – CHEMICAL**	**09/09/10**

DESCRIPTION & PURPOSE

The application of herbicides, to designated areas, with a boom-mounted spray bar to prevent new growth and/or control existing vegetation, for the purpose of insuring the capacity and integrity of flood control facilities.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Spray pre-emergent herbicide and post-emergent herbicide annually to designated areas combining applications where possible. Select and apply herbicides in a manner to minimize the degradation of water quality.

CREW SIZE	WORK METHOD
• 2 Maintenance Workers 2 **TOTAL**	1. Set up safety devices as required. 2. Treat channel areas as required. 3. Remove safety devices. 4. Clean up work site as necessary.
EQUIPMENT	
• 1 Truck-mounted chemical tank with spray bar and hand sprayer.	
MATERIAL	AVERAGE DAILY PRODUCTION
• Pre 12.5-25 lb/Ac • Emerge Contact: 12.5-25 lb/Ac • Post Brush: 120 lb/Ac • Emerge Grass: 30 lb/Ac • Waterweed: 1 gal/Ac • Spreader: 1 gal/Ac • Water 200 gal/Ac	Acres

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
45	**VEGETATION CONTROL – MECHANICAL**	**09/09/10**

DESCRIPTION & PURPOSE

The mechanical removal of undesirable vegetation such as trees, brush and weeds to maintain detention, debris basins, levees and channels for the purpose of insuring the capacity and integrity of flood control facilities.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Work to be scheduled when vegetation growth is too high for effective spraying. All trees, located in riprapped areas, drainage channels and on or within 15 feet of the toe of a levee must be cut down, the root ball removed, the voids filled and compacted to original construction specifications unless specifically accounted for in the design. Tree growth in natural conveyance areas may be acceptable. Removal of vegetation in natural areas should be considered on a case by case basis in accordance with the purpose stated above and the character of the natural area.

CREW SIZE	WORK METHOD
• 1 Equipment Operator 1 **TOTAL**	1. Obtain safety equipment, materials, and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Mow, blade down, or turn under unwanted vegetation. 4. Clean up work site as necessary.
EQUIPMENT	
• 1 Mower or Grader • 1 Tilt Trailer (if needed) • 1 Pickup	
MATERIAL	AVERAGE DAILY PRODUCTION
	4 Acres/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
50	**MAINTAIN ACCESS ROADS**	**09/09/10**

DESCRIPTION & PURPOSE

Mechanical grading of access roads to remove minor ruts and erosion, and restore normal shape and cross slope, for access to flood control facilities.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

As needed prior to rainy season, or when the weather affects the road condition.

CREW SIZE	WORK METHOD
• 2 Equipment Operators • 1 Maintenance Workers 3 **TOTAL**	1. Obtain equipment and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Grade access roads: • Restoring X-section shape • Filling potholes • Grading out ruts • Restoring ditches and drainage. 4. Roll and compact regraded. 5. Clean up work site as necessary.
EQUIPMENT	
• 1 Grader • 0-1 Water Truck • 0-1 Roller • 1 Pickup	
MATERIAL	AVERAGE DAILY PRODUCTION
• 10,000 Gal Water (if needed)	.5 Mile/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
55	**CLEAN & INSPECT INLET/OUTLET STRUCTURES**	**09/09/10**

DESCRIPTION & PURPOSE

Cleaning and inspection of catch basins, inlets, sumps, grates, outflow and other structures to remove sediment and debris and to inspect for structural integrity and proper functioning.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan for structures to be inspected and cleaned a minimum of once per year. Annual cleaning shall be the major effort to allow thorough inspection of structure in order to schedule repairs.

CREW SIZE	WORK METHOD
• .25 Foreman • 2 Maintenance Workers 2.25 **TOTAL**	1. Perform daily vehicle P.M. check and check equipment. 2. Place signs/traffic control devices as required. 3. Locate truck in the best working position and as far off roadway as practical. 4. Remove grate. Then remove debris, trash & sediment from grate. 5. Loosen solids with spade if necessary. 6. Flush/vacuum basin. 7. Inspect structure visually to determine if further cleaning or repair is necessary. 8. Dispose of debris at proper disposal site. 9. Check and clean equipment after use. 10. Clean up work site as necessary.
EQUIPMENT	
• 1 1-Ton Truck • 1 Water Tanker (1500 gal) • -or- High Pressure Vacuum (Vactor) • Appropriate Hand Tools	
MATERIAL	AVERAGE DAILY PRODUCTION
• Water	15 Each/day

NOTES:

Structures that cannot be cleaned shall be reported to the Maintenance Supervisor for initiation of corrective action.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
60	**REPAIR INLET / OUTLET STRUCTURES**	**09/09/10**

DESCRIPTION & PURPOSE

Repair of catch basins, grates, inlets, control gates, outfalls, weirs, manholes, sumps, and other spot structures to restore elements to their original operational condition.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Based on detailed inspection of repair, replace components, or entire structure as conditions warrant. Plan repair of five percent (5%) of system structures per year.

CREW SIZE	WORK METHOD
• 1 Foreman • 2 Maintenance Workers 3 **TOTAL**	1. Obtain necessary safety equipment, tools, and materials. 2. Initiate applicable safety procedures and traffic control. 3. Remove and clean area of damage/failure. 4. Repair as necessary to original condition and test operation as appropriate. 5. Clean up work site as necessary.
EQUIPMENT	
• 1 Pickup • 1 Compressor w/accessories	
MATERIAL	AVERAGE DAILY PRODUCTION
• Concrete • Aggregates • Miscellaneous parts, as required	1 Each/day

NOTES:

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
65	**CLEAN STORM SEWER LINES**	**09/09/10**

DESCRIPTION & PURPOSE

The removal of debris of any type from within conduits by: flushing with water; the use of a sewer cleaning machine; or by physically entering the conduit and manually removing debris, to restore full capacity.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan cleaning of storm sewer lines on an average 5-year cycle. Specific areas may require annual cleaning while others will require less than 5-year cleaning.

CREW SIZE	WORK METHOD
• 1 Maintenance Foreman • 2 Maintenance Workers 3 **TOTAL**	1. Obtain safety equipment and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Remove debris from conduit. 4. Load debris and haul to designated disposal site if necessary. 5. Clean up work area as necessary.
EQUIPMENT	
• 1 Sewer Cleaner	
MATERIAL	AVERAGE DAILY PRODUCTION
• 0-5,000 Gallons Water	1,500 linear feet/day

NOTES:

Work should be scheduled whenever possible, in conjunction with annual cleaning of adjacent structures.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
70	**STORM SEWER LINE REPAIR**	**09/09/10**

DESCRIPTION & PURPOSE

Excavation and repair of storm sewer lines to eliminate blockages and repair failed pipes.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Priority of repairs:
1. Eliminate blockages and hazards to public safety;
2. Remove flow restrictions and repair damaged/failed pipe sections.

CREW SIZE

- 1 Foreman
- 1 Equipment Operator
- 2 Maintenance Workers

4 **TOTAL**

EQUIPMENT

- 1 Dump Truck
- 1 Backhoe/Util Tractor
- Air Compressor w/accessories
- Appropriate Hand Tools

MATERIAL

- Pipe/fittings
- Sand
- Cement
- Rock
- Asphalt, as required

WORK METHOD

1. Set up warning signs and traffic control devices.
2. Take necessary measures to control flow -- providing uninterrupted service whenever possible.
3. Cut pavement and/or excavate to the extent required to determine necessary scope of repairs.
4. Remove flow restrictions, as necessary.
5. Back fill and compact in lifts to within 10 inches of surface.
6. Place select material (rock or shell) and compact to within 2 inches of surface* (See Note below.)
7. Coordinate density test and request repaving as required.
8. Remove signs and warning devices.
9. Clean up work site as necessary.
10. Record work accomplishment.

AVERAGE DAILY PRODUCTION

1 Repair/day

NOTES:

Verify location of other utilities prior to excavation. *Back fill specifications apply to paved areas. In easements and other unpaved areas, back fill and compact in 2-foot lifts to grade; re-sod as necessary. Install safety fence and secure job site at end of workday as required.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
75	**CLEAN / FLUSH CULVERTS & BRIDGES**	**09/09/10**

DESCRIPTION & PURPOSE

Cleaning/flushing of culverts and bridges to remove sediment and debris, and eliminate restriction to flow.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan for all culverts to be cleaned/flushed annually.

CREW SIZE	WORK METHOD
• 1 Maintenance Supervisor • 1 Maintenance Worker 2 **TOTAL**	1. Place signs and safety devices. 2. Locate truck in best working position and as far off roadway as possible. 3. Clean out ends of culvert. 4. Flush culverts until flow is unrestricted. 5. Load excess material/debris into truck for disposal at proper disposal site. 6. Pick up signs and safety devices. 7. Clean up work site as necessary.
EQUIPMENT	
• 1 1-Ton Dump Truck • 1 Water Tanker (1500 gal) • -or- High Pressure/Vacuum cleaner/Vactor • Safety Equipment • Appropriate Hand Tools	
MATERIAL	AVERAGE DAILY PRODUCTION
• Water	5-7 Each/Day

NOTES:

1. Inform Maintenance Supervisor of any non-cleanable culverts or those that can only be partially cleaned.
2. Avoid damaging downstream property when flushing culverts.
3. Work should be scheduled, whenever possible, in conjunction with annual cleaning of adjacent structures.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
80	**MISCELLANEOUS WORK ACTIVITIES**	**09/09/10**

DESCRIPTION & PURPOSE

All work performed that is not described in previous activities. This includes, among others, activities such as catwalk repair, rodent control, pump maintenance, concrete spalled area repair, painting, trash pickup*, graffiti abatement, sign installation and maintenance.

AUTHORIZED BY	LIMITS ON WORK
Maintenance Supervisor	

PERFORMANCE CRITERIA

Plan 8 labor hours per channel mile per year for miscellaneous maintenance work.

CREW SIZE	WORK METHOD
• 1 Maintenance Worker 1 **TOTAL**	1. Obtain safety equipment, materials, and tools necessary for the day's work. 2. Begin applicable safety procedures and/or traffic control. 3. Clean up work site as necessary.
EQUIPMENT	
• 1 Pickup • Hand tools	
MATERIAL	AVERAGE DAILY PRODUCTION
• As required	8 Labor Hours

NOTES:

*Includes appliances, tires, car bodies, and other large objects dumped in channels/basins.

PERFORMANCE STANDARD

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

ACTIVITY NUMBER	NAME	DATE
85	**ENGINEERING**	09/09/10

DESCRIPTION & PURPOSE

All work that is by nature engineering. This includes, among others, surveying, preparation of plans and specifications, as well as preparing and updating Emergency Action Plans.

AUTHORIZED BY	LIMITS ON WORK
Director of Public Works or designee	

PERFORMANCE CRITERIA

CREW SIZE	WORK METHOD
• N/A	1. As deemed most cost effective.
EQUIPMENT	
• N/A	
MATERIAL	AVERAGE DAILY PRODUCTION
• N/A	8 Hours/Day

NOTES:

4.35 Reporting

Comprehensive maintenance programs include procedures for reporting and summarizing work accomplished and labor-hours used for maintenance activities. This information enables managers and supervisors to compare actual performance with the planned work program. These planned-actual comparisons -- on a regular basis -- are essential for effective management and control of the work program.

The reporting procedures provide specific information:

- What Master Plan facility required work.
- What work was done by activity.
- How much of each activity was done.
- The labor-hours used to accomplish the work.

This information is used by managers in their effort to:

- Make sure the right kinds and amounts of maintenance work are done.
- Identify the problem areas and related corrective actions.
- Develop future work programs and budgets.
- Identify opportunities for improved productivity.

The work reporting process can consist of a simple form as outlined in the following section.

Daily Work Activity Report

The Daily Work Activity Report may be used to record and summarize: (1) the kinds and amounts of work performed by maintenance personnel, and (2) the number of labor-hours used to do that work. The report can be used to summarize all work activities. Each member entity may use its standard accounting/reporting procedures for the Daily Work Activity Report.

The Maintenance Supervisor or crew leader usually prepares the Daily Work Activity Report. The following are instructions for the completion of the sample report. (See Daily Work Activity Report Form.)

1. Identification Data – Fill in all blanks: the member entity, date, name of person preparing the report, and the names and employee numbers of all persons to perform work to be reported for the day. (The form provides for several combinations of activities and employees. If additional pages are needed, number the pages accordingly).

2. Master Plan Facility ID/Name – Enter the specific 4 letter-4 digit Master Plan Facility number and reach, which indicates the "from" and "to", if applicable. This number directly corresponds to the specific Master Plan location as identified on current Master Plan maps. Also, indicate the Facility Name.

3. MWP Facility Number – Enter the identifying Maintenance Work Plan facility number. (This number directly corresponds to the budget approved for the facility and will typically include a range of Master Plan facilities and reach.)

4. Activity Number – Enter the number of each activity performed. Use the Work Activity Directory or Performance Standards to complete the blank.

5. Employee Number – Enter the employee number of the person working a specific activity at the specific facility.

6. Hours Worked by Each Employee – Record the number of hours worked by each employee, by the appropriate activity. Record the time spent to the nearest quarter-hour. For example, record 1 hour and 45 minutes as 1.75 hours and 3 hours and 20 minutes as 3.25 hours.

7. Equipment Number – Enter the assigned equipment number for any mechanical equipment on which work was performed for preventive and corrective maintenance only.

8. Work Performed – Enter the location and a brief description of the work performed.

9. Accomplishment – Measure and record the amount of work done for each activity. Use the correct measurement unit for each activity. (See the Activity List in Section 4.32.) Record the amount of work done to the nearest whole unit. Record labor-hours to the nearest hour. For activities with labor-hours as the unit of measure, the "quantity" will be exactly the same as "total hours" for the activity.

10. Notes/Comments – Record any additional relevant information that may be of use in summarizing and analyzing work activity data.

The completed reports can be used for monthly summarization and report preparation, and serve as completion certification backup for the monthly force account payment billings.

REGIONAL FLOOD CONTROL DISTRICT
DAILY WORK ACTIVITY REPORT

ENTITY: _____

Employee Name:_____No._____

Date Work Performed:_____ 20____

Employee Name:_____No._____

Supervisor Name:_____

Employee Name:_____No._____

Employee Name:_____No._____

							Accomplishment	
MWP Facility Number	Master Plan Facility ID/Facility Name	Activity Number Worked	Employee Number	Hours Worked by Activity	Equip. Number Used	Work Performance (Location, Brief Description, Materials Used, Etc.)	Amount	Unit of Measure

NOTES/COMMENTS:_____

_____

The undersigned hereby certifies that the above described maintenance was performed in accordance with the criteria/standards contained in the District's Operations and Maintenance Manual. Further, the information contained herein accurately reflects the tiime and accomplishments reported during the performance of this work.

_____ _____ _____

Superivsor's Signature Date Title

Page ____ of ____

4.40 INVENTORY PROCEDURES

4.41 Purpose

The purpose of this element of the **Operations and Maintenance Manual** is to provide a record of the existing physical flood control system that is eligible for maintenance funding assistance by the District. The physical facilities that make up the collection and conveyance system have in many instances been paid for in whole or in part by the District, however, they are not owned, operated, or maintained by the District. If, however, the total flood control system does not function properly when needed, it is ultimately the responsibility of the District to determine why and to take corrective action. A critical key in assuring the system functions properly is an up-to-date inventory of the physical system.

4.42 Physical System

The member entities shall submit annual updates of the physical system inventory on the forms required by the District (See Appendix B, Exhibit A – Maintenance Work Plan Summary and Maintenance Work Program Annual Budget Form.)

4.43 Physical System Maps

The individual member entities shall submit to the District a physical system map(s) as part of the Annual Work Plan as discussed in Section 4.22, or more frequently as project completion dictates, reflecting the size, location and material elements of their drainage and flood control system. The map(s) shall reflect that portion that is on the Master Plan and also those systems that are eligible for Regional Flood Control District funding under the categories shown in Section 4.11 of this manual. Physical system maps shall be provided to the District in a form that is readily reproducible.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
OPERATIONS AND MAINTENANCE MANUAL

CHAPTER 5
EMERGENCY FUNDING PROCEDURES

5.10 EMERGENCY FUNDING PROCEDURES

5.11 Purpose

This element of the **Operations and Maintenance Manual** provides the member entities with procedures to perform emergency restoration and rehabilitation immediately following a flood event. A principal role of the District shall be to support the member entities efforts to: (1) secure funding from state, federal, member entity reserves and private sources; and (2) facilitate required immediate repairs to regional flood control facilities without delay.

Projects eligible for District emergency restoration and rehabilitation funding are those included in the member entity's approved or amended Maintenance Work Program.

5.12 Procedures

If the governing body elects to declare an emergency, then the District, in accordance with NRS 332.112 (Emergency Contracts) will authorize and process emergency purchase orders to the maximum limit of unexpended funds upon written request by the member entity.

APPENDIX A

KEY STATUTORY, REGULATORY AND POLICY REFERENCES

NEVADA REVISED STATUTES

1. CHAPTER 332 – PURCHASING: LOCAL GOVERNMENTS
2. CHAPTER 338 – PUBLIC WORKS
3. CHAPTER 543 – CONTROL OF FLOODS

UNIFORM REGULATIONS FOR THE CONTROL OF DRAINAGE

1. SECTION 12 – DESIGN/IMPROVEMENT STANDARDS
   a. 12.050 – Construction/Operation/Maintenance

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

1. SECTION 300 – DRAINAGE POLICY
   a. 303.10 – Drainage Facilities Maintenance
   b. 304.8 – Multiple Use Facilities

REGIONAL FLOOD CONTROL DISTRICT POLICIES AND PROCEDURES MANUAL

1. CHAPTER XI – FACILITY MAINTENANCE

REGIONAL FLOOD CONTROL DISTRICT BIOLOGICAL OPINION

1. Biological Opinion 1-5-93-F-67R

APPENDIX B

INTERLOCAL CONTRACT
ANNUAL MAINTENANCE WORK PROGRAM

THIS CONTRACT, made and entered into this ___ day of _____, 20____, by and between the [legal name of CITY or COUNTY], a political subdivision of the State of Nevada, hereinafter referred to as "CITY" (or "COUNTY"), and the CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT, hereinafter referred to as "DISTRICT".

W I T N E S S E T H:

WHEREAS, pursuant to Chapter 543 of the Nevada Revised Statutes, the DISTRICT may approve and fund projects to maintain flood control improvements; and

WHEREAS, pursuant to NRS 277.180 any one or more public agencies may contract with one or more other public agencies to perform any governmental service, activity or undertaking which any of the public agencies is authorized by law to perform; and

WHEREAS, the CITY (or COUNTY) desires to maintain flood control improvements within the CITY (or COUNTY) in accordance with the maintenance program set forth herein, and hereinafter referred to as "Project"; and

WHEREAS, the facilities upon which maintenance will be performed are facilities described in the DISTRICT'S Master Plan.

NOW, THEREFORE, in consideration of the covenants, conditions, agreements, and promises of the parties hereto, the DISTRICT authorizes the Project as it is mutually understood and agreed as follows:

SECTION I - SCOPE OF PROJECT

This Interlocal Contract applies to the maintenance of flood control facilities, which are identified in the DISTRICT'S Master Plan facilities including updates and amendments subsequently approved. The basic maintenance of the facilities will be in accordance with performance standards set forth in the current DISTRICT *Operations and Maintenance Manual.*

The Project is more specifically described in Exhibit "A" which is attached hereto and by this reference incorporated herein.

SECTION II - PROJECT COSTS

The DISTRICT agrees to make payment for Project costs within the limits specified below:

1. The Project costs shall not exceed $_____.

The amounts allocated to each individual facility within the Project must be specified in Exhibit "A". Any changes to said allocated amounts must be approved by the DISTRICT'S Chief Engineer in accordance with Section 4.24 of the DISTRICT *Operations and Maintenance Manual.*

A written request must be made to the DISTRICT and a Supplemental Interlocal Contract approved to increase the amount noted above prior to payment of any additional funds.

2. The CITY (or COUNTY) and DISTRICT will comply with Section 4.12 of the *Operations and Maintenance Manual.* In accordance with said manual the CITY (or COUNTY) shall submit invoices together with a detailed summary report of the maintenance service performed. The CITY (or COUNTY) shall submit an invoice voucher in the manner prescribed by the DISTRICT. The vouchers shall include such information as is necessary for the DISTRICT to determine the nature of all expenditures. Each voucher will clearly indicate that it is for services rendered in performance under this contract. Each voucher will also be accompanied by a written certification from the CITY (or COUNTY) stating that it is for performance of maintenance activities under this contract and is composed of completed elements set forth in the annual work program.

All invoices must be submitted for payment to:

Clark County Regional Flood Control District
Accounts Payable
600 S. Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106-4511

Payment shall be considered timely if made by the DISTRICT within 30 days of receipt of the invoice. Pursuant to Section IV, Paragraph 8, the DISTRICT may, in its sole discretion, withhold payments to the CITY (or COUNTY) for services rendered if the CITY (or COUNTY)

fails to satisfactorily comply with any term or condition of this contract and/or the DISTRICT *Operations and Maintenance Manual.*

SECTION III - PROJECT TIME

The CITY (or COUNTY) agrees to perform the Project to the satisfaction of the DISTRICT between July 1, 20_____ and June 30, 20_____. The DISTRICT may grant extensions or terminate this contract and require all sums advanced to the CITY (or COUNTY) to be repaid if the CITY (or COUNTY) fails to perform by said date.

SECTION IV - GENERAL

1. The CITY (or COUNTY) will complete the Project as set forth in Exhibit "A". The CITY (or COUNTY) staff personnel responsible for coordination of work under this contract are as listed below:

(list names and titles of CITY or COUNTY staff)

It is understood that staff named above will be responsible for work coordination throughout the period of this contract unless the DISTRICT is informed in writing of changes in these personnel assignments.

2. The CITY (or COUNTY) will comply with the applicable provisions of the Local Government Purchasing Act, Chapter 332 and Public Works, Chapter 338, of the Nevada Revised Statutes.

3. Applicable portions of the current editions of the *Operations and Maintenance Manual*, *Policies and Procedures Manual*, *Hydrologic Criteria and Drainage Design Manual*, and *Uniform Regulations for the Control of Drainage* adopted by the DISTRICT will apply unless specifically superseded by this CONTRACT.

4. It is the intent of the DISTRICT that scheduling of maintenance and repair of drainage and flood control facilities in general and Master Plan Facilities specifically be coordinated among member entities. Therefore, in those cases where Master Plan approved, and DISTRICT-funded projects have regional flood control significance impacting more than one

member entity, the CITY (or COUNTY) will allow all impacted member entities an opportunity to review the maintenance schedule in order to coordinate maintenance efforts.

5. The Chief Engineer or designee of the DISTRICT shall be responsible for monitoring the performance of the CITY (or COUNTY), approval for payment of billings and expenses submitted by the CITY (or COUNTY) and the acceptance of any report provided by the CITY (or COUNTY). The CITY (or COUNTY) shall be responsible for monitoring performance of CITY (or COUNTY) staff or private contractors.

6. Accurate documentation of all work performed and payments made shall be maintained by the CITY (or COUNTY) for a period of three (3) years in hard copy form after final project approval and payments. Following the three year period, the CITY (or COUNTY) shall keep records for permanent storage in original form, in microfilm/fiche media, or an electronic format in accordance with the CITY (or COUNTY) Record Retention Schedule.

7. The CITY (or COUNTY) shall provide right of access to its facilities to the DISTRICT or Chief Engineer at all reasonable times, in order to monitor and evaluate performance, compliance, and/or quality assurance under this contract.

8. In the event the CITY (or COUNTY) fails to perform the maintenance according to the standards specified in this contract and the DISTRICT *Operations and Maintenance Manual,* the DISTRICT may perform or cause to be performed the maintenance necessary to assure proper operation of the facility. Costs incurred by the DISTRICT shall be reimbursed by the CITY (or COUNTY) or be deducted from the amount authorized by this contract. The DISTRICT may not exercise this right without giving the CITY (or COUNTY) specific written notice of the maintenance required and allowing the CITY (or COUNTY) 60 days within which to perform said maintenance. The notice required by this provision must be sent to:

insert name of City or County staff)

(insert title)

(insert title)

9. The records of the CITY (or COUNTY) and/or private contractors pertaining to the subject matter of this contract shall at all reasonable times be subject to inspection and audit by the DISTRICT or an Agent of the DISTRICT.

10. If any provision of this contract shall be deemed in conflict with any statute or rule of law, such provision shall be deemed modified to be in conformance with said statute or rule of law.

11. The CITY (or COUNTY), its employees, and representative shall at all times comply with all applicable laws, ordinances, statutes, rules, and regulations in effect at the time work is performed.

12. The CITY (or COUNTY) hereby agrees to reimburse the DISTRICT if funds are received from other sources for maintenance and repair of drainage and flood control facilities paid for by the DISTRICT.

13. The DISTRICT will not be responsible for any fines and/or penalties caused by the actions or inactions of CITY (or COUNTY) employees, consultants, contractors, or agents.

14. Any costs found to be improperly allocated to the Project will be refunded by the CITY (or COUNTY) to the DISTRICT.

15. It is specifically understood and agreed to by and between the parties hereto that it is not intended by any of the provisions of any part of this contract to create in the public or any member thereof a third party beneficiary hereunder, or to authorize anyone not a party to this contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this contract.

16. Up to the limits set forth in NRS Chapter 41, the CITY (or COUNTY) will indemnify and defend the DISTRICT against and from any and all claims and demands of whatsoever nature which arises out of allegations of negligence or misconduct of CITY (or COUNTY) officers, employees or agents, related to or under this Contract which results from injury to or death of any persons whomsoever, or against and from damage to or loss or destruction of property.

17. This agreement shall be construed and interpreted in accordance with the laws of the State of Nevada.

/

/

/

IN WITNESS WHEREOF, the parties have caused this contract to be executed the day and year first above written.

Date of District Action:

_____

ATTEST:

_____
(Insert Board Secretary's Name)
Secretary to the Board

REGIONAL FLOOD CONTROL DISTRICT

BY:_____
(Insert Chairman's Name), Chairman

Approved as to Form:

BY:_____
(Insert Chief Deputy District Attorney's Name)
Chief Deputy District Attorney

****

Date of Council Action:
(or Commission Action)

ATTEST:

_____
(Insert Name), (City or County Clerk)

(CITY or COUNTY) OF _____

BY:_____
(Insert Mayor/Board Chairman's Name), Title

EXHIBIT A

PART I

Maintenance Work Plan Summary – Summary of overall work plan listing specific projects (physical system inventory) and associated costs attributable to each. (See Maintenance Work Plan Summary.)

PART II

Facility map(s) which identify location of projects (physical system inventory) and planned maintenance work by project.

PART III

Maintenance Work Program Annual Budget – Individual maintenance projects (physical system inventory) broken into maintenance activities to be completed, including narrative and associated budgeted costs for all projects identified in Part I. (See Maintenance Work Program Annual Budget.)

(MEMBER ENTITY)
MAINTENANCE WORK PLAN SUMMARY
FISCAL YEAR 20XX-XX

Master Plan Facility ID	MWP Facility Number	Facility Description	Cost
		TOTAL	$ 0.00

Maintenance Work Program Annual Budget

REGIONAL FLOOD CONTROL DISTRICT
MAINTENANCE WORK PROGRAM
ANNUAL BUDGET - FY 20XX-XX

MWP Facility #: _____ Entity: _____

Facility Name: _____ Date Prepared: _____

MP Facility ID: _____

Force Account/ Contract	Activity	Requested Work Plan Amount ($)	Amended Work Plan Amount ($)	Percent Complete	Scheduled Completion Date
	03 Facility Assessment and Inventory				
	05 Inspect Channels				
	06 Inspect Levees/Detention and Debris Basins				
	08 Species Survey and Removal				
	10 Clean and Reshape Channels/Levees				
	15 Repair Lined Channel				
	20 Erosion Control and Repair				
	21 Provide/Maintain Dust Control				
	25 Clean Detention Debris Basins				
	35 Fence Repair				
	40 Vegetation Control - Chemical				
	45 Vegetation Control - Mechanical				
	50 Maintain Access Road				
	55 Clean & Inspect Inlet/Outlet Structures				
	60 Repair Inlet/Outlet Structures				
	65 Clean Storm Sewer Lines				
	70 Storm Sewer Repair				
	75 Clean/Flush Culverts & Bridges				
	80 Miscellaneous Work Activities				
	85 Engineering				
	TOTALS	$0.00	$0.00	0%	
Delays or problem areas:					
Work completed during prior fiscal year:					
Work to be completed during current fiscal year:					

Consultant/
Contractor: _____

Project
Manager: _____ Phone Number: _____

5. REFERENCE MATERIALS

Excerpts from Abbott and Pulsipher Washes FIS Restudy and Supplement (1998, 2000): Flow Rate Tables, Hydraulic Summary Tables, Manning's 'n', I-15 Breakout, I-15 Culvert Survey Information

Excerpts from Abbott Wash at Mesquite Vistas LOMR: Hydraulic Summary Table

Excerpts from Amendment No. 1 to the Final Report for Request for LOMR Pulsipher Wash Adjacent to Falcon Ridge Parkway: Annotated Flood Zone Map

Excerpts from 2007 City of Mesquite Flood Control Master Plan Update: Hydrologic Parameters, HEC-1 Output

Excerpts from 2001 City of Mesquite Flood Control Master Plan Update: Hydrologic Summary Tables, Sediment Transport Calculations

Excerpts from Water Reuse System and Storm Detention Project Phase 2B and Phase 3: Hydrologic Summary Tables

DRAFT

ABBOTT AND PULSIPHER WASHES FLOOD INSURANCE STUDY RESTUDY

MESQUITE, CLARK COUNTY, NEVADA

550.035

OCTOBER 1998

TABLE 1
SUMMARY OF RESULTS FOR THE ABBOTT WASH WATERSHED DURING THE 100-YEAR STORM EVENT
ABBOTT AND PULSIPHER WASHES FIS RESTUDY
MESQUITE, CLARK COUNTY, NEVADA

Concentration Point *	Description	Overall Storm			Adopted Discharge (cfs)
		Area (sq mi)	DARF	Peak Q (cfs)	
40	Abbott Wash 7,800 feet north of I-15	4.73	0.91	3,156	3,156
50	Abbott Wash at I-15	6.39	0.90	3,023	3,156
60	Abbott Wash at Virgin River	6.90	0.89	3,044	3,156

*See Figure 3

The existing conditions HEC-1 model was executed for the Pulsipher Wash. The Pulsipher Wash has peak discharges during a 100-year storm event of 2,078 cfs at Concentration Point 10, 2,318 cfs at Concentration Point 20, 3,474 cfs at Concentration Point 30, 3,478 cfs at Concentration Point 50, and 3,549 cfs at Concentration Point 60. These quantities are referenced from the modified HEC-1 model of the MPU. See Figure 3 for concentration point locations. Results are shown in Table 2. This table lists the descriptions, tributary areas, appropriate DARF, peak discharges, and proposed adopted peak discharges for each appropriate concentration point.

TABLE 2
SUMMARY OF RESULTS FOR THE PULSIPHER WASH WATERSHED DURING THE 100-YEAR STORM EVENT
ABBOTT AND PULSIPHER WASHES FIS RESTUDY
MESQUITE, CLARK COUNTY, NEVADA

Concentration Point *	Description	Overall Storm			Adopted Discharge (cfs)
		Area (sq mi)	DARF	Peak Q (cfs)	
10	Pulsipher Wash 10,300 feet north of I-15	1.35	0.96	2,078	2,078
20	Pulsipher Wash 6,100 feet north of I-15	2.06	0.93	2,318	2,318
30	Pulsipher Wash 1,500 feet north of I-15	4.36	0.91	3,474	3,474
50	Pulsipher Wash at I-15	4.70	0.91	3,478	3,478
60	Pulsipher Wash at Virgin River	4.85	0.91	3,549	3,549

*See Figure 3

3.2 Hydraulic Analysis

3.2.1 Methodology

For the areas studied, the water surface elevations during the 100-year storm event were computed using the U. S. Army Corps of Engineers (USACOE) HEC-2 Water Surface Profile computer program (Reference 6) which runs inside BOSS International's BOSS RMS for AutoCAD software (Reference 7). Where otherwise unknown, the starting water surface elevations were developed using critical depth calculations.

The special bridge and special culvert options were used to model the existing bridges in the Pulsipher Wash model and the Abbott Wash model. The bridge data required was developed from construction drawings, field survey data, and topographic maps. Bridges are assumed to be normalized to the river with an approximate length equaling the span width times the sine of the skew angle plus the road width divided by the cosine of the skew angle. This conservative approach allows the continuous use of the HEC-2 model, which is a 1-D model.

Otherwise, the models would have to be discontinuous with the use of a 2-D model at the discontinuities (i.e., bridges/culverts).

The split flow option was used to model the breakouts which will occur at several locations in the Pulsipher Wash. Three methods for determining and quantifying split flows are available in BOSS RMS: weir flow, normal depth, and a rating curve. The weir flow method was selected for modeling all breakouts. Weir elevations were set at sections where an outbreak from the main channel was probable. A split flow calculation was performed when the water surface rose above the weir elevation at a particular section. The split flow methods use the computed water surface elevations to determine where split flows will occur. Limitations of the split flow option include the following. Weir elevations are fixed and do not erode over time. Breakout flow occurs perpendicular to the flow direction of the main channel. The Pulsipher Wash modeling was accomplished exclusively with BOSS RMS Version 3.5. The Abbott Wash modeling was accomplished with BOSS International's BOSS RMS Version 3.5 and the USACOE Hydrologic Engineering Center's HEC-2 Version 4.6.2.

Ground control surveys, check cross-sections, and establishment of elevation reference marks were completed by Pentacore Engineering, Inc. Vertical control is based on a project datum which ties into the Bertina benchmark. The Bertina benchmark is located approximately 3,300 feet east and 3,200 feet north of the intersection of Mesquite Boulevard and Grapevine Road. The project datum is set at an elevation 0.6 feet lower than the National Geodetic Vertical Datum of 1929 (NGVD 1929), and 2.89 feet lower than the North American Vertical Datum of 1988 (NAVD 1988). Horizontal control is tied into the North American Datum of 1983 (NAD 1983). Clark County survey monuments were used for control whenever possible.

Dimensions of the hydraulic structures were obtained by construction plans and field surveys. Table 3 lists the existing hydraulic structures, brief descriptions, and their respective locations on either the Abbott Wash or Pulsipher Wash.

3.2.3 Manning's "n" Values

Manning's roughness coefficients (n) were obtained through field inspection, aerial photographs, and engineering judgment. The roughness conditions were also documented with photographs and the "n" values were compared with published data (Reference 9). In addition, Cowan's procedure (Reference 8) for estimating hydraulic roughness coefficients was used to account for channel material, degree of irregularity, variations of channel cross-section, relative effect of obstructions, vegetation, and degree of meandering.

The "NC" card of the HEC-2 model was used to designate the proper "n" values for section areas.

3.2.4 Expansion and Contraction Coefficients

The expansion and contraction loss coefficients used are typical riverine values with gradual changes (0.3 and 0.1, respectively), and with abrupt changes (0.5 and 0.3, respectively).

3.3 Modeling Results

After discussions with the CCRFCD and COM, it was decided to designate the Special Flood Hazard Area by approximate methods (Zone A). This was necessary because the detailed Effective FIS Study was based on outdated topographic information in which the community has lost confidence. This Restudy uses new topographic information which reflects the current condition of the surrounding area.

3.3.1 Abbott Wash

A HEC-2 model was constructed to model the Abbott Wash. Cross-sections were oriented left to right looking downstream in the Abbott Wash models. See cross-section exhibits.

The Main Channel model of the Abbott Wash runs from the north boundary of Mesquite city limits to I-15. Results of the Abbott Wash modeling indicate that

ABBOTT AND PULSIPHER WASHES FIS RESTUDY
ABBOTT WASH - MAIN CHANNEL MODEL
FROM SECTION 1160 TO SECTION 985
MANNINGS "n" CALCULATIONS - CHANNEL

SECTION	n0	n1	n2	n3	n4	m5	n
1160	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1155	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1152	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1150	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1145	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1140	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1135	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1130	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1125	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1120	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1115	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1112	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1110	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1105	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1100	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1095	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1090	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1085	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1080	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1075	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1072	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1070	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1067	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1065	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1060	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1055	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1050	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1045	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1040	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1035	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1030	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1025	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1020	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1017	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1015	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1012	0.020	0.000	0.000	0.000	0.005	1.000	0.025
1010	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1005	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1002	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1000	0.020	0.005	0.000	0.000	0.000	1.000	0.025
994	0.015	0.000	0.000	0.000	0.000	1.000	0.015
992	0.015	0.000	0.000	0.000	0.000	1.000	0.015
990	0.020	0.005	0.000	0.010	0.005	1.000	0.040
985	0.020	0.005	0.000	0.010	0.005	1.000	0.040

REFERENCED FROM "OPEN-CHANNEL HYDRAULICS" , VEN TE CHOW, McGRAW-HILL, INC., 1959. SEE VOLUME III, SECTION 5.3.

n0 = MATERIAL
n1 = IRREGULARITY
n2 = CROSS SECTION VARIATIONS
n3 = OBSTRUCTIONS
n4 = VEGETATION
m5 = MEANDERING

ABBOTT AND PULSIPHER WASHES FIS RESTUDY
ABBOTT WASH - MAIN CHANNEL MODEL
FROM SECTION 1160 TO SECTION 985
MANNINGS "n" CALCULATIONS - OVERBANKS

SECTION	n0	n1	n2	n3	n4	m5	n
1160	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1155	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1152	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1150	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1145	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1140	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1135	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1130	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1125	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1120	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1115	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1112	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1110	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1105	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1100	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1095	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1090	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1085	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1080	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1075	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1072	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1070	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1067	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1065	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1060	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1055	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1050	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1045	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1040	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1035	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1030	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1025	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1020	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1017	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1015	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1012	0.020	0.000	0.000	0.000	0.010	1.000	0.030
1010	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1005	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1002	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1000	0.020	0.005	0.005	0.000	0.010	1.000	0.040
994	0.015	0.000	0.000	0.000	0.000	1.000	0.015
992	0.015	0.000	0.000	0.000	0.000	1.000	0.015
990	0.020	0.005	0.005	0.000	0.010	1.000	0.040
985	0.020	0.005	0.005	0.000	0.010	1.000	0.040

REFERENCED FROM "OPEN-CHANNEL HYDRAULICS" , VEN TE CHOW, McGRAW-HILL, INC., 1959. SEE VOLUME III, SECTION 5.3.

n0 = MATERIAL
n1 = IRREGULARITY
n2 = CROSS SECTION VARIATIONS
n3 = OBSTRUCTIONS
n4 = VEGETATION
m5 = MEANDERING

ABBOTT AND PULSIPHER WASHES FIS RESTUDY
PULSIPHER WASH - MAIN CHANNEL MODEL
FROM SECTION 4900 TO SECTION 200
MANNINGS "n" CALCULATIONS - CHANNEL

SECTION	n0	n1	n2	n3	n4	m5	n
4900	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4800	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4700	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4600	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4500	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4400	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4300	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4200	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4100	0.020	0.005	0.000	0.000	0.000	1.000	0.025
4000	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3900	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3800	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3700	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3600	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3500	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3400	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3300	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3200	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3100	0.020	0.005	0.000	0.000	0.000	1.000	0.025
3000	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2900	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2800	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2700	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2600	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2500	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2400	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2300	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2200	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2100	0.020	0.005	0.000	0.000	0.000	1.000	0.025
2000	0.015	0.000	0.000	0.000	0.000	1.000	0.015
1900	0.015	0.000	0.000	0.000	0.000	1.000	0.015
1800	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1750	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1700	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1650	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1600	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1500	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1400	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1300	0.020	0.005	0.000	0.000	0.000	1.000	0.025
1200	0.020	0.005	0.000	0.000	0.005	1.000	0.030
1100	0.020	0.005	0.000	0.000	0.005	1.000	0.030
1000	0.020	0.005	0.000	0.000	0.005	1.000	0.030
900	0.020	0.005	0.000	0.000	0.005	1.000	0.030
800	0.020	0.005	0.000	0.000	0.005	1.000	0.030
700	0.020	0.005	0.000	0.000	0.005	1.000	0.030
600	0.015	0.000	0.000	0.000	0.000	1.000	0.015
500	0.015	0.000	0.000	0.000	0.000	1.000	0.015
400	0.020	0.005	0.000	0.000	0.000	1.000	0.025
300	0.020	0.005	0.000	0.000	0.000	1.000	0.025
200	0.020	0.005	0.000	0.000	0.000	1.000	0.025

REFERENCED FROM "OPEN-CHANNEL HYDRAULICS", VEN TE CHOW, McGRAW-HILL, INC., 1959. SEE VOLUME III, SECTION 5.3.

n0 = MATERIAL
n1 = IRREGULARITY
n2 = CROSS SECTION VARIATIONS
n3 = OBSTRUCTIONS
n4 = VEGETATION
m5 = MEANDERING

ABBOTT AND PULSIPHER WASHES FIS RESTUDY
PULSIPHER WASH - MAIN CHANNEL MODEL
FROM SECTION 4900 TO SECTION 200
MANNINGS "n" CALCULATIONS - OVERBANKS

SECTION	n0	n1	n2	n3	n4	m5	n
4900	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4800	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4700	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4600	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4500	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4400	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4300	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4200	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4100	0.020	0.005	0.005	0.000	0.010	1.000	0.040
4000	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3900	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3800	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3700	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3600	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3500	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3400	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3300	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3200	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3100	0.020	0.005	0.005	0.000	0.010	1.000	0.040
3000	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2900	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2800	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2700	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2600	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2500	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2400	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2300	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2200	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2100	0.020	0.005	0.005	0.000	0.010	1.000	0.040
2000	0.015	0.000	0.000	0.000	0.000	1.000	0.015
1900	0.015	0.000	0.000	0.000	0.000	1.000	0.015
1800	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1750	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1700	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1650	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1600	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1500	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1400	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1300	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1200	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1100	0.020	0.005	0.005	0.000	0.010	1.000	0.040
1000	0.020	0.005	0.005	0.000	0.010	1.000	0.040
900	0.020	0.005	0.005	0.000	0.010	1.000	0.040
800	0.020	0.005	0.005	0.000	0.010	1.000	0.040
700	0.020	0.005	0.005	0.000	0.010	1.000	0.040
600	0.015	0.000	0.000	0.000	0.000	1.000	0.015
500	0.015	0.000	0.000	0.000	0.000	1.000	0.015
400	0.020	0.000	0.000	0.000	0.010	1.000	0.030
300	0.020	0.000	0.000	0.000	0.010	1.000	0.030
200	0.020	0.000	0.000	0.000	0.010	1.000	0.030

REFERENCED FROM "OPEN-CHANNEL HYDRAULICS", VEN TE CHOW, McGRAW-HILL, INC., 1959. SEE VOLUME III, SECTION 5.3.

n0 = MATERIAL
n1 = IRREGULARITY
n2 = CROSS SECTION VARIATIONS
n3 = OBSTRUCTIONS
n4 = VEGETATION
m5 = MEANDERING

ABBOTT WASH - 98 FLS

CHANNEL MODEL

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	985.000	3156.00	1610.46	.00	.00	1.76	41.87	.00
*	990.000	3156.00	1615.41	.00	4.95	.00	256.34	55.00
*	992.000	3156.00	1616.40	.00	1.00	.00	803.80	43.00
*	994.000	3156.00	1624.20	.00	7.80	.00	2246.45	250.00
*	1000.000	3156.00	1624.20	.00	.00	.00	1072.87	19.00
	1002.000	3156.00	1624.20	.00	.00	.00	993.01	52.00
	1005.000	3156.00	1624.20	.00	.00	.00	652.22	195.00
	1010.000	3156.00	1624.20	.00	-.01	.00	538.96	140.00
*	1012.000	3156.00	1624.19	.00	.00	.00	354.54	97.00
*	1015.000	3156.00	1624.06	.00	-.14	.00	103.47	124.00
*	1017.000	3156.00	1624.64	.00	.58	.00	84.15	95.00
*	1020.000	3156.00	1624.54	.00	-.10	.00	73.06	185.30
*	1025.000	3156.00	1624.87	.00	.32	.00	69.19	221.70
*	1030.000	3156.00	1627.07	.00	2.21	.00	90.41	190.70
*	1035.000	3156.00	1629.01	.00	1.93	.00	449.97	179.00
	1040.000	3156.00	1630.06	.00	1.05	.00	444.45	224.30
	1045.000	3156.00	1630.94	.00	.88	.00	282.70	178.00
	1050.000	3156.00	1632.22	.00	1.28	.00	298.56	196.50
*	1055.000	3156.00	1633.57	.00	1.35	.00	234.03	197.50
*	1060.000	3156.00	1635.66	.00	2.09	.00	326.61	195.00
*	1065.000	3156.00	1637.76	.00	2.10	.00	92.60	177.70
*	1067.000	3156.00	1639.38	.00	1.62	.00	320.97	113.00
*	1069.000	3156.00	1639.90	.00	.52	.00	194.20	83.00
	1070.000	3156.00	1639.88	.00	-.02	.00	270.84	67.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	1072.000	3156.00	1639.69	.00	-.19	.00	95.80	104.00
*	1075.000	3156.00	1640.10	.00	.41	.00	79.23	88.90
*	1080.000	3156.00	1641.25	.00	1.15	.00	90.44	171.70
*	1085.000	3156.00	1643.38	.00	2.12	.00	110.88	236.90
*	1090.000	3156.00	1645.27	.00	1.89	.00	68.19	188.60
	1095.000	3156.00	1646.76	.00	1.49	.00	84.29	191.90
*	1100.000	3156.00	1648.34	.00	1.58	.00	299.58	181.20
	1105.000	3156.00	1648.88	.00	.54	.00	102.64	248.20
	1110.000	3156.00	1649.59	.00	.71	.00	71.12	184.90
*	1112.000	3156.00	1651.16	.00	1.57	.00	278.82	72.00
	1115.000	3156.00	1651.41	.00	.25	.00	126.95	150.70
*	1120.000	3156.00	1651.24	.00	-.17	.00	89.21	245.80
*	1125.000	3156.00	1652.62	.00	1.38	.00	81.33	213.30
*	1130.000	3156.00	1654.82	.00	2.20	.00	64.12	204.10
*	1135.000	3156.00	1655.94	.00	1.12	.00	56.43	203.30
*	1140.000	3156.00	1657.53	.00	1.58	.00	50.40	190.30
*	1145.000	3156.00	1660.12	.00	2.59	.00	66.86	275.80
	1150.000	3156.00	1660.40	.00	.29	.00	74.39	126.40

ABBOTT WASH- 98 FLS

*	1152.000	3156.00	1660.98	.00	.57	.00	103.37	125.00
*	1155.000	3156.00	1661.25	.00	.27	.00	158.40	64.00
*	1160.000	3156.00	1661.53	.00	.28	.00	65.38	186.60

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 985.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 990.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 990.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 992.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 992.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 994.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1000.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1012.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1015.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1017.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1020.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 1025.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1025.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1030.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1030.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1035.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1035.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1055.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1055.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1060.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1060.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1065.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1065.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 1067.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1069.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1072.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 1075.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1075.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1080.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1080.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1085.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 1085.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1090.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1090.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1100.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1100.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 1112.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1120.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 1125.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1125.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1130.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1130.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1135.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1135.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 1140.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 1140.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 1145.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 1152.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

PULSIPHER WASH. 1998 FLS

THIS RUN EXECUTED 13JAN00 11:47:41

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Pulsipher Wash

SUMMARY PRINTOUT TABLE 100

	SECNO	EGLWC	ELLC	EGPRS	ELTRD	QPR	QWEIR	CLASS	H3	DEPTH	CWSEL	VCH	EG
*	600.000	1568.79	1569.51	.00	1572.66	668.74	.00	2.00	.00	2.70	1568.10	6.63	1568.79
*	2000.000	1603.81	1598.88	1599.48	1603.83	2138.11	.00	59.00	.00	10.00	1598.88	17.82	1603.81

Pulsipher Wash

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	200.000	.00	.00	.00	1554.00	668.74	1555.07	1555.07	1555.57	91.93	5.68	117.76	69.75
*	300.000	352.07	.00	.00	1558.00	668.74	1560.01	1560.01	1560.76	80.30	6.98	95.86	74.63
*	400.000	134.41	.00	.00	1560.00	668.74	1562.56	1562.56	1563.09	91.64	5.82	114.97	69.86
*	500.000	74.97	.00	.00	1564.30	668.74	1566.47	1566.47	1567.54	29.45	8.30	80.57	123.22
*	600.000	133.46	1572.66	1569.51	1565.40	668.74	1568.10	.00	1568.79	14.39	6.63	100.89	176.29
*	700.000	112.64	.00	.00	1569.50	668.74	1573.26	1573.26	1573.79	144.90	5.83	114.80	55.55
*	800.000	144.94	.00	.00	1570.00	676.08	1574.78	1574.40	1575.10	60.77	4.59	147.44	86.73
	900.000	103.62	.00	.00	1571.00	798.09	1575.36	1575.28	1575.98	93.53	6.31	126.51	82.52
	1000.000	118.27	.00	.00	1571.15	966.57	1576.44	1576.36	1577.24	110.61	7.17	134.84	91.90
*	1100.000	103.70	.00	.00	1571.40	1232.47	1577.47	1576.93	1578.01	54.21	5.94	207.55	167.39
*	1200.000	110.23	.00	.00	1571.62	1889.42	1577.89	1577.33	1578.65	50.67	7.03	268.92	265.43
*	1300.000	176.37	.00	.00	1572.69	2100.77	1578.93	1578.93	1580.10	78.50	8.68	242.00	237.11
*	1400.000	161.58	.00	.00	1578.00	2100.77	1583.68	1583.68	1584.79	71.68	8.47	248.01	248.14
*	1500.000	108.07	.00	.00	1578.00	2209.12	1584.86	1583.66	1585.15	13.21	4.49	616.70	607.80
	1600.000	196.31	.00	.00	1580.40	2209.12	1585.10	1583.69	1585.40	11.86	4.47	534.65	641.55
*	1650.000	175.57	.00	.00	1582.00	2209.12	1586.66	1586.66	1587.48	43.94	8.76	417.47	333.26
	1700.000	161.13	.00	.00	1582.05	2209.12	1587.56	1587.24	1588.08	30.70	7.01	500.54	398.71
*	1750.000	169.33	.00	.00	1582.10	2209.12	1588.69	1588.69	1589.60	37.25	8.50	384.09	361.95
*	1800.000	170.93	.00	.00	1582.10	2209.12	1589.90	1589.90	1592.04	65.02	11.74	188.10	273.97
*	1900.000	58.98	.00	.00	1582.19	2138.11	1592.09	1592.09	1597.12	56.98	18.00	118.76	283.25
*	2000.000	319.85	1603.83	1598.88	1588.88	2138.11	1598.88	1598.88	1603.81	84.68	17.82	120.06	232.35
*	2100.000	49.81	.00	.00	1590.00	3478.00	1605.22	1595.96	1605.28	.46	2.16	2161.69	5154.45
*	2200.000	328.57	.00	.00	1593.00	3478.00	1605.28	1598.04	1605.29	.12	.91	5633.05	9993.15
*	2300.000	311.55	.00	.00	1594.00	3478.00	1605.26	1600.56	1605.31	.92	2.32	2443.22	3633.66

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	2330.000	240.00	.00	.00	1596.00	3478.00	1605.24	1602.20	1605.37	2.92	3.29	1527.20	2036.33
*	2350.000	63.00	.00	.00	1602.00	3478.00	1605.15	1604.46	1605.47	21.47	4.53	785.48	750.58
	2400.000	71.00	.00	.00	1598.00	3478.00	1604.90	1604.56	1605.83	21.39	8.82	633.59	752.08

PULSIPHER WASH- 1998 FLS

*	2500.000	179.72	.00	.00	1602.00	3478.00	1606.37	1606.37	1607.75	52.28	10.39	432.21	481.01
*	2600.000	373.36	.00	.00	1606.00	3474.00	1610.06	1610.06	1611.42	68.10	9.35	371.36	420.97
*	2700.000	246.94	.00	.00	1608.00	3474.00	1612.56	1612.56	1613.79	68.64	8.89	390.77	419.33
*	2800.000	376.77	.00	.00	1610.00	3474.00	1615.31	1615.31	1616.64	68.44	9.26	375.09	419.93
*	2900.000	292.09	.00	.00	1612.00	3474.00	1618.57	1618.57	1619.51	93.81	7.78	446.70	358.68
*	3000.000	349.71	.00	.00	1614.00	3474.00	1620.69	1620.69	1621.93	44.67	9.10	442.41	519.79
*	3100.000	302.10	.00	.00	1618.00	3474.00	1624.66	1624.66	1625.94	68.16	9.08	382.61	420.78
*	3200.000	390.01	.00	.00	1622.00	3474.00	1627.52	1627.52	1629.64	59.81	11.67	297.81	449.22
	3300.000	482.80	.00	.00	1628.00	3474.00	1631.38	1631.36	1632.76	66.78	9.43	368.45	425.12
*	3400.000	402.24	.00	.00	1634.00	3474.00	1639.11	1639.11	1639.82	97.31	6.80	511.14	352.16
*	3500.000	403.18	.00	.00	1640.00	3474.00	1642.15	1641.90	1642.55	48.61	5.07	685.70	498.27
*	3600.000	358.51	.00	.00	1646.00	3474.00	1647.42	1647.42	1648.05	85.31	6.41	542.32	376.11
	3700.000	409.82	.00	.00	1648.00	3474.00	1650.06	1649.75	1650.55	45.30	5.63	617.21	516.18
*	3800.000	666.00	.00	.00	1654.00	3474.00	1656.25	1656.25	1656.94	83.86	6.70	518.75	379.36
*	3900.000	320.40	.00	.00	1656.00	2318.00	1658.79	1658.78	1659.61	79.64	7.30	317.60	259.74
*	4000.000	465.67	.00	.00	1660.00	2318.00	1664.62	1664.62	1665.76	71.86	8.58	270.18	273.44
*	4100.000	497.00	.00	.00	1666.00	2318.00	1670.34	1670.34	1671.28	74.12	7.77	298.33	269.24
*	4200.000	402.00	.00	.00	1670.00	2318.00	1674.93	1674.93	1675.84	74.94	7.65	302.84	267.78
*	4300.000	383.62	.00	.00	1676.00	2318.00	1679.22	1679.22	1680.20	74.42	7.98	290.61	268.69
*	4400.000	476.00	.00	.00	1680.00	2318.00	1684.01	1684.01	1685.31	69.04	9.16	253.12	278.97
*	4500.000	533.38	.00	.00	1686.00	2318.00	1690.55	1690.55	1691.73	69.79	8.71	266.05	277.47
*	4600.000	442.00	.00	.00	1692.00	2318.00	1695.99	1695.99	1697.15	71.67	8.66	267.73	273.80
*	4700.000	260.86	.00	.00	1696.00	2318.00	1700.65	1700.65	1701.94	46.19	9.29	282.59	341.06

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01F
*	4800.000	227.74	.00	.00	1698.00	2318.00	1703.20	1703.20	1705.21	61.16	11.39	203.56	296.41
*	4900.000	351.24	.00	.00	1702.00	2318.00	1705.90	1705.90	1707.53	64.83	10.26	226.02	287.89

Pulsipher Wash

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	200.000	668.74	1555.07	.00	.00	-1.88	118.24	.00
*	300.000	668.74	1560.01	.00	4.94	.00	63.71	352.07
*	400.000	668.74	1562.56	.00	2.55	.00	110.67	134.41
*	500.000	668.74	1566.47	.00	3.91	.00	37.73	74.97
*	600.000	668.74	1568.10	.00	1.63	.00	37.73	133.46
*	700.000	668.74	1573.26	.00	5.16	.00	117.24	112.64
*	800.000	676.08	1574.78	.00	1.52	.00	112.62	144.94
	900.000	798.09	1575.36	.00	.58	.00	82.44	103.62
	1000.000	966.57	1576.44	.00	1.08	.00	81.68	118.27
*	1100.000	1232.47	1577.47	.00	1.02	.00	97.61	103.70
*	1200.000	1889.42	1577.89	.00	.42	.00	94.20	110.23
*	1300.000	2100.77	1578.93	.00	1.04	.00	109.71	176.37
*	1400.000	2100.77	1583.68	.00	4.75	.00	111.77	161.58
*	1500.000	2209.12	1584.86	.00	1.18	.00	393.03	108.07
	1600.000	2209.12	1585.10	.00	.24	.00	242.66	196.31

PULSIPHER WASH- 1998 FIS

*	1650.000	2209.12	1586.66	.00	1.57	.00	258.69	175.57
	1700.000	2209.12	1587.56	.00	.90	.00	290.63	161.13
*	1750.000	2209.12	1588.69	.00	1.13	.00	216.43	169.33
*	1800.000	2209.12	1589.90	.00	1.21	.00	44.92	170.93
*	1900.000	2138.11	1592.09	.00	2.18	.00	12.00	58.98
*	2000.000	2138.11	1598.88	.00	6.79	.00	13.60	319.85
*	2100.000	3478.00	1605.22	.00	6.34	.00	248.25	49.81
*	2200.000	3478.00	1605.28	.00	.06	.00	746.82	328.57
*	2300.000	3478.00	1605.26	.00	-.02	.00	502.60	311.55

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	2330.000	3478.00	1605.24	.00	-.02	.00	449.86	240.00
*	2350.000	3478.00	1605.15	.00	-.08	.00	403.26	63.00
	2400.000	3478.00	1604.90	.00	-.26	.00	256.00	71.00
*	2500.000	3478.00	1606.37	.00	1.47	.00	161.68	179.72
*	2600.000	3474.00	1610.06	.00	3.70	.00	139.82	373.36
*	2700.000	3474.00	1612.56	.00	2.50	.00	160.76	246.94
*	2800.000	3474.00	1615.31	.00	2.75	.00	144.58	376.77
*	2900.000	3474.00	1618.57	.00	3.27	.00	282.84	292.09
*	3000.000	3474.00	1620.69	.00	2.12	.00	222.85	349.71
*	3100.000	3474.00	1624.66	.00	3.96	.00	149.43	302.10
*	3200.000	3474.00	1627.52	.00	2.87	.00	71.99	390.01
	3300.000	3474.00	1631.38	.00	3.85	.00	132.80	482.80
*	3400.000	3474.00	1639.11	.00	7.73	.00	408.71	402.24
*	3500.000	3474.00	1642.15	.00	3.04	.00	507.21	403.18
*	3600.000	3474.00	1647.42	.00	5.27	.00	430.17	358.51
	3700.000	3474.00	1650.06	.00	2.64	.00	369.76	409.82
*	3800.000	3474.00	1656.25	.00	6.19	.00	379.85	666.00
*	3900.000	2318.00	1658.79	.00	2.54	.00	196.62	320.40
*	4000.000	2318.00	1664.62	.00	5.83	.00	120.65	465.67
*	4100.000	2318.00	1670.34	.00	5.72	.00	158.44	497.00
*	4200.000	2318.00	1674.93	.00	4.58	.00	166.18	402.00
*	4300.000	2318.00	1679.22	.00	4.29	.00	149.61	383.62
*	4400.000	2318.00	1684.01	.00	4.79	.00	99.31	476.00
*	4500.000	2318.00	1690.55	.00	6.54	.00	113.57	533.38
*	4600.000	2318.00	1695.99	.00	5.44	.00	117.81	442.00
*	4700.000	2318.00	1700.65	.00	4.66	.00	134.71	260.86

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	4800.000	2318.00	1703.20	.00	2.55	.00	50.94	227.74
*	4900.000	2318.00	1705.90	.00	2.70	.00	70.75	351.24

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 200.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 300.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

DRAFT

ABBOTT AND PULSIPHER WASHES FIS RESTUDY

SUPPLEMENT

NOVEMBER 2000

MESQUITE, CLARK COUNTY, NEVADA

G. C. WALLACE, INC.
Engineers/Planners/Surveyors

3.2.3 I-15 Breakout Model

The breakout along I-15 was not previously analyzed in the original submittal (Reference 1). The HEC-2 model for the detailed study of the I-15 breakout is I15BRK4.OUT. This model runs west from the I-15 culvert to the limit of the topographic mapping, extending across I-15 to include the north ditch, median ditch, and south ditch. The 100-year flow used in this model of 1,340 cfs was referenced from the Main Channel model, PULSREV7.OUT (1/13/00). Channel roughness values were determined using the same methodology as was used in the original submittal. These values are 0.030 for channel and overbank areas. Channel roughness values for the I-15 Breakout model are attached.

3.3 Hydraulic Modeling Results

3.3.1 Main Channel Model

The floodway analysis of the main channel was completed with a combination of Encroachment Methods 1 and 4. The majority of sections used Encroachment Method 1 because, in this situation, Encroachment Method 4 often failed to produce reasonable results. An iterative process was applied with Encroachment Method 1 using engineering judgement to determine the locations of the encroachment stations in order to approximate equal conveyance loss for both banks of the watercourse. The 100-year floodway, floodplain, and BFEs are shown on the attached workmaps. See Table 2 for a summary of floodway results for the Main Channel model, and a comparison to the Effective BFEs. The Effective BFEs were referenced from the FIS Study for the City of Mesquite (Reference 5).

In addition to the floodway mapping, the Left Breakout area is now delineated as Shaded Zone X. The Left Breakout HEC-2 model from the second response is attached. The limit of study has been moved to accommodate this mapping change. The request for this mapping revision was outlined and agreed upon in correspondence dated August 4, 2000, between CCRFCD, MBJ, and FEMA. A copy of this message is attached.

HEC-2 Run			Floodway			Base Flood Water Surface Elevation			
Cross-Section	Flow Rate (cfs)	Hydraulic Base Line Distance (1,000 feet)	Width (ft)	Section Area (sq ft)	Mean Velocity (fps)	Regulatory (ft NGVD)	w/ Floodway (ft NGVD)	w/o Floodway (ft NGVD)	Increase (ft)
PULS2D2.OUT									
200	669	0.0	40	82	8.1	1554.3	1556.7	1555.7	1.0
300	669	0.4	23	68	9.8	1561.4	1561.6	1560.6	1.0
400	669	0.5	19	64	10.5	1564.1	1564.2	1563.2	1.0
500	669	0.6	38	80	8.3	1565.4	1567.1	1567.1	-0.0
600	669	0.7	38	100	6.7	1568.0	1568.7	1568.7	0.0
700	669	0.8	29	74	9.0	1570.1	1574.3	1573.9	0.4
800	676	1.0	30	88	7.6	1574.1	1576.0	1575.4	0.6
900	798	1.1	30	104	7.6	1574.8	1576.6	1576.0	0.6
1000	966	1.2	35	99	9.8	1575.5	1577.5	1577.0	0.5
1100	1232	1.3	40	158	7.8	1576.2	1578.9	1578.1	0.8
1200	1889	1.4	50	240	7.9	1576.9	1579.3	1578.5	0.8
1300	2101	1.6	80	209	10.0	1578.0	1580.4	1579.5	0.9
1400	2101	1.7	40	175	12.0	1579.1	1584.0	1584.2	-0.2
1500	2209	1.8	50	225	9.8	1580.0	1585.4	1585.5	-0.1
1600	2209	2.0	50	265	8.3	1582.4	1586.5	1585.7	0.8
1650	2209	2.2	65	225	9.8	1584.6	1587.7	1587.3	0.4
1700	2209	2.4	65	264	8.4	1586.6	1589.2	1588.2	1.0
1750	2209	2.5	39	179	12.3	1589.0	1589.4	1589.2	0.2
1800	2209	2.7	30	164	13.4	1592.0	1590.6	1590.5	0.1
1900	2138	2.8	12	119	18.0	1593.0	1592.7	1592.7	0.0
2000	2138	3.1	14	120	17.8	1598.8	1599.5	1599.5	0.0
2100	3478	3.1	154	1697	2.0	1599.8	1605.8	1605.8	-0.0
2200	3478	3.5	208	1850	1.9	LIMIT	1605.9	1605.9	-0.1
2300	3478	3.8	224	1482	2.3	LIMIT	1605.8	1605.8	-0.0

FEDERAL EMERGENCY MANAGEMENT AGENCY
UNINCORPORATED CLARK COUNTY/
NEVADA

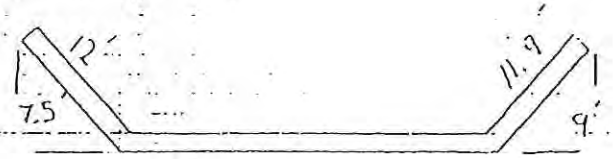
TABLE 2
FLOODWAY DATA - MAIN CHANNEL
PULSIPHER WASH

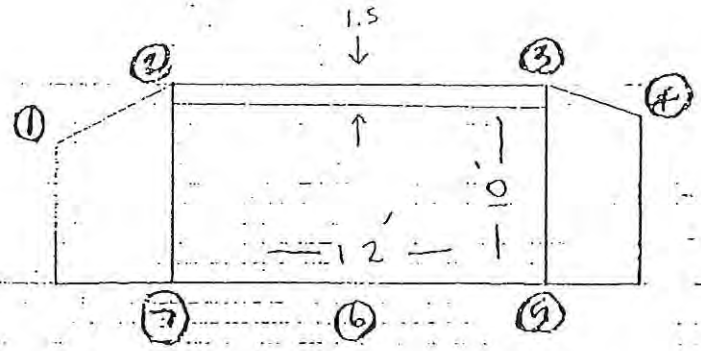
F:\550-0351\calc\table-fw.wb3 11/13/00

PULSIPHER WASH - FIS SUPPLEMENT

MESQUITE FLOOD STUDY
TIES TO REINFORCED CONCRETE
BOX
PULSIPHER WASH AND I-15

NORTH END





04-27-2000 10:47 FROM FENTRESS MESQUITE TO 8311 P.03

1835
1827
1826

MISC. BK. 1 PG. 57
B. BRULAND
W. LINDER
1-12-98

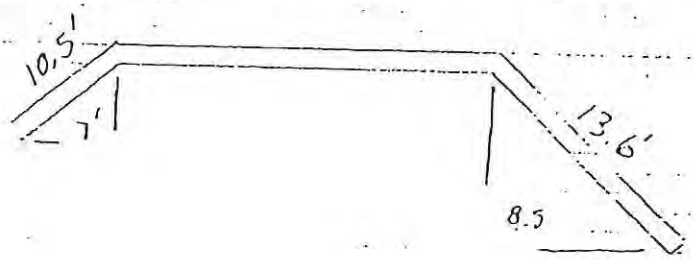
@ 385.7

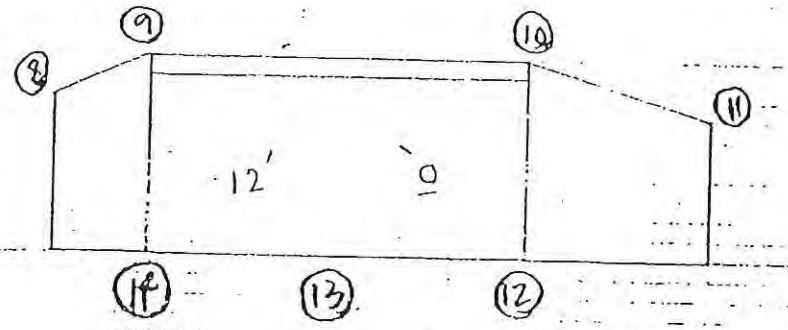
ES ESC

220 (BUS TANK) CP PUMPHOUSE

221 (MB INV) CP BRIDGE

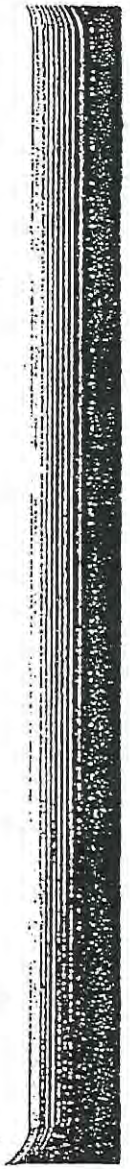
31-35 [illegible]





PULSIPHER ADD I-15
NORTHSIDE

STA	+	HI	−	ELEV	(SEE SKETCH) DESCRIPTION
OF HW				1600.62	TOP HEADWALL (NORTHSIDE FREEWAY)
T	1.13	1601.75			
			4.71	1597.04	①
			1.14	1600.61	②
			1.07	1600.68	③
			4.79	1596.96	④
			12.76	1588.99	⑤
			12.87	1588.88	⑥
			12.93	1588.82	⑦
			5.80	1595.95	50'N + 24'E TOP OF WASH
			11.94	1589.81	50'N + 9'E TOE OF WASH
			11.86	1589.89	50'N + 9'W " " "
			5.92	1595.83	50'N + 25'W TOP OF WASH
				1600.62	
TOP HW					
T	6.96	1607.58			
			3.75	1603.83	33'S + ℄ WASH EDGE PAVEMENT
			5.07	1602.51	33'S + 50'W " "
			6.37	1601.21	33'S + 100'W " "
			2.15	1605.43	33'S + 50'E " "
			0.68	1606.90	33'S + 100'W " "



PULSIPHER AND I-15
SOUTHSIDE

STA	+	HI	−	ELEV	(SEE SKETCH) DESCRIPTION
TOP HW				1593.89	
⊼	6.57	1600.46			
			12.25	1598.21	(8)
			6.59	1593.87	(9)
			6.69	1593.77	(10)
			10.21	1590.25	(11)
			18.34	1582.12	(12)
			18.27	1582.19	(13)
			18.26	1582.20	(14)
			1.40	1599.06	60'S + 30' W TOP WASH
			16.55	1583.91	60'S + 6.5' W TOE WASH
			16.02	1584.44	60'S + 7' E " "
			9.76	1590.70	60'S + 25' E TOP WASH
			1.52	1598.94	33' N + ℄ WASH EDGE PAVEMENT
			0.77	1599.69	33' N + 50' E " "
			0.13	1600.33	33' N + 100' E " "
			2.27	1598.19	33' N + 50' W " "
			2.97	1597.49	33' N + 100' W " "

NOTES

MAP BASED ON 1"=400' TOPOGRAPHIC MAPPING,
BY OLYMPUS AERIAL SURVEYS, INC. FLOWN JULY 14, 1997 AND AUGUST 26, 1997
CONTOUR INTERVAL 1 FOOT
BY NEVADA AERIAL MAPPING, FLOWN JANUARY 14, 1998
CONTOUR INTERVAL 2 FEET

PANEL AFFECTS FIRMS 32003C0379 D & 32003C0387 D
DATED AUGUST 16, 1995.

FILE: WORK_AN3.DWG

FLOODING SOURCE: ABBOTT WASH
MESQUITE, CLARK COUNTY, NEVADA

NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.

PROJECT DATUM = NGVD 1929 - 0.6 FEET
PROJECT DATUM = NAVD 1988 - 2.89 FEET

LEGEND

- REVISED ZONE A
- NEW SHADED ZONE X
- EXISTING 100-YEAR FLOODPLAIN BOUNDARY
- APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARY TIE-IN
- SFHA — SPECIAL FLOOD HAZARD AREA
- (1100) — CROSS SECTION

REV	DATE	DESCRIPTION
NO.	DATE	

RECOMMENDED

G.C. WALLACE, INC.
Engineering/Architecture

ABBOTT AND PULSIPHER WASHES FIS RESTUDY
ABBOTT WASH NORTH OF I-15 REACH
CROSS SECTION EXHIBIT

SHEET
AB1
OF 1 SHEETS

550.035

PLOTTED: 10/9/98
WORK_AN3.DWG

NOTES

MAP BASED ON 1"=400' TOPOGRAPHIC MAPPING.
BY OLYMPUS AERIAL SURVEYS, INC. FLOWN JULY 14, 1997 AND AUGUST 26, 1997
CONTOUR INTERVAL 1 FOOT

PANEL AFFECTS FIRMS 32003C0380 D & 32003C0386 D
DATED AUGUST 16, 1995.

FILE: WORK_PN4.DWG

FLOODING SOURCE: PULSIPHER WASH
MESQUITE, CLARK COUNTY, NEVADA

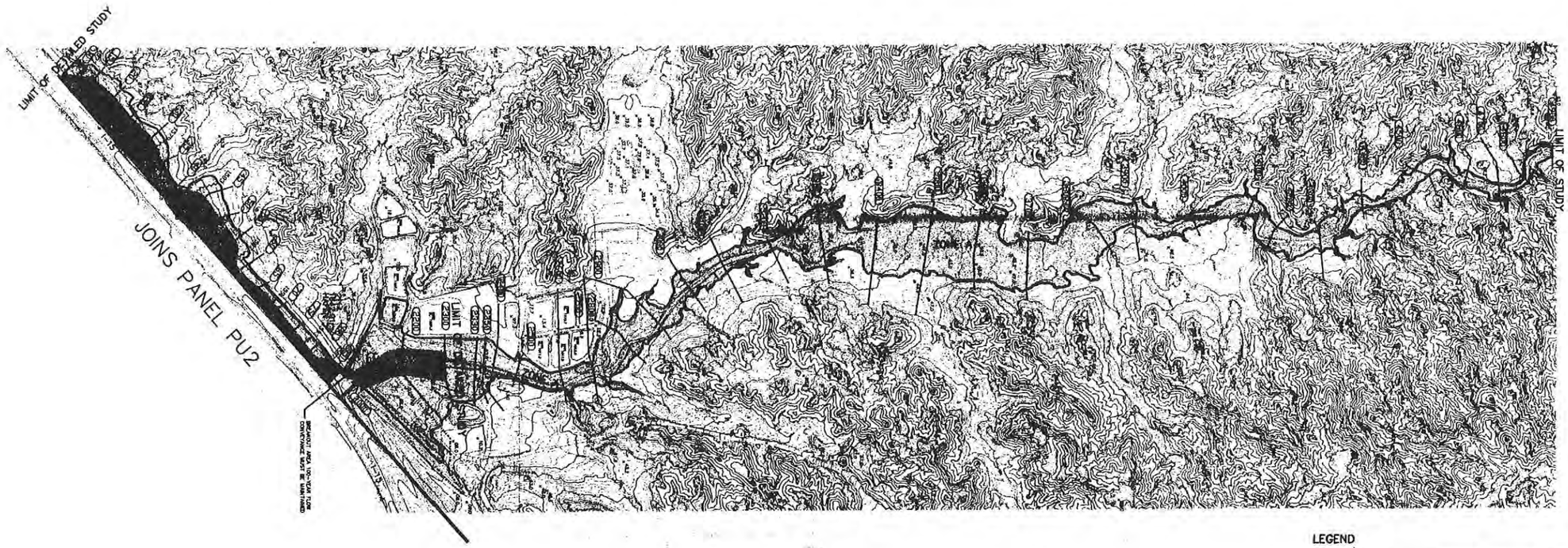
ELEVATION REFERENCE MARKS

REFERENCE MARK	PROJECT DATUM ELEVATION (FEET)	DESCRIPTION OF LOCATION
2114	1642.91	Holes: 4" Clark County aluminum monument located approximately 500 feet west and 75 feet south of I-15 culvert at Pulsipher Wash.

PROJECT DATUM = NGVD 1929 – 0.6 FEET
PROJECT DATUM = NAVD 1988 – 2.00 FEET

GRAPHIC SCALE
(IN FEET)
1 inch = 400 ft.

NORTH



LEGEND

- REVISED ZONE A AND ZONE AE
- NEW SHADED ZONE X
- EXISTING APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARY
- REVISED 100-YEAR FLOODWAY BOUNDARY
- APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARY TIE-IN
- ELEVATION REFERENCE MARK
- SFHA — SPECIAL FLOOD HAZARD AREA
- (100) — CROSS SECTION
- 1597 — BASE FLOOD ELEVATION

DESIGN: MA
DRAWN: MA
CHECK: JEP
ISSUE DATE: 11/13/00
ISSUE EDITOR:
PLOT DATE: 11-14-00
PLOT TIME: 08:19:15
mludwig

REV.	DATE	DESCRIPTION	DATE ACEN. APP.	DATE FCDM APP.

DATE:

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
1555 South Rainbow Blvd., Suite 300, Las Vegas, Nevada 89146
(702) 895-6040 FAX (702) 895-6099
P:\550-0351\dwg\mtop\work_pn4.dwg

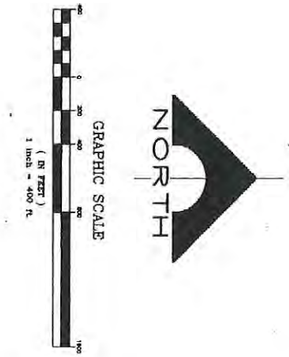
ABBOTT AND PULSIPHER WASHES FIS RESTUDY

PULSIPHER WASH NORTH OF I-15 REACH

CROSS SECTION EXHIBIT

SHEET
PU1
OF 2 SHTS

P:\550-0351\dwg\mtop\work_pn4.dwg 11-14-00 08:19:15 mludwig



NOTES

MAP BASED ON 1"=400' TOPOGRAPHIC MAPPING,
BY NEVADA AERIAL MAPPING, FLOWN JANUARY 14, 1998
CONTOUR INTERVAL 2 FEET

PANEL AFFECTS FIRM 32003C0386 D
DATED AUGUST 16, 1995

FILE: WORK_PS5.DWG

FLOODING SOURCE: PULSIPHER WASH
MESQUITE, CLARK COUNTY, NEVADA

ELEVATION REFERENCE MARKS

REFERENCE MARK	PROJECT DATUM ELEVATION (FEET)	DESCRIPTION OF LOCATION
2114	1642.91	Hafen; 4" Clark County aluminum monument located approximately 500 feet west and 75 feet south of I-15 culvert at Pulsipher Wash.
650	1560.72	T-150, Description of benchmark not available. Located south of Virgin River approximately 1300 feet east and 4200 feet south of Pulsipher Street and Leavitt Lane intersection.

PROJECT DATUM = NGVD 1929 – 0.6 FEET
PROJECT DATUM = NAVD 1988 – 2.89 FEET

LEGEND

- REVISED ZONE A AND ZONE AE
- NEW SHADED ZONE X
- EXISTING APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARY
- REVISED 100-YEAR FLOODWAY BOUNDARY
- APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARY TIE-IN
- ELEVATION REFERENCE MARK
- SFHA — SPECIAL FLOOD HAZARD AREA
- (100) — CROSS SECTION
- 1557 — BASE FLOOD ELEVATION

DESIGN:	M.S.		
DRAWN:	M.S.		
CHECK:	JEP		
ISSUE DATE: 11/13/00			
ISSUE EDITOR:			
PLOT DATE: 11-14-00			
PLOT TIME: 08:35:02		REV.	DATE
		DESCRIPTION	
		DRAWN	APP.
		DATE	DRAWN
		APP.	DATE

G.C. WALLACE, INC.
Engineers/Planners/Surveyors
2030 E. Flamingo Road, Suite 230 • Las Vegas, Nevada 89119
TELEPHONE: (702) 364-2000 • FAX: (702) 364-2020

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ABBOTT AND PULSIPHER WASHES FIS RESTUDY

PULSIPHER WASH SOUTH OF I-15 REACH

CROSS SECTION EXHIBIT

SHEET
PU2
OF 2 SHTS

F:\550-0351\dwg\map\work_ps5.dwg 11-14-00 08:35:02 mlutzweg

ABBOTT WASH AT MESQUITE VISTAS
LETTER OF MAP REVISION

452.017

November 2002

Prepared for:

Mesquite Vistas
P.O. Box 267
Mesquite NV, 89024
Phone: (702) 346-7901
Fax: (702) 346-7911

42.97+2.89 = 45.86 — Used as ~~Starting~~ WSE for Abbott Wash Model

Profile Output Table - Summary

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Max Chl Dpth (ft)	Mann Wtd Total
Mesquite Vistas	7322	3156.00	1646.00	1651.73	1651.23	1653.01	0.004047	9.08	347.53	90.61	0.82	5.73	0.025
Mesquite Vistas	7076	3156.00	1645.50	1651.65	1649.57	1652.11	0.001238	5.47	594.44	176.89	0.46	6.15	0.025
Mesquite Vistas	6925	3156.00	1645.00	1651.46	1649.29	1651.94	0.001064	5.56	638.09	301.18	0.44	6.46	0.025
Mesquite Vistas	6853	3156.00	1644.50	1650.59	1649.45	1651.76	0.002878	8.65	364.88	78.58	0.71	6.09	0.025
Mesquite Vistas	6668	3156.00	1644.00	1648.72	1648.71	1650.76	0.005913	11.46	275.34	66.44	0.99	4.72	0.025
Mesquite Vistas	6420	3156.00	1641.30	1648.71	1648.24	1649.42	0.001639	7.51	674.27	299.98	0.55	7.41	0.028
Mesquite Vistas	6400	3156.00	1641.00	1647.14	1647.14	1649.22	0.005988	11.56	272.91	65.91	1.00	6.14	0.025
Mesquite Vistas	6300	3156.00	1639.90	1645.37	1646.04	1648.29	0.009521	13.71	230.19	61.55	1.25	5.47	0.025
Mesquite Vistas	6100	3156.00	1637.64	1642.97	1643.78	1646.13	0.010604	14.26	221.29	60.60	1.32	5.33	0.025
Mesquite Vistas	5900	3156.00	1635.38	1640.69	1641.52	1643.88	0.010751	14.33	220.18	60.48	1.32	5.31	0.025
Mesquite Vistas	5618	3156.00	1632.39	1636.88	1638.33	1641.41	0.006267	17.09	184.68	56.09	1.66	4.49	0.015
Mesquite Vistas	5518	3156.00	1631.05	1635.29	1636.99	1640.56	0.007758	18.42	171.29	54.58	1.83	4.24	0.015
Mesquite Vistas	5468	3156.00	1630.48	1634.45	1636.09	1640.03	0.010600	18.95	166.50	41.97	1.68	3.97	0.015
Mesquite Vistas	5447	Bridge											
Mesquite Vistas	5425	3156.00	1630.03	1633.99	1635.64	1639.59	0.010650	18.98	166.26	41.97	1.68	3.96	0.015
Mesquite Vistas	5375	3156.00	1629.46	1633.60	1635.40	1639.24	0.008557	19.07	165.49	53.92	1.92	4.14	0.015
Mesquite Vistas	5365	3156.00	1629.32	1633.47	1635.26	1639.08	0.008487	19.01	165.98	53.97	1.91	4.15	0.015
Mesquite Vistas	5359	3156.00	1629.29	1633.42	1635.23	1639.11	0.008652	19.14	164.85	53.84	1.93	4.13	0.015
Mesquite Vistas	5328.5	3156.00	1629.13	1633.86	1635.39	1638.73	0.005936	17.71	178.25	48.42	1.63	4.73	0.015
Mesquite Vistas	5311.5	3156.00	1629.04	1633.79	1635.19	1638.67	0.005664	17.72	178.10	45.40	1.58	4.75	0.015
Mesquite Vistas	5304	Bridge											
Mesquite Vistas	5296.5	3156.00	1628.96	1633.70	1635.12	1638.59	0.005687	17.74	177.87	45.40	1.58	4.74	0.015
Mesquite Vistas	5279.5	3156.00	1628.87	1633.64	1635.13	1638.40	0.005738	17.50	180.35	48.60	1.60	4.77	0.015
Mesquite Vistas	5229.5	3156.00	1628.60	1632.90	1634.54	1637.98	0.007367	18.09	174.44	54.94	1.79	4.30	0.015
Mesquite Vistas	5100	3156.00	1627.91	1633.47	1634.05	1636.26	0.008957	13.41	235.39	62.10	1.21	5.56	0.025
Mesquite Vistas	4900	3156.00	1626.84	1633.18	1632.97	1635.07	0.005278	11.04	285.89	67.18	0.94	6.34	0.025
Mesquite Vistas	4700	3156.00	1625.77	1632.11	1631.91	1634.00	0.005288	11.05	285.69	67.16	0.94	6.34	0.025
Mesquite Vistas	4500	3156.00	1624.71	1631.19	1630.84	1632.96	0.004815	10.67	295.75	68.13	0.90	6.48	0.025
Mesquite Vistas	4300	3156.00	1623.64	1629.78	1629.78	1631.86	0.005988	11.56	272.91	65.91	1.00	6.14	0.025
Mesquite Vistas	4133	3156.00	1622.63	1629.71	1628.57	1630.96	0.001041	8.99	350.98	72.25	0.72	7.08	0.015
Mesquite Vistas	4083	3156.00	1622.33	1627.94	1627.94	1630.73	0.004025	13.41	235.42	41.98	1.00	5.61	0.015
Mesquite Vistas	4050	Bridge											
Mesquite Vistas	4017	3156.00	1621.95	1627.56	1627.56	1630.35	0.004025	13.41	235.42	41.98	1.00	5.61	0.015
Mesquite Vistas	3967	3156.00	1621.65	1626.65	1627.59	1630.01	0.004108	14.71	214.48	59.31	1.36	5.00	0.015
Mesquite Vistas	3900	3156.00	1621.23	1626.97	1627.36	1629.51	0.007880	12.79	246.71	63.27	1.14	5.74	0.025
Mesquite Vistas	3700	3156.00	1619.33	1624.77	1625.46	1627.75	0.009793	13.85	227.83	61.30	1.27	5.44	0.025
Mesquite Vistas	3500	3156.00	1617.43	1624.36	1623.57	1625.81	0.003668	9.65	327.02	71.06	0.79	6.93	0.025
Mesquite Vistas	3350	3156.00	1616.00	1624.36	1622.19	1625.22	0.001763	7.44	424.28	77.59	0.56	8.36	0.025
Mesquite Vistas	3300	3156.00	1615.22	1624.41	1621.48	1625.09	0.001247	6.63	476.26	79.31	0.48	9.19	0.025
Mesquite Vistas	3100	3156.00	1613.05	1624.50	1619.22	1624.81	0.000448	4.47	706.60	97.13	0.29	11.45	0.026
Mesquite Vistas	3050	3156.00	1612.52	1624.51	1618.53	1624.78	0.000116	4.24	745.22	91.16	0.26	11.99	0.015
Mesquite Vistas	3000	3156.00	1611.95	1624.22	1617.56	1624.75	0.000480	5.85	539.95	62.00	0.35	12.27	0.015
Mesquite Vistas	2935	Bridge											
Mesquite Vistas	2870	3156.00	1610.83	1623.99	1616.43	1624.40	0.000374	5.14	614.12	79.34	0.33	13.16	0.015
Mesquite Vistas	2823	3156.00	1610.00	1624.15	1615.80	1624.30	0.000311	3.18	992.05	110.96	0.19	14.15	0.034
Mesquite Vistas	2600	3156.00	1608.00	1624.13	1614.29	1624.25	0.000109	2.77	1141.05	114.78	0.15	16.13	0.025
Mesquite Vistas	2488	3156.00	1606.00	1624.20	1615.42	1624.21	0.000011	0.94	6521.44	992.93	0.05	18.20	0.036

used as Tie-In

Profile Output Table - Bridge Only

Reach	River Sta	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min Top Rd (ft)	Q Weir (cfs)	Delta EG (ft)
Mesquite Vistas	5447	1640.03	1637.48	293.37	1634.45	3156.00	1640.20		0.44
Mesquite Vistas	5304	1638.67	1636.30	292.11	1633.79	3156.00	1639.30		0.07
Mesquite Vistas	4050	1630.73	1630.33	335.76		3156.00	1632.28		0.38
Mesquite Vistas	2935	1624.75	1621.95	420.30		3156.00	1628.47		0.35

AMENDMENT NO. 1 TO THE FINAL REPORT FOR REQUEST FOR LETTER OF MAP REVISION PULSIPHER WASH ADJACENT TO FALCON RIDGE PARKWAY

CASE NO.: 06-09-B051P

LOCATED IN: MESQUITE, CLARK COUNTY, NEVADA

Submitted to:

FEMA Map Coordination Contractor
3601 Eisenhower Avenue, Suite 600
Alexandria, VA 22304-6425

Submitted by:

Bulloch Brothers Engineering, Inc.
750 West Pioneer Boulevard
Mesquite, Nevada 89027

February 2006

Table 3. Comparison of Duplicate Effective and Post Projects Models

Station	Duplicate Effective HEC-RAS Model BFEs (ft)[2]	Post Projects HEC-RAS Model BFEs (ft)[2]	Difference (ft)
3900	1658.80	1658.78	-0.02
3800	1656.25	1655.66*	-0.59
3700	1650.06	1650.90	0.84
3500	1642.10	1641.86*	-0.24
3400	1639.17	1638.96*	-0.21
3300	1631.36	1638.19	6.83
3200	1627.54	1627.27	-0.27
3100	1624.66	1621.47	-3.19
3000	1620.68	1622.61	1.93
2900	1618.65	1618.87*	0.22
2800	1615.32	1616.65*	1.33
2700	1612.56	1612.77*	0.21
2500	1606.35	1605.42	-0.93
2400	1604.97	1604.77	-0.20
2330	1605.33	1605.15	-0.18
2300	1605.34	1605.37	0.03
2200	1605.37	1605.41	0.04
2100	1605.30	**1605.32**	**0.02**
2000	1598.84 [3]	1598.84 [3]	0.00
1900	1592.10	1592.09	-0.01

[1] The proposed Flood Zone 'A' ties into the existing Flood Zone 'A' at Stations 3900 and 2100. Stations 2200 through 3800 were revised to reflect post-projects conditions.
[2] Elevations shown are based on NGVD 29 benchmark.
[3] The critical water surface elevation at the upstream end of I-15 culvert is used for section 2000.
* Critical depth used where supercritical flows occur in natural channel.

The downstream end of the post-projects model ties into the effective FIS model at Station 2100, with a BFE equal to 1605.32 (0.10' higher than the effective FIS HEC-2 model; 0.02' higher than the duplicate effective HEC-RAS model).

Table 4. Post Projects Model Results in NGVD29 and NAVD88.

Station	Post Projects HEC-RAS Model BFEs (ft) (NGVD29)	Post Projects HEC-RAS Model BFEs (ft) (NAVD88)	Difference (ft)
3900	1658.78	1661.62	2.84
3800	1655.66*	1658.50	2.84
3750	1652.75	1655.59	2.84
3700	1650.90	1653.74	2.84
3620	1647.35*	1650.19	2.84
3580	1646.24*	1649.08	2.84
3500	1641.86*	1644.70	2.84
3480	1641.11	1643.95	2.84
3400	1638.96*	1641.80	2.84
3375	1638.46	1641.30	2.84
3350	1638.45	1641.29	2.84
3325	1638.45	1641.29	2.84
3300	1638.19	1641.03	2.84
3280	1637.68	1640.52	2.84
3270	1634.72	1637.56	2.84
3260	1633.09	1635.93	2.84
3240	1630.85	1633.69	2.84
3220	1629.00	1631.84	2.84
3200	1627.27	1630.11	2.84
3175	1625.63	1628.47	2.84
3150	1624.01	1626.85	2.84
3125	1622.42	1625.26	2.84
3100	1621.47	1624.31	2.84
3080	1621.20	1624.04	2.84
3070	1623.90*	1626.74	2.84
3025	1622.99*	1625.83	2.84
3000	1622.61	1625.45	2.84
2970	1621.58	1624.42	2.84
2935	1620.22*	1623.06	2.84
2900	1618.87*	1621.71	2.84
2870	1618.37*	1621.21	2.84
2835	1617.27*	1620.11	2.84
2800	1616.65*	1619.49	2.84
2770	1615.08*	1617.92	2.84
2735	1614.59*	1617.43	2.84
2700	1612.77*	1615.61	2.84

2670	1613.14	1615.98	2.84
2660	1612.96	1615.80	2.84
2650	1612.70	1615.54	2.84
2590	1608.50	1611.34	2.84
2570	1607.94*	1610.78	2.84
2550	1606.60*	1609.44	2.84
2500	1605.42	1608.26	2.84
2400	1604.77	1607.61	2.84
2330	1605.15	1607.99	2.84
2300	1605.37	1608.21	2.84
2200	**1605.40**	**1608.24**	2.84
2120	**1605.37**	**1608.21**	2.84
2100	**1605.32**	**1608.16**	2.84
2000	1598.84 [2]	1601.68 [2]	2.84
1900	1592.09	1594.93	2.84

[1] The conversion factor to raise NGVD29 to North American Vertical Datum of 1988 (NAVD88) is +2.84 feet.
[2] The critical water surface elevation at the upstream end of I-15 culvert is used for section 2000.
* Critical depth used where supercritical flows occur in natural channel.

Table 5. Floodway Model Results in NGVD29 and NAVD88.

Station	Floodway HEC-RAS Model WSELs (ft) (NGVD29)	Floodway HEC-RAS Model WSELs (ft) (NAVD88)	Difference (ft)
2300	1606.32	1609.16	2.84
2200	1606.32	1609.16	2.84
2120	1606.33	1609.17	2.84
2100	1606.27	1609.11	2.84
2000	1598.84 [2]	1601.68 [2]	2.84
1900	1592.05	1594.89	2.84

[1] The conversion factor to raise NGVD29 to North American Vertical Datum of 1988 (NAVD88) is +2.84 feet.
[2] The critical water surface elevation at the upstream end of I-15 culvert is used for section 2000.

ACRN=GR1365 ********** BENCH MARK DESCRIPTION **********
DESIGNATION--Z 405
QUAD--0361141E2 USN--
MONUMENT BY--NGS
RECOVERY BY--
STAMPING--Z 405 1982

STATE--NV COUNTY--CLARK
LATITUDE=364815N LONGITUDE=1140410W
YR--1982 MARK TYPE--FLANGE-ENCASED ROD
DATE-- CONDITION--

***** MARK MADE BY/FOR--NGS
***** SPECIFIC SETTING--STAINLESS STEEL ROD
IN MESQUITE, IN THE EAST PLANTER BOX AT THE EAST ENTRANCE TO THE CHURCH OF LATTER DAY SAINTS, 17.2 METERS (56.5 FT) NORTH OF THE BOULEVARD CENTERLINE, 20.2 METERS (66.5 FT) SOUTHEAST OF THE SOUTHEAST CORNER OF THE EAST WING OF THE CHURCH, 7.6 METERS (21.5 FT) NORTHWEST OF THE NORTHWEST CORNER OF A CONCRETE BRIDGE OVER A DRY WASH, 2.7 METERS (9 FT) NORTH OF A POWER LINE T JUNCTION POLE, 0.6 METER (2 FT) EAST OF THE EAST CURB OF A DRIVEWAY.

LAT-N364815. LON-W1140410. SOURCE/ORDER/DATUM-G 4 27 ADJID-
ELEVATION- 487.2197 SOURCE/ORDER/DATUM-A 88 ADJID-0000002 1598.49
ELEVATION- 486.3414 SOURCE/ORDER/DATUM-F 29 ADJID-L24739 1595.61

USE THIS ELEV. (BBE BM ELEV.= 1595.65) 29 Matches
BBE INFO 486.36597(M) 1595.69
1595.61 - 88
-2.64 DIFF
NAVD 88
NGVD 29

ACRN=GR1368 ********** BENCH MARK DESCRIPTION **********
DESIGNATION--C 406
QUAD--0361141I2 USN--
MONUMENT BY--NGS
RECOVERY BY--
STAMPING--C 406 1982

STATE--NV COUNTY--CLARK
LATITUDE=364648N LONGITUDE=1140624W
YR--1982 MARK TYPE--FLANGE-ENCASED ROD
DATE-- CONDITION--

***** MARK MADE BY/FOR--NGS
***** SPECIFIC SETTING--STAINLESS STEEL ROD
2.1 KM (1.3 MI) NORTHEAST ALONG STATE HIGHWAY 170 FROM THE JUNCTION OF MAIN STREET IN BUNKERVILLE, 1.6 KM (1.0 MI) SOUTHWEST OF THE SOUTH END OF THE BRIDGE OVER THE VIRGIN RIVER, 0.9 METER (3 FT) SOUTHWEST OF THE NORTHWEST POLE FOR A POWER LINE SPUR CROSSING THE HIGHWAY, 19.2 METERS (63 FT) NORTHWEST OF THE HIGHWAY CENTERLINE, 92.9 METERS (305 FT) SOUTHWEST OF MILEPOST 10, 51.8 METERS (170 FT) NORTHEAST OF THE NORTHWEST END OF A 36 INCH CORRUGATED METAL PIPE CULVERT.

LAT-N364648. LON-W1140624. SOURCE/ORDER/DATUM-G 4 27 ADJID-
ELEVATION- 477.7853 SOURCE/ORDER/DATUM-A 88 ADJID-0000002 1567.53
ELEVATION- 476.9084 SOURCE/ORDER/DATUM-F 29 ADJID-L24739 1564.66

GR0140 Superseded values are not recommended for survey control.
GR0140 NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
GR0140 See file dsdata.txt to determine how the superseded data were derived.
GR0140
GR0140 MARKER: DD = SURVEY DISK
GR0140 SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
GR0140 STAMPING: SEE TEXT
GR0140 STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
GR0140+STABILITY: SURFACE MOTION
GR0140

GR0140 HISTORY	- Date	Condition	Report By
GR0140 HISTORY	- 1957	MONUMENTED	NVDH
GR0140 HISTORY	- 1957	GOOD	NGS
GR0140 HISTORY	- 1979	MARK NOT FOUND	USGS

GR0140
GR0140 STATION DESCRIPTION
GR0140
GR0140'DESCRIBED BY NATIONAL GEODETIC SURVEY 1957
GR0140'7.8 MI W FROM MESQUITE.
GR0140'7.8 MILES WEST ALONG U.S. HIGHWAY 91 FROM THE POST OFFICE IN MESQUITE,
GR0140'150 FEET EAST OF A T ROAD SOUTH, 50 FEET SOUTH OF THE CENTER LINE OF
GR0140'THE HIGHWAY 2.8 FEET NORTH OF A ROUND BLACK AND WHITE IRON REFERENCE
GR0140'POST, SET IN A CONCRETE POST FLUSH WITH THE GROUND. STAMPED DIST 50 FT
GR0140'STA F 233 + 74.48 POT ANGLE 90 O Z 136 1957 ELEV 1588.60.
GR0140
GR0140 STATION RECOVERY (1979)
GR0140
GR0140'RECOVERY NOTE BY US GEOLOGICAL SURVEY 1979
GR0140'MARK NOT FOUND.

1 National Geodetic Survey, Retrieval Date = JULY 10, 2002

GR1365 **********
GR1365 DESIGNATION - Z 405
GR1365 PID - GR1365
GR1365 STATE/COUNTY- NV/CLARK
GR1365 USGS QUAD - MESQUITE (1985)
GR1365
GR1365 *CURRENT SURVEY CONTROL
GR1365

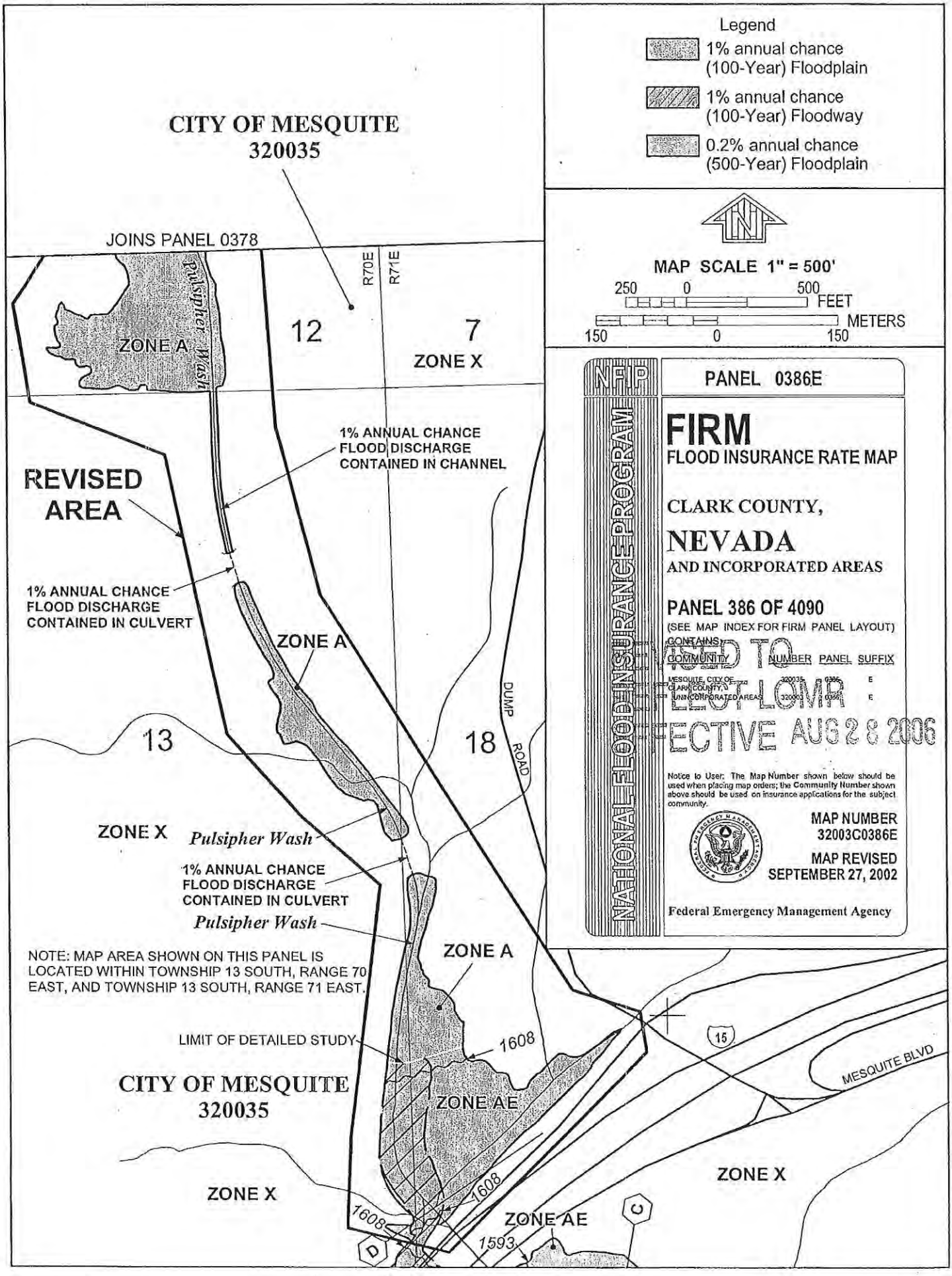
GR1365* NAD 83(1986)-	36 48 14.	(N)	114 04 12.	(W)	SCALED
GR1365* NAVD 88	487.220	(meters)	1598.49	(feet)	ADJUSTED
GR1365					
GR1365 GEOID HEIGHT-	-26.43	(meters)			GEOID99
GR1365 DYNAMIC HT -	486.735	(meters)	1596.90	(feet)	COMP
GR1365 MODELED GRAV-	979,624.4	(mgal)			NAVD 88
GR1365 OBS GRAVITY -	979,624.2	(mgal)			GRAV_OBS

GR1365
GR1365 VERT ORDER - FIRST CLASS II
GR1365
GR1365.The horizontal coordinates were scaled from a topographic map and have
GR1365.an estimated accuracy of +/- 6 seconds.
GR1365
GR1365.The orthometric height was determined by differential leveling
GR1365.and adjusted by the National Geodetic Survey in June 1991.
GR1365
GR1365.The geoid height was determined by GEOID99.
GR1365
GR1365.The dynamic height is computed by dividing the NAVD 88
GR1365.geopotential number by the normal gravity value computed on the
GR1365.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
GR1365.degrees latitude (g = 980.6199 gals.).

```
GR1365
GR1365.The modeled gravity was interpolated from observed gravity values.
GR1365.The observed gravity was obtained from relative gravimeter ties
GR1365.to the IGSN71 gravity network.
GR1365
GR1365;                    North         East     Units  Estimated Accuracy
GR1365;SPC NV E     - 8,228,940.      335,040.       MT  (+/- 180 meters Scaled)
GR1365
GR1365                          SUPERSEDED SURVEY CONTROL
GR1365
GR1365.No superseded survey control is available for this station.
GR1365
GR1365_MARKER: I = METAL ROD
GR1365_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
GR1365_STAMPING: Z 405 1982
GR1365_MARK LOGO: NGS
GR1365_PROJECTION: FLUSH
GR1365_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
GR1365_ROD/PIPE-DEPTH: 12.2 meters
GR1365
GR1365  HISTORY     - Date      Condition       Report By
GR1365  HISTORY     - 1982      MONUMENTED      NGS
GR1365  HISTORY     - 19941017  MARK NOT FOUND  USPSQD
GR1365  HISTORY     - 19951007  GOOD            USPSQD
GR1365
GR1365                          STATION DESCRIPTION
GR1365
GR1365'DESCRIBED BY NATIONAL GEODETIC SURVEY 1982
GR1365'IN MESQUITE.
GR1365'IN MESQUITE, IN THE EAST PLANTER BOX AT THE EAST ENTRANCE TO THE
GR1365'CHURCH OF LATTER DAY SAINTS, 17.2 METERS (56.5 FT) NORTH OF THE
GR1365'BOULEVARD CENTERLINE, 20.2 METERS (66.5 FT) SOUTHEAST OF THE SOUTHEAST
GR1365'CORNER OF THE EAST WING OF THE CHURCH, 9.6 METERS (31.5 FT) NORTHWEST
GR1365'OF THE NORTHWEST CORNER OF A CONCRETE BRIDGE OVER A DRY WASH, 2.7
GR1365'METERS (9 FT) NORTH OF A POWER LINE T JUNCTION POLE, 0.6 METER (2 FT)
GR1365'EAST OF THE EAST CURB OF A DRIVEWAY.
GR1365'THE MARK IS 0.05 M BELOW THE DRIVEWAY CURB.
GR1365
GR1365                          STATION RECOVERY (1994)
GR1365
GR1365'RECOVERY NOTE BY US POWER SQUADRON 1994
GR1365'MARK NOT FOUND.
GR1365
GR1365                          STATION RECOVERY (1995)
GR1365
GR1365'RECOVERY NOTE BY US POWER SQUADRON 1995
GR1365'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:03:19
```

- This listing contains control for which complete digital
- data sheets where not provided. The complete data sheets were
- not provided for the reason listed below. The reason below is
- associated with a horizontal control Nonpub code shown under
- the heading 'H' and/or a vertical control Nonpub code shown under
- the heading 'v'


Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
CITY OF MESQUITE
320035
JOINS PANEL 0378
R70E
R71E
12
7
ZONE A
Pulsipher Wash
ZONE X
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
REVISED AREA
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
ZONE A
DUMP ROAD
13
18
ZONE X
Pulsipher Wash
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
Pulsipher Wash
ZONE A
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 70 EAST, AND TOWNSHIP 13 SOUTH, RANGE 71 EAST.
LIMIT OF DETAILED STUDY
1608
CITY OF MESQUITE
320035
ZONE AE
15
MESQUITE BLVD
ZONE X
ZONE X
1608
1608
ZONE AE
1593
C
D
MAP SCALE 1" = 500'
250 0 500 FEET
150 0 150 METERS
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0386E
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS
PANEL 386 OF 4090
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
MESQUITE, CITY OF 320035 0386 E
CLARK COUNTY, UNINCORPORATED AREAS 320003 0386 E
REVISED TO REFLECT LOMR EFFECTIVE AUG 28 2006
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
32003C0386E
MAP REVISED
SEPTEMBER 27, 2002
Federal Emergency Management Agency

REVISIONS			
NO	DESCRIPTION	DATE	BY APPROVED

BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS—LAND SURVEYORS—LAND PLANNERS
www.bullochbrothers.com
1050 WEST BLUFF ST., SUITE 200, PLEASANT GROVE, UTAH 84062, (801) 785-8487
750 WEST PIONEER BLVD., MESQUITE, NEVADA 89027, (702) 346-5100
P.O. BOX 5174, CEDAR CITY, UTAH 84720, (435) 586-8692

ANNOTATED FLOOD ZONE MAP
FIGURE 2
FROM
FIRM MAP NOS.
32003C0386E & 32003C0378E
MESQUITE, NEVADA

PROJECT NO: 1405-02-02	SCALE: 1" = 300'		
DATE: JAN. 2006	DRAWN BY: EW.		
SHEET NO: 1 OF 1	CHECKED BY: LE.		

The information depicted on this map is for the purpose of determining flood insurance rates only and should not be used or relied upon for any other purpose. The Federal Emergency Management Agency assumes no responsibility for any consequences arising from any other use of the information. The map was produced from information available at the time of publication. Subsequent updates to roads, base hydrography, and other features may not be reflected on this map. To obtain more detailed information in areas where Base Flood Elevations and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study report for this jurisdiction. Users should be aware that BFEs shown on the map are rounded to the nearest whole foot on the primary flood source. Some BFEs may have been determined based on detailed analyses. For these areas, elevations may be more accurate than they appear on the map. Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located. Contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov. If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

H:\1405-02-02 (Tri-Am Pkwy - Sunday Trust)\EXHIBITS\EXH Figures\Annotated from Map-Index\EXH-02-06-06.dwg, 1/31/2006 10:58:12 AM, Lasso

2007
CITY OF MESQUITE
FLOOD CONTROL MASTER PLAN UPDATE

Prepared For:

Clark County Regional Flood Control District
600 South Grand Central Parkway, Suite 300
Las Vegas, Nevada 89106-4511

Prepared By:

PBS&J
2270 Corporate Circle, Suite 100
Henderson, Nevada 89074-6382

July 2007

Mesquite

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

PBS&J

4.3.6. Depth-Area-Reduction Factors

The precipitation depths obtained from NOAA Atlas 2 represent rainfall frequency at isolated points. Storms, however, cause rainfall to occur over widespread areas simultaneously, with the most intense rainfall typically occurring near the center of the storm. To account for the rainfall variation, standard precipitation analysis methods require adjusting point precipitation depths downward in order to better represent the average depth of rainfall over the entire storm area. This is done using depth-area reduction curves that relate point precipitation reduction factors to storm area and duration. The reduction factors cause the rainfall depth to decrease as the tributary area increases.

Depth-area-reduction factors (DARF) were applied to the rainfall depths in the HEC-1 models at each concentration point based on upstream tributary area. Due to the number of concentration points created for the 2007 MPU, an average DARF value was used for a range of tributary areas. Average DARF values were established using Table 502 in the CCRFCD Design Manual as a guide. **Table 4-2** summarizes the DARF values generally used in the HEC-1 models.

Table 4-2 Tributary Area and Corresponding DARF Value

Area (mi^2)	Average DARF
0≤Area<0.5	0.990
0.5≤Area<1	0.975
1≤Area<1.5	0.960
1.5≤Area<2	0.940
2≤Area<4	0.920
4≤Area<6	0.905
6≤Area<8	0.890
8≤Area<10	0.870
10≤Area<22	0.820

4.3.7. Storm Centerings

Storm centering situates the design storm over the watershed in such a way that it maximizes the peak discharge at a given point within the watershed. For smaller watersheds, storm centering is typically disregarded because a single storm centering above the most downstream concentration point will give adequate peak discharge results at all points of interest. However, for larger watersheds or when important flood control facilities need to be sized, storm centering is relevant because it produces the greatest peak at the design point. The storm centerings used for the 2007 MPU have been classified into three general categories: Series A, B, and C. The three storm centering series are defined as follows:

Series A
Storm centering for the entire watershed (above the most downstream concentration point) with SDN 3, 4, and 5 HEC-1 models. Series A storm centerings will control many areas of the watershed, especially in the upper portions of the watershed upstream of detention basins.

Series B
Storm centering for the entire watershed with SDN 3, SDN 4, and SDN 5 HEC-1 models, which is the same as Series A, except that the discharge from all detention basins is diverted out of the HEC-1 models. This series of storm centerings will control many areas of the watershed, especially those portions downstream of detention basins. Note that the tributary area displayed in the HEC-1 models for many of the concentration points downstream of detention basins may not be the actual tributary area representing the peak flow at a given location; this is due to the fact that even after detention basin discharge has been diverted out of the model, the tributary area to the detention basin is still carried with the downstream flow.

Series C
These storm centerings are used only to model special cases where the peak flow for a given location may not be produced by the Series A or B centerings.

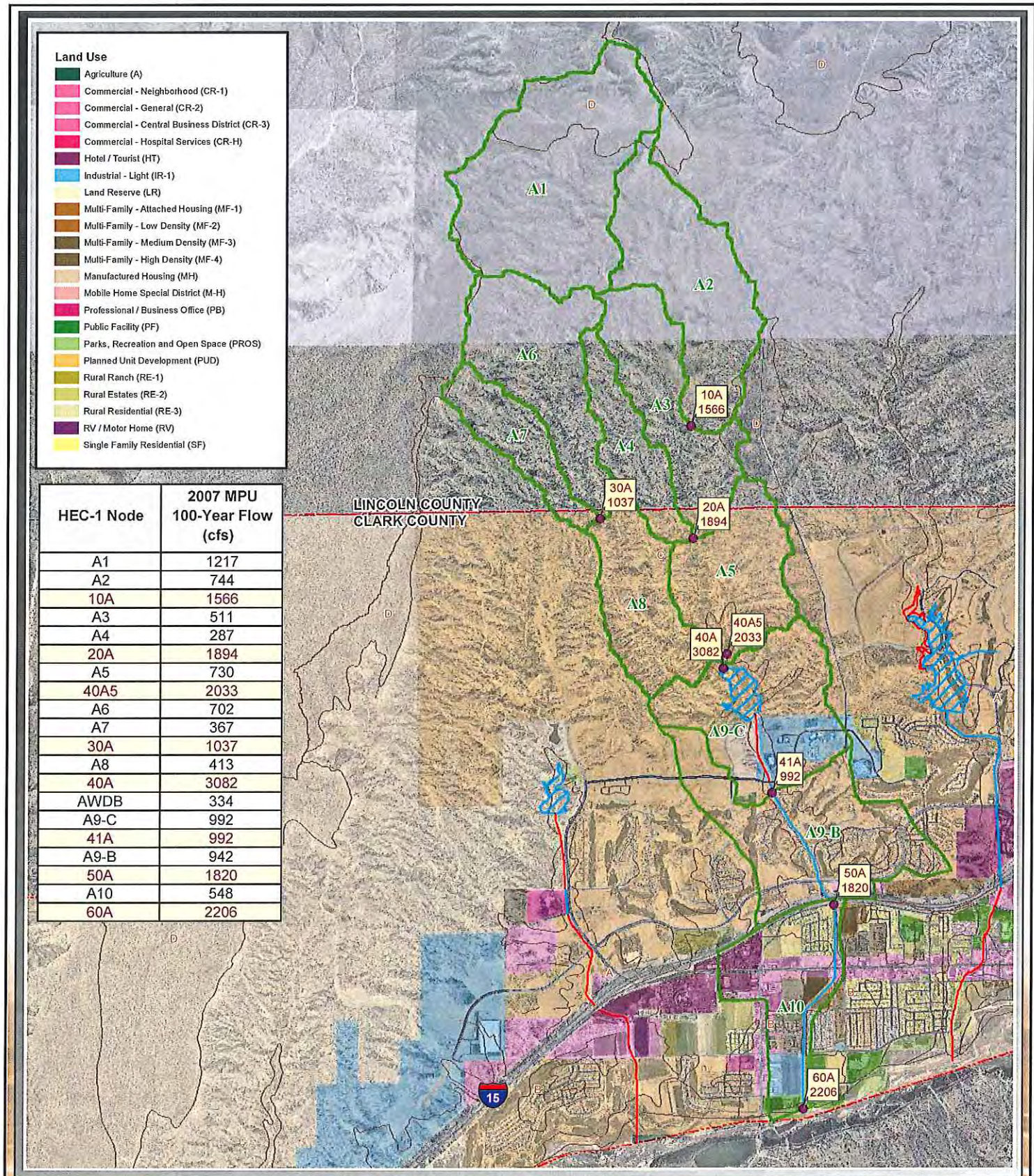
The maximum storm centering size used for the MPU is approximately 200 square miles. In the 2007 MPU, the maximum storm centering size is only applicable to the Toquop Wash watershed because it has tributary area greater than 200 square miles. The storm centering methodology used for the Toquop Wash is described in Section 11.

4.3.8. Land Use

The 2007 MPU was developed using the "ultimate developed condition" as a basis for the analysis. This condition assumes that the full build-out condition has been reached and all available land within the City of Mesquite city limits has been fully developed. This condition is assumed so that facilities built today will have capacity into the future.

Land use data in the 2007 MPU were based on zoning information obtained from the City of Mesquite in GIS shapefile format. The zoning information was converted to established 2007 MPU land use categories, using the land use data from Tables 601 and 602 in the CCRFCD Design Manual as a guide.

The City of Mesquite "Single Family Residential" zoning category was broken down into seven sub-categories (SF1 – SF7) based on the average lot size. The average lot size was determined using a combination of GIS, parcel maps, and aerial photos. It is important to note that 90% of the single family residential units have an average lot size of 10,000 square feet or less.



HEC-1 Node	2007 MPU 100-Year Flow (cfs)
A1	1217
A2	744
10A	1566
A3	511
A4	287
20A	1894
A5	730
40A5	2033
A6	702
A7	367
30A	1037
A8	413
40A	3082
AWDB	334
A9-C	992
41A	992
A9-B	942
50A	1820
A10	548
60A	2206

N

1 inch equals 4,000 feet

0 1,000 2,000 4,000 Feet

CITY OF MESQUITE
FLOOD CONTROL
MASTER PLAN UPDATE

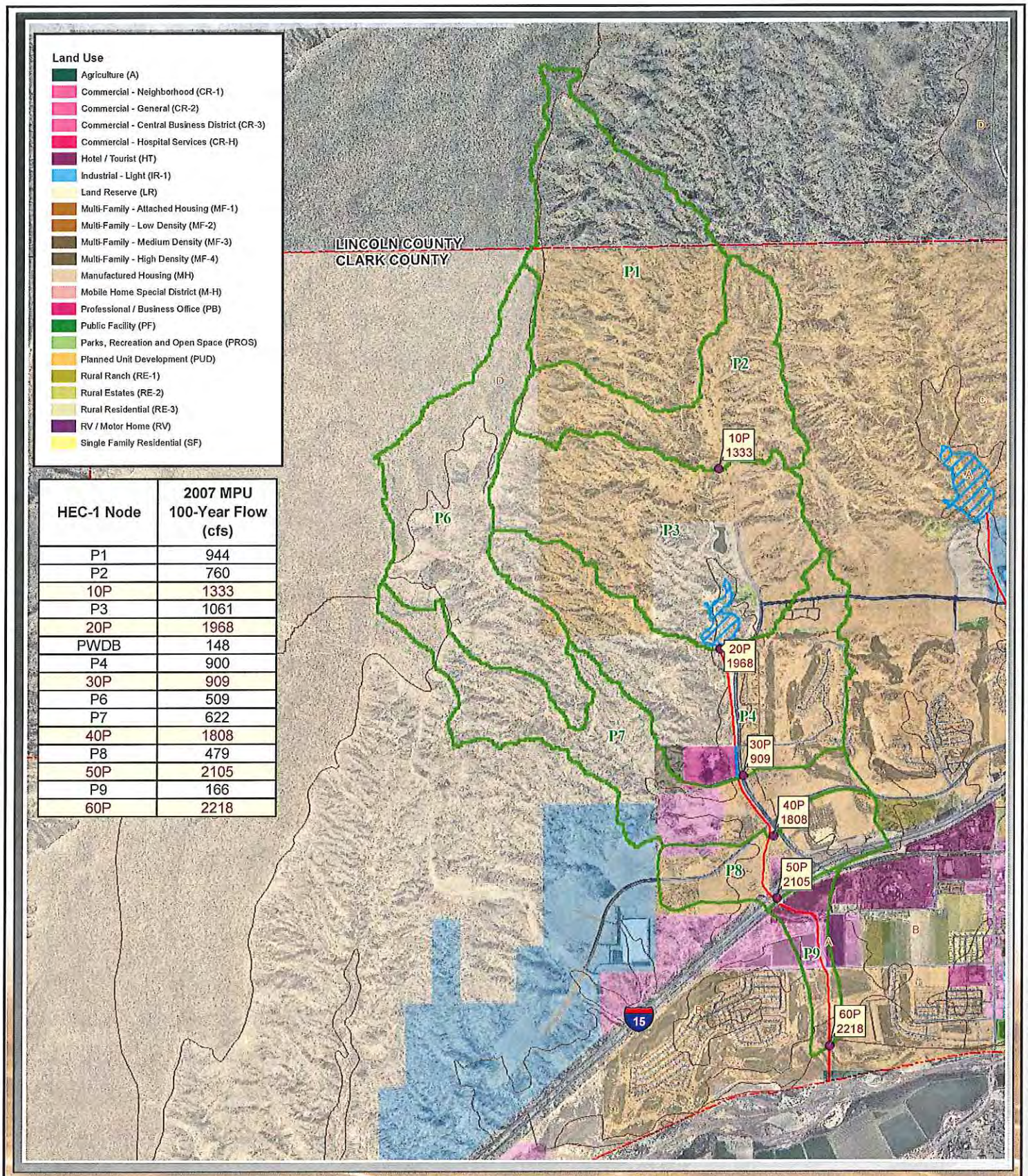
FIGURE 6-1

ABBOTT WASH WATERSHED HYDROLOGIC SUMMARY

Subbasin Boundary
A Hydrologic Soil Groups
City of Mesquite
Existing Facilities
Proposed Facilities
HEC-1 Combination Point
60A 2206 Combination Point Label 100-Year Flow (cfs)

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

PBS&J Mesquite



HEC-1 Node	2007 MPU 100-Year Flow (cfs)
P1	944
P2	760
10P	1333
P3	1061
20P	1968
PWDB	148
P4	900
30P	909
P6	509
P7	622
40P	1808
P8	479
50P	2105
P9	166
60P	2218

N

1 inch equals 3,000 feet

0 750 1,500 3,000
Feet

CITY OF MESQUITE
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE 7-1

PULSIPHER WASH WATERSHED HYDROLOGIC SUMMARY

Subbasin Boundary
A Hydrologic Soil Groups
City of Mesquite
Existing Facilities
Proposed Facilities
HEC-1 Combination Point
60P 2218 Combination Point Label 100-Year Flow (cfs)

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

PBS&J Mesquite

1/9/07 W:\P:\Projects\PubWks\MPUMesquite\mxd\Mesquite\BR_8x11_Hydro_Pulsipher.mxd

Appendix C

Hydrologic Parameters

Table C-1

Stanard Form 4

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

PBS&J
File: SF4.xls

MESQUITE MPU
ABBOT WASH - ULTIMATE CONDITION

BY: MLD
DATE: 12/7/06

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./UN. (D or U)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (Lc) (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (L) (7)	SLOPE % (S) (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	(Kn)
A1	U	86.0	0.7452	734.54	1.15	3701	N/A	N/A	9214	0.064	N/A	N/A	N/A	N/A	N/A	**0.33**	**0.04**
A2	U	85.1	0.7333	500.77	0.78	300	16.7	4.5	14030	4.4	3.10	6.2	39.2	43.7	N/A	**0.44**	
A3	U	84.9	0.7307	353.52	0.55	300	6.7	6.1	12620	3.7	2.85	5.7	38.6	44.8	N/A	**0.45**	
A4	U	85.2	0.7346	199.13	0.31	291	34.4	3.4	12689	2.8	2.48	4.9	44.7	48.1	N/A	**0.48**	
A5	D	83.9	0.7175	326.75	0.51	100	20.0	2.5	7641	3.4	3.72	5.6	23.3	25.9	53.0	**0.26**	
A6	U	85.0	0.7320	423.64	0.66	271	7.4	5.6	13019	6.0	3.63	7.2	31.3	36.9	N/A	**0.37**	
A7	U	84.9	0.7307	179.51	0.28	300	40.0	3.4	10060	6.2	3.69	7.3	24.0	27.4	N/A	**0.27**	
A8	D	83.0	0.7056	302.37	0.47	300	33.3	3.8	10790	1.3	2.30	3.5	52.8	56.6	71.6	**0.57**	
A9a*	D	89.4	0.7901	60.79	0.09	211	0.9	8.4	2832	5.2	4.61	7.0	7.4	15.8	26.9	**0.16**	
A9-B	D	79.1	0.6541	524.31	0.82	300	20.0	5.1	9649	2.8	3.38	5.1	32.2	37.4	65.3	**0.37**	
A9-C	D	82.8	0.7030	455.66	0.71	300	20.0	4.6	7616	3.4	3.72	5.6	23.3	27.8	54.0	**0.28**	
A10	D	85.6	0.7399	332.13	0.52	150	2.0	6.3	7623	0.8	1.81	2.7	48.0	54.3	53.2	**0.53**	

Tc = Ti + Tt **Eqn. 601**
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3 **Eqn. 602**
K = 0.0132 (CN) - 0.39 **Eqn. 603**
Tc Check = L/180+10 **Eqn. 604**
Tlag = 0.6 Tc **Eqn. 612**
Tt = 500/V1+ (Travel Length-500)/V2

For the travel time (Tt) calculations (**Sec. 602.1**),
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Min Tc = 10 mins for undeveloped basins
Min Tc = 5 mins for developed basins

Undeveloped V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Undeveloped V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

Note: All basins over one square mile are calculated by the TLAG equation and denoted by gray shaded fray
TLAG = 20*Kn(LLc/S^0.5)^0.33 **Eqn. 613**

REFERENCE :

STANDARD FORM 4

*A9a does not contribute to Abbot Wash. This basin is routed through Additional Wash AD-2.

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

PBS&J
File: SF4.xls

MESQUITE MPU
PULSIPHER WASH - ULTIMATE CONDITION

BY: MLD
DATE: 12/7/06

SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag	REMARKS
DESIG: (1)	DEV./UN. (D or U)	CN	K (2)	AREA Ac (3)	AREA Mi^2	INITIAL LENGTH Feet (4)	SLOPE % (5)	Ti Min (6)	TRAVEL LENGTH Feet (7)	SLOPE % (8)	V1 VELOCITY FPS (9a)	V2 VELOCITY FPS (9b)	Tt Min (10)	Min (13)	Min (14)	Tlag= 0.6Tc/60 Hours	
P1	U	84.9	0.7307	552.50	0.86	300	6.7	6.1	12380	6.0	3.63	7.2	29.8	35.9	N/A	**0.36**	
P2	U	84.1	0.7201	325.58	0.51	200	15.0	3.9	7762	7.6	4.08	8.1	17.0	20.9	N/A	**0.21**	
P3	U	83.4	0.7109	584.34	0.91	133	7.5	4.1	11537	5.7	3.53	7.0	28.6	32.7	N/A	**0.33**	
P4	U	83.6	0.7135	526.56	0.82	100	20.0	2.6	11130	3.7	2.84	5.6	34.3	36.9	N/A	**0.37**	
P6	U	86.2	0.7478	464.81	0.73	250	4.0	6.3	17120	4.1	3.00	6.0	49.3	55.6	N/A	**0.56**	
P7	U	87.5	0.7650	405.03	0.63	300	5.0	6.1	14910	4.8	3.24	6.4	39.9	46.0	N/A	**0.46**	
P8	D	90.4	0.8033	188.53	0.29	300	1.3	8.5	4952	2.8	3.38	5.1	17.0	25.4	39.2	**0.25**	
P9	D	79.0	0.6528	81.26	0.13	100	14.0	3.3	4452	0.9	1.92	2.9	27.0	30.4	35.3	**0.30**	

Tc = Ti + Tt **Eqn. 601**
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3 **Eqn. 602**
K = 0.0132 (CN) - 0.39 **Eqn. 603**
Tc Check = L/180+10 **Eqn. 604**
Tlag = 0.6 Tc **Eqn. 612**
Tt = 500/V1+ (Travel Length-500)/V2

For the travel time (Tt) calculations (**Sec. 602.1**),
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

Min Tc = 10 mins for undeveloped basins
Min Tc = 5 mins for developed basins

Undeveloped V1 = 14.8*(S/100)^1/2 Developed V1 = 20.2*(S/100)^1/2
Undeveloped V2 = 29.4*(S/100)^1/2 Developed V2 = 30.6*(S/100)^1/2

Note: All basins over one square mile are calculated by the TLAG equation and denoted by gray shaded fray
TLAG = 20*Kn(LLc/S^0.5)^0.33 **Eqn. 613**

REFERENCE : **STANDARD FORM 4**

Table C-2

Muskigum and Kinematic Wave Routing

ROUTING PARAMETERS -- MUSKINGUM (RM) AND KINEMATIC (RK)
MESQUITE MPU 2007

HEC-1 Node	L (ft)	Upstream Elevation (ft)	Downstream Elevation (ft)	S (ft/ft)	n	Width (ft)	Side Slope (H:V)	R (ft)	V (ft/sec)	Vwave (ft/sec)	K (hr)	X	NSTPS
TOWN WASH													
T1-10	15610	2140	1900	0.015	0.04	N/A		1.5	6.04	9.66	0.45	0.15	5
10T-20	5586	1900	1830	0.013	0.04			1.5	5.45	8.72	0.18	0.15	2
20T-30	12110	1830	1720	0.009	0.04			1.5	4.64	7.42	0.45	0.15	5
30T-40	7744	1720	1658	0.008	0.04	55.00	4:1	N/A					
50T-51	1428	1678	1644	0.024	0.015	12.00	N/A						
51T-52	2248	1644	1632	0.005	0.015	12.00	N/A						
52T-60	1287	1632	1612	0.016	0.015	12.00	N/A						
60T-70	5893	1612	1594	0.003	0.015	16.00	1:1						
ABBOT WASH													
A1-10	11190	1950	1800	0.013	0.04	N/A		1.5	5.64	9.02	0.34	0.15	4
10A-20	5501	1800	1740	0.011	0.04			1.5	5.08	8.13	0.19	0.15	2
20A-40	6119	1740	1680	0.010	0.04	25.00	4:1	N/A					
30A-40	10640	1800	1680	0.011	0.04	23.00	4:1						
40A-41	5262	1680	1642	0.007	0.015	16.00	1:1						
41A-50	4047	1642	1608	0.008	0.015	16.00	1:1						
50A-60	6733	1608	1548	0.009	0.015	16.00	1:1						
PULSIPHER WASH													
P1-10	2648	1760	1740	0.008	0.04	N/A		1.50	4.23	6.77	0.11	0.15	1
10P-20	6265	1740	1660	0.013	0.04			1.50	5.50	8.80	0.20	0.15	2
20P-30	3109	1660	1630	0.010	0.015	16.00	1:1	N/A					
30P-40	1566	1630	1604	0.017	0.015	16.00	1:1						
P6-40	6454	1720	1604	0.018	0.015	16.00	1:1						
40P-50	1653	1604	1590	0.008	0.015	16.00	1:1						
50P-60	4552	1590	1538	0.011	0.015	16.00	1:1						
WESTERN WASHES													
W6a-10	9359	2130	1540	0.063	0.04	N/A		1.5	12.22	19.56	0.13	0.15	2
ADDITIONAL WASHES													
A9a-10	6698	1616	1563	0.008	0.018	50.00	4:1	N/A					

X	R	Description
0.1	0.6	Large flood plain storage - Shallow sheet flow
0.15	1.5	Normal Natural condition- poorly defined natural channels
0.3	2.5	Flows primarily confined within a major wash

Routing Method

Undeveloped - Muskingum Method

Developed - Kinematic Wave

Equations

$V = 1.49\ R^{2/3}S^{1/2}/n$

$Vwave = 8/5V$

$K = L/3600Vwave$

$NSTPS = 60K/\Delta t$

Δt= Simulation timestep (HEC-1)

Parameters

V= Average channel velocity

Vwave= Wave velocity

K= Travel time

X= Floodplain storage parameter

NSTPS = Timesteps

L= Length of the routing reach

S= Slope

n= Roughness coefficient

R= Hydraulic radius

Table C-3

Watershed Subareas, Soils Data, Land Use Data, Composite Curve Numbers, and Green-Ampt Parameters

Abbott Wash

ABBOTT WASH - SUBAREAS, SOILS DATA, LAND USE DATA, COMPOSITE CURVE NUMBER, GREEN-AMPT PARAMETERS

Basin Name	Soil Type	Hydrologic Soil Group	City of Mesquite Land Use	Corresponding TR-55 Land Use	Curve No.	% of Composition	Composite Curve No.	RTIMP	XKSAT (IN / HR)	IA (IN)	PSIF (IN)	Vegetation Cover	Irrigated Veg Cover	Dtheta Dry	Dtheta Normal	Dtheta	Ck	XKSAT Adj. (IN / HR)
A1	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	66.6%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	33.4%	86.0	0%	0.27	0.15	4.61	15%	0%	0.35	0.25	0.35	1.06	0.29
A2	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	97.9%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	2.1%	85.1	0%	0.22	0.15	4.93	15%	0%	0.36	0.25	0.36	1.06	0.23
A3	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	90.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	4.0%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	1.5%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	4.1%	84.9	1%	0.22	0.15	4.90	17%	3%	0.36	0.25	0.36	1.08	0.24
A4	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	86.8%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	2.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	10.7%	85.2	6%	0.22	0.15	4.95	19%	5%	0.36	0.25	0.36	1.09	0.24
A5	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	7.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	24.3%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S7) 6000 sqft	Townhouses/6000 Sq ft lots or less (69% Imp)	90.00	4.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	50.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - Neighbourhood (CR-1)	Commercial and Business (85% Imp)	94.00	2.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	94.00	3.4%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	4.7%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	73.00	2.1%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	0.4%	83.9	39%	0.23	0.12	4.87	41%	40%	0.36	0.25	0.29	1.34	0.31
A6	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	98.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	0.4%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	1.0%	85.0	0%	0.22	0.15	4.94	15%	0%	0.36	0.25	0.36	1.06	0.23
A7	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	97.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	2.4%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	0.5%	84.9	0%	0.22	0.15	4.94	16%	2%	0.36	0.25	0.36	1.07	0.23
A8	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	3.0%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	40.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	46.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	7.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - Neighbourhood (CR-1)	Commercial and Business (85% Imp)	94.00	0.2%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	2.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	73.00	0.4%	83.0	30%	0.22	0.13	4.92	48%	48%	0.36	0.25	0.29	1.42	0.32
A9a	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	38.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	94.00	1.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	94.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	31.4%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	12.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	9.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - Neighbourhood (CR-1)	Commercial and Business (85% Imp)	89.00	1.7%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	4.8%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.6%	89.4	75%	0.27	0.08	4.63	22%	22%	0.35	0.25	0.26	1.13	0.30
A9-B	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	25.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S7) 6000 sqft	Townhouses/6000 Sq ft lots or less (69% Imp)	90.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S6) 7000 sqft	Residential 7000 Sq. Ft Lot (63%Imp)	89.00	4.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	11.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (SF3) 14000 sqft	Residential 14000 Sq. Ft Lot (30% Imp)	81.00	0.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (SF2) 20000 sqft	Residential 20000 Sq. Ft Lot (25% Imp)	80.00	2.8%	--	--	--	--	--	--	--	--	--	--	--	--

Basin Name	Soil Type	Hydrologic Soil Group	City of Mesquite Land Use	Corresponding TR-55 Land Use	Curve No.	% of Composition	Composite Curve No.	RTIMP	XKSAT (IN / HR)	IA (IN)	PSIF (IN)	Vegetation Cover	Irrigated Veg Cover	Dtheta Dry	Dtheta Normal	Dtheta	Ck	XKSAT Adj. (IN / HR)
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	10.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	3.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	91.00	0.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	3.7%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	6.8%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S7) 6000 sqft	Townhouses/6000 Sq ft lots or less (69% Imp)	80.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	7.1%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (SF2) 20000 sqft	Residential 20000 Sq. Ft Lot (25% Imp)	54.00	1.5%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	4.0%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	0.4%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	6.4%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	1.2%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	2.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	3.6%	79.1	40%	0.28	0.12	4.57	44%	44%	0.35	0.25	0.28	1.38	0.39
A9-C	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	25.8%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S6) 7000 sqft	Residential 7000 Sq. Ft Lot (63%Imp)	89.00	0.7%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	1.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	8.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	21.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	94.00	5.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	0.8%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	91.00	15.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	2.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	8.7%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	2.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	1.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	81.00	5.1%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.5%	82.8	45%	0.25	0.12	4.75	40%	40%	0.35	0.25	0.28	1.32	0.33
A10	110	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	0.9%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	73.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	3.5%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	81.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Manufactured Housing (MH)	Industrial (72% Imp)	81.00	0.8%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	0.7%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	0.8%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	0.9%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	1.8%	--	--	--	--	--	--	--	--	--	--	--	--
	360	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	1.3%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	69.00	0.1%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	82.00	7.8%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	88.00	6.5%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	88.00	5.7%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Manufactured Housing (MH)	Industrial (72% Imp)	88.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	92.00	2.9%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	92.00	9.5%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Commercial - Neighbourhood (CR-1)	Commercial and Business (85% Imp)	92.00	0.8%	--	--	--	--	--	--	--	--	--	--	--	--

Basin Name	Soil Type	Hydrologic Soil Group	City of Mesquite Land Use	Corresponding TR-55 Land Use	Curve No.	% of Composition	Composite Curve No.	RTIMP	XKSAT (IN / HR)	IA (IN)	PSIF (IN)	Vegetation Cover	Irrigated Veg Cover	Dtheta Dry	Dtheta Normal	Dtheta	Ck	XKSAT Adj. (IN / HR)
	719	0 %A 100 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	92.00	13.5%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	88.00	9.8%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	89.00	5.1%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	73.00	1.1%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	0.1%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	0.2%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	1.1%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	73.00	4.2%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	6.2%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	81.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Public Facility (PF)	Commercial and Business (85% Imp)	89.00	1.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	2.5%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	2.0%	85.6	73%	0.44	0.09	3.88	23%	23%	0.35	0.26	0.27	1.15	0.51

Pulsipher Wash

PULSIPHER WASH - SUBAREAS, SOILS DATA, LAND USE DATA, COMPOSITE CURVE NUMBERS, GREEN-AMPT PARAMETERS

Basin Name	Soil Type	Hydrologic Soil Group	City of Mesquite Land Use	Corresponding TR-55 Land Use	Curve No.	% of Composition	Composite Curve No.	RTIMP	XKSAT (IN / HR)	IA (IN)	PSIF (IN)	Vegetation Cover	Irrigated Veg Cover	Dtheta Dry	Dtheta Normal	Dtheta	Ck	XKSAT Adj. (IN / HR)
P1	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	38.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	21.8%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	35.0%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	4.2%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	84.00	0.6%	84.9	20%	0.23	0.14	4.90	33%	27%	0.36	0.25	0.32	1.26	0.28
P2	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	3.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	45.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	42.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	0.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	6.2%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	0.7%	84.1	30%	0.22	0.13	4.94	46%	46%	0.36	0.25	0.29	1.40	0.31
P3	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	28.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	25.8%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	31.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	7.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	0.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	0.5%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	1.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	63.00	4.7%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	0.3%	83.4	23%	0.23	0.14	4.89	37%	32%	0.36	0.25	0.31	1.30	0.29
P4	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	32.0%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	17.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S5) 8000 sqft	Residential 8000 Sq. Ft Lot (58% Imp)	88.00	4.3%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	83.00	18.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Single Family Residential (SF2) 20000 sqft	Residential 20000 Sq. Ft Lot (25% Imp)	80.00	3.3%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	7.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	91.00	3.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	0.9%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - Hospital Services (Cr-2)	Commercial and Business (85% Imp)	94.00	3.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	1.0%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	63.00	4.1%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Single Family Residential (S4) 10000 sqft	Residential 10000 Sq. Ft Lot (38% Imp)	61.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	0.5%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - Hospital Services (Cr-2)	Commercial and Business (85% Imp)	89.00	1.0%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	1.6%	83.6	26%	0.23	0.13	4.86	35%	29%	0.36	0.25	0.32	1.27	0.29
P6	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	56.0%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	1.4%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	42.1%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	84.00	0.2%	86.2	0%	0.29	0.15	4.53	16%	1%	0.35	0.25	0.35	1.06	0.31
P7	143	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	2.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	85.00	51.8%	--	--	--	--	--	--	--	--	--	--	--	--

Basin Name	Soil Type	Hydrologic Soil Group	City of Mesquite Land Use	Corresponding TR-55 Land Use	Curve No.	% of Composition	Composite Curve No.	RTIMP	XKSAT (IN / HR)	IA (IN)	PSIF (IN)	Vegetation Cover	Irrigated Veg Cover	Dtheta Dry	Dtheta Normal	Dtheta	Ck	XKSAT Adj. (IN / HR)
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	91.00	2.2%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	17.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Commercial - Hospital Services (Cr-2)	Commercial and Business (85% Imp)	94.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	91.00	4.1%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	1.9%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	63.00	0.4%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - High Density (MF-2)	Apartments/Condos (72% Imp)	81.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	10.0%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	81.00	0.1%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	1.8%	--	--	--	--	--	--	--	--	--	--	--	--
	755	0 %A 0 %B 0 %C 100 %D	Land Reserve (LR)	Semiarid Rangelands Desert Shrub Poor	88.00	7.4%	87.5	31%	0.25	0.12	4.74	16%	7%	0.35	0.25	0.34	1.07	0.27
P8	143	0 %A 0 %B 100 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	94.00	38.6%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Industrial - Light (IR-1)	Industrial (72% Imp)	91.00	11.7%	--	--	--	--	--	--	--	--	--	--	--	--
	143	0 %A 0 %B 100 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	92.00	9.4%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	22.8%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	14.0%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	2.4%	90.4	81%	0.29	0.08	4.52	17%	17%	0.35	0.25	0.26	1.07	0.31
P9	110	0 %A 0 %B 100 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	79.00	10.0%	--	--	--	--	--	--	--	--	--	--	--	--
	110	0 %A 0 %B 100 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	91.00	2.2%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	7.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	RV / Motor Home (RV)	Commercial and Business (85% Imp)	89.00	0.6%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	12.3%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	9.2%	--	--	--	--	--	--	--	--	--	--	--	--
	150	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	6.8%	--	--	--	--	--	--	--	--	--	--	--	--
	360	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	719	0 %A 100 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	92.00	2.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	5.4%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	5.4%	--	--	--	--	--	--	--	--	--	--	--	--
	TMD	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.5%	--	--	--	--	--	--	--	--	--	--	--	--
	TnA	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	10.2%	--	--	--	--	--	--	--	--	--	--	--	--
	TnA	100 %A 0 %B 0 %C 0 %D	Multi Family - Low Density (MF-2)	Apartments/Condos (72% Imp)	81.00	3.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TnA	100 %A 0 %B 0 %C 0 %D	RV / Motor Home (RV)	Commercial and Business (85% Imp)	89.00	3.6%	--	--	--	--	--	--	--	--	--	--	--	--
	TnA	100 %A 0 %B 0 %C 0 %D	Commercial - General (CR-2)	Commercial and Business (85% Imp)	89.00	7.1%	--	--	--	--	--	--	--	--	--	--	--	--
	TnA	100 %A 0 %B 0 %C 0 %D	Streets and Highways Including Right of Way	Paved: Open Ditches (Incl. ROW)	83.00	0.3%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Parks, Recreation, and Open Space (PROS)	Urban Open Space Fair Cond. Grass Cover	49.00	2.8%	--	--	--	--	--	--	--	--	--	--	--	--
	TtA	100 %A 0 %B 0 %C 0 %D	Hotel / Tourist (HT)	Commercial and Business (85% Imp)	89.00	9.6%	79.0	57%	0.57	0.10	3.51	30%	30%	0.35	0.27	0.29	1.22	0.69

Table C-4

Curve Number Table

LU Code	Description	Hydrologic Soil Group			
		A	B	C	D
1	Null	0	0	0	0
2	Urban Open Space Poor Cond. Grass Cover	68	79	86	89
3	Urban Open Space Fair Cond. Grass Cover	49	69	79	84
4	Urban Open Space Good Cond. Grass Cover	39	61	74	80
5	Impervious Area- Paved Parking Lots, Roofs, Driveways etc.	98	98	98	98
6	Paved: Open Ditches (Incl. ROW)	83	89	92	93
7	Gravel (Incl. ROW)	76	85	89	91
8	Dirt (Incl. ROW)	72	82	87	89
9	Western Desert Urban Area - Natural Desert Landscaping	63	77	85	88
10	Western Desert Urban Area - Artifcial Desert Landscaping	96	96	96	96
11	Commercial and Business (85% Imp)	89	92	94	95
12	Industrial (72% Imp)	81	88	91	93
13	Apartments/Condos (72% Imp)	81	88	91	93
14	Townhouses/6000 Sq ft lots or less (69% Imp)	80	87	90	92
15	Residential 7000 Sq. Ft Lot (63%Imp)	76	84	89	91
16	Residential 8000 Sq. Ft Lot (58% Imp)	73	82	88	90
17	Residential 10000 Sq. Ft Lot (38% Imp)	61	75	83	87
18	Residential 14000 Sq. Ft Lot (30% Imp)	57	72	81	86
19	Residential 20000 Sq. Ft Lot (25% Imp)	54	70	80	85
20	Residential 40000 Sq. Ft Lot (20% Imp)	51	68	79	84
21	Residential 80000 Sq. Ft Lot (12% Imp)	46	65	77	82
22	Newly Graded Areas (Pervious Areas Only, No Vegetation)	77	86	91	94
23	Agriculture Fallow Bare Soil	77	86	91	94
24	Agriculture Fallow CR Poor	76	85	90	93
25	Agriculture Fallow CR Good	74	83	88	90
26	Agriculture Row Straight row (SR) Poor	72	81	88	91
27	Agriculture Row Straight row (SR) Good	67	78	85	89
28	Agriculture Row SR + CR Poor	71	80	87	90
29	Agriculture Row SR + CR Good	64	75	82	85
30	Agriculture Row Contoured (C) Poor	70	79	84	88
31	Agriculture Row Contoured (C) Good	65	75	82	86
32	Agriculture Row C +CR Poor	69	78	83	87
33	Agriculture Row C +CR Good	64	74	81	85
34	Agriculture Row Countoured & Terraced (C&T) Poor	66	74	80	82
35	Agriculture Row Countoured & Terraced (C&T) Good	62	71	78	81
36	Agriculture Row Crop Straight row (SR) Poor	65	73	79	81
37	Agriculture Row Crop Straight row (SR) Good	61	70	77	80
38	Agriculture Small Grain SR Poor	65	76	84	88
39	Agriculture Small Grain SR Good	63	75	83	87
40	Agriculture Small Grain SR + CR Poor	64	75	83	86
41	Agriculture Small Grain SR + CR Good	60	72	80	84
42	Agriculture Small Grain C Poor	63	74	82	85
43	Agriculture Small Grain C Good	61	73	81	84
44	Agriculture Small Grain C + CR Poor	62	73	81	84
45	Agriculture Small Grain C + CR Good	60	72	80	83
46	Agriculture Small Grain C&T Poor	61	72	79	82
47	Agriculture Small Grain C&T Good	59	70	78	81
48	Agriculture Small Grain C&T + CR Poor	60	71	78	81
49	Agriculture Small Grain C&T + CR Good	58	69	77	80
50	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow SR Poor	66	77	85	89
51	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow SR Good	58	72	81	85
52	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow C Poor	64	75	83	85
53	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow C Good	55	69	78	83
54	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow C&T Poor	63	73	80	83
55	Agriculture Close-seeded or Broadcast Legumes or Rotation Meadow C&T Good	51	67	76	80
56	Agriculture Pasture, grassland, or range - continues forage for grazing Poor	68	79	86	89

LU Code	Description	Hydrologic Soil Group			
		A	B	C	D
57	Agriculture Pasture, grassland, or range - continues forage for grazing Fair	49	69	79	84
58	Agriculture Pasture, grassland, or range - continues forage for grazing Good	39	61	74	80
59	Agriculture Meadow - continous grass, protected from grazing and generally mowed for hay	30	58	71	78
60	Agriculture Brush - brush-weed-grass mixture with brush the major element Poor	48	67	77	83
61	Agriculture Brush - brush-weed-grass mixture with brush the major element Fair	35	56	70	77
62	Agriculture Brush - brush-weed-grass mixture with brush the major element Good	30	48	65	73
63	Agriculture Woods - grass combination (orchard or tree farm) Poor	57	73	82	86
64	Agriculture Woods - grass combination (orchard or tree farm) Fair	43	65	76	82
65	Agriculture Woods - grass combination (orchard or tree farm) Good	32	58	72	79
66	Agriculture Woods Poor	45	66	77	83
67	Agriculture Woods Fair	36	60	73	79
68	Agriculture Woods Good	30	55	70	77
69	Agriculture Farmsteads - buildings, lanes, friveways, and surrounding lots	59	74	82	86
70	Semiarid Rangelands Herbeceous Poor	--	80	87	93
71	Semiarid Rangelands Herbeceous Fair	--	71	81	89
72	Semiarid Rangelands Herbeceous Good	--	62	74	85
73	Semiarid Rangelands Oak-Aspen Poor	--	66	74	79
74	Semiarid Rangelands Oak-Aspen Fair	--	48	57	63
75	Semiarid Rangelands Oak-Aspen Good	--	30	41	48
76	Semiarid Rangelands Pinyon-Juniper Poor	--	75	85	89
77	Semiarid Rangelands Pinyon-Juniper Fair	--	58	73	80
78	Semiarid Rangelands Pinyon-Juniper Good	--	41	61	71
79	Semiarid Rangelands Sagebrush with grass understory Poor	--	67	80	85
80	Semiarid Rangelands Sagebrush with grass understory Fair	--	51	63	70
81	Semiarid Rangelands Sagebrush with grass understory Good	--	35	47	55
82	Semiarid Rangelands Desert Shrub Poor	63	77	85	88
83	Semiarid Rangelands Desert Shrub Fair	55	72	81	86
84	Semiarid Rangelands Desert Shrub Good	49	68	79	84

Appendix D

HEC-1 Models

Abbott Wash

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   07FEB07  TIME  15:29:15   *
*                                       *
*****************************************
```

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

              *
              *DIAGRAM
    1         ID     CCRFCD 2007 MPU - CITY OF MESQUITE
    2         ID     ABBOTT WASH
    3         ID     FUTURE DEVELOPED CONDITION
    4         ID     INPUT FILE = ABWA_SDN3b.DAT
    5         ID     INPUT FILE DATE = AUGUST 2006
    6         ID     DESIGN STORM = 100-YEAR, 6-HOUR STORM
    7         ID     STORM DISTRIBUTION = SDN3
    8         ID     STORM CENTERING = SERIES B
    9         ID     MODELED BY PBS&J
   10         ID
   11         ID     JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
   12         ID       AREA        DARF
   13         ID       (SQ MI)     (100-YR)
   14         ID       6-8         0.89
   15         ID       4-6         0.905
   16         ID       2-4         0.92
   17         ID       1.5-2       0.94
   18         ID       1-1.5       0.96
   19         ID       0.5-1       0.975
   20         ID       0-0.5       0.99
   21         ID
   22         IT       5       0       0     300
   23         IO       5
   24         IN       5       0       0
   25         JR    PREC     .89    .905     .92     .94     .96    .975     .99
              *

   26         KK      A1
   27         BA    1.15
   28         PB   3.150
   29         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   30         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   31         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   32         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   33         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   34         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   35         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   36         PC   0.998   0.999       1
   37         LG    0.15     .35    4.61     .29       0
   38         UD     .33
              *

   39         KK   A1-10   CNAME
   40         KM   ROUTE SUBBASIN A1 THROUGH SUBBASIN A2
   41         RM       4     .34     .15
              *

   42         KK      A2
   43         BA    0.78
   44         LG    0.15     .36    4.93     .23       0
   45         UD     .44
              *
```



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

```
46          KK     10A   CNAME      20
47          KM   COMBINE ROUTE A1-10 AND SUBBASIN A2
48          HC       2
            *

49          KK  10A-20
50          KM   ROUTE COMBINATION POINT 10A THROUGH SUBBASIN A3
51          RM       2     .19     .15
            *

52          KK      A3
53          BA    0.55
54          LG    0.15     .36     4.9     .24       1
55          UD     .45
            *

56          KK      A4
57          BA    0.31
58          LG    0.15     .36    4.95     .24       6
59          UD     .48
            *

60          KK     20A   CNAME      40
61          KM   COMBINE ROUTE 10A-20, SUBBASIN A3, AND SUBBASIN A4
62          HC       3
            *

63          KK  20A-40
64          KM   ROUTE COMBINATION POINT 20A THROUGH SUBBASIN A5
65          RK    6119    .010    .040            TRAP      25       4
            *

66          KK      A5
67          BA    0.51
68          LG    0.12     .29    4.87     .31      39
69          UD     .26
            *

70          KK    40A5
71          KM   COMBINE ROUTE 20A-40 AND SUBBASIN A5
72          HC       2
            *

73          KK      A6
74          BA    0.66
75          LG    0.15     .36    4.94     .23       0
76          UD     .37
            *
```



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

77          KK      A7
78          BA    0.28
79          LG    0.15     .36    4.94     .23       0
80          UD     .27
            *

81          KK     30A   CNAME      40
82          KM   COMBINE SUBBASIN A6 AND SUBBASIN A7
83          HC       2
            *

84          KK  30A-40
85          KM   ROUTE COMBINATION POINT 30A THROUGH SUBBASIN A8
86          RK   10640    .011    .040            TRAP      23       4
            *

87          KK      A8
88          BA    0.47
89          LG    0.13     .29    4.92     .32      30
90          UD     .57
            *

91          KK     40A   CNAME      50
92          KM   COMBINE COMBINATION POINT 40A5, ROUTE 30A-40, AND SUBBASIN A8
93          HC       3
            *

94          KK    AWDB
95          KM    Abbott Wash Reservoir - Stantec design plans
96          RS       1    ELEV  1657.8
97          SV       0    23.5    40.1    56.7    92.5   129.5   167.7   227.6   248.3   269.6
98          SV  312.35   333.7   380.0   457.4
99          SE  1657.8    1660    1661    1662    1664    1666    1668    1671    1672    1673
100         SE    1675    1676    1678    1681
101         SQ       0      55      90     130     197     245     284     335     350     761
102         SQ    8054   12140   21653   38325
            *

103         KK   DAWDB
104         KM   DIVERT OUTFLOW FOR STORM CENTERING
```

```
          105          DT    DOUT
          106          DI       0   50000
          107          DQ       0   50000
                       *

          108          KK    A9-C
          109          BA    0.71
          110          LG    0.12     .28    4.75     .33      45
          111          UD     .28
                       *
1                                                HEC-1 INPUT                                                    PAGE  4

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

          112          KK     41A   CNAME
          113          KM   COMBINE ROUTE 40A-41 AND SUBBASIN A9-C
          114          HC       2
                       *

          115          KK  41A-50
          116          KM   ROUTE COMBINATION POINT 41A THROUGH SUBBASIN A9-B
          117          RK    4047    .008    .015            TRAP      16       1
                       *

          118          KK    A9-B
          119          BA    0.82
          120          LG    0.12     .28    4.57     .39      40
          121          UD     .37
                       *

          122          KK     50A   CNAME
          123          KM   COMBINE ROUTE 41A-50 AND ROUTE A9-B
          124          HC       2
                       *

          125          KK  50A-60
          126          KM   ROUTE COMBINATION POINT 50A THROUGH SUBBASIN A10
          127          RK    6733    .009    .015            TRAP      16       1
                       *

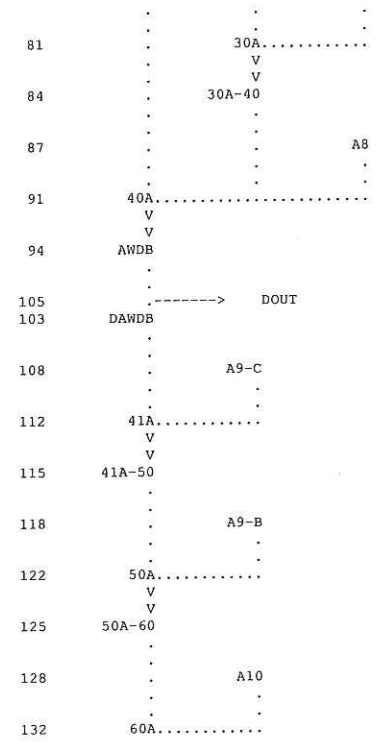
          128          KK     A10
          129          BA    0.52
          130          LG     .09     .27    3.88     .51      73
          131          UD     .53
                       *

          132          KK     60A
          133          HC       2
                       *
          134          ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

    26           A1
                  V
                  V
    39          A1-10
                  .
                  .
    42            .          A2
                  .           .
                  .           .
    46           10A.....     .
                  V           .
                  V           .
    49          10A-20        .
                  .           .
                  .           .
    52            .          A3
                  .           .
                  .           .
    56            .           .          A4
                  .           .           .
                  .           .           .
    60           20A...............      .
                  V                      .
                  V                      .
    63          20A-40                   .
                  .                      .
                  .                      .
    66            .          A5          .
                  .           .          .
                  .           .          .
    70           40A5.....    .          .
                  .           .          .
                  .           .          .
    73            .          A6          .
                  .           .          .
                  .           .          .
    77            .           .          A7
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   07FEB07  TIME  15:29:15   *
*                                       *
*****************************************
```

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

CCRFCD 2007 MPU - CITY OF MESQUITE
ABBOTT WASH
FUTURE DEVELOPED CONDITION
INPUT FILE = ABWA_SDN3b.DAT
INPUT FILE DATE = AUGUST 2006
DESIGN STORM = 100-YEAR, 6-HOUR STORM
STORM DISTRIBUTION = SDN3
STORM CENTERING = SERIES B
MODELED BY PBS&J

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA (SQ MI)	DARF (100-YR)
6-8	0.89
4-6	0.905
2-4	0.92
1.5-2	0.94
1-1.5	0.96
0.5-1	0.975
0-0.5	0.99

23 IO OUTPUT CONTROL VARIABLES

IPRNT		5	PRINT CONTROL
IPLOT		0	PLOT CONTROL
QSCAL		0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN		5	MINUTES IN COMPUTATION INTERVAL
IDATE	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2	0	ENDING DATE
NDTIME		0055	ENDING TIME
ICENT		19	CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.89 .90 .92 .94 .96 .98 .99
WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .89	RATIO 2 .90	RATIO 3 .92	RATIO 4 .94	RATIO 5 .96	RATIO 6 .98	RATIO 7 .99
HYDROGRAPH AT											
+	A1	1.15	1	FLOW	1076.	1106.	1137.	1177.	1217.	1248.	1278.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	A1-10	1.15	1	FLOW	910.	937.	964.	999.	1035.	1062.	1089.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
HYDROGRAPH AT											
+	A2	.78	1	FLOW	643.	661.	679.	703.	726.	744.	761.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
2 COMBINED AT											
+	10A	1.93	1	FLOW	1427.	1468.	1510.	1566.	1622.	1664.	1705.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO											
+	10A-20	1.93	1	FLOW	1331.	1370.	1409.	1463.	1516.	1555.	1595.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	A3	.55	1	FLOW	441.	454.	466.	482.	499.	511.	523.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83
HYDROGRAPH AT											
+	A4	.31	1	FLOW	243.	250.	256.	265.	274.	281.	287.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
3 COMBINED AT											
+	20A	2.79	1	FLOW	1789.	1841.	1894.	1965.	2036.	2090.	2143.
				TIME	4.08	4.08	4.08	4.08	4.08	4.08	4.08
ROUTED TO											
+	20A-40	2.79	1	FLOW	1771.	1831.	1882.	1948.	2024.	2081.	2134.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	A5	.51	1	FLOW	649.	664.	678.	697.	716.	730.	744.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	40A5	3.30	1	FLOW	1916.	1980.	2033.	2104.	2185.	2245.	2301.
				TIME	4.17	4.17	4.17	4.17	4.17	4.17	4.17
HYDROGRAPH AT											
+	A6	.66	1	FLOW	609.	626.	642.	664.	686.	702.	718.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	A7	.28	1	FLOW	313.	321.	329.	340.	351.	359.	367.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	30A	.94	1	FLOW	901.	925.	949.	981.	1013.	1037.	1061.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	30A-40	.94	1	FLOW	872.	909.	929.	956.	984.	987.	1010.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
HYDROGRAPH AT											
+	A8	.47	1	FLOW	354.	363.	372.	384.	395.	404.	413.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00

3 COMBINED AT

+	40A	4.71	1	FLOW	2996.	3082.	3171.	3295.	3407.	3479.	3561.
				TIME	4.00	4.00	4.00	4.00	4.00	4.00	4.00
ROUTED TO											
+	AWDB	4.71	1	FLOW	328.	334.	339.	346.	400.	484.	564.
				TIME	5.33	5.33	5.33	5.33	5.25	5.17	5.17
			** PEAK STAGES IN FEET **								
			1	STAGE	1670.58	1670.93	1671.26	1671.71	1672.12	1672.33	1672.52
				TIME	5.33	5.33	5.33	5.33	5.25	5.17	5.17
DIVERSION TO											
+	DOUT	4.71	1	FLOW	328.	334.	339.	346.	400.	484.	564.
				TIME	5.33	5.33	5.33	5.33	5.25	5.17	5.17
HYDROGRAPH AT											
+	DAWDB	4.71	1	FLOW	0.	0.	0.	0.	0.	0.	0.
				TIME	.00	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT											
+	A9-C	.71	1	FLOW	884.	903.	922.	947.	973.	992.	1011.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT											
+	41A	5.42	1	FLOW	884.	903.	922.	947.	973.	992.	1011.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67	3.67
ROUTED TO											
+	41A-50	5.42	1	FLOW	861.	879.	898.	923.	947.	966.	984.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	A9-B	.82	1	FLOW	833.	852.	871.	897.	923.	942.	961.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
2 COMBINED AT											
+	50A	6.24	1	FLOW	1694.	1731.	1769.	1820.	1870.	1908.	1946.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
ROUTED TO											
+	50A-60	6.24	1	FLOW	1645.	1683.	1720.	1770.	1820.	1857.	1895.
				TIME	3.75	3.75	3.75	3.75	3.75	3.75	3.75
HYDROGRAPH AT											
+	A10	.52	1	FLOW	494.	503.	513.	525.	538.	548.	558.
				TIME	3.92	3.92	3.92	3.92	3.92	3.92	3.92
2 COMBINED AT											
+	60A	6.76	1	FLOW	2115.	2161.	2206.	2267.	2327.	2373.	2418.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83	3.83

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	INTERPOLATED TO COMPUTATION INTERVAL TIME TO PEAK	INTERPOLATED TO COMPUTATION INTERVAL VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .89									
20A-40	MANE	2.96	1785.29	251.45	.95	5.00	1771.21	250.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1416E+03 EXCESS= .0000E+00 OUTFLOW= .1419E+03 BASIN STORAGE= .6174E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .90									
20A-40	MANE	2.82	1837.20	250.40	.99	5.00	1831.36	250.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1462E+03 EXCESS= .0000E+00 OUTFLOW= .1466E+03 BASIN STORAGE= .7355E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .92									
20A-40	MANE	2.86	1884.12	252.75	1.02	5.00	1881.59	250.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1510E+03 EXCESS= .0000E+00 OUTFLOW= .1513E+03 BASIN STORAGE= .6789E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .94									
20A-40	MANE	2.74	1959.01	251.75	1.06	5.00	1948.11	250.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1574E+03 EXCESS= .0000E+00 OUTFLOW= .1577E+03 BASIN STORAGE= .6689E-03 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .96									
20A-40	MANE	2.70	2034.45	250.77	1.10	5.00	2024.28	250.00	1.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1638E+03 EXCESS= .0000E+00 OUTFLOW= .1641E+03 BASIN STORAGE= .7471E-03 PERCENT ERROR= -.2

```
          FOR PLAN = 1  RATIO=  .98
            20A-40  MANE          2.75   2087.90    250.43      1.14      5.00   2081.30    250.00        1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1687E+03 EXCESS= .0000E+00 OUTFLOW= .1690E+03 BASIN STORAGE= .5669E-03 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .99
            20A-40  MANE          2.73   2133.91    249.93      1.17      5.00   2133.85    250.00        1.17

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1736E+03 EXCESS= .0000E+00 OUTFLOW= .1739E+03 BASIN STORAGE= .7324E-03 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .89
            30A-40  MANE          5.00    887.84    235.36      1.00      5.00    872.05    235.00        1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4914E+02 EXCESS= .0000E+00 OUTFLOW= .5005E+02 BASIN STORAGE= .2302E-02 PERCENT ERROR=  -1.9

          FOR PLAN = 1  RATIO=  .90
            30A-40  MANE          5.00    909.18    234.98      1.03      5.00    909.09    235.00        1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5074E+02 EXCESS= .0000E+00 OUTFLOW= .5170E+02 BASIN STORAGE= .2261E-02 PERCENT ERROR=  -1.9

          FOR PLAN = 1  RATIO=  .92
            30A-40  MANE          5.00    930.47    234.62      1.07      5.00    928.81    235.00        1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5238E+02 EXCESS= .0000E+00 OUTFLOW= .5341E+02 BASIN STORAGE= .2316E-02 PERCENT ERROR=  -2.0

          FOR PLAN = 1  RATIO=  .94
            30A-40  MANE          5.00    958.96    234.16      1.11      5.00    956.17    235.00        1.11

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5463E+02 EXCESS= .0000E+00 OUTFLOW= .5550E+02 BASIN STORAGE= .2082E-02 PERCENT ERROR=  -1.6

          FOR PLAN = 1  RATIO=  .96
            30A-40  MANE          5.00    986.99    233.67      1.15      5.00    984.21    235.00        1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5687E+02 EXCESS= .0000E+00 OUTFLOW= .5775E+02 BASIN STORAGE= .3290E-02 PERCENT ERROR=  -1.5

          FOR PLAN = 1  RATIO=  .98
            30A-40  MANE          5.00   1007.82    238.68      1.18      5.00    986.69    235.00        1.18

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5855E+02 EXCESS= .0000E+00 OUTFLOW= .5929E+02 BASIN STORAGE= .2766E-02 PERCENT ERROR=  -1.3

          FOR PLAN = 1  RATIO=  .99
            30A-40  MANE          5.00   1035.05    238.27      1.22      5.00   1010.41    235.00        1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6023E+02 EXCESS= .0000E+00 OUTFLOW= .6100E+02 BASIN STORAGE= .3076E-02 PERCENT ERROR=  -1.3

          FOR PLAN = 1  RATIO=  .89
            41A-50  MANE          1.05    879.51    221.93       .23      5.00    860.93    225.00         .23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6622E+02 EXCESS= .0000E+00 OUTFLOW= .6631E+02 BASIN STORAGE= .4787E-04 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .90
            41A-50  MANE           .99    897.08    222.68       .23      5.00    879.47    225.00         .23

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6766E+02 EXCESS= .0000E+00 OUTFLOW= .6773E+02 BASIN STORAGE= .5236E-04 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .92
            41A-50  MANE          1.05    918.78    222.32       .24      5.00    897.99    225.00         .24

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6910E+02 EXCESS= .0000E+00 OUTFLOW= .6918E+02 BASIN STORAGE= .5057E-04 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .94
            41A-50  MANE          1.04    945.78    222.09       .25      5.00    922.70    225.00         .25

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7103E+02 EXCESS= .0000E+00 OUTFLOW= .7111E+02 BASIN STORAGE= .4420E-04 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .96
            41A-50  MANE          1.04    967.33    222.54       .25      5.00    947.35    225.00         .25
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7295E+02 EXCESS= .0000E+00 OUTFLOW= .7303E+02 BASIN STORAGE= .5328E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .98

41A-50	MANE	1.05	989.15	222.06	.26	5.00	965.82	225.00	.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7439E+02 EXCESS= .0000E+00 OUTFLOW= .7446E+02 BASIN STORAGE= .4370E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

41A-50	MANE	1.07	1004.86	221.93	.26	5.00	984.26	225.00	.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7583E+02 EXCESS= .0000E+00 OUTFLOW= .7589E+02 BASIN STORAGE= .4850E-04 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .89

50A-60	MANE	1.35	1681.09	228.13	.41	5.00	1645.09	225.00	.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1364E+03 EXCESS= .0000E+00 OUTFLOW= .1365E+03 BASIN STORAGE= .2707E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .90

50A-60	MANE	1.34	1720.06	227.13	.42	5.00	1682.57	225.00	.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1394E+03 EXCESS= .0000E+00 OUTFLOW= .1395E+03 BASIN STORAGE= .2999E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .92

50A-60	MANE	1.30	1755.55	226.90	.43	5.00	1720.08	225.00	.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1425E+03 EXCESS= .0000E+00 OUTFLOW= .1426E+03 BASIN STORAGE= .2865E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .94

50A-60	MANE	1.33	1810.34	227.33	.44	5.00	1769.98	225.00	.44

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1465E+03 EXCESS= .0000E+00 OUTFLOW= .1467E+03 BASIN STORAGE= .2828E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .96

50A-60	MANE	1.31	1864.33	227.68	.45	5.00	1819.83	225.00	.45

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1506E+03 EXCESS= .0000E+00 OUTFLOW= .1507E+03 BASIN STORAGE= .3446E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .98

50A-60	MANE	1.25	1898.24	227.08	.46	5.00	1857.28	225.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1536E+03 EXCESS= .0000E+00 OUTFLOW= .1538E+03 BASIN STORAGE= .3502E-03 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

50A-60	MANE	1.37	1931.76	227.18	.47	5.00	1894.53	225.00	.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1566E+03 EXCESS= .0000E+00 OUTFLOW= .1568E+03 BASIN STORAGE= .2998E-03 PERCENT ERROR= -.1

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

Pulsipher Wash

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             JUN  1998                 *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   07FEB07  TIME  15:23:14   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    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
              *
              *DIAGRAM
    1         ID     CCRFCD 2007 MPU - CITY OF MESQUITE
    2         ID     PULSIPHER WASH
    3         ID     FUTURE DEVELOPED CONDITION
    4         ID     INPUT FILE = PUWA_SDN3a.DAT
    5         ID     INPUT FILE DATE = AUGUST 2006
    6         ID     DESIGN STORM = 100-YEAR, 6-HOUR STORM
    7         ID     STORM DISTRIBUTION = SDN3
    8         ID     STORM CENTERING = SERIES A
    9         ID     MODELED BY PBS&J
   10         ID
   11         ID     JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
   12         ID     AREA       DARF
   13         ID     (SQ MI)    (100-YR)
   14         ID     4-6        0.905
   15         ID     2-4        0.92
   16         ID     1.5-2      0.94
   17         ID     1-1.5      0.96
   18         ID     0.5-1      0.975
   19         ID     0-0.5      0.99
   20         ID
   21         IT       2              0     300
   22         IO       5
   23         IN       5              0
   24         JR    PREC     .905     .92     .94     .96     .975     .99
              *

   25         KK      P1
   26         BA    0.86
   27         PB    3.00
   28         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
   29         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
   30         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
   31         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
   32         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
   33         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
   34         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
   35         PC   0.998   0.999       1
   36         LG    0.14     .32     4.9     .28    20.0
   37         UD     .36
              *

   38         KK   P1-10   CNAME
   39         KM   ROUTE SUBBASIN P1 THROUGH SUBBASIN P2
   40         RM       1     .11     .15
              *

   41         KK      P2
   42         BA    0.51
   43         LG    0.13     .29    4.94     .31      30
   44         UD     .21
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
45          KK     10P   CNAME      20
46          KM   COMBINE ROUTE P1-10 AND SUBBASIN 10P
47          HC       2
            *

48          KK  10P-20
49          KM   ROUTE COMBINATION 10P THROUGH SUBBASIN P3
50          RM       2     .20     .15
            *

51          KK      P3
52          BA    0.91
53          LG    0.14     .31    4.89     .29      23
54          UD     .33
            *

55          KK     20P   CNAME      30
56          KM   COMBINE ROUTE 10P-20 AND SUBBASIN P3
57          HC       2
            *

58          KK    PWDB
59          KM    PULSHIPER Wash Reservoir
60          RS       1    ELEV  1655.8
61          SV       0    8.07   22.39   37.55   53.65   70.79   89.01  129.25  136.94  151.68
62          SV  175.97  189.45  202.93  233.06
63          SE  1655.8    1656    1658    1660    1662    1664    1666    1670  1670.7    1672
64          SE    1674    1675    1676    1678
65          SQ       0       3      37      66      88     106     121     146     150    2493
66          SQ    9471   13904   18870   29772
            *

67          KK  20P-30
68          KM   ROUTE COMBINATION POINT 20P THROUGH SUBBASIN P4
69          RK    3109    .010    .015            TRAP      16       1
            *

70          KK      P4
71          BA     .82
72          LG    0.13     .32    4.86     .29      26
73          UD     .37
            *

74          KK     30P
75          KM   COMBINE ROUTE 20P-30 AND SUBBASIN P4
76          HC       2
            *

77          KK  30P-40
78          KM   ROUTE COMBINATION POINT 30P THROUGH SUBBASIN P7
79          RK    1566    .017    .015            TRAP      16       1
            *
```

1 HEC-1 INPUT PAGE 3

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

80          KK      P6
81          BA    0.73
82          LG    0.15     .35    4.53     .31       0
83          UD     .56
            *

84          KK   P6-40
85          KM   ROUTE SUBBASIN P6 THROUGH SUBBASIN P7
86          RK    6454    .018    .015            TRAP      16       1
            *

87          KK      P7
88          BA    0.63
89          LG    0.12     .34    4.74     .27      31
90          UD     .46
            *

91          KK     40P   CNAME
92          KM   COMBINE ROUTE 30P-40, ROUTE P6-40, AND SUBBASIN P7
93          HC       3
            *

94          KK  40P-50
95          KM   ROUTE COMBINATION POINT 40P THROUGH SUBBASIN P8
96          RK    1653    .008    .015            TRAP      16       1
            *

97          KK      P8
98          BA    0.29
99          LG     .08     .26    4.52     .31      81
100         UD     .25
            *

101         KK     50P   CNAME
102         KM   COMBINE ROUTE 40P-50 AND SUBBASIN P8
103         HC       2
            *
```

```
104          KK  50P-60
105          KM   ROUTE COMBINATION POINT 50P THROUGH SUBBASIN P9
106          RK    4552    .011    .015            TRAP      16       1
             *
107          KK      P9
108          BA    0.13
109          LG     .10     .29    3.51    0.69      57
110          UD     .30
             *
1                                        HEC-1 INPUT                                                    PAGE  4

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


111          KK      60
112          KM   COMBINE ROUTE 50P-60 AND SUBBASIN P9
113          HC       2
             *
114          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   25          P1
               V
               V
   38        P1-10
               .
               .
   41          .          P2
               .           .
               .           .
   45         10P.....
               V
               V
   48       10P-20
               .
               .
   51          .          P3
               .           .
               .           .
   55         20P.....
               V
               V
   58         PWDB
               V
               V
   67       20P-30
               .
               .
   70          .          P4
               .           .
               .           .
   74         30P.....
               V
               V
   77       30P-40
               .
               .
   80          .          P6
               .           V
               .           V
   84          .       P6-40
               .           .
               .           .
   87          .           .          P7
               .           .           .
               .           .           .
   91         40P.....................
               V
               V
   94       40P-50
               .
               .
   97          .          P8
               .           .
               .           .
  101         50P.....
               V
               V
  104       50P-60
               .
               .
  107          .          P9
               .           .
               .           .
  111         60.....

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                  ****************************************
```

```
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*                JUN   1998             *
*             VERSION 4.1               *
*                                       *
*  RUN DATE   07FEB07  TIME  15:23:14   *
*                                       *
*****************************************
```


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


CCRFCD 2007 MPU - CITY OF MESQUITE
PULSIPHER WASH
FUTURE DEVELOPED CONDITION
INPUT FILE = PUWA_SDN3a.DAT
INPUT FILE DATE = AUGUST 2006
DESIGN STORM = 100-YEAR, 6-HOUR STORM
STORM DISTRIBUTION = SDN3
STORM CENTERING = SERIES A
MODELED BY PBS&J

JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:

AREA (SQ MI)	DARF (100-YR)
4-6	0.905
2-4	0.92
1.5-2	0.94
1-1.5	0.96
0.5-1	0.975
0-0.5	0.99

22 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		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1	0	ENDING DATE
NDTIME		0958	ENDING TIME
ICENT		19	CENTURY MARK

COMPUTATION INTERVAL .03 HOURS
TOTAL TIME BASE 9.97 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
.90 .92 .94 .96 .98 .99

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .90	RATIO 2 .92	RATIO 3 .94	RATIO 4 .96	RATIO 5 .98	RATIO 6 .99
HYDROGRAPH AT										
+	P1	.86	1	FLOW	846.	867.	895.	923.	944.	965.
				TIME	3.77	3.77	3.77	3.77	3.77	3.77
ROUTED TO										
+	P1-10	.86	1	FLOW	790.	810.	836.	863.	883.	903.
				TIME	3.87	3.87	3.87	3.87	3.87	3.87
HYDROGRAPH AT										
+	P2	.51	1	FLOW	688.	704.	724.	745.	760.	775.
				TIME	3.63	3.63	3.63	3.63	3.63	3.63
2 COMBINED AT										
+	10P	1.37	1	FLOW	1221.	1252.	1292.	1333.	1363.	1394.
				TIME	3.73	3.73	3.73	3.73	3.73	3.73
ROUTED TO										
+	10P-20	1.37	1	FLOW	1123.	1151.	1189.	1227.	1256.	1284.

				TIME	3.93	3.93	3.93	3.93	3.93	3.93
HYDROGRAPH AT										
+	P3	.91	1	FLOW	953.	976.	1007.	1038.	1061.	1084.
				TIME	3.73	3.73	3.73	3.73	3.73	3.73
2 COMBINED AT										
+	20P	2.28	1	FLOW	1920.	1968.	2032.	2096.	2144.	2192.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	PWDB	2.28	1	FLOW	146.	148.	176.	286.	376.	478.
				TIME	5.27	5.30	5.23	4.77	4.63	4.53
			** PEAK STAGES IN FEET **							
			1	STAGE	1670.01	1670.32	1670.71	1670.78	1670.83	1670.88
				TIME	5.30	5.30	5.23	4.77	4.63	4.53
ROUTED TO										
+	20P-30	2.28	1	FLOW	146.	148.	176.	285.	376.	476.
				TIME	5.33	5.33	5.27	4.80	4.67	4.57
HYDROGRAPH AT										
+	P4	.82	1	FLOW	809.	829.	855.	881.	900.	920.
				TIME	3.77	3.77	3.77	3.77	3.77	3.77
2 COMBINED AT										
+	30P	3.10	1	FLOW	889.	909.	937.	965.	986.	1007.
				TIME	3.80	3.80	3.80	3.80	3.80	3.80
ROUTED TO										
+	30P-40	3.10	1	FLOW	888.	909.	936.	965.	985.	1006.
				TIME	3.80	3.80	3.80	3.80	3.80	3.80
HYDROGRAPH AT										
+	P6	.73	1	FLOW	445.	458.	477.	495.	509.	523.
				TIME	3.97	3.97	3.97	3.97	3.97	3.97
ROUTED TO										
+	P6-40	.73	1	FLOW	443.	457.	475.	494.	507.	521.
				TIME	4.03	4.03	4.03	4.00	4.00	4.00
HYDROGRAPH AT										
+	P7	.63	1	FLOW	560.	574.	591.	609.	622.	635.
				TIME	3.87	3.87	3.87	3.87	3.87	3.87
3 COMBINED AT										
+	40P	4.46	1	FLOW	1808.	1854.	1915.	1977.	2023.	2069.
				TIME	3.87	3.87	3.87	3.87	3.87	3.87
ROUTED TO										
+	40P-50	4.46	1	FLOW	1804.	1850.	1911.	1973.	2019.	2064.
				TIME	3.87	3.87	3.87	3.87	3.87	3.87
HYDROGRAPH AT										
+	P8	.29	1	FLOW	435.	443.	453.	464.	471.	479.
				TIME	3.67	3.67	3.67	3.67	3.67	3.67
2 COMBINED AT										
+	50P	4.75	1	FLOW	2105.	2156.	2225.	2294.	2346.	2397.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	50P-60	4.75	1	FLOW	2102.	2153.	2221.	2290.	2342.	2393.
				TIME	3.87	3.87	3.87	3.87	3.87	3.87
HYDROGRAPH AT										
+	P9	.13	1	FLOW	148.	151.	156.	160.	163.	166.
				TIME	3.70	3.70	3.70	3.70	3.70	3.70
2 COMBINED AT										
+	60	4.88	1	FLOW	2218.	2272.	2344.	2417.	2471.	2525.
				TIME	3.87	3.83	3.83	3.83	3.83	3.83

1

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

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= .90									
20P-30	MANE	1.40	146.06	319.93	.60	2.00	146.06	320.00	.59

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7286E+02 EXCESS= .0000E+00 OUTFLOW= .7239E+02 BASIN STORAGE= .6312E+00 PERCENT ERROR= -.2

FOR PLAN = 1 RATIO= .92									
20P-30	MANE	1.38	147.82	321.02	.60	2.00	147.82	320.00	.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7397E+02 EXCESS= .0000E+00 OUTFLOW= .7341E+02 BASIN STORAGE= .6397E+00 PERCENT ERROR= -.1

```
          FOR PLAN = 1  RATIO=  .94
            20P-30  MANE          1.25    176.04    316.51       .62      2.00    176.00    316.00         .62

CONTINUITY SUMMARY (AC-FT) - INFLOW= .7571E+02 EXCESS= .0000E+00 OUTFLOW= .7520E+02 BASIN STORAGE= .6493E+00 PERCENT ERROR=   -.2

          FOR PLAN = 1  RATIO=  .96
            20P-30  MANE          1.17    285.55    288.33       .66      2.00    285.03    288.00         .66

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8092E+02 EXCESS= .0000E+00 OUTFLOW= .8031E+02 BASIN STORAGE= .6499E+00 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .98
            20P-30  MANE           .94    375.61    279.19       .69      2.00    375.50    280.00         .69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8486E+02 EXCESS= .0000E+00 OUTFLOW= .8426E+02 BASIN STORAGE= .6502E+00 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .99
            20P-30  MANE           .96    476.22    273.80       .73      2.00    475.84    274.00         .72

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8882E+02 EXCESS= .0000E+00 OUTFLOW= .8824E+02 BASIN STORAGE= .6504E+00 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .90
            30P-40  MANE           .44    887.90    228.30       .79      2.00    887.64    228.00         .79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1302E+03 EXCESS= .0000E+00 OUTFLOW= .1300E+03 BASIN STORAGE= .2677E+00 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .92
            30P-40  MANE           .42    908.75    228.22       .80      2.00    908.54    228.00         .80

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1327E+03 EXCESS= .0000E+00 OUTFLOW= .1325E+03 BASIN STORAGE= .2711E+00 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .94
            30P-40  MANE           .42    936.75    228.35       .82      2.00    936.50    228.00         .82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1364E+03 EXCESS= .0000E+00 OUTFLOW= .1362E+03 BASIN STORAGE= .2751E+00 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .96
            30P-40  MANE           .39    964.71    228.43       .87      2.00    964.55    228.00         .87

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1435E+03 EXCESS= .0000E+00 OUTFLOW= .1432E+03 BASIN STORAGE= .2753E+00 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .98
            30P-40  MANE           .40    985.55    228.13       .90      2.00    985.44    228.00         .90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1489E+03 EXCESS= .0000E+00 OUTFLOW= .1486E+03 BASIN STORAGE= .2754E+00 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .99
            30P-40  MANE           .39   1006.51    228.31       .93      2.00   1006.33    228.00         .93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1544E+03 EXCESS= .0000E+00 OUTFLOW= .1541E+03 BASIN STORAGE= .2755E+00 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .90
             P6-40  MANE          1.57    444.05    240.67       .79      2.00    443.31    242.00         .79

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3092E+02 EXCESS= .0000E+00 OUTFLOW= .3094E+02 BASIN STORAGE= .1365E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .92
             P6-40  MANE          1.56    457.36    240.30       .82      2.00    457.08    242.00         .82

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3199E+02 EXCESS= .0000E+00 OUTFLOW= .3201E+02 BASIN STORAGE= .1433E-02 PERCENT ERROR=    .0

          FOR PLAN = 1  RATIO=  .94
             P6-40  MANE          1.55    476.47    241.12       .86      2.00    475.27    242.00         .86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3342E+02 EXCESS= .0000E+00 OUTFLOW= .3344E+02 BASIN STORAGE= .1616E-02 PERCENT ERROR=   -.1

          FOR PLAN = 1  RATIO=  .96
             P6-40  MANE          1.55    494.41    240.69       .90      2.00    493.60    240.00         .90
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3487E+02 EXCESS= .0000E+00 OUTFLOW= .3488E+02 BASIN STORAGE= .2011E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

P6-40	MANE	1.53	507.88	241.63	.92	2.00	507.33	240.00	.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3595E+02 EXCESS= .0000E+00 OUTFLOW= .3597E+02 BASIN STORAGE= .1399E-02 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .99

P6-40	MANE	1.53	522.20	241.24	.95	2.00	521.18	240.00	.95

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3705E+02 EXCESS= .0000E+00 OUTFLOW= .3706E+02 BASIN STORAGE= .1392E-02 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90

40P-50	MANE	.33	1807.06	232.55	.88	2.00	1804.04	232.00	.88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2093E+03 EXCESS= .0000E+00 OUTFLOW= .2089E+03 BASIN STORAGE= .3624E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .92

40P-50	MANE	.33	1852.65	232.78	.90	2.00	1849.67	232.00	.90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2140E+03 EXCESS= .0000E+00 OUTFLOW= .2136E+03 BASIN STORAGE= .3670E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .94

40P-50	MANE	.33	1914.43	232.68	.93	2.00	1910.89	232.00	.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2206E+03 EXCESS= .0000E+00 OUTFLOW= .2202E+03 BASIN STORAGE= .3723E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .96

40P-50	MANE	.31	1976.66	232.60	.97	2.00	1972.76	232.00	.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2307E+03 EXCESS= .0000E+00 OUTFLOW= .2304E+03 BASIN STORAGE= .3725E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

40P-50	MANE	.31	2021.92	232.71	1.00	2.00	2018.59	232.00	1.00

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2384E+03 EXCESS= .0000E+00 OUTFLOW= .2382E+03 BASIN STORAGE= .3726E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .99

40P-50	MANE	.46	2066.86	232.72	1.03	2.00	2064.43	232.00	1.03

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2461E+03 EXCESS= .0000E+00 OUTFLOW= .2458E+03 BASIN STORAGE= .3728E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .90

50P-60	MANE	.84	2102.77	231.94	.97	2.00	2102.40	232.00	.97

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2456E+03 EXCESS= .0000E+00 OUTFLOW= .2448E+03 BASIN STORAGE= .9005E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .92

50P-60	MANE	.77	2155.50	231.63	.99	2.00	2153.37	232.00	.99

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2509E+03 EXCESS= .0000E+00 OUTFLOW= .2501E+03 BASIN STORAGE= .9125E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .94

50P-60	MANE	.83	2221.55	231.26	1.02	2.00	2221.12	232.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2584E+03 EXCESS= .0000E+00 OUTFLOW= .2576E+03 BASIN STORAGE= .9249E+00 PERCENT ERROR= -.1

FOR PLAN = 1 RATIO= .96

50P-60	MANE	.79	2292.29	231.46	1.06	2.00	2290.09	232.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2694E+03 EXCESS= .0000E+00 OUTFLOW= .2685E+03 BASIN STORAGE= .9258E+00 PERCENT ERROR= .0

FOR PLAN = 1 RATIO= .98

50P-60	MANE	.81	2342.30	231.94	1.09	2.00	2341.94	232.00	1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2778E+03 EXCESS= .0000E+00 OUTFLOW= .2769E+03 BASIN STORAGE= .9259E+00 PERCENT ERROR= .0

```
          FOR PLAN = 1  RATIO=  .99
            50P-60  MANE          .77   2394.37    231.29      1.13      2.00   2392.83    232.00        1.13

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2861E+03 EXCESS= .0000E+00 OUTFLOW= .2854E+03 BASIN STORAGE= .9260E+00 PERCENT ERROR=   -.1


*** NORMAL END OF HEC-1 ***
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THE CITY OF MESQUITE

FLOOD CONTROL

MASTER PLAN UPDATE 2001

September 2001

Prepared for:

Clark County Regional Flood Control District
Las Vegas, Nevada

Project Number: 0279.0010

IV. SEDIMENTATION ANALYSIS

The MPU 1995 used the Pacific Southwest Inter-Agency Committee (PSIAC) Method to estimate average annual sediment yields. The PSIAC method was developed specifically for use in the arid southwest, but it is only a rough estimate for broad planning purposes. It uses nine (9) generalized watershed parameters, which are cataloged into three broad classes (high, moderate, and low) and assigned numerical values from 0 to 25. The nine factors believed to affect sediment yield in the Pacific Southwest are surface geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and sediment transport. The total points for each watershed is then related to the numerical values assigned to each parameter as a function of watershed area.

This Update uses the methodology as presented in the revised CCRFCD Manual to estimate the 100-year sediment deposit at locations of interest. This analysis addresses sediment deposition for a 100-year storm event. The objectives of this analysis were to provide information for planning and design of detention/debris basins in Abbott and Pulsipher Washes and for an evaluation of the function and operability of Town Wash Detention Basin.

The sediment deposition for the 100-year storm was analyzed by separating the problem into two parts, wash load and bed load. The wash load is the portion of the sediment yield that remains in suspension for the duration of a flood and is generally composed of particles smaller than those found in the streambed. The bed material load may be transported in suspension or by intermittent movement along the wash. Both types of sediment transport must be accounted for to determine the total debris load supplied to a particular flood control facility.
The Universal Soil Loss Equation was used to calculate the wash load while the Meyer-Peter formula was used to determine the bed load.

The Universal Soil Loss Equation (USLE) is the most widely used equation for empirical estimation of gross erosion from upland areas. The USLE equation is:

$$A = RKLSCP$$

Where

A = estimated annual soil loss in tons per acre;
R = rainfall erosivity factor;
K = soil erodibility factor (the erosion rate for a specific soil);
LS = topographic factor (L is the slope length factor and S is the slope gradient factor);
C = cropping factor; and
P = the erosion control practice factor.

The rainfall-erosivity factor R can be calculated for each storm from:

$$R = 0.01\Sigma(916 + 331 \log I)I$$

Where I is the rainfall intensity in inches per hour. In the study area, the rainfall intensity may be computed by distributing the 100-year 6-hour total precipitation over the SDN5 design storm.

Soil erodibility factor K is a function of percent silt, percent of coarse sand, soil structure, permeability of soil, and percent of organic matter. The soil erosion factor can be obtained from the Table 13 in Soil Survey of Virgin River Area, Nevada - Arizona by Soil Conservation Service (Reference 4).

Soil loss is affected by both length and degree of slope. These two factors may be combined into a single topographic factor, LS. The LS factor can be obtained from the slope-effect chart (Figure 3-2) in National Engineering Handbook (Reference 15).

Cropping-management factor C was defined as the ratio of soil loss from land cropped under specific conditions to corresponding loss from tilled, continuously fallow ground. The C factor can be obtained from the Table 3-2 in National Engineering Handbook Section 3 (Reference 15).

The conservation practice factor P accounts for the effect of conservation practices such as contouring, strip cropping and terracing on erosion. This factor has no significance for wildland areas and can be set at 1.0.

The bed load was determined using the Meyer-Peter formula. The formula is:

$$q_b = (39.25\ q^{2/3}\ S_o - 9.95 d_m)^{3/2}$$

where

q_b = unit bed load discharge expressed in ponds per second per foot of width (lbs/s);

S_o = slope;

d_m = effective diameter of the bed material in feet; and

q = unit discharge q is in cfs.

To determine the effective diameter, divide the size distribution curve of a bed material mechanical analysis into at least 10 equal size fractions and determine the mean size and weight percentage of each fraction. The unit discharge q may be estimated based on the assumption that the flow in the well-defined channels that will carry the bedload into the basin occurs as critical-depth-domain alluvial flow.

The Dawdy equation was used to calculate water depth Y:

$$Y = 0.07056Q^{0.4}.$$

Detailed calculations and more information are included in Appendix E. Table 5 presents a summary of the sedimentation analysis.

Once the sediment yield was determined, the Delivery Ratio for the watershed was determined and applied. The delivery ratios used in this study were obtained from the Figure 6-2 in National Engineering Handbook Section 3 (Reference 15).

Sediment production in the Mesquite areas is primarily due to erosion of entrenched channel margins. Channel erosion occurs as headward migration and as undercutting and collapse of steep channel banks at the outside of meander bends. As shown in Table 5, wash load accounts for majority of the total sediment deposit.

TABLE 5
SUMMARY OF SEDIMETATION ANALYSIS

WATERSHED	BED LOAD (ac-ft)	WASH LOAD (ac-ft)	DELIVERY RATIO	TOTAL** (ac-ft)	MPU 1995* (ac-ft)
TOWN WASH @ DETENTION BASIN	8.56	170.70	0.20	36	17
ABBOTT WASH @ DETENTION BASIN	4.55	71.00	0.26	20	5.2
ABBOTT WASH @ I-15	4.55	90.00	0.25	24	6.3
PULSIPHER WASH @ DETENTION BASIN	4.89	43.26	0.30	14	2.7
PULSIPHER WASH @ I-15	4.89	70.00	0.28	21	5.2

- MPU 1995 used Pacific Southwest Inter-Agency Committee (PSIAC) Method produces average sediment yields per year.
- **CCRFCD HC&DDM methodology produces a 100-year sediment volume.
- Note: The Unnamed Wash and the West Washes are not included within this analysis

The data shows that peak discharge estimates decrease, compared with those from the MPU 1995. In general, the decreases are caused by a significant reduction in the rainfall amounts used (Table 1) for the various watersheds. Another reason for the decrease in flows is the application of a series of DARF's in the HEC-1 models in this Update. HEC-1 hydrology modeling results for full-developed conditions, based on the land use plan proposed in the Comprehensive Master Plan, as well as the existing condition are presented in Table 4.

TABLE 4
SUMMARY OF100-YEAR FLOWS

Watershed	Location	Existing Conditions (CFS)		Future Conditions (CFS)	
		MPU 1995	MPU 2001	MPU 1995	MPU 2001
Town Wash	40 (Detention Basin Inflow)	3091	2744	3355	3252
	Detention Basin Outflow	587	571	595	580
	Subbasin T8	548	700	N/A	1020
	50	814	726	N/A	N/A
	Subbasin T9	979	1350	1569	1790
	60 (I-15)	1691	1599	1839	1670
	80 (Virgin River)	2060	1771	2416	1860
Abbott Wash	20	1703	1460	1712	1471
	30	1333	1558	1370	1470
	40	3051	2803	3170	2750
	50 (I-15)	2970	2667	3266	2747
	60 (Virgin River)	2967	2423	3274	2975
Pulsipher Wash	20	2244	1955	2609	2135
	30	3468	2580	4416	2986
	50 (I-15)	3472	2535	4708	3099
	60 (Virgin River)	3166	1828	4338	3215
UnnamedWash	@ I-15	626	600	780	750
West Washes	W1		1011		1169
	W2		79		98
	W3		406		497
	W4		190		214
	W5		236		273
	W6		1502		1624

* Note: Flows from the 1995 MPU were obtained directly from the HEC-1 analysis output files.

TABLE 3
SUMMARY OF SEDIMETATION ANALYSIS

WATERSHED	BED LOAD (ac-ft)	WASH LOAD (ac-ft)	DELIVERY RATIO	TOTAL (ac-ft)	MPU 1995* (ac-ft)
TOWN WASH @ DETENTION BASIN	8.56	170.70	0.20	36	17
ABBOTT WASH @ DETENTION BASIN	4.55	71.00	0.26	20	5.2
ABBOTT WASH @ I-15	4.55	90.00	0.25	24	6.3
PULSIPHER WASH @ DETENTION BASIN	4.89	43.26	0.30	14	2.7
PULSIPHER WASH @ I-15	4.89	70.00	0.28	21	5.2

* MPU 1995 used Pacific Southwest Inter-Agency Committee (PSIAC) Method which produces average sediment yield per year.

SEDIMENTATION ANALYSIS
WASH LOAD CALCULATION - UNIVERSAL SOIL LOSS EQUATION

ABBOTT WASH @ PROPOSED DETENTION BASIN

DATE: 06/22/00
BY: JL

	TIME (min.)	DISTRIB.	RAINFALL (inch)	INTENSITY (in./hr.)	E	R	K	LS	C	P	A (tons/ac.)
1	0	0	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
2	5	0.02	0.064	0.77	878.11	6.75	0.30	1.35	0.35	1.0	0.96
3	10	0.057	0.118	1.42	966.55	13.74	0.30	1.35	0.35	1.0	1.95
4	15	0.07	0.042	0.50	816.19	4.08	0.30	1.35	0.35	1.0	0.58
5	20	0.087	0.054	0.65	854.75	5.58	0.30	1.35	0.35	1.0	0.79
6	25	0.108	0.067	0.81	885.13	7.14	0.30	1.35	0.35	1.0	1.01
7	30	0.124	0.051	0.61	846.03	5.20	0.30	1.35	0.35	1.0	0.74
8	35	0.13	0.019	0.23	705.04	1.63	0.30	1.35	0.35	1.0	0.23
9	40	0.13	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
10	45	0.13	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
11	50	0.13	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
12	55	0.13	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
13	60	0.13	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
14	65	0.133	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
15	70	0.14	0.022	0.27	727.20	1.96	0.30	1.35	0.35	1.0	0.28
16	75	0.142	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
17	80	0.148	0.019	0.23	705.04	1.63	0.30	1.35	0.35	1.0	0.23
18	85	0.158	0.032	0.38	778.47	2.99	0.30	1.35	0.35	1.0	0.42
19	90	0.172	0.045	0.54	826.84	4.45	0.30	1.35	0.35	1.0	0.63
20	95	0.181	0.029	0.35	763.33	2.64	0.30	1.35	0.35	1.0	0.37
21	100	0.19	0.029	0.35	763.33	2.64	0.30	1.35	0.35	1.0	0.37
22	105	0.197	0.022	0.27	727.20	1.96	0.30	1.35	0.35	1.0	0.28
23	110	0.199	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
24	115	0.2	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
25	120	0.201	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
26	125	0.204	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
27	130	0.214	0.032	0.38	778.47	2.99	0.30	1.35	0.35	1.0	0.42
28	135	0.229	0.048	0.58	836.76	4.82	0.30	1.35	0.35	1.0	0.68
29	140	0.241	0.038	0.46	804.68	3.71	0.30	1.35	0.35	1.0	0.53
30	145	0.249	0.026	0.31	746.39	2.29	0.30	1.35	0.35	1.0	0.33
31	150	0.251	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
32	155	0.256	0.016	0.19	678.83	1.30	0.30	1.35	0.35	1.0	0.18
33	160	0.27	0.045	0.54	826.84	4.45	0.30	1.35	0.35	1.0	0.63
34	165	0.278	0.026	0.31	746.39	2.29	0.30	1.35	0.35	1.0	0.33
35	170	0.281	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
36	175	0.283	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
37	180	0.295	0.038	0.46	804.68	3.71	0.30	1.35	0.35	1.0	0.53
38	185	0.322	0.086	1.04	921.25	9.56	0.30	1.35	0.35	1.0	1.35
39	190	0.352	0.096	1.15	936.40	10.79	0.30	1.35	0.35	1.0	1.53
40	195	0.409	0.182	2.19	1028.67	22.52	0.30	1.35	0.35	1.0	3.19
41	200	0.499	0.288	3.46	1094.33	37.84	0.30	1.35	0.35	1.0	5.36
42	205	0.59	0.291	3.50	1095.91	38.31	0.30	1.35	0.35	1.0	5.43
43	210	0.71	0.384	4.61	1135.68	52.35	0.30	1.35	0.35	1.0	7.42

44	215	0.744	0.109	1.31	954.39	12.47	0.30	1.35	0.35	1.0	1.77
45	220	0.781	0.118	1.42	966.55	13.74	0.30	1.35	0.35	1.0	1.95
46	225	0.812	0.099	1.19	941.11	11.21	0.30	1.35	0.35	1.0	1.59
47	230	0.819	0.022	0.27	727.20	1.96	0.30	1.35	0.35	1.0	0.28
48	235	0.835	0.051	0.61	846.03	5.20	0.30	1.35	0.35	1.0	0.74
49	240	0.851	0.051	0.61	846.03	5.20	0.30	1.35	0.35	1.0	0.74
50	245	0.856	0.016	0.19	678.83	1.30	0.30	1.35	0.35	1.0	0.18
51	250	0.86	0.013	0.15	646.75	0.99	0.30	1.35	0.35	1.0	0.14
52	255	0.868	0.026	0.31	746.39	2.29	0.30	1.35	0.35	1.0	0.33
53	260	0.876	0.026	0.31	746.39	2.29	0.30	1.35	0.35	1.0	0.33
54	265	0.888	0.038	0.46	804.68	3.71	0.30	1.35	0.35	1.0	0.53
55	270	0.91	0.070	0.85	891.81	7.54	0.30	1.35	0.35	1.0	1.07
56	275	0.926	0.051	0.61	846.03	5.20	0.30	1.35	0.35	1.0	0.74
57	280	0.937	0.035	0.42	792.17	3.35	0.30	1.35	0.35	1.0	0.47
58	285	0.95	0.042	0.50	816.19	4.08	0.30	1.35	0.35	1.0	0.58
59	290	0.97	0.064	0.77	878.11	6.75	0.30	1.35	0.35	1.0	0.96
60	295	0.976	0.019	0.23	705.04	1.63	0.30	1.35	0.35	1.0	0.23
61	300	0.982	0.019	0.23	705.04	1.63	0.30	1.35	0.35	1.0	0.23
62	305	0.985	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
63	310	0.987	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
64	315	0.989	0.006	0.08	547.11	0.42	0.30	1.35	0.35	1.0	0.06
65	320	0.99	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
66	325	0.993	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
67	330	0.993	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
68	335	0.994	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
69	340	0.995	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
70	345	0.998	0.010	0.12	605.40	0.70	0.30	1.35	0.35	1.0	0.10
71	350	0.998	0.000	0.00	0.00	0.00	0.30	1.35	0.35	1.0	0.00
72	355	0.999	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
73	360	1	0.003	0.04	447.47	0.17	0.30	1.35	0.35	1.0	0.02
TOTAL			3.20								**50.71**

SEDIMENTATION ANALYSIS
BED LOAD CALCULATION - MEYER-PETER EQUATION

ABBOTT WASH

DATE: 06/21
BY: JL

SEGMENT	Q	Y	V	q	S	dm	qb	TIME	Wsoil	V. SED.
	(cfs)	(ft)	(fps)	(cfs)	(ft/ft)	(ft)	(lbs/sec)	(min)	(lbs/c.f.)	(acre-ft)
1	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
2	0.6	0.06	1.36	0.08	0.030	0.02	0.00	2.00	110.00	0.00
3	1.279	0.08	1.58	0.12	0.030	0.02	0.03	2.00	110.00	0.00
4	3.323	0.11	1.91	0.22	0.030	0.02	0.11	2.00	110.00	0.00
5	7.121	0.15	2.22	0.34	0.030	0.02	0.23	2.00	110.00	0.00
6	12.914	0.19	2.50	0.49	0.030	0.02	0.39	2.00	110.00	0.00
7	20.35	0.23	2.74	0.64	0.030	0.02	0.56	2.00	110.00	0.00
8	29.721	0.27	2.96	0.80	0.030	0.02	0.74	2.00	110.00	0.00
9	42.152	0.31	3.17	0.99	0.030	0.02	0.96	2.00	110.00	0.00
10	57.386	0.35	3.37	1.19	0.030	0.02	1.19	2.00	110.00	0.00
11	73.474	0.39	3.55	1.38	0.030	0.02	1.42	2.00	110.00	0.00
12	87.333	0.42	3.67	1.54	0.030	0.02	1.60	2.00	110.00	0.00
13	100.028	0.44	3.77	1.67	0.030	0.02	1.76	2.00	110.00	0.00
14	109.593	0.46	3.84	1.76	0.030	0.02	1.87	2.00	110.00	0.00
15	118.336	0.47	3.90	1.84	0.030	0.02	1.97	2.00	110.00	0.00
16	125.363	0.48	3.95	1.91	0.030	0.02	2.05	2.00	110.00	0.00
17	131.259	0.49	3.98	1.96	0.030	0.02	2.11	2.00	110.00	0.00
18	135.832	0.50	4.01	2.00	0.030	0.02	2.16	2.00	110.00	0.00
19	138.549	0.50	4.03	2.03	0.030	0.02	2.19	2.00	110.00	0.00
20	138.904	0.50	4.03	2.03	0.030	0.02	2.19	2.00	110.00	0.00
21	136.785	0.50	4.01	2.01	0.030	0.02	2.17	2.00	110.00	0.00
22	132.401	0.49	3.99	1.97	0.030	0.02	2.12	2.00	110.00	0.00
23	126.073	0.48	3.95	1.91	0.030	0.02	2.05	2.00	110.00	0.00
24	118.345	0.47	3.90	1.84	0.030	0.02	1.97	2.00	110.00	0.00
25	109.859	0.46	3.84	1.76	0.030	0.02	1.87	2.00	110.00	0.00
26	101.031	0.44	3.78	1.68	0.030	0.02	1.77	2.00	110.00	0.00
27	92.138	0.43	3.71	1.59	0.030	0.02	1.66	2.00	110.00	0.00
28	83.352	0.41	3.64	1.49	0.030	0.02	1.55	2.00	110.00	0.00
29	74.751	0.39	3.56	1.40	0.030	0.02	1.44	2.00	110.00	0.00
30	66.752	0.38	3.48	1.31	0.030	0.02	1.33	2.00	110.00	0.00
31	59.178	0.36	3.40	1.22	0.030	0.02	1.22	2.00	110.00	0.00
32	52.151	0.34	3.31	1.13	0.030	0.02	1.12	2.00	110.00	0.00
33	45.87	0.32	3.23	1.04	0.030	0.02	1.02	2.00	110.00	0.00
34	40.408	0.31	3.15	0.97	0.030	0.02	0.93	2.00	110.00	0.00
35	35.976	0.29	3.07	0.90	0.030	0.02	0.85	2.00	110.00	0.00
36	32.635	0.28	3.01	0.85	0.030	0.02	0.79	2.00	110.00	0.00
37	30.322	0.27	2.97	0.81	0.030	0.02	0.75	2.00	110.00	0.00
38	28.867	0.27	2.94	0.79	0.030	0.02	0.73	2.00	110.00	0.00
39	28.049	0.27	2.92	0.78	0.030	0.02	0.71	2.00	110.00	0.00
40	27.623	0.26	2.92	0.77	0.030	0.02	0.70	2.00	110.00	0.00
41	27.519	0.26	2.91	0.77	0.030	0.02	0.70	2.00	110.00	0.00
42	27.923	0.27	2.92	0.77	0.030	0.02	0.71	2.00	110.00	0.00
43	28.884	0.27	2.94	0.79	0.030	0.02	0.73	2.00	110.00	0.00
44	30.466	0.27	2.97	0.82	0.030	0.02	0.76	2.00	110.00	0.00

45	32.705	0.28	3.02	0.85	0.030	0.02	0.80	2.00	110.00	0.00
46	35.635	0.29	3.07	0.90	0.030	0.02	0.85	2.00	110.00	0.00
47	39.246	0.30	3.13	0.95	0.030	0.02	0.91	2.00	110.00	0.00
48	43.575	0.32	3.19	1.01	0.030	0.02	0.98	2.00	110.00	0.00
49	48.198	0.33	3.26	1.07	0.030	0.02	1.06	2.00	110.00	0.00
50	52.793	0.34	3.32	1.14	0.030	0.02	1.13	2.00	110.00	0.00
51	57.128	0.35	3.37	1.19	0.030	0.02	1.19	2.00	110.00	0.00
52	61.003	0.36	3.42	1.24	0.030	0.02	1.25	2.00	110.00	0.00
53	64.402	0.37	3.45	1.28	0.030	0.02	1.30	2.00	110.00	0.00
54	67.272	0.38	3.48	1.31	0.030	0.02	1.34	2.00	110.00	0.00
55	69.175	0.38	3.50	1.33	0.030	0.02	1.36	2.00	110.00	0.00
56	70.178	0.38	3.51	1.35	0.030	0.02	1.38	2.00	110.00	0.00
57	70.288	0.38	3.51	1.35	0.030	0.02	1.38	2.00	110.00	0.00
58	69.476	0.38	3.51	1.34	0.030	0.02	1.37	2.00	110.00	0.00
59	67.684	0.38	3.49	1.32	0.030	0.02	1.34	2.00	110.00	0.00
60	65.051	0.37	3.46	1.29	0.030	0.02	1.30	2.00	110.00	0.00
61	61.702	0.36	3.42	1.25	0.030	0.02	1.26	2.00	110.00	0.00
62	57.955	0.36	3.38	1.20	0.030	0.02	1.20	2.00	110.00	0.00
63	54.038	0.35	3.33	1.15	0.030	0.02	1.14	2.00	110.00	0.00
64	50.093	0.33	3.28	1.10	0.030	0.02	1.08	2.00	110.00	0.00
65	46.707	0.33	3.24	1.05	0.030	0.02	1.03	2.00	110.00	0.00
66	44.038	0.32	3.20	1.02	0.030	0.02	0.99	2.00	110.00	0.00
67	42.334	0.31	3.18	0.99	0.030	0.02	0.96	2.00	110.00	0.00
68	41.797	0.31	3.17	0.99	0.030	0.02	0.95	2.00	110.00	0.00
69	42.528	0.31	3.18	1.00	0.030	0.02	0.96	2.00	110.00	0.00
70	44.568	0.32	3.21	1.03	0.030	0.02	1.00	2.00	110.00	0.00
71	47.88	0.33	3.25	1.07	0.030	0.02	1.05	2.00	110.00	0.00
72	52.304	0.34	3.31	1.13	0.030	0.02	1.12	2.00	110.00	0.00
73	57.406	0.35	3.37	1.19	0.030	0.02	1.19	2.00	110.00	0.00
74	62.956	0.37	3.44	1.26	0.030	0.02	1.27	2.00	110.00	0.00
75	68.713	0.38	3.50	1.33	0.030	0.02	1.36	2.00	110.00	0.00
76	73.476	0.39	3.55	1.38	0.030	0.02	1.42	2.00	110.00	0.00
77	77.045	0.40	3.58	1.42	0.030	0.02	1.47	2.00	110.00	0.00
78	79.456	0.40	3.60	1.45	0.030	0.02	1.50	2.00	110.00	0.00
79	80.535	0.40	3.61	1.46	0.030	0.02	1.51	2.00	110.00	0.00
80	80.82	0.41	3.61	1.47	0.030	0.02	1.52	2.00	110.00	0.00
81	80.806	0.41	3.61	1.47	0.030	0.02	1.52	2.00	110.00	0.00
82	80.822	0.41	3.61	1.47	0.030	0.02	1.52	2.00	110.00	0.00
83	81.137	0.41	3.62	1.47	0.030	0.02	1.52	2.00	110.00	0.00
84	81.594	0.41	3.62	1.47	0.030	0.02	1.53	2.00	110.00	0.00
85	81.935	0.41	3.62	1.48	0.030	0.02	1.53	2.00	110.00	0.00
86	82.043	0.41	3.62	1.48	0.030	0.02	1.53	2.00	110.00	0.00
87	81.842	0.41	3.62	1.48	0.030	0.02	1.53	2.00	110.00	0.00
88	81.119	0.41	3.62	1.47	0.030	0.02	1.52	2.00	110.00	0.00
89	79.828	0.40	3.60	1.45	0.030	0.02	1.50	2.00	110.00	0.00
90	78.113	0.40	3.59	1.44	0.030	0.02	1.48	2.00	110.00	0.00
91	76.365	0.40	3.57	1.42	0.030	0.02	1.46	2.00	110.00	0.00
92	75.5	0.39	3.56	1.41	0.030	0.02	1.45	2.00	110.00	0.00
93	76.49	0.40	3.57	1.42	0.030	0.02	1.46	2.00	110.00	0.00
94	80.421	0.40	3.61	1.46	0.030	0.02	1.51	2.00	110.00	0.00
95	88.508	0.42	3.68	1.55	0.030	0.02	1.61	2.00	110.00	0.00
96	101.497	0.44	3.78	1.68	0.030	0.02	1.77	2.00	110.00	0.00

97	121.068	0.48	3.92	1.87	0.030	0.02	2.00	2.00	110.00	0.00
98	151.319	0.52	4.10	2.14	0.030	0.02	2.32	2.00	110.00	0.00
99	194.654	0.58	4.31	2.48	0.030	0.02	2.74	2.00	110.00	0.01
100	258.291	0.65	4.56	2.94	0.030	0.02	3.31	2.00	110.00	0.01
101	340.791	0.72	4.82	3.48	0.030	0.02	3.96	2.00	110.00	0.01
102	452.246	0.81	5.10	4.12	0.030	0.02	4.75	2.00	110.00	0.01
103	587.063	0.90	5.37	4.82	0.030	0.02	5.62	2.00	110.00	0.02
104	744.722	0.99	5.63	5.56	0.030	0.02	6.53	2.00	110.00	0.02
105	928.168	1.08	5.89	6.34	0.030	0.02	7.51	2.00	110.00	0.03
106	1132.834	1.17	6.13	7.14	0.030	0.02	8.51	2.00	110.00	0.03
107	1352.186	1.25	6.35	7.95	0.030	0.02	9.51	2.00	110.00	0.04
108	1574.713	1.33	6.54	8.71	0.030	0.02	10.46	2.00	110.00	0.05
109	1794.676	1.40	6.72	9.42	0.030	0.02	11.35	2.00	110.00	0.05
110	1996.559	1.46	6.86	10.04	0.030	0.02	12.13	2.00	110.00	0.06
111	2178.329	1.51	6.98	10.58	0.030	0.02	12.81	2.00	110.00	0.07
112	2341.422	1.56	7.09	11.05	0.030	0.02	13.40	2.00	110.00	0.07
113	2486.126	1.60	7.17	11.45	0.030	0.02	13.91	2.00	110.00	0.08
114	2613.95	1.63	7.24	11.80	0.030	0.02	14.35	2.00	110.00	0.08
115	2728.569	1.66	7.31	12.11	0.030	0.02	14.73	2.00	110.00	0.08
116	2832.189	1.68	7.36	12.38	0.030	0.02	15.08	2.00	110.00	0.09
117	2928.895	1.71	7.41	12.63	0.030	0.02	15.39	2.00	110.00	0.09
118	3019.218	1.73	7.45	12.87	0.030	0.02	15.69	2.00	110.00	0.09
119	3100.344	1.74	7.49	13.07	0.030	0.02	15.95	2.00	110.00	0.09
120	3172.462	1.76	7.53	13.25	0.030	0.02	16.17	2.00	110.00	0.10
121	3233.681	1.77	7.56	13.41	0.030	0.02	16.37	2.00	110.00	0.10
122	3284.088	1.78	7.58	13.53	0.030	0.02	16.52	2.00	110.00	0.10
123	3324.354	1.79	7.60	13.63	0.030	0.02	16.65	2.00	110.00	0.10
124	3355.164	1.80	7.61	13.71	0.030	0.02	16.74	2.00	110.00	0.10
125	3375.878	1.80	7.62	13.76	0.030	0.02	16.81	2.00	110.00	0.10
126	3384.104	1.81	7.63	13.78	0.030	0.02	16.83	2.00	110.00	0.10
127	3378.267	1.81	7.62	13.76	0.030	0.02	16.81	2.00	110.00	0.10
128	3358.427	1.80	7.62	13.71	0.030	0.02	16.75	2.00	110.00	0.10
129	3325.472	1.79	7.60	13.63	0.030	0.02	16.65	2.00	110.00	0.10
130	3281.054	1.78	7.58	13.52	0.030	0.02	16.51	2.00	110.00	0.10
131	3227.337	1.77	7.55	13.39	0.030	0.02	16.35	2.00	110.00	0.10
132	3166.399	1.76	7.53	13.24	0.030	0.02	16.15	2.00	110.00	0.10
133	3099.641	1.74	7.49	13.07	0.030	0.02	15.94	2.00	110.00	0.09
134	3027.805	1.73	7.46	12.89	0.030	0.02	15.71	2.00	110.00	0.09
135	2952.323	1.71	7.42	12.69	0.030	0.02	15.47	2.00	110.00	0.09
136	2874.501	1.69	7.38	12.49	0.030	0.02	15.22	2.00	110.00	0.09
137	2795.219	1.67	7.34	12.28	0.030	0.02	14.95	2.00	110.00	0.09
138	2715.081	1.65	7.30	12.07	0.030	0.02	14.69	2.00	110.00	0.08
139	2634.281	1.63	7.25	11.85	0.030	0.02	14.41	2.00	110.00	0.08
140	2552.036	1.61	7.21	11.63	0.030	0.02	14.13	2.00	110.00	0.08
141	2467.708	1.59	7.16	11.40	0.030	0.02	13.84	2.00	110.00	0.08
142	2380.792	1.57	7.11	11.16	0.030	0.02	13.54	2.00	110.00	0.07
143	2290.974	1.55	7.05	10.90	0.030	0.02	13.22	2.00	110.00	0.07
144	2198.675	1.52	7.00	10.64	0.030	0.02	12.88	2.00	110.00	0.07
145	2105.034	1.49	6.94	10.36	0.030	0.02	12.54	2.00	110.00	0.06
146	2011.583	1.47	6.87	10.08	0.030	0.02	12.19	2.00	110.00	0.06
147	1919.548	1.44	6.81	9.80	0.030	0.02	11.84	2.00	110.00	0.06
148	1829.484	1.41	6.74	9.53	0.030	0.02	11.49	2.00	110.00	0.06

149	1741.414	1.38	6.68	9.25	0.030	0.02	11.14	2.00	110.00	0.05
150	1655.025	1.36	6.61	8.97	0.030	0.02	10.79	2.00	110.00	0.05
151	1570.01	1.33	6.54	8.69	0.030	0.02	10.44	2.00	110.00	0.05
152	1486.274	1.30	6.47	8.41	0.030	0.02	10.09	2.00	110.00	0.04
153	1403.807	1.27	6.40	8.13	0.030	0.02	9.74	2.00	110.00	0.04
154	1322.954	1.24	6.32	7.84	0.030	0.02	9.38	2.00	110.00	0.04
155	1244.361	1.21	6.24	7.56	0.030	0.02	9.03	2.00	110.00	0.04
156	1168.52	1.18	6.17	7.28	0.030	0.02	8.68	2.00	110.00	0.03
157	1095.972	1.15	6.09	7.00	0.030	0.02	8.34	2.00	110.00	0.03
158	1027.118	1.12	6.01	6.74	0.030	0.02	8.00	2.00	110.00	0.03
159	961.323	1.09	5.93	6.47	0.030	0.02	7.68	2.00	110.00	0.03
160	898.69	1.06	5.85	6.22	0.030	0.02	7.36	2.00	110.00	0.03
161	839.034	1.03	5.77	5.97	0.030	0.02	7.04	2.00	110.00	0.02
162	782.311	1.01	5.69	5.72	0.030	0.02	6.74	2.00	110.00	0.02
163	728.655	0.98	5.61	5.48	0.030	0.02	6.44	2.00	110.00	0.02
164	678.249	0.95	5.53	5.25	0.030	0.02	6.16	2.00	110.00	0.02
165	631.135	0.92	5.45	5.03	0.030	0.02	5.88	2.00	110.00	0.02
166	586.973	0.90	5.37	4.82	0.030	0.02	5.61	2.00	110.00	0.02
167	545.379	0.87	5.29	4.61	0.030	0.02	5.36	2.00	110.00	0.02
168	506.112	0.84	5.22	4.41	0.030	0.02	5.11	2.00	110.00	0.01
169	469.057	0.82	5.14	4.21	0.030	0.02	4.86	2.00	110.00	0.01
170	434.084	0.79	5.06	4.02	0.030	0.02	4.63	2.00	110.00	0.01
171	401.154	0.77	4.98	3.83	0.030	0.02	4.40	2.00	110.00	0.01
172	370.25	0.75	4.90	3.65	0.030	0.02	4.18	2.00	110.00	0.01
173	341.445	0.72	4.82	3.48	0.030	0.02	3.96	2.00	110.00	0.01
174	314.794	0.70	4.74	3.31	0.030	0.02	3.76	2.00	110.00	0.01
175	290.046	0.68	4.67	3.15	0.030	0.02	3.57	2.00	110.00	0.01
176	267.281	0.65	4.59	3.00	0.030	0.02	3.38	2.00	110.00	0.01
177	246.234	0.63	4.52	2.86	0.030	0.02	3.20	2.00	110.00	0.01
178	226.65	0.61	4.44	2.72	0.030	0.02	3.03	2.00	110.00	0.01
179	208.481	0.59	4.37	2.59	0.030	0.02	2.87	2.00	110.00	0.01
180	191.672	0.57	4.29	2.46	0.030	0.02	2.72	2.00	110.00	0.01
181	176.129	0.55	4.22	2.34	0.030	0.02	2.57	2.00	110.00	0.00
182	161.735	0.54	4.15	2.22	0.030	0.02	2.43	2.00	110.00	0.00
183	148.377	0.52	4.08	2.11	0.030	0.02	2.29	2.00	110.00	0.00
184	135.977	0.50	4.01	2.00	0.030	0.02	2.16	2.00	110.00	0.00
185	124.539	0.48	3.94	1.90	0.030	0.02	2.04	2.00	110.00	0.00
186	113.935	0.47	3.87	1.80	0.030	0.02	1.92	2.00	110.00	0.00
187	103.964	0.45	3.80	1.70	0.030	0.02	1.80	2.00	110.00	0.00
188	94.712	0.43	3.73	1.61	0.030	0.02	1.69	2.00	110.00	0.00
189	86.11	0.42	3.66	1.52	0.030	0.02	1.58	2.00	110.00	0.00
190	78.104	0.40	3.59	1.44	0.030	0.02	1.48	2.00	110.00	0.00
191	70.71	0.38	3.52	1.35	0.030	0.02	1.38	2.00	110.00	0.00
192	63.916	0.37	3.45	1.27	0.030	0.02	1.29	2.00	110.00	0.00
193	57.695	0.35	3.38	1.20	0.030	0.02	1.20	2.00	110.00	0.00
194	52.011	0.34	3.31	1.13	0.030	0.02	1.11	2.00	110.00	0.00
195	46.813	0.33	3.24	1.06	0.030	0.02	1.03	2.00	110.00	0.00
196	42.076	0.31	3.17	0.99	0.030	0.02	0.96	2.00	110.00	0.00
197	37.769	0.30	3.10	0.93	0.030	0.02	0.88	2.00	110.00	0.00
198	33.834	0.29	3.04	0.87	0.030	0.02	0.82	2.00	110.00	0.00
199	30.259	0.27	2.97	0.81	0.030	0.02	0.75	2.00	110.00	0.00
200	27.03	0.26	2.90	0.76	0.030	0.02	0.69	2.00	110.00	0.00

201	24.133	0.25	2.84	0.71	0.030	0.02	0.63	2.00	110.00	0.00
202	21.548	0.24	2.77	0.66	0.030	0.02	0.58	2.00	110.00	0.00
203	19.244	0.23	2.71	0.62	0.030	0.02	0.53	2.00	110.00	0.00
204	17.188	0.22	2.65	0.58	0.030	0.02	0.49	2.00	110.00	0.00
205	15.354	0.21	2.59	0.54	0.030	0.02	0.44	2.00	110.00	0.00
206	13.715	0.20	2.53	0.51	0.030	0.02	0.41	2.00	110.00	0.00
207	12.246	0.19	2.48	0.47	0.030	0.02	0.37	2.00	110.00	0.00
208	10.925	0.18	2.42	0.44	0.030	0.02	0.34	2.00	110.00	0.00
209	9.762	0.17	2.37	0.41	0.030	0.02	0.31	2.00	110.00	0.00
210	8.733	0.17	2.32	0.39	0.030	0.02	0.28	2.00	110.00	0.00
211	7.801	0.16	2.26	0.36	0.030	0.02	0.25	2.00	110.00	0.00
212	6.961	0.15	2.21	0.34	0.030	0.02	0.23	2.00	110.00	0.00
213	6.25	0.15	2.17	0.32	0.030	0.02	0.20	2.00	110.00	0.00
214	5.591	0.14	2.12	0.30	0.030	0.02	0.18	2.00	110.00	0.00
215	5.004	0.13	2.07	0.28	0.030	0.02	0.16	2.00	110.00	0.00
216	4.497	0.13	2.03	0.26	0.030	0.02	0.15	2.00	110.00	0.00
217	4.022	0.12	1.98	0.24	0.030	0.02	0.13	2.00	110.00	0.00
218	3.63	0.12	1.94	0.23	0.030	0.02	0.12	2.00	110.00	0.00
219	3.249	0.11	1.90	0.21	0.030	0.02	0.10	2.00	110.00	0.00
220	2.942	0.11	1.86	0.20	0.030	0.02	0.09	2.00	110.00	0.00
221	2.64	0.10	1.82	0.19	0.030	0.02	0.08	2.00	110.00	0.00
222	2.397	0.10	1.79	0.18	0.030	0.02	0.07	2.00	110.00	0.00
223	2.155	0.10	1.75	0.17	0.030	0.02	0.06	2.00	110.00	0.00
224	1.961	0.09	1.72	0.16	0.030	0.02	0.05	2.00	110.00	0.00
225	1.771	0.09	1.68	0.15	0.030	0.02	0.05	2.00	110.00	0.00
226	1.607	0.08	1.65	0.14	0.030	0.02	0.04	2.00	110.00	0.00
227	1.459	0.08	1.62	0.13	0.030	0.02	0.03	2.00	110.00	0.00
228	1.315	0.08	1.59	0.12	0.030	0.02	0.03	2.00	110.00	0.00
229	1.202	0.08	1.56	0.12	0.030	0.02	0.02	2.00	110.00	0.00
230	1.09	0.07	1.53	0.11	0.030	0.02	0.02	2.00	110.00	0.00
231	0.988	0.07	1.50	0.10	0.030	0.02	0.02	2.00	110.00	0.00
232	0.902	0.07	1.47	0.10	0.030	0.02	0.01	2.00	110.00	0.00
233	0.815	0.06	1.44	0.09	0.030	0.02	0.01	2.00	110.00	0.00
234	0.738	0.06	1.41	0.09	0.030	0.02	0.01	2.00	110.00	0.00
235	0.674	0.06	1.39	0.08	0.030	0.02	0.00	2.00	110.00	0.00
236	0.61	0.06	1.36	0.08	0.030	0.02	0.00	2.00	110.00	0.00
237	0.6	0.06	1.36	0.08	0.030	0.02	0.00	2.00	110.00	0.00
238	0.6	0.06	1.36	0.08	0.030	0.02	0.00	2.00	110.00	0.00
239	0.59	0.06	1.35	0.08	0.030	0.02	0.00	2.00	110.00	0.00
240	0.58	0.06	1.35	0.08	0.030	0.02	0.00	2.00	110.00	0.00
241	0.57	0.06	1.34	0.07	0.030	0.02	0.00	2.00	110.00	0.00
242	0.56	0.06	1.34	0.07	0.030	0.02	0.00	2.00	110.00	0.00
243	0.55	0.06	1.33	0.07	0.030	0.02	0.00	2.00	110.00	0.00
244	0.54	0.05	1.33	0.07	0.030	0.02	0.00	2.00	110.00	0.00
245	0.53	0.05	1.32	0.07	0.030	0.02	0.00	2.00	110.00	0.00
246	0.52	0.05	1.32	0.07	0.030	0.02	0.00	2.00	110.00	0.00
247	0.51	0.05	1.31	0.07	0.030	0.02	0.00	2.00	110.00	0.00
248	0.51	0.05	1.31	0.07	0.030	0.02	0.00	2.00	110.00	0.00
249	0.51	0.05	1.31	0.07	0.030	0.02	0.00	2.00	110.00	0.00
250	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
251	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
252	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00

253	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
254	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
255	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
256	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
257	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
258	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
259	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
260	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
261	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
262	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
263	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
264	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
265	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
266	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
267	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
268	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
269	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
270	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
271	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
272	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
273	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
274	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
275	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
276	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
277	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
278	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
279	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
280	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
281	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
282	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
283	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
284	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
285	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
286	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
287	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
288	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
289	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
290	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
291	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
292	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
293	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
294	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
295	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
296	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
297	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
298	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
299	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
300	0	0.00	0.00	0.00	0.030	0.02	0.00	2.00	110.00	0.00
TOTAL										**4.55**

SEDIMENTATION ANALYSIS
WASH LOAD CALCULATION - UNIVERSAL SOIL LOSS EQUATION

PULSIPHER WASH

DATE: 06/22/00
BY: JL

	TIME (min.)	DISTRIB.	RAINFALL (inch)	INTENSITY (in./hr.)	E	R	K	LS	C	P	A (tons/ac.)
1	0	0	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
2	5	0.02	0.066	0.79	881.66	6.94	0.30	1.45	0.35	1.0	1.06
3	10	0.057	0.121	1.46	970.10	14.13	0.30	1.45	0.35	1.0	2.15
4	15	0.07	0.043	0.51	819.74	4.20	0.30	1.45	0.35	1.0	0.64
5	20	0.087	0.056	0.67	858.30	5.75	0.30	1.45	0.35	1.0	0.87
6	25	0.108	0.069	0.83	888.68	7.35	0.30	1.45	0.35	1.0	1.12
7	30	0.124	0.052	0.63	849.58	5.35	0.30	1.45	0.35	1.0	0.81
8	35	0.13	0.020	0.24	708.59	1.67	0.30	1.45	0.35	1.0	0.25
9	40	0.13	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
10	45	0.13	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
11	50	0.13	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
12	55	0.13	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
13	60	0.13	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
14	65	0.133	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
15	70	0.14	0.023	0.28	730.75	2.01	0.30	1.45	0.35	1.0	0.31
16	75	0.142	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
17	80	0.148	0.020	0.24	708.59	1.67	0.30	1.45	0.35	1.0	0.25
18	85	0.158	0.033	0.39	782.02	3.08	0.30	1.45	0.35	1.0	0.47
19	90	0.172	0.046	0.55	830.39	4.58	0.30	1.45	0.35	1.0	0.70
20	95	0.181	0.030	0.35	766.88	2.72	0.30	1.45	0.35	1.0	0.41
21	100	0.19	0.030	0.35	766.88	2.72	0.30	1.45	0.35	1.0	0.41
22	105	0.197	0.023	0.28	730.75	2.01	0.30	1.45	0.35	1.0	0.31
23	110	0.199	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
24	115	0.2	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
25	120	0.201	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
26	125	0.204	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
27	130	0.214	0.033	0.39	782.02	3.08	0.30	1.45	0.35	1.0	0.47
28	135	0.229	0.049	0.59	840.31	4.96	0.30	1.45	0.35	1.0	0.76
29	140	0.241	0.039	0.47	808.23	3.82	0.30	1.45	0.35	1.0	0.58
30	145	0.249	0.026	0.32	749.94	2.36	0.30	1.45	0.35	1.0	0.36
31	150	0.251	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
32	155	0.256	0.016	0.20	682.38	1.34	0.30	1.45	0.35	1.0	0.20
33	160	0.27	0.046	0.55	830.39	4.58	0.30	1.45	0.35	1.0	0.70
34	165	0.278	0.026	0.32	749.94	2.36	0.30	1.45	0.35	1.0	0.36
35	170	0.281	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
36	175	0.283	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
37	180	0.295	0.039	0.47	808.23	3.82	0.30	1.45	0.35	1.0	0.58
38	185	0.322	0.089	1.06	924.80	9.83	0.30	1.45	0.35	1.0	1.50
39	190	0.352	0.098	1.18	939.95	11.10	0.30	1.45	0.35	1.0	1.69
40	195	0.409	0.187	2.24	1032.22	23.17	0.30	1.45	0.35	1.0	3.53
41	200	0.499	0.295	3.54	1097.88	38.91	0.30	1.45	0.35	1.0	5.92
42	205	0.59	0.298	3.58	1099.46	39.40	0.30	1.45	0.35	1.0	6.00
43	210	0.71	0.394	4.73	1139.23	53.83	0.30	1.45	0.35	1.0	8.20

44	215	0.744	0.112	1.34	957.94	12.82	0.30	1.45	0.35	1.0	1.95
45	220	0.781	0.121	1.46	970.10	14.13	0.30	1.45	0.35	1.0	2.15
46	225	0.812	0.102	1.22	944.66	11.53	0.30	1.45	0.35	1.0	1.76
47	230	0.819	0.023	0.28	730.75	2.01	0.30	1.45	0.35	1.0	0.31
48	235	0.835	0.052	0.63	849.58	5.35	0.30	1.45	0.35	1.0	0.81
49	240	0.851	0.052	0.63	849.58	5.35	0.30	1.45	0.35	1.0	0.81
50	245	0.856	0.016	0.20	682.38	1.34	0.30	1.45	0.35	1.0	0.20
51	250	0.86	0.013	0.16	650.30	1.02	0.30	1.45	0.35	1.0	0.16
52	255	0.868	0.026	0.32	749.94	2.36	0.30	1.45	0.35	1.0	0.36
53	260	0.876	0.026	0.32	749.94	2.36	0.30	1.45	0.35	1.0	0.36
54	265	0.888	0.039	0.47	808.23	3.82	0.30	1.45	0.35	1.0	0.58
55	270	0.91	0.072	0.87	895.36	7.76	0.30	1.45	0.35	1.0	1.18
56	275	0.926	0.052	0.63	849.58	5.35	0.30	1.45	0.35	1.0	0.81
57	280	0.937	0.036	0.43	795.72	3.45	0.30	1.45	0.35	1.0	0.52
58	285	0.95	0.043	0.51	819.74	4.20	0.30	1.45	0.35	1.0	0.64
59	290	0.97	0.066	0.79	881.66	6.94	0.30	1.45	0.35	1.0	1.06
60	295	0.976	0.020	0.24	708.59	1.67	0.30	1.45	0.35	1.0	0.25
61	300	0.982	0.020	0.24	708.59	1.67	0.30	1.45	0.35	1.0	0.25
62	305	0.985	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
63	310	0.987	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
64	315	0.989	0.007	0.08	550.66	0.43	0.30	1.45	0.35	1.0	0.07
65	320	0.99	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
66	325	0.993	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
67	330	0.993	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
68	335	0.994	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
69	340	0.995	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
70	345	0.998	0.010	0.12	608.95	0.72	0.30	1.45	0.35	1.0	0.11
71	350	0.998	0.000	0.00	0.00	0.00	0.30	1.45	0.35	1.0	0.00
72	355	0.999	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
73	360	1	0.003	0.04	451.02	0.18	0.30	1.45	0.35	1.0	0.03
TOTAL			3.28								**56.04**

SEDIMENTATION ANALYSIS

BED LOAD CALCULATION - MEYER-PETER EQUATION

PULSIPHER WASH @ I-15

DATE: 06/21
BY: JL

SEGMENT	Q	Y	V	q	S	dm	qb	TIME	Wsoil	V. SED.
	(cfs)	(ft)	(fps)	(cfs)	(ft/ft)	(ft)	(lbs/sec	(min)	(lbs/c.f.)	(acre-ft)
1	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
2	1.636	0.09	1.66	0.14	0.032	0.02	0.05	2.00	110.00	0.00
3	8.281	0.16	2.29	0.37	0.032	0.02	0.30	2.00	110.00	0.00
4	25.238	0.25	2.86	0.73	0.032	0.02	0.74	2.00	110.00	0.00
5	55.451	0.35	3.35	1.17	0.032	0.02	1.31	2.00	110.00	0.00
6	98.751	0.44	3.76	1.65	0.032	0.02	1.94	2.00	110.00	0.00
7	150.942	0.52	4.09	2.13	0.032	0.02	2.58	2.00	110.00	0.00
8	203.179	0.59	4.35	2.55	0.032	0.02	3.14	2.00	110.00	0.01
9	243.846	0.63	4.51	2.84	0.032	0.02	3.54	2.00	110.00	0.01
10	269.89	0.66	4.60	3.02	0.032	0.02	3.78	2.00	110.00	0.01
11	284.463	0.67	4.65	3.12	0.032	0.02	3.91	2.00	110.00	0.01
12	293.591	0.68	4.68	3.18	0.032	0.02	3.99	2.00	110.00	0.01
13	303.273	0.69	4.71	3.24	0.032	0.02	4.08	2.00	110.00	0.01
14	317.633	0.70	4.75	3.33	0.032	0.02	4.20	2.00	110.00	0.01
15	334.9	0.72	4.80	3.44	0.032	0.02	4.34	2.00	110.00	0.01
16	352.213	0.73	4.85	3.54	0.032	0.02	4.49	2.00	110.00	0.01
17	366.593	0.74	4.89	3.63	0.032	0.02	4.61	2.00	110.00	0.01
18	375.677	0.75	4.91	3.68	0.032	0.02	4.68	2.00	110.00	0.01
19	377.253	0.75	4.92	3.69	0.032	0.02	4.69	2.00	110.00	0.01
20	371.314	0.75	4.90	3.66	0.032	0.02	4.64	2.00	110.00	0.01
21	359.295	0.74	4.87	3.59	0.032	0.02	4.55	2.00	110.00	0.01
22	342.895	0.72	4.82	3.49	0.032	0.02	4.41	2.00	110.00	0.01
23	324.164	0.71	4.77	3.37	0.032	0.02	4.25	2.00	110.00	0.01
24	305.569	0.69	4.71	3.26	0.032	0.02	4.10	2.00	110.00	0.01
25	287.775	0.67	4.66	3.14	0.032	0.02	3.94	2.00	110.00	0.01
26	271.294	0.66	4.60	3.03	0.032	0.02	3.79	2.00	110.00	0.01
27	256.149	0.64	4.55	2.93	0.032	0.02	3.65	2.00	110.00	0.01
28	241.827	0.63	4.50	2.83	0.032	0.02	3.52	2.00	110.00	0.01
29	227.996	0.61	4.45	2.73	0.032	0.02	3.39	2.00	110.00	0.01
30	214.438	0.60	4.39	2.63	0.032	0.02	3.25	2.00	110.00	0.01
31	200.996	0.58	4.34	2.53	0.032	0.02	3.12	2.00	110.00	0.01
32	187.88	0.57	4.28	2.43	0.032	0.02	2.98	2.00	110.00	0.01
33	175.612	0.55	4.22	2.33	0.032	0.02	2.85	2.00	110.00	0.01
34	165.1	0.54	4.17	2.25	0.032	0.02	2.74	2.00	110.00	0.01
35	157.039	0.53	4.13	2.18	0.032	0.02	2.65	2.00	110.00	0.00
36	151.78	0.52	4.10	2.14	0.032	0.02	2.59	2.00	110.00	0.00
37	148.865	0.52	4.08	2.11	0.032	0.02	2.56	2.00	110.00	0.00
38	146.707	0.51	4.07	2.10	0.032	0.02	2.53	2.00	110.00	0.00
39	143.162	0.51	4.05	2.07	0.032	0.02	2.49	2.00	110.00	0.00
40	137.903	0.50	4.02	2.02	0.032	0.02	2.43	2.00	110.00	0.00
41	132.144	0.49	3.99	1.97	0.032	0.02	2.36	2.00	110.00	0.00
42	127.814	0.49	3.96	1.93	0.032	0.02	2.31	2.00	110.00	0.00
43	126.492	0.49	3.95	1.92	0.032	0.02	2.29	2.00	110.00	0.00

44	129.339	0.49	3.97	1.94	0.032	0.02	2.33	2.00	110.00	0.00
45	136.101	0.50	4.01	2.00	0.032	0.02	2.41	2.00	110.00	0.00
46	146.097	0.51	4.07	2.09	0.032	0.02	2.53	2.00	110.00	0.00
47	158.255	0.53	4.13	2.19	0.032	0.02	2.66	2.00	110.00	0.00
48	170.77	0.55	4.20	2.30	0.032	0.02	2.80	2.00	110.00	0.01
49	181.162	0.56	4.25	2.38	0.032	0.02	2.91	2.00	110.00	0.01
50	188.621	0.57	4.28	2.44	0.032	0.02	2.99	2.00	110.00	0.01
51	193.558	0.58	4.30	2.48	0.032	0.02	3.04	2.00	110.00	0.01
52	196.84	0.58	4.32	2.50	0.032	0.02	3.08	2.00	110.00	0.01
53	199.301	0.58	4.33	2.52	0.032	0.02	3.10	2.00	110.00	0.01
54	201.162	0.58	4.34	2.53	0.032	0.02	3.12	2.00	110.00	0.01
55	201.609	0.58	4.34	2.54	0.032	0.02	3.12	2.00	110.00	0.01
56	199.878	0.58	4.33	2.52	0.032	0.02	3.11	2.00	110.00	0.01
57	195.537	0.58	4.31	2.49	0.032	0.02	3.06	2.00	110.00	0.01
58	188.956	0.57	4.28	2.44	0.032	0.02	2.99	2.00	110.00	0.01
59	181.065	0.56	4.25	2.38	0.032	0.02	2.91	2.00	110.00	0.01
60	172.639	0.55	4.21	2.31	0.032	0.02	2.82	2.00	110.00	0.01
61	164.474	0.54	4.17	2.24	0.032	0.02	2.73	2.00	110.00	0.01
62	157.077	0.53	4.13	2.18	0.032	0.02	2.65	2.00	110.00	0.00
63	150.663	0.52	4.09	2.13	0.032	0.02	2.58	2.00	110.00	0.00
64	145.91	0.51	4.07	2.09	0.032	0.02	2.52	2.00	110.00	0.00
65	143.597	0.51	4.05	2.07	0.032	0.02	2.50	2.00	110.00	0.00
66	144.64	0.51	4.06	2.08	0.032	0.02	2.51	2.00	110.00	0.00
67	149.894	0.52	4.09	2.12	0.032	0.02	2.57	2.00	110.00	0.00
68	159.337	0.53	4.14	2.20	0.032	0.02	2.68	2.00	110.00	0.00
69	172.299	0.55	4.20	2.31	0.032	0.02	2.82	2.00	110.00	0.01
70	187.29	0.57	4.28	2.43	0.032	0.02	2.98	2.00	110.00	0.01
71	201.808	0.58	4.34	2.54	0.032	0.02	3.13	2.00	110.00	0.01
72	213.751	0.60	4.39	2.63	0.032	0.02	3.25	2.00	110.00	0.01
73	222.159	0.61	4.42	2.69	0.032	0.02	3.33	2.00	110.00	0.01
74	226.122	0.61	4.44	2.72	0.032	0.02	3.37	2.00	110.00	0.01
75	225.865	0.61	4.44	2.72	0.032	0.02	3.36	2.00	110.00	0.01
76	221.868	0.61	4.42	2.69	0.032	0.02	3.33	2.00	110.00	0.01
77	214.938	0.60	4.39	2.64	0.032	0.02	3.26	2.00	110.00	0.01
78	206.849	0.59	4.36	2.58	0.032	0.02	3.18	2.00	110.00	0.01
79	200.454	0.58	4.33	2.53	0.032	0.02	3.11	2.00	110.00	0.01
80	197.955	0.58	4.32	2.51	0.032	0.02	3.09	2.00	110.00	0.01
81	201.254	0.58	4.34	2.53	0.032	0.02	3.12	2.00	110.00	0.01
82	210.371	0.59	4.38	2.60	0.032	0.02	3.21	2.00	110.00	0.01
83	222.543	0.61	4.43	2.69	0.032	0.02	3.33	2.00	110.00	0.01
84	233.468	0.62	4.47	2.77	0.032	0.02	3.44	2.00	110.00	0.01
85	240.228	0.63	4.49	2.82	0.032	0.02	3.50	2.00	110.00	0.01
86	241.334	0.63	4.50	2.83	0.032	0.02	3.51	2.00	110.00	0.01
87	236.957	0.62	4.48	2.79	0.032	0.02	3.47	2.00	110.00	0.01
88	228.854	0.61	4.45	2.74	0.032	0.02	3.39	2.00	110.00	0.01
89	219.5	0.60	4.41	2.67	0.032	0.02	3.30	2.00	110.00	0.01
90	211.239	0.60	4.38	2.61	0.032	0.02	3.22	2.00	110.00	0.01
91	207.11	0.59	4.36	2.58	0.032	0.02	3.18	2.00	110.00	0.01
92	210.205	0.59	4.38	2.60	0.032	0.02	3.21	2.00	110.00	0.01
93	222.65	0.61	4.43	2.69	0.032	0.02	3.33	2.00	110.00	0.01
94	246.693	0.63	4.52	2.86	0.032	0.02	3.56	2.00	110.00	0.01
95	282.193	0.67	4.64	3.10	0.032	0.02	3.89	2.00	110.00	0.01

96	326.222	0.71	4.78	3.39	0.032	0.02	4.27	2.00	110.00	0.01
97	380.705	0.75	4.93	3.71	0.032	0.02	4.72	2.00	110.00	0.01
98	455.556	0.81	5.11	4.14	0.032	0.02	5.29	2.00	110.00	0.01
99	568.656	0.89	5.34	4.73	0.032	0.02	6.10	2.00	110.00	0.02
100	737.516	0.98	5.62	5.52	0.032	0.02	7.19	2.00	110.00	0.02
101	970.135	1.10	5.94	6.51	0.032	0.02	8.55	2.00	110.00	0.03
102	1265.85	1.22	6.27	7.64	0.032	0.02	10.10	2.00	110.00	0.04
103	1608.88	1.34	6.57	8.82	0.032	0.02	11.73	2.00	110.00	0.05
104	1974.37	1.46	6.85	9.97	0.032	0.02	13.32	2.00	110.00	0.07
105	2354.08	1.56	7.09	11.08	0.032	0.02	14.86	2.00	110.00	0.08
106	2749.67	1.66	7.32	12.16	0.032	0.02	16.36	2.00	110.00	0.09
107	3153.19	1.76	7.52	13.21	0.032	0.02	17.80	2.00	110.00	0.11
108	3525.71	1.84	7.69	14.12	0.032	0.02	19.07	2.00	110.00	0.12
109	3797.69	1.89	7.80	14.76	0.032	0.02	19.97	2.00	110.00	0.13
110	3933.27	1.92	7.86	15.08	0.032	0.02	20.40	2.00	110.00	0.13
111	3956.3	1.92	7.87	15.13	0.032	0.02	20.48	2.00	110.00	0.13
112	3915.26	1.91	7.85	15.04	0.032	0.02	20.35	2.00	110.00	0.13
113	3857.07	1.90	7.83	14.90	0.032	0.02	20.16	2.00	110.00	0.13
114	3815.38	1.90	7.81	14.81	0.032	0.02	20.02	2.00	110.00	0.13
115	3779.21	1.89	7.80	14.72	0.032	0.02	19.91	2.00	110.00	0.13
116	3735.04	1.88	7.78	14.62	0.032	0.02	19.76	2.00	110.00	0.13
117	3675.9	1.87	7.75	14.48	0.032	0.02	19.57	2.00	110.00	0.12
118	3604.66	1.85	7.72	14.31	0.032	0.02	19.34	2.00	110.00	0.12
119	3531.57	1.84	7.69	14.13	0.032	0.02	19.09	2.00	110.00	0.12
120	3462.66	1.82	7.66	13.97	0.032	0.02	18.86	2.00	110.00	0.12
121	3398.78	1.81	7.63	13.81	0.032	0.02	18.65	2.00	110.00	0.11
122	3334.46	1.80	7.60	13.66	0.032	0.02	18.43	2.00	110.00	0.11
123	3261.44	1.78	7.57	13.48	0.032	0.02	18.18	2.00	110.00	0.11
124	3172.52	1.76	7.53	13.25	0.032	0.02	17.87	2.00	110.00	0.11
125	3065.42	1.74	7.48	12.98	0.032	0.02	17.50	2.00	110.00	0.10
126	2941.59	1.71	7.42	12.67	0.032	0.02	17.06	2.00	110.00	0.10
127	2804.56	1.68	7.35	12.31	0.032	0.02	16.56	2.00	110.00	0.09
128	2658.44	1.64	7.27	11.92	0.032	0.02	16.02	2.00	110.00	0.09
129	2507.75	1.60	7.18	11.51	0.032	0.02	15.45	2.00	110.00	0.08
130	2354.51	1.56	7.09	11.08	0.032	0.02	14.86	2.00	110.00	0.08
131	2200.06	1.52	7.00	10.64	0.032	0.02	14.25	2.00	110.00	0.07
132	2046.08	1.48	6.90	10.19	0.032	0.02	13.62	2.00	110.00	0.07
133	1894.53	1.43	6.79	9.73	0.032	0.02	12.98	2.00	110.00	0.06
134	1748.16	1.39	6.68	9.27	0.032	0.02	12.35	2.00	110.00	0.06
135	1610.35	1.34	6.57	8.82	0.032	0.02	11.74	2.00	110.00	0.05
136	1484.67	1.30	6.47	8.40	0.032	0.02	11.16	2.00	110.00	0.05
137	1373.44	1.26	6.37	8.02	0.032	0.02	10.63	2.00	110.00	0.05
138	1275.65	1.22	6.27	7.67	0.032	0.02	10.15	2.00	110.00	0.04
139	1186.39	1.19	6.18	7.35	0.032	0.02	9.70	2.00	110.00	0.04
140	1101.44	1.15	6.09	7.03	0.032	0.02	9.26	2.00	110.00	0.04
141	1019.06	1.12	6.00	6.71	0.032	0.02	8.81	2.00	110.00	0.03
142	939.995	1.08	5.90	6.39	0.032	0.02	8.38	2.00	110.00	0.03
143	867.302	1.05	5.81	6.09	0.032	0.02	7.96	2.00	110.00	0.03
144	804.45	1.02	5.72	5.82	0.032	0.02	7.60	2.00	110.00	0.03
145	752.969	0.99	5.65	5.59	0.032	0.02	7.29	2.00	110.00	0.02
146	714.15	0.97	5.59	5.42	0.032	0.02	7.05	2.00	110.00	0.02
147	687.129	0.95	5.54	5.29	0.032	0.02	6.88	2.00	110.00	0.02

148	667.611	0.94	5.51	5.20	0.032	0.02	6.75	2.00	110.00	0.02
149	648.74	0.93	5.48	5.11	0.032	0.02	6.63	2.00	110.00	0.02
150	626.525	0.92	5.44	5.01	0.032	0.02	6.48	2.00	110.00	0.02
151	601.253	0.91	5.40	4.89	0.032	0.02	6.32	2.00	110.00	0.02
152	575.042	0.89	5.35	4.76	0.032	0.02	6.14	2.00	110.00	0.02
153	550.185	0.87	5.30	4.63	0.032	0.02	5.97	2.00	110.00	0.02
154	528.042	0.86	5.26	4.52	0.032	0.02	5.82	2.00	110.00	0.02
155	507.352	0.85	5.22	4.41	0.032	0.02	5.67	2.00	110.00	0.02
156	487.361	0.83	5.18	4.31	0.032	0.02	5.53	2.00	110.00	0.02
157	467.703	0.82	5.13	4.20	0.032	0.02	5.38	2.00	110.00	0.02
158	448.15	0.80	5.09	4.10	0.032	0.02	5.24	2.00	110.00	0.01
159	428.778	0.79	5.05	3.99	0.032	0.02	5.09	2.00	110.00	0.01
160	409.267	0.78	5.00	3.88	0.032	0.02	4.94	2.00	110.00	0.01
161	389.307	0.76	4.95	3.76	0.032	0.02	4.79	2.00	110.00	0.01
162	368.887	0.74	4.90	3.64	0.032	0.02	4.62	2.00	110.00	0.01
163	348.363	0.73	4.84	3.52	0.032	0.02	4.46	2.00	110.00	0.01
164	328.324	0.71	4.78	3.40	0.032	0.02	4.29	2.00	110.00	0.01
165	308.798	0.69	4.72	3.28	0.032	0.02	4.12	2.00	110.00	0.01
166	289.14	0.68	4.66	3.15	0.032	0.02	3.95	2.00	110.00	0.01
167	268.798	0.66	4.60	3.01	0.032	0.02	3.77	2.00	110.00	0.01
168	247.9	0.63	4.52	2.87	0.032	0.02	3.58	2.00	110.00	0.01
169	227.116	0.61	4.44	2.72	0.032	0.02	3.38	2.00	110.00	0.01
170	207.292	0.59	4.36	2.58	0.032	0.02	3.18	2.00	110.00	0.01
171	188.907	0.57	4.28	2.44	0.032	0.02	2.99	2.00	110.00	0.01
172	172.19	0.55	4.20	2.31	0.032	0.02	2.82	2.00	110.00	0.01
173	157.288	0.53	4.13	2.19	0.032	0.02	2.65	2.00	110.00	0.00
174	144.373	0.51	4.06	2.08	0.032	0.02	2.51	2.00	110.00	0.00
175	133.156	0.50	3.99	1.98	0.032	0.02	2.37	2.00	110.00	0.00
176	122.674	0.48	3.93	1.88	0.032	0.02	2.25	2.00	110.00	0.00
177	112.127	0.46	3.86	1.78	0.032	0.02	2.12	2.00	110.00	0.00
178	101.494	0.44	3.78	1.68	0.032	0.02	1.98	2.00	110.00	0.00
179	91.277	0.43	3.70	1.58	0.032	0.02	1.84	2.00	110.00	0.00
180	82.156	0.41	3.63	1.48	0.032	0.02	1.71	2.00	110.00	0.00
181	74.451	0.39	3.55	1.40	0.032	0.02	1.60	2.00	110.00	0.00
182	67.976	0.38	3.49	1.32	0.032	0.02	1.50	2.00	110.00	0.00
183	62.232	0.37	3.43	1.25	0.032	0.02	1.42	2.00	110.00	0.00
184	56.706	0.35	3.37	1.18	0.032	0.02	1.33	2.00	110.00	0.00
185	51.27	0.34	3.30	1.12	0.032	0.02	1.24	2.00	110.00	0.00
186	46.03	0.32	3.23	1.05	0.032	0.02	1.15	2.00	110.00	0.00
187	41.148	0.31	3.16	0.98	0.032	0.02	1.06	2.00	110.00	0.00
188	36.753	0.30	3.09	0.91	0.032	0.02	0.98	2.00	110.00	0.00
189	32.929	0.28	3.02	0.86	0.032	0.02	0.90	2.00	110.00	0.00
190	29.58	0.27	2.96	0.80	0.032	0.02	0.83	2.00	110.00	0.00
191	26.625	0.26	2.89	0.75	0.032	0.02	0.77	2.00	110.00	0.00
192	23.998	0.25	2.83	0.71	0.032	0.02	0.71	2.00	110.00	0.00
193	21.643	0.24	2.78	0.66	0.032	0.02	0.66	2.00	110.00	0.00
194	19.52	0.23	2.72	0.62	0.032	0.02	0.61	2.00	110.00	0.00
195	17.599	0.22	2.66	0.59	0.032	0.02	0.56	2.00	110.00	0.00
196	15.853	0.21	2.61	0.55	0.032	0.02	0.52	2.00	110.00	0.00
197	14.259	0.20	2.55	0.52	0.032	0.02	0.48	2.00	110.00	0.00
198	12.796	0.19	2.50	0.48	0.032	0.02	0.44	2.00	110.00	0.00
199	11.453	0.19	2.44	0.45	0.032	0.02	0.40	2.00	110.00	0.00

200	10.219	0.18	2.39	0.42	0.032	0.02	0.36	2.00	110.00	0.00
201	9.089	0.17	2.33	0.40	0.032	0.02	0.33	2.00	110.00	0.00
202	8.057	0.16	2.28	0.37	0.032	0.02	0.30	2.00	110.00	0.00
203	7.116	0.15	2.22	0.34	0.032	0.02	0.27	2.00	110.00	0.00
204	6.263	0.15	2.17	0.32	0.032	0.02	0.24	2.00	110.00	0.00
205	5.49	0.14	2.11	0.29	0.032	0.02	0.21	2.00	110.00	0.00
206	4.792	0.13	2.05	0.27	0.032	0.02	0.18	2.00	110.00	0.00
207	4.165	0.12	2.00	0.25	0.032	0.02	0.16	2.00	110.00	0.00
208	3.605	0.12	1.94	0.23	0.032	0.02	0.14	2.00	110.00	0.00
209	3.107	0.11	1.88	0.21	0.032	0.02	0.12	2.00	110.00	0.00
210	2.667	0.10	1.83	0.19	0.032	0.02	0.10	2.00	110.00	0.00
211	2.28	0.10	1.77	0.17	0.032	0.02	0.08	2.00	110.00	0.00
212	1.942	0.09	1.71	0.16	0.032	0.02	0.07	2.00	110.00	0.00
213	1.648	0.09	1.66	0.14	0.032	0.02	0.05	2.00	110.00	0.00
214	1.394	0.08	1.60	0.13	0.032	0.02	0.04	2.00	110.00	0.00
215	1.175	0.07	1.55	0.12	0.032	0.02	0.03	2.00	110.00	0.00
216	0.987	0.07	1.50	0.10	0.032	0.02	0.02	2.00	110.00	0.00
217	0.827	0.06	1.45	0.09	0.032	0.02	0.01	2.00	110.00	0.00
218	0.691	0.06	1.39	0.08	0.032	0.02	0.01	2.00	110.00	0.00
219	0.576	0.06	1.34	0.08	0.032	0.02	0.00	2.00	110.00	0.00
220	0.479	0.05	1.30	0.07	0.032	0.02	0.00	2.00	110.00	0.00
221	0.47	0.05	1.29	0.07	0.032	0.02	0.00	2.00	110.00	0.00
222	0.46	0.05	1.29	0.07	0.032	0.02	0.00	2.00	110.00	0.00
223	0.45	0.05	1.28	0.07	0.032	0.02	0.00	2.00	110.00	0.00
224	0.44	0.05	1.27	0.06	0.032	0.02	0.00	2.00	110.00	0.00
225	0.43	0.05	1.27	0.06	0.032	0.02	0.00	2.00	110.00	0.00
226	0.43	0.05	1.27	0.06	0.032	0.02	0.00	2.00	110.00	0.00
227	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
228	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
229	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
230	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
231	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
232	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
233	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
234	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
235	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
236	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
237	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
238	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
239	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
240	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
241	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
242	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
243	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
244	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
245	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
246	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
247	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
248	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
249	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
250	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
251	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00

252	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
253	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
254	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
255	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
256	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
257	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
258	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
259	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
260	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
261	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
262	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
263	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
264	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
265	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
266	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
267	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
268	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
269	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
270	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
271	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
272	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
273	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
274	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
275	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
276	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
277	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
278	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
279	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
280	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
281	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
282	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
283	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
284	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
285	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
286	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
287	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
288	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
289	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
290	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
291	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
292	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
293	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
294	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
295	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
296	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
297	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
298	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
299	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
300	0	0.00	0.00	0.00	0.032	0.02	0.00	2.00	110.00	0.00
TOTAL										**4.89**

SOIL SURVEY OF

VIRGIN RIVER AREA, NEVADA - ARIZONA

PARTS OF CLARK AND LINCOLN COUNTIES, NEVADA AND PART OF MOHAVE COUNTY, ARIZONA

United States Department of Agriculture
Soil Conservation Service

in cooperation with
United States Department of the Interior
Bureau of Land Management
University of Nevada Agricultural Experiment Station
and University of Arizona Agricultural Experiment Station

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
Ad*. Alluvial land											
Ae	0-8	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28	5	3
Anthony	8-60	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28		
Af	0-8	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28	5	3
Anthony	8-30	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28		
	30-60	6.0-20	0.04-0.06	7.9-8.4	<2	Low	High	Low	0.15		
Ah	0-8	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28	5	3
Anthony	8-60	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.28		
AMC*	0-6	>20	0.05-0.07	7.9-8.4	<2	Low	Moderate	Low	0.15	5	1
Arada	6-27	>20	0.05-0.07	8.5-9.0	<2	Low	Moderate	Low	0.15		
	27-37	6.0-20	0.06-0.08	8.5-9.0	<2	Low	High	Low	0.10		
	37-60	2.0-6.0	0.04-0.07	8.5-9.0	<2	Low	High	Low	0.10		
AOB*	0-6	>20	0.05-0.07	7.9-8.4	<2	Low	Moderate	Low	0.15	5	1
Arada	6-24	>20	0.05-0.07	8.5-9.0	<2	Low	Moderate	Low	0.15		
	24-60	2.0-6.0	0.04-0.07	8.5-9.0	<2	Low	High	Low	0.10		
ASC*	0-6	>20	0.05-0.07	7.9-8.4	<2	Low	Moderate	Low	0.15	3	1
Arada Variant	6-30	>20	0.05-0.07	8.5-9.0	<2	Low	Moderate	Low	0.17		
	30	---	---	---	---	---	---	---	---		
ATA*	0-8	6.0-20	0.05-0.07	7.4-9.0	<2	Low	Moderate	Low	0.15	5	1
Arizo	8-60	>20	0.04-0.06	7.4-9.0	<2	Low	Moderate	Low	0.10		
AVB*, AXC*	0-8	6.0-20	0.05-0.07	7.4-9.0	<2	Low	Moderate	Low	0.10	5	4
Arizo	8-60	>20	0.04-0.06	7.4-9.0	<2	Low	Moderate	Low	0.10		
AYD*	0-5	0.6-2.0	0.14-0.16	>9.0	<4	Low	High	Moderate	0.43	5	7
Arrolime	5-49	0.6-2.0	0.06-0.08	7.9-9.0	>4	Low	High	High	0.32		
	49-60	0.2-0.6	0.17-0.19	6.6-7.8	>4	Moderate	High	High	0.37		
BD*. Badland											
BFD*	0-5	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low	Moderate	Low	0.17	1	2
Bard	5-19	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	19	---	---	---	---	---	---	---	---		
BHC*	0-5	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low	Moderate	Low	0.28	1	4
Bard	5-19	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	19	---	---	---	---	---	---	---	---		
BMD*	0-5	2.0-6.0	0.05-0.10	7.9-8.4	<2	Low	Moderate	Low	0.20	1	5
Bard	5-19	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	19	---	---	---	---	---	---	---	---		
BNB*	0-4	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low	Moderate	Low	0.28	1	4
Bard	4-15	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	15	---	---	---	---	---	---	---	---		
BOB*:											
Bard	0-5	2.0-6.0	0.05-0.10	7.9-8.4	<2	Low	Moderate	Low	0.20	1	5
	5-19	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	19	---	---	---	---	---	---	---	---		
Rough broken land.											

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
BRB*:											
Bard	0-4	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low	Moderate	Low	0.28	1	4
	4-15	2.0-6.0	0.11-0.13	>7.8	<2	Low	High	Low	0.32		
	15	---	---	---	---	---	---	---	---		
Tonopah	0-6	6.0-20	0.06-0.08	7.9-9.0	<2	Low	Moderate	Low	0.20	5	4
	6-60	>20	0.03-0.05	8.5-9.0	<4	Low	High	Low	0.10		
BTC*:											
Bitter Spring	0-2	2.0-6.0	0.04-0.08	8.5-9.0	<2	Low	High	Low	0.24	5	8
	2-7	2.0-6.0	0.08-0.12	7.9-9.0	<2	Low	High	Low	0.28		
	7-50	2.0-6.0	0.04-0.08	7.9-8.4	>2	Low	High	High	0.15		
Arizo	0-8	6.0-20	0.05-0.07	7.4-9.0	<2	Low	Moderate	Low	0.10	5	4
	8-60	>20	0.04-0.06	7.4-9.0	<2	Low	Moderate	Low	0.10		
Bu	0-6	0.6-2.0	0.17-0.19	7.9-8.4	2-4	Low	High	Moderate	0.49	5	6
Black Butte	6-20	0.2-0.6	0.15-0.17	7.9-8.4	4-8	Moderate	High	Moderate	0.32		
	20-60	>20	0.05-0.07	7.9-8.4	4-8	Low	High	Moderate	0.17		
Bv	0-6	2.0-6.0	0.17-0.19	7.9-8.4	2-4	Low	High	Moderate	0.49	5	6
Black Butte	6-20	0.2-0.6	0.17-0.19	7.9-8.4	4-8	Moderate	High	Moderate	0.32		
	20-60	>20	0.04-0.09	7.9-8.4	4-8	Low	High	Moderate	0.17		
Bw	0-9	6.0-20	0.08-0.10	8.5-9.0	<8	Low	High	High	0.15	5	2
Bluepoint	9-41	6.0-20	0.08-0.10	7.9-9.0	<8	Low	High	High	0.15		
	41-60	2.0-6.0	0.10-0.12	7.9-9.0	<8	Low	High	High	0.20		
By	0-9	2.0-6.0	0.10-0.12	8.5-9.0	>16	Low	High	High	---	---	3
Bluepoint	9-41	6.0-20	0.08-0.10	7.9-9.0	>16	Low	High	High	---		
	41-60	2.0-6.0	0.10-0.12	7.9-9.0	>8	Low	High	High	---		
Ca	0-6	2.0-6.0	0.12-0.15	7.9-9.0	>4	Low	High	Moderate	0.37	5	3
Calico	6-22	2.0-6.0	0.13-0.17	7.9-9.0	>2	Low	High	Moderate	0.49		
	22-43	0.06-0.2	0.17-0.19	7.9-9.0	>2	High	High	Moderate	0.32		
	43-60	>20	0.04-0.08	7.9-9.0	>2	Low	High	Moderate	0.17		
Cc	0-6	2.0-6.0	0.12-0.15	7.9-8.4	2-4	Low	High	Low	0.37	5	3
Calico	6-22	2.0-6.0	0.13-0.17	7.9-8.4	2-4	Low	High	Low	0.49		
	22-43	0.06-0.2	0.17-0.19	7.9-8.4	2-4	High	High	Low	0.32		
	43-60	>20	0.04-0.08	7.9-8.4	2-4	Low	High	Low	0.17		
Cd	0-6	2.0-6.0	0.12-0.15	7.9-9.0	>4	Low	High	Moderate	0.37	5	3
Calico	6-22	2.0-6.0	0.13-0.17	7.9-9.0	>2	Low	High	Moderate	0.49		
	22-43	0.06-0.2	0.17-0.19	7.9-9.0	>2	High	High	Moderate	0.32		
	43-60	>20	0.04-0.08	7.9-9.0	>2	Low	High	Moderate	0.17		
Cm	0-6	0.2-0.6	0.17-0.19	7.9-9.0	>4	Moderate	High	Moderate	0.32	5	6
Calico	6-22	2.0-6.0	0.13-0.17	7.9-9.0	>2	Low	High	Moderate	0.49		
	22-43	0.06-0.2	0.17-0.19	7.9-9.0	>2	High	High	Moderate	0.32		
	43-60	>20	0.04-0.08	7.9-9.0	>2	Low	High	Moderate	0.17		
Cn	0-9	6.0-20	0.05-0.10	7.9-8.4	<4	Low	High	Low	0.15	5	2
Calico Variant	9-27	2.0-6.0	0.05-0.12	7.9-8.4	<4	Low	High	Low	0.17		
	27-60	0.06-0.2	0.17-0.19	7.9-8.4	<4	High	High	Low	0.32		
Co	0-9	6.0-20	0.05-0.10	>8.4	>8	Low	High	Moderate	0.15	5	2
Calico Variant	9-27	2.0-6.0	0.05-0.12	>8.4	>8	Low	High	Moderate	0.17		
	27-60	0.06-0.2	0.17-0.19	>8.4	>8	High	High	Moderate	0.32		
CTC*:											
Colorock	0-3	0.6-2.0	0.06-0.10	7.9-8.4	<2	Low	High	Low	0.24	1	7
	3-15	2.0-6.0	0.04-0.09	8.5-9.0	<2	Low	High	Low	0.17		
	15-42	---	---	---	---	---	---	---	---		
	42-60	6.0-20	0.04-0.09	7.9-8.4	>4	Low	High	Low	0.17		
Tonopah	0-6	6.0-20	0.04-0.06	7.9-9.0	<2	Low	Moderate	Low	0.10	5	5
	6-60	>20	0.03-0.05	8.5-9.0	<4	Low	High	Low	0.10		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
CYB*----------	0-1	2.0-6.0	0.09-0.11	8.5-9.0	<2	Low--------	High-----	Low------	0.24	1	4
Crystal Springs	1-11	2.0-6.0	0.09-0.11	8.5-9.0	<2	Low--------	High-----	Low------	0.28		
	11	---	---	---	---	----------	---------	---------	---		
Ea----------	0-17	2.0-6.0	0.06-0.09	7.9-8.4	<2	Low--------	High-----	Low------	0.24	5	4
Eastland	17-38	>20	0.04-0.06	7.9-8.4	<2	Low--------	High-----	Low------	0.15		
	38-60	2.0-6.0	0.06-0.09	7.9-9.0	<2	Low--------	High-----	Low------	0.20		
FLC*----------	0-5	0.06-0.2	0.13-0.17	7.9-9.0	2-4	Moderate	High-----	High-----	0.28	5	7
Flattop	5-22	2.0-6.0	0.06-0.08	7.9-9.0	>4	Low--------	High-----	High-----	0.20		
	22-30	2.0-6.0	0.03-0.06	7.9-8.4	>8	Low--------	High-----	High-----	0.17		
	30-60	---	---	---	---	----------	---------	---------	---		
GAE*:											
Garr----------	0-2	2.0-6.0	0.04-0.06	8.5-9.0	<2	Low--------	High-----	Low------	0.17	1	5
	2-16	2.0-6.0	0.04-0.06	8.5-9.0	<2	Low--------	High-----	Low------	0.17		
	16	---	---	---	---	----------	---------	---------	---		
Rock outcrop.											
Gd----------	0-9	6.0-20	0.04-0.07	7.9-9.0	<4	Low--------	High-----	Low------	0.17	5	2
Gila	9-60	0.6-2.0	0.15-0.17	7.9-8.4	2-16	Low--------	High-----	Moderate	0.49		
Ge----------	0-9	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	High-----	Low------	0.49	5	5
Gila	9-60	0.6-2.0	0.15-0.17	7.9-8.4	2-16	Low--------	High-----	Moderate	0.49		
Gf, Gn----------	0-9	0.6-2.0	0.15-0.17	7.9-9.0	>16	Low--------	High-----	Moderate	0.49	5	5
Gila	9-60	0.6-2.0	0.15-0.17	7.9-9.0	>4	Low--------	High-----	Moderate	0.49		
Gm----------	0-9	0.6-2.0	0.15-0.17	7.9-9.0	>4	Low--------	High-----	Moderate	0.37	5	5
Gila	9-60	0.6-2.0	0.15-0.17	7.9-8.4	>2	Low--------	High-----	Moderate	0.49		
Go----------	0-8	6.0-20	0.05-0.07	7.9-8.4	<2	Low--------	High-----	Low------	0.17	5	2
Glendale	8-60	0.2-0.6	0.17-0.19	7.9-8.4	4-16	Moderate	High-----	Moderate	0.55		
Gr----------	0-8	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	High-----	Low------	0.32	5	5
Glendale	8-60	0.2-0.6	0.17-0.19	7.9-8.4	4-16	Moderate	High-----	Moderate	0.55		
Gs----------	0-9	0.6-2.0	0.15-0.17	7.9-8.4	>8	Low--------	High-----	Moderate	0.32	5	5
Glendale	9-60	0.2-0.6	0.17-0.19	7.9-8.4	>8	Moderate	High-----	Moderate	0.55		
Gv----------	0-10	0.6-2.0	0.16-0.18	7.9-9.0	2-8	Low--------	High-----	High-----	0.43	5	5
Grapevine	10-60	0.6-2.0	0.12-0.15	8.5-9.0	2-8	Low--------	High-----	High-----	0.32		
Ir, It----------	0-12	0.6-2.0	0.16-0.18	7.9-8.4	4-8	Low--------	High-----	High-----	0.28	5	5
Ireteba	12-60	0.6-2.0	0.13-0.16	7.9-8.4	>8	Low--------	High-----	High-----	0.24		
La----------	0-4	0.6-2.0	0.07-0.10	8.5-9.0	>16	Low--------	High-----	High-----	0.15	5	2
Land	4-60	0.2-0.6	0.13-0.19	7.9-9.0	>16	Moderate	High-----	High-----	0.37		
Lc, Ld----------	0-4	0.2-0.6	0.15-0.19	8.5-9.0	>16	Moderate	High-----	High-----	0.37	5	7
Land	4-60	0.2-0.6	0.13-0.19	7.9-9.0	>16	Moderate	High-----	High-----	0.37		
MMB*----------	0-2	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low--------	High-----	Low------	0.20	1	2
Mormon Mesa	2-16	2.0-6.0	0.10-0.13	8.5-9.0	<2	Low--------	High-----	Low------	0.32		
	16	---	---	---	---	----------	---------	---------	---		
MOB*----------	0-2	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low--------	High-----	Low------	0.28	1	3
Mormon Mesa	2-16	2.0-6.0	0.10-0.13	8.5-9.0	<2	Low--------	High-----	Low------	0.32		
	16	---	---	---	---	----------	---------	---------	---		
NAC*:											
Nickel----------	0-7	2.0-6.0	0.06-0.10	7.9-9.0	<2	Low--------	High-----	Low------	0.17	5	5
	7-60	0.2-0.6	0.04-0.08	7.9-9.0	<2	Low--------	High-----	Low------	0.15		
Arizo----------	0-8	6.0-20	0.05-0.07	7.4-9.0	<2	Low--------	Moderate	Low------	0.10	5	4
	8-60	>20	0.04-0.06	7.4-9.0	<2	Low--------	Moderate	Low------	0.10		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
NAC*:											
Cave	0-4	0.6-2.0	0.07-0.12	7.9-8.4	2-4	Low	High	Low	0.28	2	---
	4-15	0.6-2.0	0.05-0.08	7.9-8.4	>4	Low	High	Low	0.28		
	15	---	---	---	---	---	---	---	---		
Oc	0-7	0.06-0.2	0.17-0.19	7.9-8.4	<2	High	High	Low	0.28	5	4
Overton	7-25	0.06-0.2	0.17-0.19	7.9-8.4	<2	High	High	Low	0.28		
	25-60	0.06-0.2	0.17-0.19	7.9-8.4	<2	High	High	Low	0.28		
Oe, On, Or	0-7	0.06-0.2	0.17-0.19	7.9-9.0	>4	High	High	High	0.28	5	4
Overton	7-25	0.06-0.2	0.17-0.19	7.9-9.0	>16	High	High	High	0.28		
	25-60	0.06-0.2	0.17-0.19	8.5-9.0	>4	High	High	High	0.28		
Os, Ot	0-11	0.6-2.0	0.19-0.21	8.5-9.0	>4	Low	High	High	0.64	5	6
Overton Variant	11-31	0.6-2.0	0.13-0.15	8.5-9.0	>16	Low	High	High	0.49		
	31-60	0.6-2.0	0.13-0.15	8.5-9.0	>4	Low	High	High	0.32		
PL*.											
Playas											
PME*:											
Pulsipher	0-2	0.6-2.0	0.07-0.12	7.4-8.4	<2	Low	High	Low	0.28	1	6
	2-15	2.0-6.0	0.04-0.08	7.4-8.4	<2	Low	High	Low	0.17		
	15	---	---	---	---	---	---	---	---		
Rock outcrop.											
PPE*:											
Pulsipher	0-2	0.6-2.0	0.07-0.12	7.4-8.4	<2	Low	High	Low	0.28	1	6
	2-15	2.0-6.0	0.04-0.08	7.4-8.4	<2	Low	High	Low	0.17		
	15	---	---	---	---	---	---	---	---		
Pulsipher Variant	0-6	0.06-0.2	0.13-0.18	7.9-8.4	<2	Moderate	High	Low	0.32	1	7
	6-14	0.06-0.2	0.11-0.15	7.9-8.4	<2	High	High	Low	0.24		
	14	---	---	---	---	---	---	---	---		
PRE*	0-6	0.06-0.2	0.13-0.18	7.9-8.4	<2	Moderate	High	Low	0.32	1	7
Pulsipher Variant	6-14	0.06-0.2	0.11-0.15	7.9-8.4	<2	High	High	Low	0.24		
	14	---	---	---	---	---	---	---	---		
Re*.											
Riverwash											
RME*:											
Rock land.											
Moapa	0-4	>20	0.04-0.07	7.9-8.4	<2	Low	Moderate	Low	0.15	2	1
	4-30	>20	0.04-0.07	8.5-9.0	<2	Low	Moderate	Low	0.17		
	30-36	---	---	---	---	---	---	---	---		
RTF*:											
Rock land.											
St. Thomas	0-2	2.0-6.0	0.05-0.10	7.9-8.4	<2	Low	High	Low	0.24	1	7
	2-12	2.0-6.0	0.04-0.07	7.9-8.4	<2	Low	High	Low	0.24		
	12	---	---	---	---	---	---	---	---		
SP*	0-5	0.06-0.2	0.17-0.19	7.9-8.4	>2	Moderate	High	High	0.37	5	7
Spring	5-43	0.06-0.2	0.17-0.19	6.6-8.4	>4	Moderate	High	High	0.32		
	43-60	0.2-0.6	0.17-0.19	6.6-7.8	>4	Low	High	High	0.55		
Tb	0-13	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low	High	Low	0.28	5	3
Tobler	13-60	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low	High	Low	0.28		
Tc	0-13	0.6-2.0	0.13-0.15	7.9-8.4	>16	Low	High	Moderate	0.32	5	3
Tobler	13-60	2.0-6.0	0.13-0.15	7.9-8.4	>8	Low	High	Moderate	0.32		
Td	0-13	0.2-0.6	0.17-0.19	7.9-8.4	<2	Low	High	Low	0.55	5	6
Tobler	13-60	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	High	Low	0.32		

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	In/hr	In/in	pH	Mmhos/cm						
Te	0-13	0.06-0.2	0.17-0.19	7.9-8.4	>16	High	High	Moderate	0.20	5	4
Tobler	13-60	2.0-6.0	0.13-0.15	7.9-8.4	>8	Low	High	Moderate	0.32		
THB*	0-6	6.0-20	0.06-0.08	7.9-9.0	<2	Low	Moderate	Low	0.20	5	4
Tonopah	6-60	>20	0.03-0.05	8.5-9.0	<4	Low	High	Low	0.10		
TMD*	0-6	6.0-20	0.04-0.06	7.9-9.0	<2	Low	Moderate	Low	0.10	5	5
Tonopah	6-60	>20	0.03-0.05	8.5-9.0	<4	Low	High	Low	0.10		
TnA, TnB	0-9	>20	0.04-0.06	8.5-9.0	<2	Low	Moderate	Low	0.15	5	1
Toquop	9-60	>20	0.04-0.06	7.9-9.0	<2	Low	Moderate	Low	0.15		
TsA	0-9	>20	0.04-0.06	8.5-9.0	2-4	Low	High	Low	0.15	5	1
Toquop	9-60	>20	0.04-0.06	7.9-9.0	2-4	Low	High	Low	0.15		
TtA	0-9	2.0-6.0	0.13-0.15	8.5-9.0	<2	Low	Moderate	Low	0.24	5	3
Toquop	9-60	>20	0.04-0.06	7.9-9.0	<2	Low	Moderate	Low	0.15		
TuA	0-9	2.0-6.0	0.13-0.15	8.5-9.0	2-4	Low	High	Low	0.24	5	3
Toquop	9-60	>20	0.04-0.06	7.9-9.0	2-4	Low	High	Low	0.15		
TvA	0-9	0.2-0.6	0.17-0.19	8.5-9.0	4-8	Moderate	High	Moderate	0.37	5	7
Toquop	9-60	>20	0.04-0.06	7.9-9.0	>8	Low	High	Moderate	0.15		
Vd	0-12	2.0-6.0	0.08-0.12	7.4-8.4	<2	Low	Moderate	Low	0.28	5	3
Vinton	12-60	2.0-6.0	0.06-0.08	7.9-8.4	<2	Low	High	Low	0.20		
VEF*:											
Virgin Peak	0-6	2.0-6.0	0.04-0.08	6.6-7.3	<2	Low	High	Low	0.20	1	3
	6-14	---	---	---	---	---	---	---	---		
	14	---	---	---	---	---	---	---	---		
Rock land.											
Vg, Vn	0-6	0.06-0.2	0.15-0.17	7.9-8.4	>2	High	High	Moderate	0.28	5	4L
Virgin River	6-35	0.06-0.2	0.17-0.19	7.9-8.4	>2	High	High	Moderate	0.28		
	35-60	0.2-0.6	0.11-0.14	7.9-8.4	>2	Low	High	Moderate	0.20		
Vr	0-6	0.06-0.2	0.18-0.20	7.9-8.4	>8	High	High	Moderate	0.32	5	7
Virgin River Variant	6-28	0.06-0.2	0.18-0.20	7.9-8.4	>8	High	High	Moderate	0.32		
	28-60	2.0-6.0	0.06-0.08	7.9-8.4	>8	Low	High	Moderate	0.17		
WEE*	0-6	2.0-6.0	0.07-0.09	7.9-8.4	<2	Low	High	Low	0.17	5	5
Weiser	6-60	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low	High	Low	0.17		

* See map unit description for the composition and behavior of the map unit.

United States Department of Agriculture

Soil Conservation Service

National Engineering Handbook

Section 3 Sedimentation

Chapter 3

Erosion

Chapter 3
Erosion

General

Erosion consists of a series of complex and interrelated natural processes that loosen or dissolve and move earth or rock material. The land surface is worn away through the detachment and transport of soil and rock materials by moving water, wind, or other geologic agents.

Erosion can be divided into two categories according to the conditions under which it occurs. The first category is normal (geologic) erosion, which has been occurring at variable rates, depending on climatic and terrestrial conditions, since the first solid materials formed on earth. Geologic erosion is extremely slow in most places. It is, in fact, an important process in soil formation. The underlying rock is attacked by air and water, and fragments are detached, decomposed, or dissolved. This process is termed weathering. Generally, a rough equilibrium is reached in natural environments between geologic erosion and soil formation. The rates of normal upland erosion and soil formation are determined mainly by climate, parent rocks, soil, precipitation, topography, and vegetal cover.

The second category is accelerated erosion caused by the activities of man. Accelerated erosion has been defined as "erosion occurring at a rate greater than normal for the site, usually through reduction of a vegetal cover" (Roehl 1965). Deforestation, cultivation, and destruction of vegetation accelerate erosion. Soil that normally would take 100 years to be eroded may vanish in 1 year or even a single day (United Nations 1953).

Both categories of erosion can be subdivided into two types: sheet and channel. This classification is helpful in (1) estimating the amount of erosion and sediment yield, (2) determining the relative importance of sediment sources, (3) formulating treatment measures to reduce erosion and sediment yield, and (4) evaluating the effectiveness of treatment measures.

In planning programs to reduce erosion and sediment yield, it is most important that the various types of erosion be thoroughly investigated as sources of sediment. Proper conservation practices and land stabilization measures can then be planned and applied.

Sheet erosion, which includes rill erosion, is the removal of soil or earth material from the land surface by the forces of raindrop impact, overland runoff, or wind. Although it occurs on all land surfaces, sheet erosion is particularly active on cultivated areas of mild slope where the runoff is not concentrated in well-defined channels but consists largely of overland flow. The numerous small but conspicuous rills caused by minor concentration of runoff are obliterated by normal field cultivation. This type of erosion occurs gradually over large areas as though the soil were removed in sheets (Bennett 1939, p. 92–115).

Materials derived from sheet erosion are fine grained because overland flow, which is usually laminar, seldom exceeds a velocity of 2 or 3 ft/s. Flow of this low velocity can transport only the fine particles detached by raindrop impact. Ellison (1945) reported a grain-size diameter of less than 0.05 mm for 95 percent of the sediment in prechannel runoff from a silt loam soil in Ohio.

Factors Involved

The basic factors in sheet erosion are rainfall, soil properties, slope length, slope gradient, and kind and condition of cover. Several equations incorporating these factors can be used to obtain a quantitative estimate of the amount of soil material moved by sheet erosion. These equations, originally developed for the humid areas east of the Rocky Mountains, are particularly well suited for determining the effects of land treatment measures on erosion.

Equations

From the late 1940's until 1972, SCS geologists, who are responsible for estimating yield, used the Musgrave Equation to compute the amount of sheet and rill erosion in a watershed. The Musgrave Equation was part of one of several procedures used to estimate sediment yield. Additional research on erosion resulted in the development of the Universal Soil Loss Equation (USLE) by the Agricultural Research Service (ARS) in cooperation with SCS and certain State experiment stations. In September 1972 the Musgrave Equation was replaced by the USLE for computing sheet erosion for project areas.

Both the Musgrave Equation and the USLE are empirical formulas in which sediment yield from subacre test plots is defined as "erosion" or "soil loss." The computed soil loss from large areas is usually greater than the sediment yield from the same area, and the larger the area, the greater the discrepancy between computed soil loss and sediment yield. Neither equation allows for deposition on upland areas. Soil loss computed by these equations represents nothing that can be located or measured in the field. It therefore is an abstract figure that must not be confused with sediment yield. Computed soil loss, however, is a valuable tool for comparing the soil loss from different areas or the effects of different land treatments on a given area.

The USLE initially was used only for cropland, hayland, and pastures in rotation, because erosion factors reflecting the effect of cover on uncultivated land areas were not available. Because the USLE had been used in much of the country as a tool in planning land treatment on individual operating units, use of this equation with its refined data was recommended for watersheds and other project areas in which SCS has responsibilities. Before this could be done, however, additional plant-cover factors (C) had to be determined for permanent pastureland, rangeland, woodland, and idle land to estimate the effect of these types of cover on soil losses.

In November 1971, SCS and ARS personnel tentatively agreed on the factors for types of cover on uncultivated lands, and subsequent analyses by ARS provided values for them. These factors are used in the USLE to estimate sheet and rill erosion for work in SCS projects such as watersheds, river basin studies, and resource conservation and development (RC&D).

The complete Universal Soil Loss Equation is

$$A = RKLSCP$$

where

- A = the computed annual soil loss (sheet and rill erosion) in tons per acre. A is not the sediment yield.
- R = the rainfall factor: the number of erosion index units in a normal year's rain.
- K = the soil erodibility factor: the erosion rate per erosion index unit for a specific soil in cultivated continuous fallow on

9-percent slope 72.6 ft long.

L = the slope length factor: the ratio of the soil loss from the field slope length to that from a 72.6-ft length on the same soil type and gradient.

S = The slope gradient factor: the ratio of the soil loss from the field gradient to that from a 9-percent slope on the same soil type and slope length.

C = the cropping management factor: the ratio of the soil loss from a field with specified cropping and management to that from the fallow condition from which the K factor is evaluated.

P = the erosion control practice factor: the ratio of the soil loss with contouring, contour stripcropping, or contour-irrigated furrows to that with straight-row farming, upslope and downslope.

Rainfall Factor (R)

The energy of moving water detaches and transports soil materials. The energy intensity (EI) value is the product of the total raindrop energy of a storm and the maximum 30-min intensity. Soil losses are linearly proportional to the number of EI units. The EI values of the storms from a 22-year (maximum) record were summed to obtain an average annual rainfall-erosion index for a given location. This annual index serves as the R factor and can be obtained from figure 3–1, which is figure 1 in Agriculture Handbook 537 (Wischmeier and Smith 1978). This handbook also includes a procedure for determining the effect of snowmelt on the R factor.

Soil Erodibility Factor (K)

The resistance of a soil surface to erosion is a function of the soil's physical and chemical properties. The soil properties most significantly affecting soil erodibility are texture, organic-matter content, structure, and permeability. The K values assigned to named soils can be obtained from soil scientists, technical guides, or published lists.

Slope Length (L) and Slope Gradient (S)

Soil loss is affected by both length and degree of slope. For convenience in field application, these two factors are combined into a single topographic factor, LS.

The LS factor for a gradient as much as 50 percent and a slope length as much as 1,000 ft is obtained from the slope-effect chart (fig. 3–2). Similar data appear in tabular form in table 3–1. Values shown on the chart and table for slopes of less than 3 percent, greater than 20 percent, or longer than 400 feet are extrapolations of the formula to cover conditions beyond the range of research data. Computed soil loss determined from these LS values may need to be adjusted on the basis of experience and judgment.

Plant Cover or Cropping Management Factor (C)

The erosion equation, as applied to cropland and hayland, uses established factor relationships to estimate a basic soil loss that is determined by soil properties, topographic features, certain conservation practices, and expected rainfall patterns for a specific field. The basic soil loss is the rate at which the field would erode if it were continuously in tilled fallow. The C factor value indicates the percentage of this potential soil loss that would occur if the surface were partially protected by a particular combination of cover and management practices. Musgrave cover factors cannot be substituted for the C factor in the USLE because different base conditions were used to develop the cover factors (tilled continuous fallow for the USLE as opposed to uphill and downhill row crops for the Musgrave Equation).

Use of the C factor in other situations depends on three distinct but interrelated zones of influence: vegetal cover in direct contact with the soil surface, canopy cover, and the surface and beneath it.

C factor for cropland and hayland.—The C factor measures the effects of cropping sequences, cover, and management on soil losses from cropland and hayland. It is computed, on a local basis, for conventional and conservation (minimum-tillage) farming systems.

C factor for permanent pasture, grazed forest land, range, and idle land.—The effects of the three zones of influence are used in estimating the C factor for permanent pasture, grazed forest land, range, and idle land. The C factors are given in table 3–2.

C factor for forest land.—Permanent (undisturbed) forest land differs in several respects from the land for which C-factor values are given in table 3–2. A layer of compacted decaying duff or litter is extremely effective against water erosion. Research data, although limited, support a C value

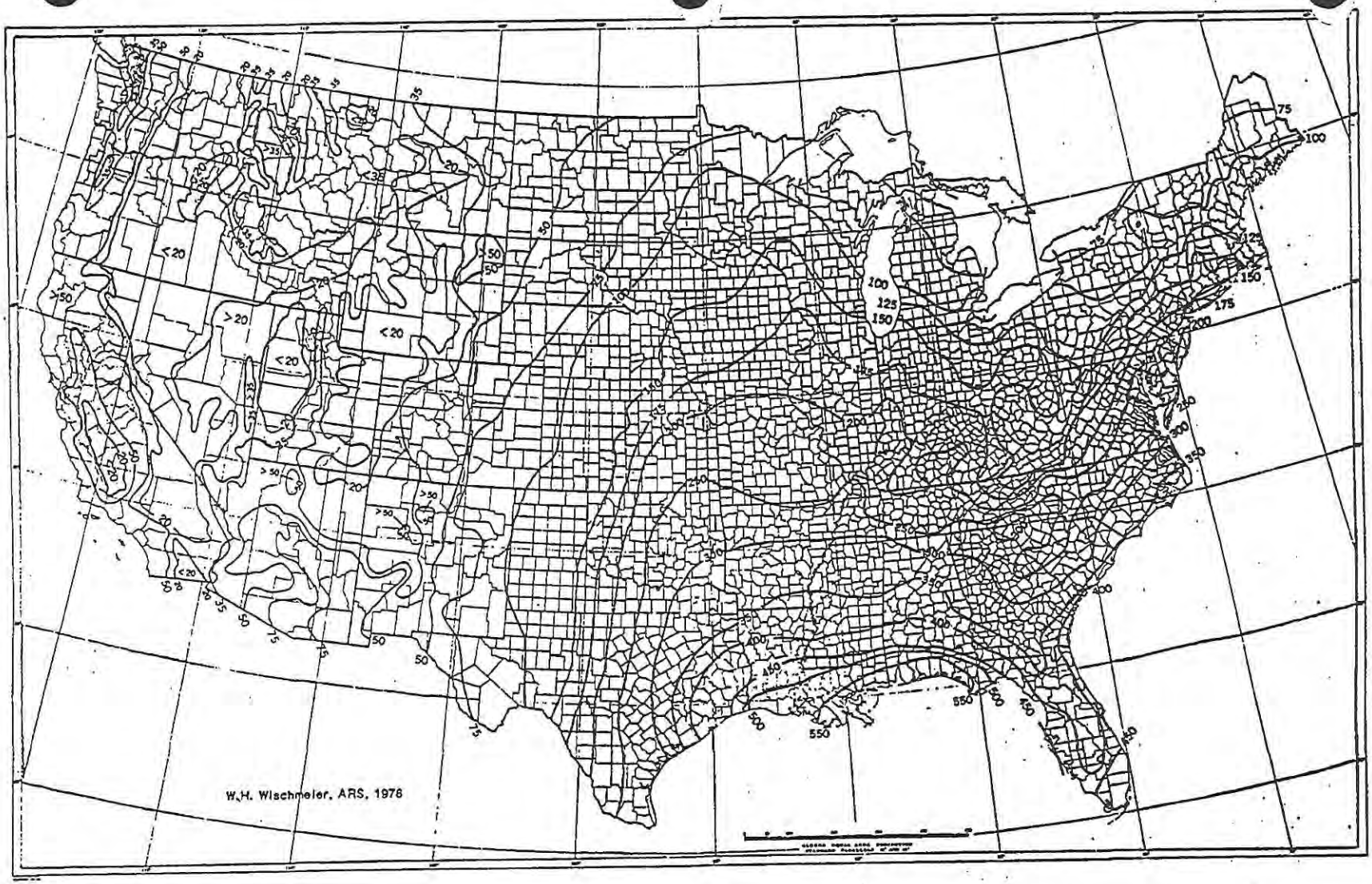
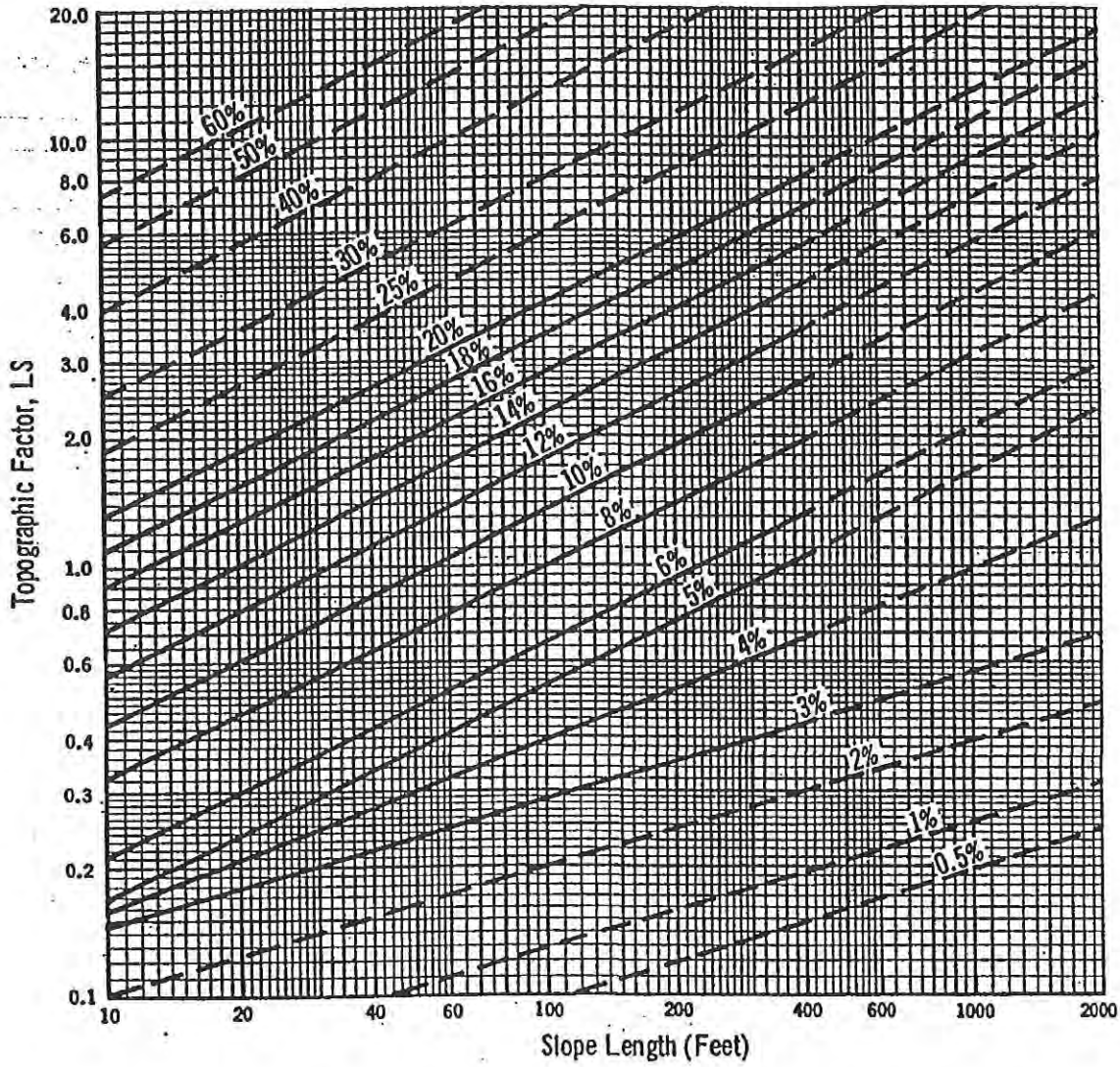


Figure 3-1.—Average annual values of the R factor.



*The dashed lines represent estimates for slope dimensions beyond the range of lengths and steepnesses for which data are available. The curves were derived by the formula:

$$LS = \left(\frac{\lambda}{72.6}\right)^{m} \left(\frac{430x^2 + 30x + 0.43}{6.57415}\right)$$

where λ = field slope length in feet and $m = 0.5$ if $s = 5\%$ or greater, 0.4 if $s = 4\%$, and 0.3 if $s = 3\%$ or less; and $x = \sin\theta$. θ is the angle of slope in degrees.

Figure 3–2.—Slope-effect chart (topographic factor, LS).

Table 3–1.—Values of the topographic factor, LS for specific combinations of slope length and steepness[1]

Percent slope	Slope length (feet)											
	25	50	75	100	150	200	300	400	500	600	800	1,000
0.2	0.060	0.069	0.075	0.080	0.086	0.092	0.099	0.105	0.110	0.114	0.121	0.126
0.5	.073	.083	.090	.096	.104	.110	.119	.126	.132	.137	.145	.152
0.8	.086	.098	.107	.113	.123	.130	.141	.149	.156	.162	.171	.179
2	.133	.163	.185	.201	.227	.248	.280	.305	.326	.344	.376	.402
3	.190	.233	.264	.287	.325	.354	.400	.437	.466	.492	.536	.573
4	.230	.303	.357	.400	.471	.528	.621	.697	.762	.820	.920	1.01
5	.268	.379	.464	.536	.656	.758	.928	1.07	1.20	1.31	1.52	1.69
6	.336	.476	.583	.673	.824	.952	1.17	1.35	1.50	1.65	1.90	2.13
8	.496	.701	.859	.992	1.21	1.41	1.72	1.98	2.22	2.43	2.81	3.14
10	.685	.968	1.19	1.37	1.68	1.94	2.37	2.74	3.06	3.36	3.87	4.33
12	.903	1.28	1.56	1.80	2.21	2.55	3.13	3.61	4.04	4.42	5.11	5.71
14	1.15	1.62	1.99	2.30	2.81	3.25	3.98	4.59	5.13	5.62	6.49	7.26
16	1.42	2.01	2.46	2.84	3.48	4.01	4.92	5.68	6.35	6.95	8.03	8.98
18	1.72	2.43	2.97	3.43	4.21	4.86	5.95	6.87	7.68	8.41	9.71	10.9
20	2.04	2.88	3.53	4.08	5.00	5.77	7.07	8.16	9.12	10.0	11.5	12.9

[1] $LS = (\lambda/72.6)^m (65.41 \sin^2\theta + 4.56 \sin\theta + 0.065)$ where λ = slope length in feet; m = 0.2 for gradients <1 percent, 0.3 for 1- to 3-percent slopes, 0.4 for 3.5- to 4.5-percent slopes, 0.5 for 5-percent slopes and steeper; and θ = angle of slope. (For other combinations of length and gradient, interpolate between adjacent values.)

as low as 0.0001 for woodland with a 100-percent duff cover. Values of the C factor for undisturbed forest land are given in table 3–3. Table 3–4 gives values for forest land that has been harvested and cropland that has been converted to woodland, both of which required some mechanical preparation for planting.

Tables 3–2, 3–3, and 3–4 provide a wide range of values for the C factor. Although some land situations may not fit neatly in any of the three general categories, a representative C factor for most situations can be obtained from these tables.

Erosion Control Practice Factor (P)

The P factor measures the effect of control practices that reduce the erosion potential of the runoff by their influence on drainage patterns, runoff concentration, and runoff velocity. Practices for which P factors have been established are contouring and contour stripcropping. The latter values are also used for contour-irrigated furrows. In contour stripcropping, strips of sod or meadow are alternated with strips of row crops or small grains. Terraces and diversions, where used, reduce the length of slope. The P values for computing sediment yield reduction for terraces and diversions are given in table 3–5.

Water Quality and Sediment Yield

The computed soil loss for large areas is not sediment yield, and it is not directly related to water quality. Overland sediment transport is a complex process of transport and deposition. The USLE estimates the transport component and specifically excludes the deposition component. For example, only 5 percent of the computed soil loss may appear as sediment yield in a drainage area of 500 mi^2. The remaining 95 percent is redistributed and deposited on uplands or flood plains and is not a net soil loss from the area. Procedures for computing sediment yield are given in Chapter 6.

Example of Use of USLE in Watershed Planning

Assume a watershed area of 600 acres above a proposed floodwater-retarding structure in Fountain County, Ind. (fig. 3–3). Compute the average annual soil loss from sheet erosion for present conditions and that for future conditions after the recommended land treatment has been applied on all land in the watershed.

Present conditions.—Cropland: 280 acres of continuous corn with residue removed, cultivated upslope and downslope, average yield of 70 bu/acre; soil is Fayette silt loam; slopes are 8 percent and 200 ft long.

Table 3-2.—C factors for permanent pasture, grazed forest land, range, and idle land[1]

Vegetative canopy			Cover that contacts the soil surface					
			Percent ground cover					
Type and height[2]	Percent cover[3]	Type[4]	0	20	40	60	80	95+
No appreciable canopy		G	0.45	0.20	0.10	0.042	0.013	0.003
		W	.45	.24	.15	.091	.043	.011
Tall grass, weeds, or short brush with average drop fall height of 20 in. or less	25	G	.36	.17	.09	.038	.013	.003
		W	.36	.20	.13	.083	.041	.011
	50	G	.26	.13	.07	.035	.012	.003
		W	.26	.16	.11	.076	.039	.011
	75	G	.17	.10	.06	.032	.011	.003
		W	.17	.12	.09	.068	.038	.011
Appreciable brush or bushes, with average drop fall height of 6½ ft	25	G	.40	.18	.09	.040	.013	.003
		W	.40	.22	.14	.087	.042	.011
	50	G	.34	.16	.08	.038	.012	.003
		W	.34	.19	.13	.082	.041	.011
	75	G	.28	.14	.08	.036	.012	.003
		W	.28	.17	.12	.078	.040	.011
Trees, but no appreciable low brush. Average drop fall height of 13 ft	25	G	.42	.19	.10	.041	.013	.003
		W	.42	.23	.14	.089	.042	.011
	50	G	.39	.18	.09	.040	.013	.003
		W	.39	.21	.14	.087	.042	.011
	75	G	.36	.17	.09	.039	.012	.003
		W	.36	.20	.13	.084	.041	.011

[1]The listed C values require that the vegetation and mulch are randomly distributed over the entire area. For grazed forest land multiply these values by 0.7.

[2]Canopy height is measured as the average fall height of water drops falling from the canopy to the ground. Canopy effect is inversely proportional to drop fall height and is negligible if fall height exceeds 33 ft.

[3]Portion of total-area surface that would be hidden from view by canopy in a vertical projection (a bird's-eye view).

[4]G: cover at surface is grass, grasslike plants, decaying compacted duff, or litter. W: cover at surface is mostly broadleaf herbaceous plants (as weeds with little lateral-root network near the surface) or undecayed residues or both.

R = 185
K = 0.37
LS = 1.4
C = 0.43
P = 1.00

A (annual soil loss) = 185 × 0.37 × 1.4 × 0.43 × 1.0
= 41.2 tons/acre

Pasture: 170 acres; 50 percent of area has canopy cover of short brush (0.5-m [1.6-ft] fall height); 80 percent of surface is covered by grass and grasslike plants; soil is Fayette silt loam; slopes are 8 percent and 200 ft long.

R = 185
K = 0.37
LS = 1.4
C = 0.012

A (annual soil loss) = 185 × 0.37 × 1.4 × 0.012
= 1.15 tons/acre

Forest: 150 acres; 30 percent of area has tree; ‹nopy; 50 percent of surface is covered by litter; .ndergrowth is unmanaged; soil is Bates silt loam; slopes are 12 percent and 100 ft long.

R = 185
K = 0.32
LS = 1.8
C = 0.009

A (annual soil loss) = 185 × 0.32 × 1.8 × 0.009
= 0.96 ton/acre

Future conditions.—Cropland: 280 acres in rotation of wheat, meadow, corn, corn with residue left, contour stripcropped; soil is Fayette silt loam;

Table 3–3.—C factors for undisturbed forest land[1]

Percentage of area covered by canopy of trees and undergrowth	Percentage of area covered by duff[2]	C factor[3]
100–75	100–90	0.0001–0.001
70–45	85–75	.002 – .004
40–20	70–40	.003 – .009

[1]Where effective litter cover is less than 40 percent or canopy cover is less than 20 percent, use table 3–2. Also use table 3–2 where woodlands are being grazed, harvested, or burned.

[2]Percentage of area covered by duff is dominant. Interpolate on basis of duff, not canopy.

[3]The ranges in listed C values are caused by the ranges in the specified forest litter and canopy covers and by variations in effective canopy heights.

Table 3–4.—C factors for mechanically prepared woodland sites

Site preparation	Mulch cover[1]	Soil condition[2] and weed cover[3]							
		Excellent		Good		Fair		Poor	
		NC	WC	NC	WC	NC	WC	NC	WC
	Percent								
Disked, raked, or bedded[4]	None	0.52	0.20	0.72	0.27	0.85	0.32	0.94	0.36
	10	.33	.15	.46	.20	.54	.24	.60	.26
	20	.24	.12	.34	.17	.40	.20	.44	.22
	40	.17	.11	.23	.14	.27	.17	.30	.19
	60	.11	.08	.15	.11	.18	.14	.20	.15
	80	.05	.04	.07	.06	.09	.08	.10	.09
Burned[5]	None	.25	.10	.26	.10	.31	.12	.45	.17
	10	.23	.10	.24	.10	.26	.11	.36	.16
	20	.19	.10	.19	.10	.21	.11	.27	.14
	40	.14	.09	.14	.09	.15	.09	.17	.11
	60	.08	.06	.09	.07	.10	.08	.11	.08
	80	.04	.04	.05	.04	.05	.04	.06	.05
Drum chopped[5]	None	.16	.07	.17	.07	.20	.08	.29	.11
	10	.15	.07	.16	.07	.17	.08	.23	.10
	20	.12	.06	.12	.06	.14	.07	.18	.09
	40	.09	.06	.09	.06	.10	.06	.11	.07
	60	.06	.05	.06	.05	.07	.05	.07	.05
	80	.03	.03	.03	.03	.03	.03	.04	.04

[1]Percentage of surface covered by residue in contact with the soil.

[2]*Excellent* soil condition—Highly stable soil aggregates in topsoil with fine tree roots and litter mixed in. *Good*—Moderately stable soil aggregates in topsoil or highly stable aggregates in subsoil (topsoil removed during raking), only traces of litter mixed in. *Fair*—Highly unstable soil aggregates in topsoil or moderately stable aggregates in subsoil, no litter mixed in. *Poor*—No topsoil, highly erodible soil aggregates in subsoil, no litter mixed in.

[3]NC—No live vegetation. WC—75-percent cover of grass and weeds having an average drop fall height of 20 in. For intermediate percentages of cover, interpolate between columns.

[4]Modify the listed C values as follows to account for effects of surface roughness and aging. *First year after treatment*: multiply listed C values by 0.40 for rough surface (depressions >6 in.); by 0.65 for moderately rough; and by 0.90 for smooth depressions <2 in.) *For 1 to 4 years after treatment*: multiply listed factors by 0.7. *For 4+ to 8 years*: use table 3–2. *More than 8 years*: use table 3–3.

[5]*For first 3 years*: use C values as listed. *For 3+ to 8 years after treatment*: use table 3–2. *More than 8 years after treatment*: use table 3–3.

United States Department of Agriculture

Soil Conservation Service

National Engineering Handbook

Section 3 Sedimentation

Chapter 6
Sediment Sources, Yields, and Delivery Ratios

delivered. The extent and condition of the transport system have considerable bearing on the amount of sediment the system can transport. A transport system with high channel density has the greatest chance of acquiring materials from the uplands and should have a high sediment-delivery ratio. The condition of the channels (clogged or open, meandering or straight) affects velocity and, consequently, transport capacity. A high-gradient stream, usually associated with steep slopes and high relief, transports eroded material efficiently. The converse is true of a low-gradient stream.

Texture of Eroded Material

The texture of the eroded material also affects the sediment delivery ratio. Transport of sand requires a relatively high velocity. Much of the sand is deposited in upstream areas wherever velocity drops significantly. Sand usually becomes part of the sediment load only if its source areas are adjacent to an efficient transport system. Eroded silt and clay are likely to stay in suspension as long as the water is moving, and most of such material is delivered downstream. Some of the coarser particles may be deposited as colluvium before they reach the transport system. The sands and larger grain-size materials are usually produced by channel erosion, and the silts and clays are common products of sheet erosion.

Depositional Area

Some sediment is deposited at the foot of upland slopes, along the edges of valleys, in valley flats, in and along main stream channels, and at the heads of and in reservoirs, lakes, and ponds. Such deposition within a watershed decreases the amount of sediment delivered to points downstream.

Watershed Characteristics

The topography of a watershed affects the sediment delivery ratio. Slope is a major factor affecting the rate of erosion. High relief often indicates both a high erosion rate and a high sediment-delivery ratio. The relief/length ratio (R/L ratio) often corresponds closely to the sediment delivery ratio. For use in the R/L ratio, relief (measured in feet) is defined as the difference between the average elevation of the watershed divide at the headwaters of the main-stem drainage and the elevation of the streambed at the point of sediment yield. Length is defined as the maximum valley length (in feet) parallel to the main-stem drainage from the point of sediment yield to the watershed divide. The shape of a watershed can affect the sediment delivery ratio. Channel density also affects the sediment delivery ratio; channel density and topography are closely related. The size of the drainage area is also important. Size can be considered a composite variable that incorporates and averages out the individual effects of variability in topography, geology, and climate.

Procedures for Estimating the Sediment Delivery Ratio

Determining the sediment delivery ratio requires knowledge of the sediment yield at a given point in a watershed and the total amount of erosion. If this information is available, determining the sediment delivery ratio is simple. Values for both these required items, however, usually are not available for most small watersheds.

Gross erosion in a watershed can be estimated by using standard SCS procedures (see Chap. 3). Sediment yield can be determinied from reservoir sedimentation surveys or sediment-load measurements.

Many reservoirs are not located at points where measurements of sediment yield are needed, and a program of sediment-load sampling may be long and expensive. But if the ratio of known sediment yield and erosion within a homogeneous area can be analyzed in conjunction with some measurable influencing factor, these data can be used to predict or estimate the sediment delivery ratio for similar areas where measurements are lacking.

In a given physiographic area, finding measurable factors that can be definitely related to the sediment delivery ratio is the goal of any delivery-ratio analysis. As already pointed out, many factors can affect the sediment delivery ratio. Some are more pronounced in their effect than others; some lend themselves to quantitative expression and others do not.

Statistical analysis is an effective means of developing information for estimating the sediment delivery ratio. The sediment delivery ratio is used as a dependent variable and the measurable watershed factors are used as the independent or controlling variables. For such an analysis, quantitative data on sediment yield, erosion, and

measurable watershed factors must be available. Reservoir sedimentation surveys are a source of sediment yield data. Either maps or field surveys can be used to obtain the erosion information and determine the watershed factors. These data can be analyzed to develop a means for estimating the sediment delivery ratio for similar areas. Analyses of this type should be made in consultation with the geologist (sedimentation) of the appropriate national technical center (NTC).

Size of Drainage Area

Data obtained from past studies (Gottschalk and Brune 1950, Woodburn and Roehl[3], Maner and Barnes 1953, Glymph 1954, Maner 1957, Roehl 1962) are plotted in figure 6–2. The figure indicates a wide variation in the sediment delivery ratio for any given size of drainage area. The shaded area represents the range of data and the dashed line is the median. This analysis of data from widely scattered areas does show, however, that there is evidently some similarity in sediment delivery ratios throughout the country and that they vary inversely as the 0.2 power of the size of the drainage area. Rough estimates of the sediment delivery ratio can be made from figure 6–2, but any such estimate should be tempered with judgment, and other factors such as texture, relief, type of erosion, sediment transport system, and areas of deposition within the drainage area should be considered. For example, if the texture of the upland soils is mostly silt or clay, the sediment delivery ratio will be higher than if the texture is sand.

Somewhat more refined relationships between sediment delivery ratio and drainage area have been developed by regions at some NTC's and can be used in place of figure 6–2.

Relief-Length Ratio

The watershed relief-length ratio (Maner and Barnes 1953, Roehl 1962) is a significant indicator of the sediment delivery ratio. Empirical equations were derived to estimate the R/L ratio for the Red Hills of Texas, Oklahoma, and Kansas and for the southern Piedmont region of the Southeast. The significance of the R/L ratio may be less pronounced in some areas than in others, but it is related to, and seems to be a reasonable expression of, several watershed factors.

Source-Texture Analysis

In all the preceding discussion of methods of estimating the sediment delivery ratio, the delivery ratio is a percentage of total erosion. In many places the individual delivery ratio of the component parts of the total erosion is of concern to SCS geologists. Reasonable and realistic values for the delivery of component parts must be estimated from scanty data. One method of obtaining these estimates is to make certain determinations or assumptions about the source of various components of a known sediment yield.

In the following example the method of source-texture analysis is applied to a watershed in which the sediment sources are sheet erosion, gullies, roadbanks, ditches, and receding streambanks. The suspended-sediment yield (determined by sampling) consists of silt and clay, and the bedload (estimated as a percentage of the suspended-sediment yield) is sand. The streambed is in equilibrium and therefore is not considered a net source of sediment under existing conditions. Because of the texture of the sediment and the texture of the material available in the various sources, assume that all the sand is provided by gullies, roadbanks, and ditches and that the fine materials are provided by the receding streambanks and sheet erosion. Assume that 100 percent of the streambank material will be delivered to the point of measurement.

Use the following procedure to determine the sediment delivery ratio:

1. Compute the amount of sediment produced by each source or type of erosion in tons per year.
2. Determine the suspended-sediment yield of the watershed by sampling.
3. Establish a delivery ratio for the gullies and roadside erosion by comparing the amount of sand being carried past the point of measurement with the volume of material provided by gullies, roadbanks, and ditches.

Table 6–2 illustrates source-texture analysis for estimating sediment delivery ratios.

This procedure can be used to estimate the sediment delivery ratio in similar areas. Many broad assumptions are required in an analysis of this

[3]Woodburn, Russell, and J. W. Roehl. Unpublished study (1951). USDA, Agricultural Research Service, Oxford, Miss.

type, and the results will be only as good as the assumptions.

Source Deposition

Another method of determining the sediment delivery ratio is to make a field study of a watershed and estimate the amount of deposition that can be traced to any one source. The difference in the volume of such deposition and the volume of sediment produced by the source gives an estimate of the delivery ratio from that source.

Table 6–2.—Sediment source and the delivery ratio

Sediment source	Erosion[1]		Sediment yield[2]		Delivery ratio
	Sand	Fines	Sand	Fines	
	tons/yr	*tons/yr*	*tons/yr*	*tons/yr*	*Pct.*
Sheet erosion	—	900,000	—	[3]300,000	33
Channel erosion					
Gullies	350,000	—	280,000	—	[4]80
Roadbanks	150,000	—	120,000	—	[4]80
Streambanks	—	900,000	—	900,000	100
Total	500,000	1,800,000	[5]400,000	[6]1,200,000	70

[1]Determine by standard SCS procedures.
[2]Assume that all fines are from sheet erosion and streambanks and all sand is from gullies and roadbanks.
[3]Difference between total yield of fines and yield of fines from streambanks.
[4]Compute as ratio of total sand yield to total sand available; assume equal delivery ratio for gullies and roadbanks.
[5]Estimate bedload as a percentage of the suspended load.
[6]Determine from suspended-load measurements.

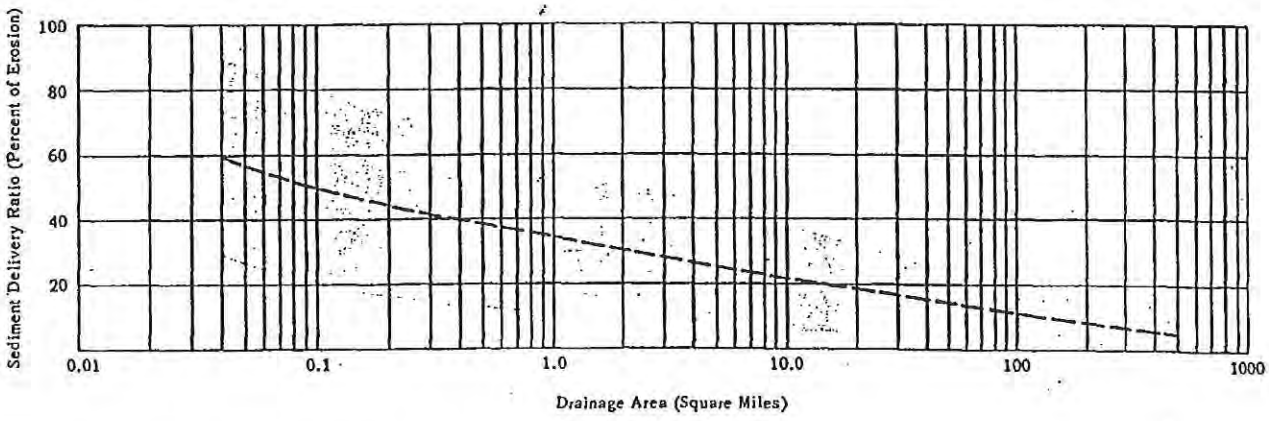


Figure 6–2.—Relationship between drainage area and sediment delivery ratio.

Summary

In many places data needed for detailed analyses are insufficient or nonexistent. Using an equation to obtain sediment data outside the physiographic area for which the equation was developed is generally not recommended. Yet SCS geologists must know the sediment delivery ratio to determine the sediment yield and the relative importance of various sediment sources and to recommend measures for reducing the sediment yield.

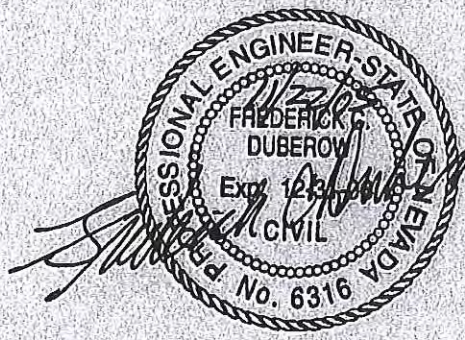
Information about the sediment yield from some watersheds is available in most areas of the Nation. These data can be obtained from suspended-load records and reservoir sedimentation-survey records. Comparing sediment yield with the calculated gross erosion indicates the expected sediment delivery ratio for an area. This kind of analysis is much broader than a detailed study, and extrapolating such an estimate to other areas can cause error.

City of Mesquite, Nevada

Water Reuse System and Storm Detention Project

Phase 2B and Phase 3:
Pulsipher Wash Detention Basin and Pulsipher Reuse Water Storage Pond, Abbott Wash Detention Basin and Abbott Reuse Water Storage Pond, Abbott Wash Detention Basin Access Road

100% Design Document Report



Stantec Consulting Inc.

November 2005

APPROVED J- 583

this 26 day of October 2006

State Engineer

Parameter	Pulsipher	Abbott
Length of basin	3.7 miles	6.2 miles
Length from centroid to outlet	1.6 miles	2.75 miles
Average basin slope	239.1 ft/mi	138.2 ft/mi
Roughness	0.045	0.045
Lag time	44.5 min	74.5 min

3.2.2 Sediment Volumes

The sediment volumes identified in the City of Mesquite Flood Control Master Plan Update 2001 (MPU2001) were used to compute the amount of dead storage to include in the reservoir stage-storage relationships. The MPU2001 implements the methodology provided in the CCRFCD Manual to estimate the 100-year sediment deposit at locations of interest, including the I-15 crossing. The analysis included wash load and bed load using the Universal Soil Loss Equation (USLE) and the Meyer-Peter formula, respectively.

The amount of sediment per year at I-15 was identified in the MPU2001. To compute the amount of sediment accumulation at the reservoirs, a ratio of the relative areas was used. For Pulsipher Wash, the ratio of the contributing area for the reservoir to the drainage area at I-15 is 0.49. Therefore 49% of the sediment yield at I-15 (21 ac-ft) was used in the model.

Location	Drainage Basin Area (acres)	Sediment Volume (ac-ft)
Pulsipher Wash at I-15	2,986	21
Pulsipher Wash at reservoir	1,454	10.2
Abbott Wash at I-15	4,111	24
Abbott Wash at reservoir	3,287	19.2

3.2.3 Detention Basin Design

The stage-storage relationships were modified to account for dead storage, as described above, and input into the HEC-1 model. The stage-storage relationships were developed in AutoCAD using 2 ft contour intervals. The stage-storage curves can be found on the design drawings.

The stage-discharge relationships were input into the HEC-1 model. The relationships were computed using both the low flow outlet and emergency spillway. The stage-discharge relationships were developed in Microsoft Excel using 1 ft intervals. Calculations are included in Appendix A. The following dimensions and features for each detention basin have been identified.

Parameter	Pulsipher	Abbott
Type	Earth/RCC cap	Earth/RCC cap
Maximum dam height	26 ft	29 ft
Dam length	528 ft	512 ft
Dam crest elevation	1678 ft	1681 ft
Dam crest width	10 ft	10 ft
Minimum freeboard (above PMF Maximum water level)	3 ft	2.4 ft

Pulsipher Sub-Area Sediment Loading

Sub-Area	Area (ft²)	Area (acres)	Percent of Total Area	Sediment from Sub-Area (acre feet)	Sediment Collected Sub-Area (acre feet)	
P-1	22526510.28	517.14	17.32	3.64	3.64	
P-2	15202953.06	349.01	11.69	2.45	6.09	
P-3a	16977955.42	389.76	13.05	2.74	8.83	
P-3b	5570805.32	127.89	4.28	0.90	0.90	
P-3c	**3059156.63**	**70.23**	**2.35**	**0.49**	**10.23**	**Pulsipher Site**
P-4	21085589.96	484.06	16.21	3.40	13.63	
P-6	17069350.21	391.86	13.12	2.76	2.76	
P-7	16277735.80	373.69	12.52	2.63	5.38	
P-8	12285645.97	282.04	9.45	1.98	21.00	
	Total	2985.67	100.00	21.00		

Sum of P-1 through P-3c	1454.03	acres
Sum of P-1 through P-4	1938.08	acres
Sum of P-1 through P-8	2985.67	acres

Abbott Sub-Area Sediment Loading

Sub-Area	Area (ft)	Area (acres)	Percent of Total Area	Sediment from Sub-Area (acre feet)	Cum. Sediment to or Sub-Area (acre feet)	
A-1	30178409.42	692.80	16.85	4.04	4.04	
A-2	24023962.95	551.51	13.41	3.22	7.26	
A-3	15662136.83	359.55	8.75	2.10	9.36	
A-4	8958060.34	205.65	5.00	1.20	1.20	
A-5	13745940.06	315.56	7.68	1.84	12.40	
A-6	18686934.79	428.99	10.43	2.50	2.50	
A-7	8309146.66	190.75	4.64	1.11	1.11	
A-8	13251810.21	304.22	7.40	1.78	5.39	
A-9B	**10357296.51**	**237.77**	**5.78**	**1.39**	**19.19**	**Abbott Dam Site**
A-9C	29087514.4	667.76	16.24	3.90	23.08	
A-9A	6834119.87	156.89	3.82	0.92	24.00	
	Total	4111.46	100.00	24.00		

Total Area above Dam Site = 5.14 sq. miles

Abbott Stage Capacity Relationship
Detention Basin

Elevation (ft)	Storage Area (acre)	Storage Volume (acre-ft)	Cumulative Total Storage Volume (acre-ft)	Cumulative Storage minus 19.2 acre-ft Sediment Storage (acre-ft)	
1654	0.00	0.00	0.00	0	
1656	2.73	2.73	2.73	0	
1657.8	10.04	11.49	14.21	-4.99	
1658	10.85	2.09	16.30	-2.90	
1660	15.61	26.46	42.76	23.56	
1662	17.59	33.20	75.96	56.76	
1664	18.19	35.78	111.74	92.54	
1666	18.80	36.98	148.73	129.53	
1668	19.43	38.23	186.95	167.75	
1670	20.08	39.50	226.46	207.26	
1671	20.64	20.36	246.82	227.62	
1672	20.70	20.67	267.49	248.29	Top of Spillway
1672.25	20.78	5.18	272.67	253.47	
1674	21.33	36.84	309.51	290.31	
1676	22.11	43.44	352.96	333.76	
1678	24.15	46.27	399.22	380.02	
1680	26.36	50.51	449.73	430.53	
1681	27.50	26.93	476.66	457.46	Top of Dam

Abbott Stage Capacity Relationship
Lined Reuse Storage Pond

Elevation (ft)	Storage Area (acre)	Storage Volume (acre-ft)	Cumulative Storage Volume (acre-ft)	
1684	**0.33**	**0**	**0**	Bottom of Pond
1686	1.03	1.35	1.35	
1688	1.18	2.21	3.57	
1690	1.35	2.53	6.10	
1692	1.52	2.86	8.96	
1694	1.69	3.21	12.17	
1696	1.87	3.56	15.73	
1697	**1.96**	**1.92**	**17.65**	Max Normal WSE
1698	2.06	2.01	19.66	
1700	**2.25**	**4.30**	**23.96**	Top of Dam

Stage-Discharge
Pulsipher Detention Basin

Outlet Pipes	Low Flow	Silt
Pipe Diameter (in)	48	24
Pipe Invert El	1655.8	1652.0
Orifice Diameter (in)	38	24
Orifice Invert El	1655.8	1652.0
Orifice Center El	1657.4	1653.0
Orifice Top El	1659.0	1654.0
Orifice Coefficient	0.65	0.65

Emergency Spillway Data	
Weir Length (ft)	400
Weir Crest Elevation	1670.7
P	3.0

Stage Elev (ft)	P/Ho	Weir Coeff	Low Flow Orifice (cfs)	Silt Pipe Orifice (cfs)	Spillway (cfs)	Total (cfs)	
1652			0	0	0	0	
1653			0	7	0	7	
1654			0	16	0	16	Bottom of Basin
1655			0	23	0	23	
1656			3	28	0	31	
1657			22	33	0	55	
1658			37	37	0	74	
1659			52	40	0	92	
1660			66	43	0	110	
1661			78	46	0	124	
1662			88	49	0	137	
1663			97	52	0	149	
1664			106	54	0	160	
1665			113	57	0	170	
1666			121	59	0	180	
1667			127	61	0	189	
1668			134	63	0	197	
1669			140	66	0	206	
1670			146	68	0	213	
1670.7	0	0	**150**	**69**	**0**	**219**	Spillway Crest
1671	10.0	3.95	152	70	260	481	
1672	2.3	3.94	157	71	2336	2564	
1673	1.3	3.91	162	73	5455	5691	
1674	0.9	3.88	167	75	9304	9546	
1675	0.7	3.85	**172**	**77**	**13732**	**13981**	Max PMF WSE
1676	0.6	3.83	177	79	18693	18949	
1677	0.5	3.8	182	80	24036	24298	
1678	0.4	3.75	**187**	**82**	**29585**	**29854**	Top of Dam

01#10

Stage-Discharge
Abbott Detention Basin

Outlet Pipes	Low Flow	Silt
Pipe Diameter (in)	72	36
Pipe Invert El	1657.8	1653.0
Orifice Diameter (in)	60	36
Orifice Invert El	1657.8	1653.0
Orifice Center El	1660.3	1654.5
Orifice Top El	1662.8	1656.0
Orifice Coefficient	0.65	0.65

Emergency Spillway Data	
Weir Length (ft)	380
Weir Crest Elevation	1672.0
P	3.0

Stage Elev (ft)	P/Ho	Weir Coeff	Low Flow Orifice (cfs)	Silt Pipe Orifice (cfs)	Spillway (cfs)	Total (cfs)	
1653			0	0	0	0	
1654			0	6	0	6	Bottom of Basin
1655			0	26	0	26	
1656			0	45	0	45	
1657			0	58	0	58	
1658			1	69	0	70	
1659			25	78	0	103	
1660			55	86	0	141	
1661			90	94	0	184	
1662			130	101	0	231	
1663			168	107	0	276	
1664			197	114	0	311	
1665			222	119	0	342	
1666			245	125	0	370	
1667			265	130	0	395	
1668			284	135	0	420	
1669			302	140	0	442	
1670			319	145	0	464	
1671			335	150	0	485	
1672	0	0	**350**	**154**	**0**	**505**	Spillway Crest
1673	6.0	3.95	358	156	403	917	
1673	3.0	3.95	365	159	1140	1664	
1674	1.5	3.92	379	163	4213	4755	
1675	1.0	3.88	393	167	7661	8221	
1676	0.75	3.86	406	171	11734	12311	
1677	0.60	3.83	419	175	16272	16865	
1678	0.50	3.80	431	179	21222	21832	
1678.6	0.45	3.78	**438**	**181**	**24355**	**24974**	Max PMF WSE
1679	0.43	3.75	443	183	26391	27017	
1680	0.38	3.75	455	186	32244	32885	
1681	0.33	3.69	**466**	**190**	**37859**	**38515**	Top of Dam

Pulsipher Stage Capacity Relationship
Detention Basin

Elevation (ft)	Storage Area (acre)	Storage Volume (acre-ft)	Cumulative Total Storage Volume (acre-ft)	Cumulative Storage minus 10.23 acre-ft Sediment Storage (acre-ft)	
1653	1.72	0.86	0.86	-9.37	
1654	6.41	4.07	4.93	-5.30	Bottom of Basin
1656	6.96	13.37	18.30	8.07	
1658	7.36	14.32	32.62	22.39	
1660	7.79	15.15	47.78	37.55	
1662	8.31	16.10	63.88	53.65	
1664	8.84	17.14	81.02	70.79	
1666	9.39	18.22	99.24	89.01	
1668	10.00	19.39	118.64	108.41	
1670	10.85	20.85	139.48	129.25	
1670.7	11.10	7.68	**147.17**	**136.94**	Spillway Crest
1672	11.58	14.74	161.91	151.68	
1674	12.72	24.30	186.20	175.97	
1676	14.23	26.95	213.16	202.93	
1678	15.90	30.13	**243.29**	**233.06**	Top of Dam

Pulsipher Stage Capacity Relationship
Lined Reuse Storage Pond

Elevation (ft)	Storage Area (acre)	Storage Volume (acre-ft)	Cumulative Storage Volume (acre-ft)	
1686	**0.53**	**0**	**0**	Bottom of Pond
1688	0.83	1.36	1.36	
1690	1.80	2.63	3.99	
1692	1.95	3.75	7.74	
1694	2.11	4.06	11.81	
1696	2.28	4.39	16.20	
1697	2.36	2.32	18.51	
1698	**2.45**	**2.40**	**20.92**	Max. Normal WSE
1700	2.63	5.08	26.00	

6. IMPROVEMENT PLANS / AS-BUILTS FOR EXISTING FACILITIES

ABBOTT AND PULSIPHER WASHES LOMR CERTIFICATION

Based on field observations, I certify that the existing improvements substantially conform to the design drawing and/or as-built for the following improvement plans:

- Hardy Way Extension, Stamped by Christopher L. Thompson, Dated April 3, 2008.
- Pulsipher Wash Improvements, Stamped by Travis H, Anderson, Dated November 14, 2007.
- Pulsipher Wash Improvements, Stamped by Greg L. Bulloch, Dated October 18, 2002.
- Mesquite Water Reuse System and Storm Detention Project, Stamped by Jason T. Broome, Dated January 21, 2009.
- Detention Basins Additional Grading Plan, Stamped by Jerry Pruitt, Dated August 16, 2011.

Jerry E. Pruitt, PE – Senior Vice President
G. C. WALLACE, INC.

DISCLAIMER NOTE:

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND OR OVERHEAD UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION. CONTRACTOR TO NOTIFY ENGINEER OF ANY CHANGES OR DISCREPANCIES

Avoid power line contact. It's costly.	Avoid cutting underground utility lines. It's costly.
Call before you Underground 1-702-646-5710 OVERTON POWER DISTRICT 5	Call before you Dig 1-800-227-2600

N.G.S. CONTROL BENCHMARK

NATIONAL GEODETIC SURVEY BENCHMARK Z-405 STAINLESS STEEL ROD IN CASING STAMPED Z-405 1982, ON THE NORTH SIDE OF MESQUITE BOULEVARD AND THE WEST SIDE OF TOWN WASH, ±238' EASTERLY FROM THE CENTERLINE OF DESERT DRIVE, AND ±58' NORTHERLY FROM THE CENTERLINE OF MESQUITE BOULEVARD. PUBLISHED ELEVATION = 1596.49 FEET NAVD 1988 NORTH AMERICAN VERTICAL DATUM OF 1988.

PROJECT BENCHMARK

LOCAL MESQUITE NEVADA PLITE 2006 DATUM (PERPETUATED FROM MARK HEART CT USING NGVD 29, NATIONAL GEODETIC VERTICAL DATUM IN THE MESQUITE VALLEY).

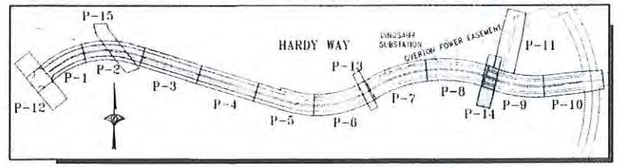
A 2" ALUMINUM CAP MONUMENT IN THE INTERSECTION OF FALCON RIDGE PARKWAY AND HARDY WAY, STAMPED DBE PLS 13275
2006 PROJECT DATUM = NAVD 1988 WINUS 3.2C FEET
2006 PROJECT BENCHMARK ELEVATION = 1719.81 (FT)

BASIS OF BEARINGS

SOUTH 00°50'08" EAST, BEING THE BEARING OF WEST LINE OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 70 EAST, M.D.M., CITY OF MESQUITE, CLARK COUNTY, NEVADA, AS SHOWN BY MAP THEREOF IN FILE 3, PAGE 87 OF MISCELLANEOUS MAPS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA

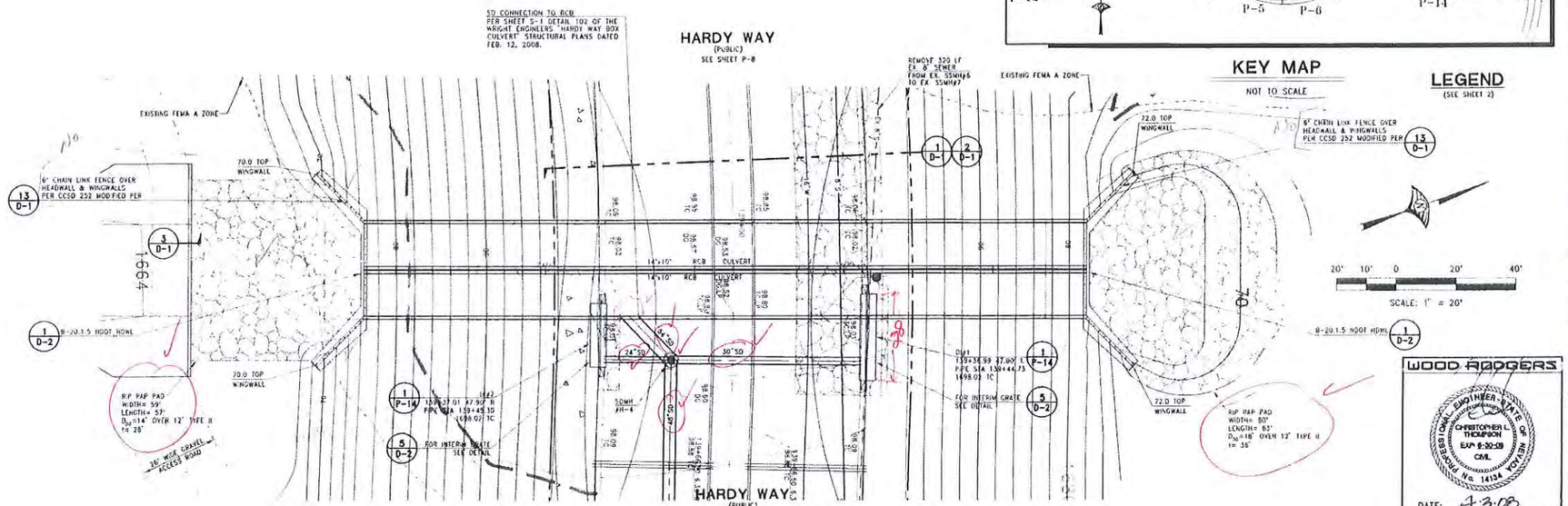
NOTES:

1. ALL SANITARY SEWER IS PUBLIC.
2. ALL STORM DRAIN IS PUBLIC UNLESS NOTED OTHERWISE



KEY MAP
NOT TO SCALE

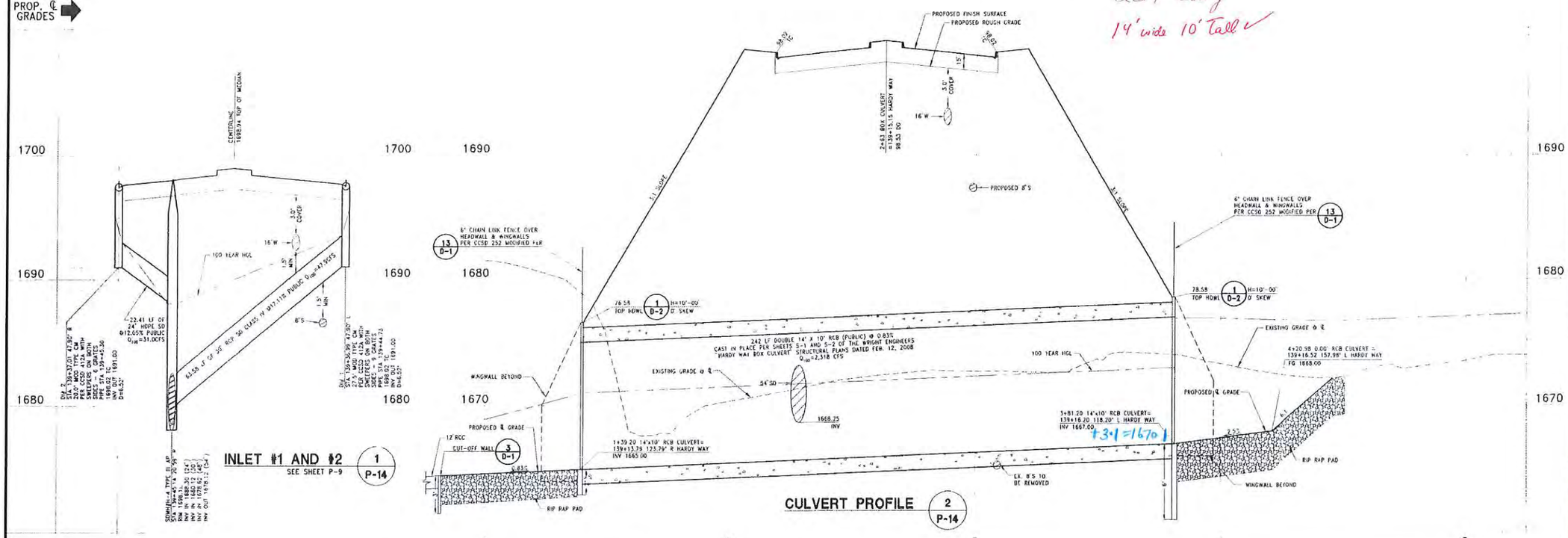
LEGEND
(SEE SHEET 2)



DOUBLE 14' X 10' RCB CULVERT

239' Long
14' wide 10' Tall

EXISTING GROUND @ ℄
PROP. ℄ GRADES



INLET #1 AND #2 — SEE SHEET P-9 — 1 / P-14

CULVERT PROFILE — 2 / P-14

1 2 3 4 5

WOOD RODGERS
DEVELOPING - INNOVATIVE - DESIGN - SOLUTIONS
9900 Covington Cross Dr. Ste. 102 Tel 702.434.2950
Las Vegas, NV. 89144 Fax 702.434.2957

DESIGNED BY: CAM, LVR2
DRAWN BY: CDR
CHECKED BY: SWH
SCALE: H: 1"=20' V: 1"=4'
DATE: JANUARY 30, 2008

WOOD RODGERS
PROFESSIONAL ENGINEER - STATE OF NEVADA
CHRISTOPHER L. THOMPSON
EXP: 6-30-09
CIVIL
No. 14134
DATE: 4-3-08

IMPROVEMENT PLANS FOR
HARDY WAY EXTENSION
PLAN AND PROFILE
DOUBLE 14' X 10' BOX CULVERT
CITY OF MESQUITE NEVADA

PROJECT NO. 1817.035
DRAWING P-14
SHT 24 OF 28

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

DATE: 3/18/2011 SHEET NO. OF

SUBJECT: JOB NO.

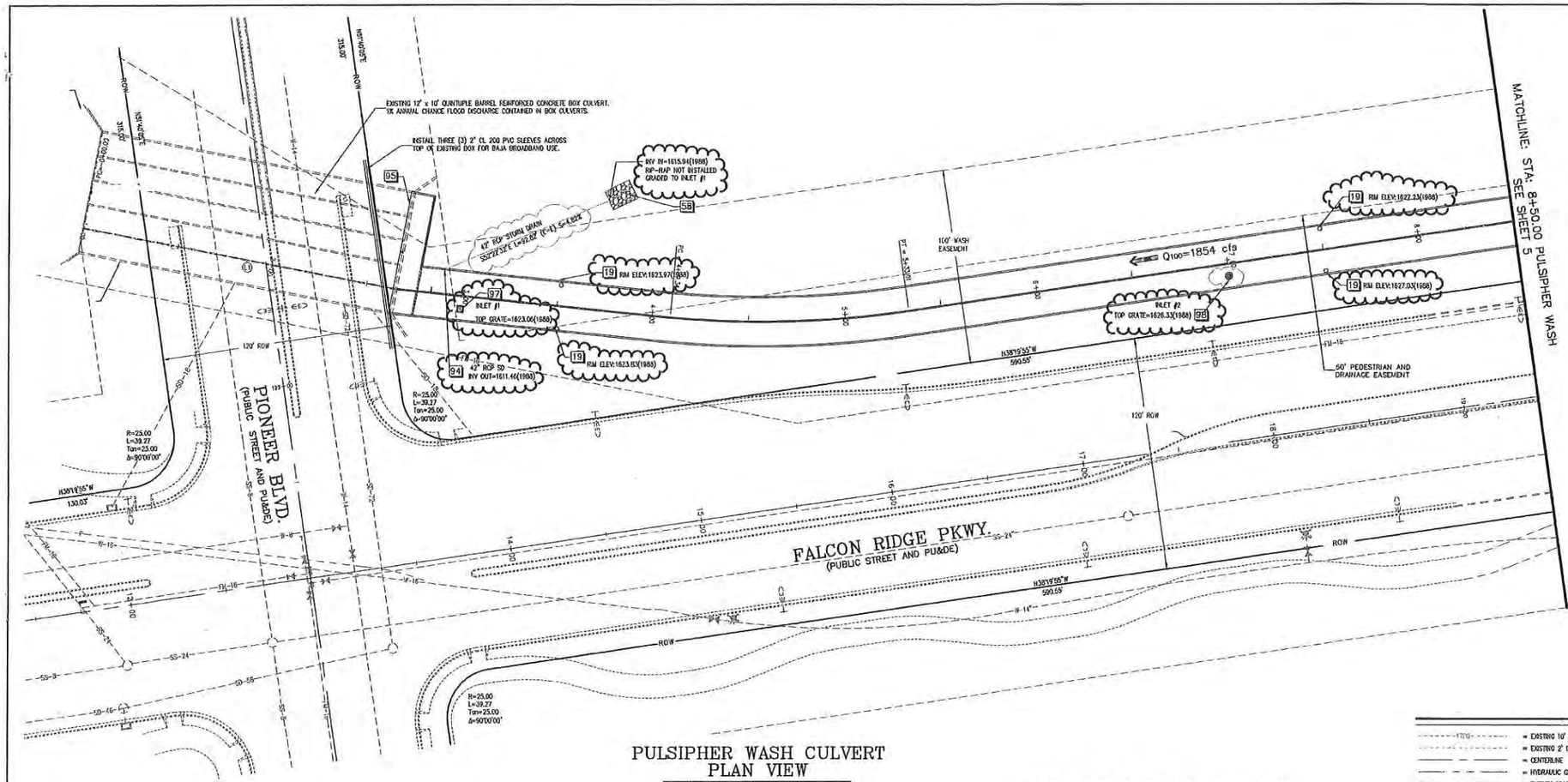
CLIENT: CHECKED BY CALC BY BG

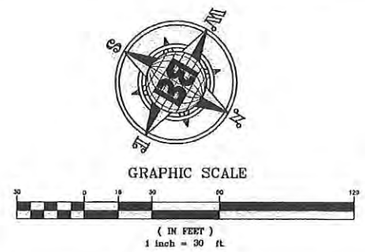
Pulsipher Wash

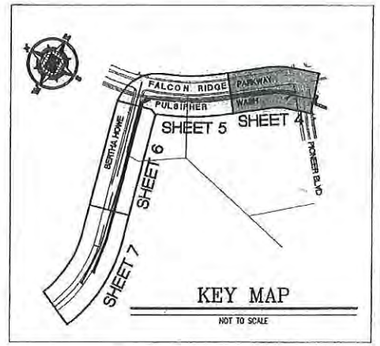
	88' datum (surveyed)	29' Datum (From As Built Plan)
Start of the Channel	1531.49	1528.4 = 3.09
End of Pioneer Bridge	1608.13	1605.0 = 3.13

Average: 3.10

Use this as conversion







PULSIPHER WASH CULVERT PLAN VIEW

STA: 0+00.00 TO STA: 8+00.00
SCALE HOR: 1"=30'

Call Two Working Days Before You Dig!
1-800-227-2600

NOTE: ALL EXISTING UTILITY LOCATIONS MUST BE

DISCLAIMER:
THE OVERALL GRADING, DRAINAGE SWALES AND OTHER DRAINAGE SYSTEMS DEPICTED ON THIS PLAN ARE SHOWN AS A REPRESENTATION OF MINIMUM DRAINAGE REQUIREMENTS. HOWEVER, IT IS TO BE UNDERSTOOD THAT EROSION MAY AND MOST LIKELY WILL OCCUR ON CUT SLOPES, FILL SLOPES, MINOR DRAINAGE SWALES DIRECTED AT DOWN SLOPES AND/OR RETAINING WALLS, AND MINOR DRAINAGE SWALES DIRECTED TOWARD MORE MAJOR DRAINAGE FACILITIES (I.E.: STREETS, CURBS & GUTTER, STORM DRAIN). IT SHOULD ALSO BE UNDERSTOOD THAT THE DEVELOPER AND/OR CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING SOME FORM OF EROSION PROTECTION FOR THE AREAS NOTED ABOVE.

CURVE TABLE CENTER LINE

CURVE	RADIUS	TANGENT	LENGTH	DELTA
C1	525.00	62.17	123.67	13°29'45"

LINE TABLE CENTER LINE

LINE	LENGTH	BEARING
L1	165.00'	N19°09'02"W
L2	144.34'	N24°59'05"W
L3	348.32'	N39°19'55"W

LEGEND

- 1770 — EXISTING 10' CONTOUR WITH ELEVATION SHOWN
- EXISTING 2' CONTOUR
- CENTERLINE
- HYDRAULIC GRADE LINE (HGL)
- ENERGY GRADE LINE (EGL)
- SD — EXISTING STORM DRAIN
- W — EXISTING WATERLINE
- SS — EXISTING SANITARY SEWER
- FM — EXISTING FORCE MAIN
- EASEMENT
- PROPOSED 42" STORM DRAIN
- P — PROPERTY LINE
- ROW — RIGHT-OF-WAY
- EXISTING HYDRANT
- EXISTING GATE VALVE
- (1) — CURVE IDENTIFICATION
- A/8 — CROSS SECTION
- 1769.00 — EXISTING WASH SPOT ELEVATION
- 56 — CONSTRUCTION NOTE
- PROPOSED CULVERT
- EXISTING CULVERT
- EXISTING MANHOLE
- PROPOSED MANHOLE
- PROPOSED CONCRETE
- EXISTING ASPHALT
- 1623.14 — EXISTING TOP BACK OF CURB ELEVATION

CONSTRUCTION NOTES

19 INSTALL MODIFIED TYPE 4 MANHOLE PER DETAIL 6, SHEET 8A OFFSET/DISTANCE FROM CL TO CENTER OF 4' OPENING.

56 PROVIDE LOOSE RIP-RAP FOR TEMPORARY INLET PROTECTION ACCORDING TO: D50=12", DEPTH=2.0', LENGTH=14.0', WIDTH=10.5'

94 INSTALL PIPE THROUGH WALL PER DETAIL G/8

95 TIE PROPOSED BOX CULVERT INTO EXISTING BOX CULVERT PER "R.C.B. CULVERT EXTENSION" DETAIL PER NEVADA DEPARTMENT OF TRANSPORTATION, "METHOD OF EXTENDING R.C.B. CULVERTS", B-20.1.7 (502).

97 MOUNT NEW NEENAH GRATE R-3807 (2 PC. ASSEMBLY) OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 36" # OPENING IN BOX CULVERT FOR INLET.

98 MOUNT NEW NEENAH GRATE R-2580 OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 30" # OPENING IN BOX CULVERT FOR INLET.

ELEVATIONS IN NAVD1988 DATUM
STATE PLANE COORD. NEVADA EAST, FT

AS BUILTS

00027920

REVISIONS			
NO	DESCRIPTION	DATE	BY APPROVED

BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS—LAND SURVEYORS—LAND PLANNERS
www.bullochbrothers.com

P.O. BOX 3172	CEDAR CITY, UT	84720	(435) 586-6500
P.O. BOX 20866	BOULDER CITY, NV	89039	(702) 435-0768
760 W. PIONEER BLVD. SUITE 200	MESQUITE, NV	89027	(702) 346-5100
1785 E. SAHARA AVE. SUITE 315	LAS VEGAS, NV	89104	(702) 735-5857
3100 W. PINEBROOK RD. SUITE 130C	PARK CITY, UT	84098	(435) 649-9006

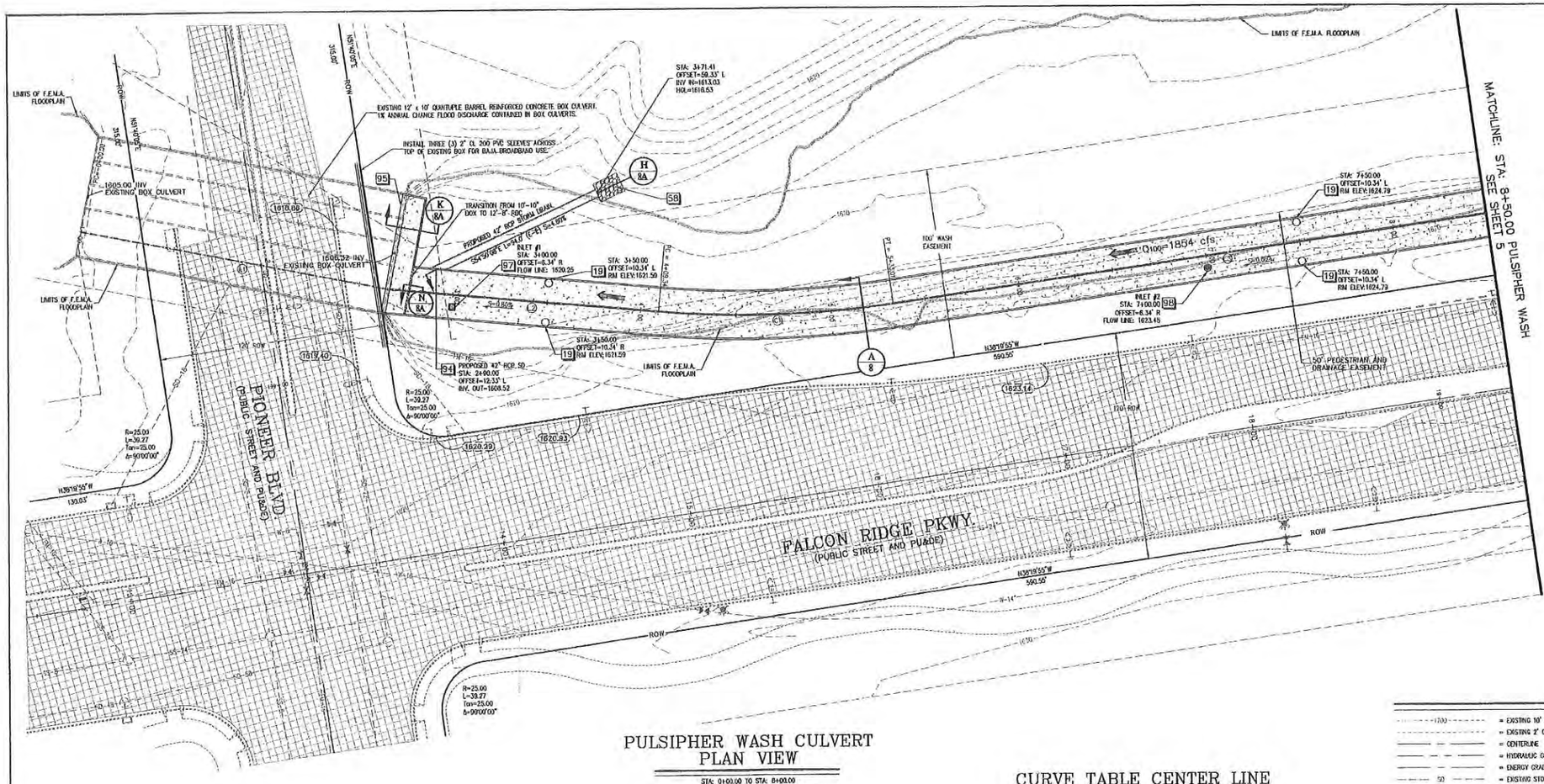
AS BUILT PLAN
STA: 01+00.00 TO STA: 7+00.00
FOR
PULSIPHER WASH IMPROVEMENTS
BARCELONA PARTNERS
MESQUITE, NEVADA

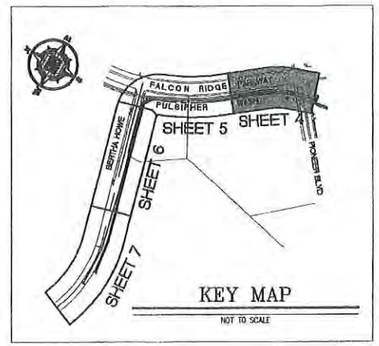
PROFESSIONAL ENGINEER · STATE OF NEVADA
TRAVIS H. ANDERSON
Exp. 12/31/08
CIVIL
No. 016479

SCALE: 1" = 30'	DRAWN BY: TK/CO	CHECKED BY: LH
PROJECT NO: 1470-05	DATE: NOV. 2007	SHEET NO: 4 OF 8

PLOT DATE
30% SUBMITTAL
90% SUBMITTAL
100% SUBMITTAL
SUBMITTAL #3
APPROVED

THE INFORMATION CONTAINED IN THESE PLANS IS THE PROPERTY OF BULLOCH BROTHERS ENGINEERING INC. AND IS NOT TO BE USED IN WHOLE OR IN PART FOR ANY PROJECT OTHER THAN THE SPECIFIC PROJECT FOR WHICH IT WAS PREPARED WITHOUT THE EXPRESS WRITTEN CONSENT OF BULLOCH BROTHERS ENGINEERING INC. ANY UNAUTHORIZED USE OF THESE PLANS WILL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO BULLOCH BROTHERS ENGINEERING INC.





PULSIPHER WASH CULVERT PLAN VIEW

STA: 0+00.00 TO STA: 8+00.00
SCALE HOR: 1"=30'

Call Two Working Days Before You Dig!
1-800-227-2600

NOTE: ALL EXISTING UTILITY LOCATIONS MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

DISCLAIMER:
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CURVE TABLE CENTER LINE

CURVE	RADIUS	TANGENT	LENGTH	DELTA
C1	525.00	67.12	123.87	13°29'45"

LINE TABLE CENTER LINE

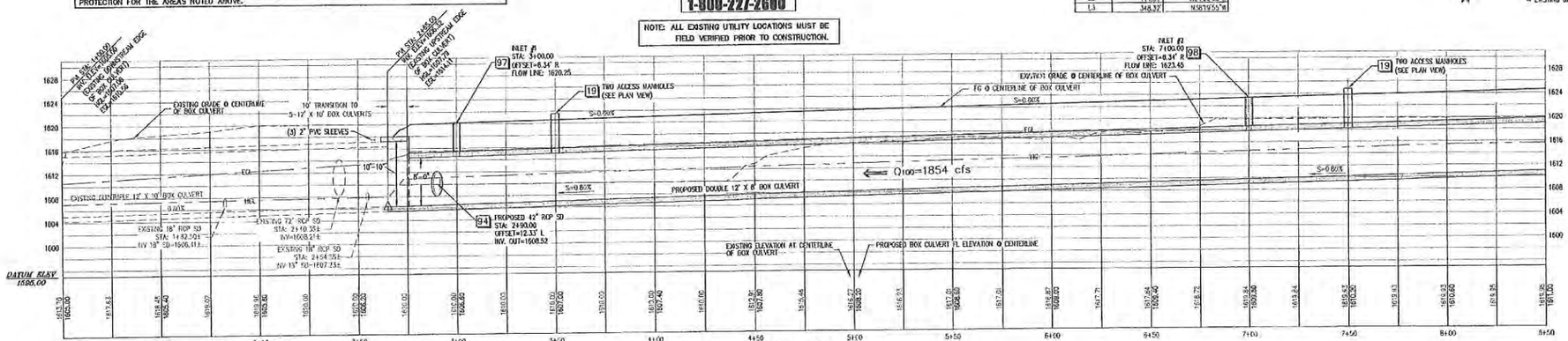
LINE	LENGTH	BEARING
L1	165.00'	N38°19'55"W
L2	144.34'	N24°09'04"W
L3	348.32'	N38°19'55"W

LEGEND

- 1700 = EXISTING 10' CONTOUR WITH ELEVATION SHOWN
- = EXISTING 2' CONTOUR
- = CENTERLINE
- = HYDRAULIC GRADE LINE (HGL)
- = ENERGY GRADE LINE (EGL)
- SD = EXISTING STORM DRAIN
- W = EXISTING WATERLINE
- SS = EXISTING SANITARY SEWER
- FM = EXISTING FORCE MAIN
- = EASEMENT
- = PROPOSED 42" STORM DRAIN
- P = PROPERTY LINE
- ROW = RIGHT-OF-WAY
- "H" = EXISTING HYDRANT
- = EXISTING GATE VALVE
- (1) = CURVE IDENTIFICATION
- A/8 = CROSS SECTION
- 1769.00 = EXISTING WASH SPOT ELEVATION
- 56 = CONSTRUCTION NOTE
- = PROPOSED CULVERT
- = EXISTING CULVERT
- = EXISTING MANHOLE
- = PROPOSED MANHOLE
- = PROPOSED CONCRETE
- = EXISTING ASPHALT
- 1623.14 = EXISTING TOP BACK OF CURB ELEVATION

PULSIPHER WASH CULVERT PROFILE VIEW

STA: 0+00.00 TO STA: 8+00.00
SCALE HOR: 1"=30', SCALE VER: 1"=10'



CONSTRUCTION NOTES

19 INSTALL MODIFIED TYPE 4 MANHOLE PER DETAIL G, SHEET 8A OFFSET/DISTANCE FROM CL TO CENTER OF 4' OPENING.

58 PROVIDE LOOSE RIP-RAP FOR TEMPORARY INLET PROTECTION ACCORDINGLY: D50=12", DEPTH=2.0', LENGTH=14.0', WIDTH=10.5'

94 INSTALL PIPE THROUGH WALL PER DETAIL G/8

95 TIE PROPOSED BOX CULVERT INTO EXISTING BOX CULVERT PER "R.C.B. CULVERT EXTENSION" DETAIL PER NEVADA DEPARTMENT OF TRANSPORTATION, "METHOD OF EXTENDING R.C.B. CULVERTS", D-201.7 (502).

97 MOUNT NEW NEENAH GRATE R-3867 (2 PC. ASSEMBLY) OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 36" ø OPENING IN BOX CULVERT FOR INLET.

98 MOUNT NEW NEENAH GRATE R-2580 OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 30" ø OPENING IN BOX CULVERT FOR INLET.

00027921

REVISIONS			
NO	DESCRIPTION	DATE	BY APPROVED

BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS-LAND SURVEYORS-LAND PLANNERS
www.bullochbrothers.com
P.O. BOX 3174 CEDAR CITY, UT 84720 (435) 586-2468
200 S. MAIN, SUITE 206 SALT LAKE CITY, UT 84101 (801) 521-8529
755 E. PIONEER BLVD. MESQUITE, NV 89027 (702) 346-5100
1800 E. SKYLINE DR., SUITE 200 PLEASANT GROVE, UT 84062 (801) 785-4457
3100 W. FIELDSBORO RD., SUITE 1002 PARK CITY, UT 84098 (435) 655-9565

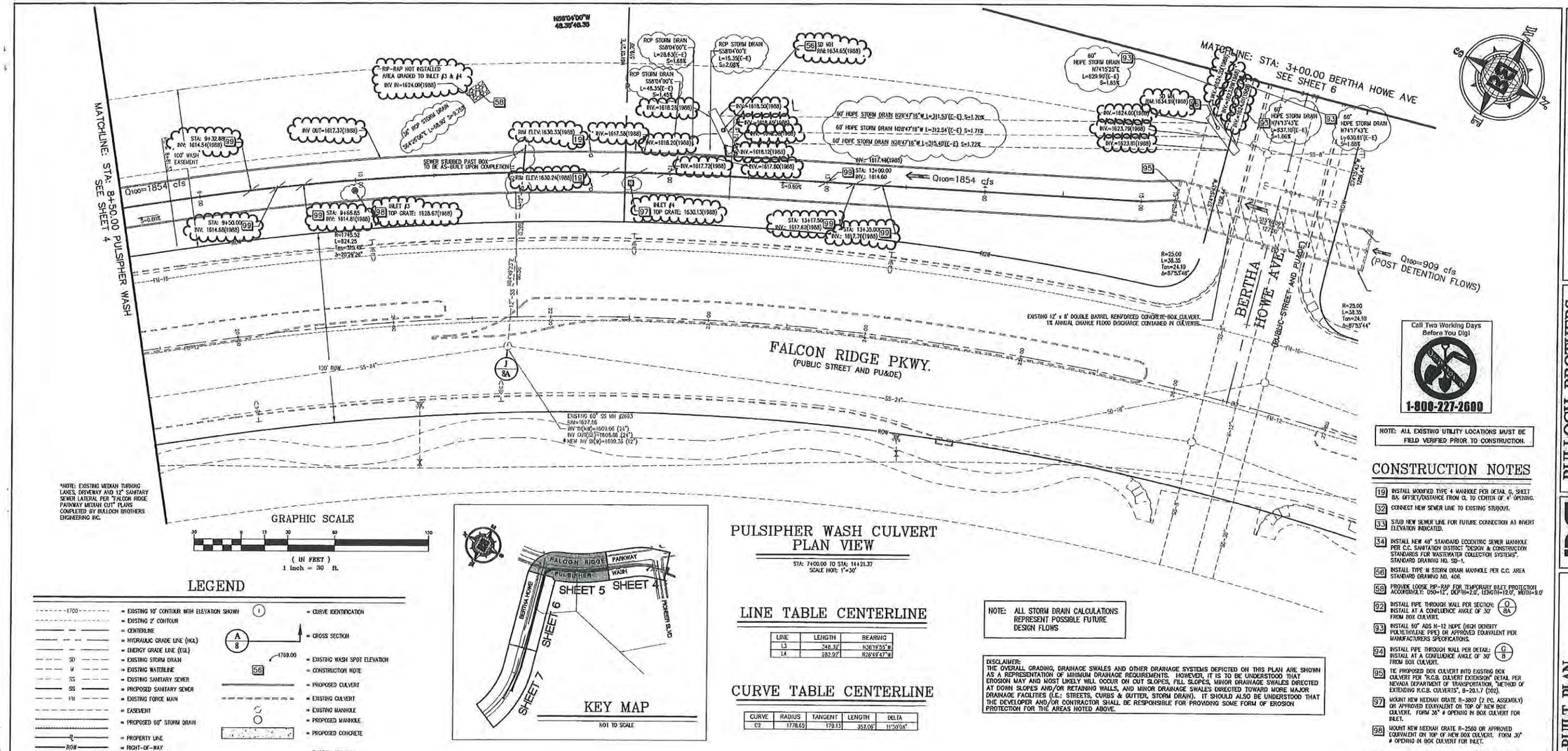
PLAN AND PROFILE
STA: 01+00.00 TO STA: 7+00.00
FOR
PULSIPHER WASH IMPROVEMENTS
BARCELONA PARTNERS
MESQUITE, NEVADA

PROFESSIONAL ENGINEER STATE OF NEVADA TRAVIS H. ANDERSON Exp. 12/31/08 CIVIL No. 016479
1-14-07

SCALE	DRAWN BY	CHECKED BY
1" = 30'	TS/CD	L.R.
PROJECT NO.	DATE	SHEET NO.
1470-05	NOV. 2007	4 OF 8

PLOT DATE
60% SUBMITTAL
90% SUBMITTAL
100% SUBMITTAL
SUBMITTAL 2
APPROVED

N:\1470-05 (Concrete Reinforced Box Culvert)\24-PLAN PROFILE-1-11 01 07.dwg, 11/13/2007 3:15:13 PM, Barbara Cox



ELEVATIONS IN NAVD1988 DATUM
STATE PLANE COORD. NEVADA EAST ZONE, FT

AS BUILTS

00027922

NO	DESCRIPTION	DATE	BY	APPROVED
	REVISIONS			

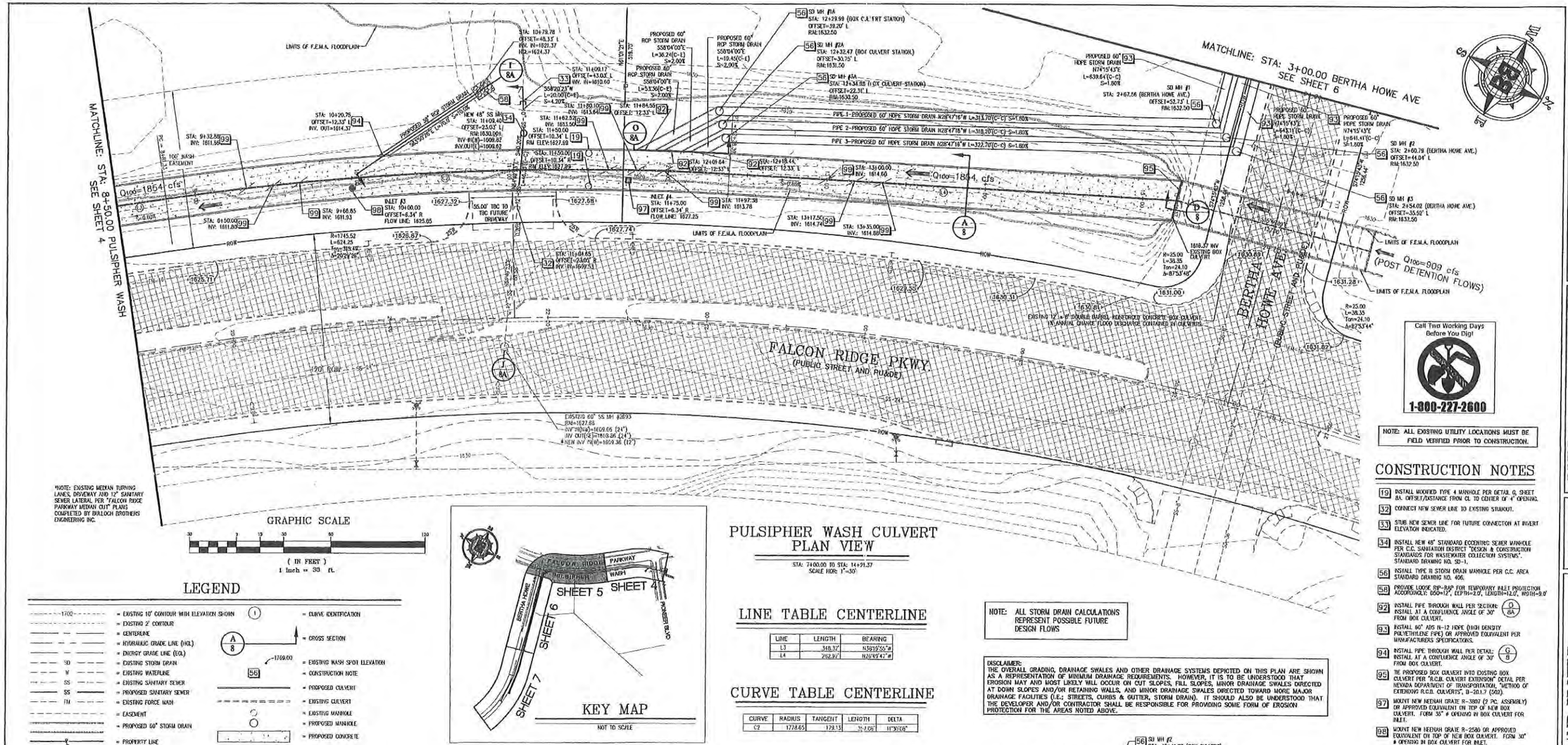
BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS-LAND SURVEYORS-LAND PLANNERS
www.bullochbrothers.com
P.O. BOX 1174 CEDAR CITY UT 84720 (435) 865-8592
P.O. BOX 20566 MESQUITE NV 89027 (702) 346-5105
760 N. PIONEER BLVD MESQUITE CITY NV 89027 (702) 346-5105
1596 W. STATE ST., SUITE 500 PLEASANT GROVE UT 84062 (801) 785-9467
3302 N. MAIN STREET, SUITE 1000 PARK CITY UT 84098 (435) 655-0566

AS-BUILT PLAN
STA: 7+00.00 TO STA: 14+21.37
FOR
PULSIPHER WASH IMPROVEMENTS
BARCELONA PARTNERS
MESQUITE, NEVADA

PROFESSIONAL ENGINEER · STATE OF NEVADA
TRAVIS H. ANDERSON
Exp. 12/31/08
CIVIL
No. 016479

SCALE:	DRAWN BY:	CHECKED BY:
1" = 30'	TK	LH

PROJECT NO:	DATE:	SHEET NO:
1470-05	NOV. 2007	5 OF 8



NOTE: EXISTING MEDIAN TURNING LANES, DRIVEWAY AND 12" SANITARY SEWER LATERAL PER "FALCON RIDGE PARKWAY MEDIAN CUT" PLANS COMPLETED BY BULLOCH BROTHERS ENGINEERING INC.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

LEGEND

- 1700 — EXISTING 10' CONTOUR WITH ELEVATION SHOWN
- EXISTING 2' CONTOUR
- CENTERLINE
- HYDRAULIC GRADE LINE (HGL)
- ENERGY GRADE LINE (EGL)
- SD — EXISTING STORM DRAIN
- W — EXISTING WATERLINE
- SS — EXISTING SANITARY SEWER
- SS — PROPOSED SANITARY SEWER
- FM — EXISTING FORCE MAIN
- EASEMENT
- PROPOSED 60" STORM DRAIN
- PROPERTY LINE
- ROW — RIGHT-OF-WAY
- EXISTING HYDRANT
- EXISTING GATE VALVE
- (1623.14) — EXISTING TOP BACK OF CURB ELEVATION
- (1) — CURVE IDENTIFICATION
- (A/8) — CROSS SECTION
- 1709.00 — EXISTING WASH SPOT ELEVATION
- 56 — CONSTRUCTION NOTE
- PROPOSED CULVERT
- EXISTING CULVERT
- EXISTING MANHOLE
- PROPOSED MANHOLE
- PROPOSED CONCRETE
- EXISTING ASPHALT

KEY MAP
NOT TO SCALE

PULSIPHER WASH CULVERT PLAN VIEW

STA: 7+00.00 TO STA: 14+21.37
SCALE HOR: 1"=30'

LINE TABLE CENTERLINE

LINE	LENGTH	BEARING
L3	348.32'	N39°19'55"W
L4	282.92'	N25°49'47"W

CURVE TABLE CENTERLINE

CURVE	RADIUS	TANGENT	LENGTH	DELTA
C2	1778.65	178.13	351.08'	11°30'08"

NOTE: ALL STORM DRAIN CALCULATIONS REPRESENT POSSIBLE FUTURE DESIGN FLOWS

DISCLAIMER:
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Call Two Working Days Before You Dig!
1-800-227-2600

NOTE: ALL EXISTING UTILITY LOCATIONS MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

CONSTRUCTION NOTES

19 INSTALL MODIFIED TYPE 4 MANHOLE PER DETAIL G, SHEET 8A. OFFSET/DISTANCE FROM CL TO CENTER OF 4' OPENING.

32 CONNECT NEW SEWER LINE TO EXISTING STUBOUT.

33 STUB NEW SEWER LINE FOR FUTURE CONNECTION AT INVERT ELEVATION INDICATED.

34 INSTALL NEW 48" STANDARD ECCENTRIC SEWER MANHOLE PER C.C. SANITATION DISTRICT "DESIGN & CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS", STANDARD DRAWING NO. SD-1.

56 INSTALL TYPE B STORM DRAIN MANHOLE PER C.C. AREA STANDARD DRAWING NO. 406.

58 PROVIDE LOOSE RIP-RAP FOR TEMPORARY INLET PROTECTION ACCORDINGLY: D50=12", DEPTH=2.0', LENGTH=12.0', WIDTH=9.0'

92 INSTALL PIPE THROUGH WALL PER SECTION: (O/8A) INSTALL AT A CONFLUENCE ANGLE OF 30° FROM BOX CULVERT.

93 INSTALL 60" ADS N-12 HDPE (HIGH DENSITY POLYETHYLENE PIPE) OR APPROVED EQUIVALENT PER MANUFACTURERS SPECIFICATIONS.

94 INSTALL PIPE THROUGH WALL PER DETAIL: (G/8) INSTALL AT A CONFLUENCE ANGLE OF 30° FROM BOX CULVERT.

95 TIE PROPOSED BOX CULVERT INTO EXISTING BOX CULVERT PER "R.C.B. CULVERT EXTENSION" DETAIL PER NEVADA DEPARTMENT OF TRANSPORTATION, "METHOD OF EXTENDING R.C.D. CULVERTS", D-201.7 (502).

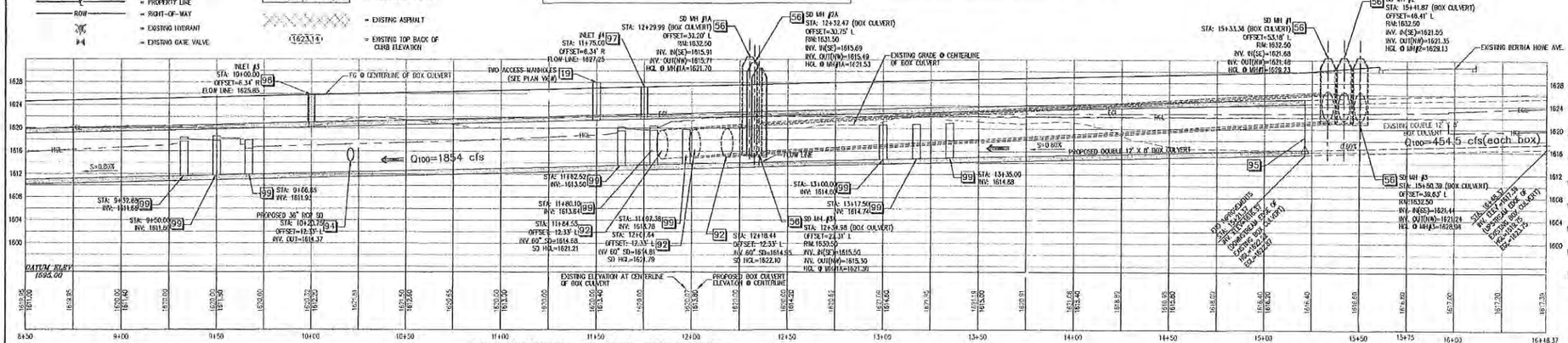
97 MOUNT NEW NEENAH GRATE R-3007 (2 PC. ASSEMBLY) OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 35" # OPENING IN BOX CULVERT FOR INLET.

98 MOUNT NEW NEENAH GRATE R-2580 OR APPROVED EQUIVALENT ON TOP OF NEW BOX CULVERT. FORM 30" # OPENING IN BOX CULVERT FOR INLET.

99 CONSTRUCT 4' X 6' WALL OPENING TO EQUALIZE FLOW THROUGH CENTER WALL PER DETAIL: (P/8A)

PULSIPHER WASH CULVERT PROFILE VIEW

STA: 7+00.00 TO STA: 14+21.37
SCALE HOR: 1"=30', SCALE VER: 1"=10'



BERTHA HOWE STORM DRAIN PROFILE VIEW

STA: 1+00.00 TO STA: 3+00.0
SCALE HOR: 1"=30', SCALE VER: 1"=10'

NO	DESCRIPTION	DATE	BY	APPROVED

BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS - LAND SURVEYORS - LAND PLANNERS
www.bulloch-brothers.com

CEDAR CITY	UT	84720	(435) 586-9662
BULLHEAD CITY	AZ	86429	(928) 416-0705
PLEASANT GROVE	UT	84062	(801) 785-3100
P.O. BOX 219966			
1800 W. STATE ST., SUITE 200			
3100 W. ENGLEBROOK BLVD., SUITE 1000			

PLAN AND PROFILE
STA: 7+00.00 TO STA: 14+21.37
FOR
PULSIPHER WASH IMPROVEMENTS
BARCELONA PARTNERS
MESQUITE, NEVADA

PROFESSIONAL ENGINEER — STATE OF NEVADA — TRAVIS H. ANDERSON — Exp. 12/31/08 — CIVIL — No. 016479 — 8-27-08

SCALE	DRAWN BY	CHECKED BY
1" = 30'	TK	L.H.

PROJECT NO.	DATED	SHEET NO.
1470-05	NOV. 2007	5 OF 8

PLOT DATE
SITE PLAN(FINAL)
SITE PLAN(TOPO)
ESTIMATE
APPROVED

THESE PLANS ARE THE PROPERTY OF BULLOCH BROTHERS ENGINEERING INC. AND ARE NOT TO BE USED IN ANY WAY WITHOUT THE WRITTEN PERMISSION OF BULLOCH BROTHERS ENGINEERING INC.

00027923

CONSTRUCTION NOTES

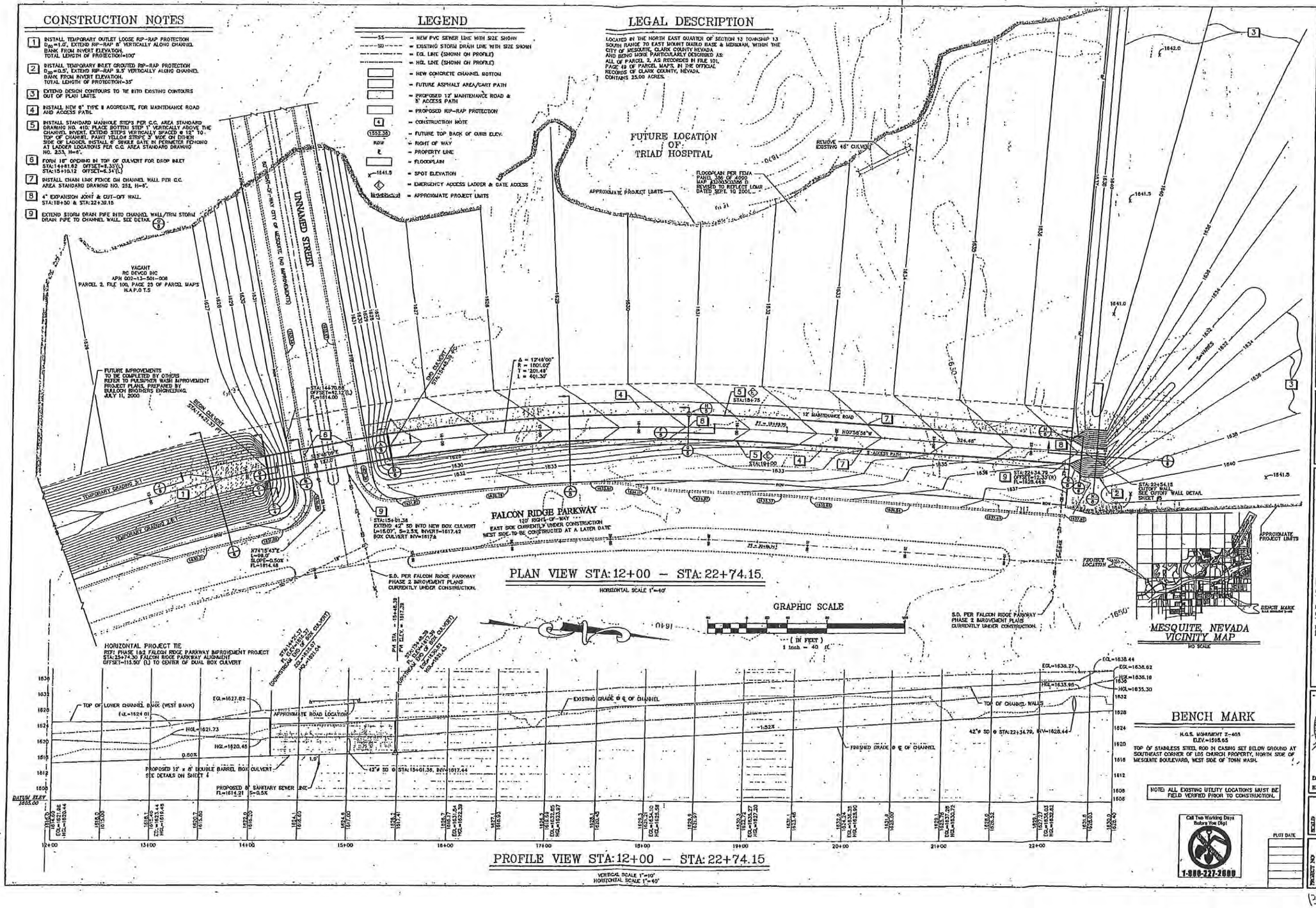
1. INSTALL TEMPORARY OUTLET LOOSE RIP-RAP PROTECTION D_{50}=1.0', EXTEND RIP-RAP 8' VERTICALLY ALONG CHANNEL BANK FROM INVERT ELEVATION. TOTAL LENGTH OF PROJECTION=100'
2. INSTALL TEMPORARY INLET GROUTED RIP-RAP PROTECTION D_{50}=0.5', EXTEND RIP-RAP 2.5' VERTICALLY ALONG CHANNEL BANK FROM INVERT ELEVATION. TOTAL LENGTH OF PROTECTION=35'
3. EXTEND DESIGN CONTOURS TO TIE WITH EXISTING CONTOURS OUT OF PLAN LIMITS.
4. INSTALL NEW 8" TYPE II AGGREGATE, FOR MAINTENANCE ROAD AND ACCESS PATH.
5. INSTALL STANDARD MANHOLE STEPS PER C.C. AREA STANDARD DRAWING NO. 410. PLACE BOTTOM STEP 1' VERTICALLY ABOVE THE CHANNEL INVERT. EXTEND STEPS VERTICALLY SPACED @ 12" TO TOP OF CHANNEL. PAINT YELLOW STRIPE 3" WIDE ON EITHER SIDE OF LADDER. INSTALL 6' SWING GATE IN FENCE TO ENTER AT LADDER LOCATIONS PER C.C. AREA STANDARD DRAWING NO. 253, H=6'.
6. FORM 18" OPENING IN TOP OF CULVERT FOR DROP INLET STA:14+81.82 OFFSET=8.33'(L)
   STA:15+10.12 OFFSET=6.34'(L)
7. INSTALL CHAIN LINK FENCE ON CHANNEL WALL PER C.C. AREA STANDARD DRAWING NO. 252, H=6'.
8. 4" EXPANSION JOINT & CUT-OFF WALL. STA:18+50 & STA:22+38.15
9. EXTEND STORM DRAIN PIPE INTO CHANNEL WALL/TRIM STORM DRAIN PIPE TO CHANNEL WALL. SEE DETAIL

LEGEND

- 8" — NEW PVC SEWER LINE WITH SIZE SHOWN
- SD — EXISTING STORM DRAIN LINE WITH SIZE SHOWN
- EGL LINE (SHOWN ON PROFILE)
- HGL LINE (SHOWN ON PROFILE)
- NEW CONCRETE CHANNEL BOTTOM
- FUTURE ASPHALT AREA/CART PATH
- PROPOSED 12' MAINTENANCE ROAD & 8' ACCESS PATH
- PROPOSED RIP-RAP PROTECTION
- 4 — CONSTRUCTION NOTE
- (1552.38) ROW — FUTURE TOP BACK OF CURB ELEV.
- ℄ — RIGHT OF WAY
- PROPERTY LINE
- FLOODPLAIN
- 1641.5 — SPOT ELEVATION
- EMERGENCY ACCESS LADDER & GATE ACCESS
- APPROXIMATE PROJECT LIMITS

LEGAL DESCRIPTION

LOCATED IN THE NORTH EAST QUARTER OF SECTION 13 TOWNSHIP 13 SOUTH RANGE 70 EAST MOUNT DIABLO BASE & MERIDIAN, WITHIN THE CITY OF MESQUITE, CLARK COUNTY NEVADA AND BEING MORE PARTICULARLY DESCRIBED AS: ALL OF PARCEL 2, AS RECORDED IN FILE 101, PAGE 49 OF PARCEL MAPS, IN THE OFFICIAL RECORDS OF CLARK COUNTY, NEVADA. CONTAINS 25.00 ACRES.



PLAN VIEW STA:12+00 – STA:22+74.15

HORIZONTAL SCALE 1"=40'

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

PROFILE VIEW STA:12+00 – STA:22+74.15

VERTICAL SCALE 1"=10'
HORIZONTAL SCALE 1"=40'

BENCH MARK

H.G.S. MONUMENT Z-405
ELEV.=1598.65

TOP OF STAINLESS STEEL ROD IN CASING SET BELOW GROUND AT SOUTHEAST CORNER OF LDS CHURCH PROPERTY, NORTH SIDE OF MESQUITE BOULEVARD, WEST SIDE OF TOWN WASH.

NOTE: ALL EXISTING UTILITY LOCATIONS MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

Call Two Working Days Before You Dig!
1-800-227-2600

NO	DESCRIPTION	DATE	BY

REVISIONS

BULLOCH BROTHERS ENGINEERING INC.
CIVIL ENGINEERS—LAND SURVEYORS—
LAND PLANNERS
P.O. BOX 3274 CEDAR CITY, UTAH 84721 (435) 586-9732
169 WEST 1680 SOUTH, UNIT 5 ST. GEORGE, UTAH 84770 (435) 628-4708
581 W MESQUITE BLVD, STE 4 MESQUITE, NEVADA 89027 (702) 346-3101

PLAN AND PROFILE STA:12+00 - STA:22+74.15

FOR

PULSIPHER WASH IMPROVEMENTS

CITY OF MESQUITE

MESQUITE, NEVADA

ERIC L. BULLOCH — 5151510 — CIVIL — STATE OF NEVADA — PROFESSIONAL ENGINEER

DATED: 12/5/02

EXP: 12/31/03

SCALED	DRAWN BY	CHECKED BY
1"=40'	E.M.L.	
PROJECT NO.	DATE	SHEET NO.
1306-99-2	SEPT. 2002	

2306-15-2

D4

Brajesh Gautam

From: James Monroe
Sent: Tuesday, June 14, 2011 10:12 AM
To: Jerry Pruitt; Brajesh Gautam
Subject: FW: Abbott/Pulsipher Detention Basins
Attachments: J-582 & J-583 Abbott & Pulsipher ATI.doc

Fyi..

From: Brook Demitropoulos
Sent: Monday, June 13, 2011 9:43 AM
To: James Monroe
Subject: FW: Abbott/Pulsipher Detention Basins

FYI.

From: Michael Anderson [mailto:manderson@water.nv.gov]
Sent: Friday, June 10, 2011 2:57 PM
To: Brook Demitropoulos
Subject: RE: Abbott/Pulsipher Detention Basins

Brook;

Here is a copy of the Approval to Impound. Let me know if you need the initial authorization to construct or endorsed permit as well.

J-582 is Abbott and J-583 is Pulsipher.

Mike!
Michael J. Anderson, P.E.
(775) 684-2843 ofc.
(775) 684-2810 fax.
Staff Engineer III, Safety of Dams
Nevada Division of Water Resources
901 S. Stewart Street, Suite 2002
Carson City, Nevada 89701

From: Brook Demitropoulos [mailto:BDemitropoulos@gcwallace.com]
Sent: Wednesday, June 08, 2011 2:03 PM
To: Michael Anderson
Subject: Abbott/Pulsipher Detention Basins

Hello Mike –

Thanks again for all your help in finding the approval letter for Duck Creek Railroad Detention Basin (J-587).

I have another request, we are submitting LOMR to FEMA and would like to include the Dam Safety approval letter for the Abbott/Pulsipher Detention Basins.
I believe the Dam Safety number is J-583.

Is there a way to retrieve this information from your website or could you get it for me? That would be most helpful.

Thanks again,
Brook

Brook Demitropoulos
G. C. WALLACE COMPANIES
Engineers | Planners | Surveyors
1555 S. Rainbow Boulevard
Las Vegas NV 89146
Office 702-804-2042
Fax 702-804-2299

Any files contained within are to be used for information ONLY. Accuracy and/or design information to be verified from approved original plans. Use of electronic media is at the sole risk of the user.

From: Michael Anderson [mailto:manderson@water.nv.gov]
Sent: Wednesday, June 08, 2011 11:12 AM
To: Brook Demitropoulos
Subject: J-587 Cederburg, Dennis, Clark County Dept of Public Works.doc

Brook;

Here you are.

Mike!
Michael J. Anderson, P.E.
(775) 684-2843 ofc.
(775) 684-2810 fax.
Staff Engineer III, Safety of Dams
Nevada Division of Water Resources
901 S. Stewart Street, Suite 2002
Carson City, Nevada 89701

February 13, 2008

Bill Tanner
Public Works Department
10 East Mesquite Boulevard
Mesquite, Nevada 89027

Re: Abbott & Pulsipher Wash Detention Dams, J-582 & J-583.

Dear Mr. Tanner:

Your supplemental as-built information has been received and reviewed, thank you. You are herewith **authorized** to temporarily impound storm water for controlled release in the Abbott & Pulsipher Wash Detention Dams, permits J-582 & J-583, respectively. You are herewith similarly authorized to impound water within the municipal reuse ponds associated with each site.

Mesquite, its assigns or successors are responsible for making periodic inspections of the structure and reporting any slumps, sloughs, cracking or other unanticipated conditions to the State Engineer as expeditiously as possible.

If you have any questions on this or any other safety of dams matter, please feel free to contact the undersigned at (775) 684-2843.

Sincerely,

Michael J. Anderson, P.E.
Hydraulic Engineer III

MA/sg
c.c. Cliff Lawson, NDEP-BWPC

NAVD 29

Mesquite
Nevada

MESQUITE WATER REUSE SYSTEM AND STORM DETENTION PROJECT

RECORD DRAWINGS

JANUARY 2009

RECD
2009 JAN 21 PM 1:19

AS BUILTS
Revised 1-25-09 Page 6 of 10

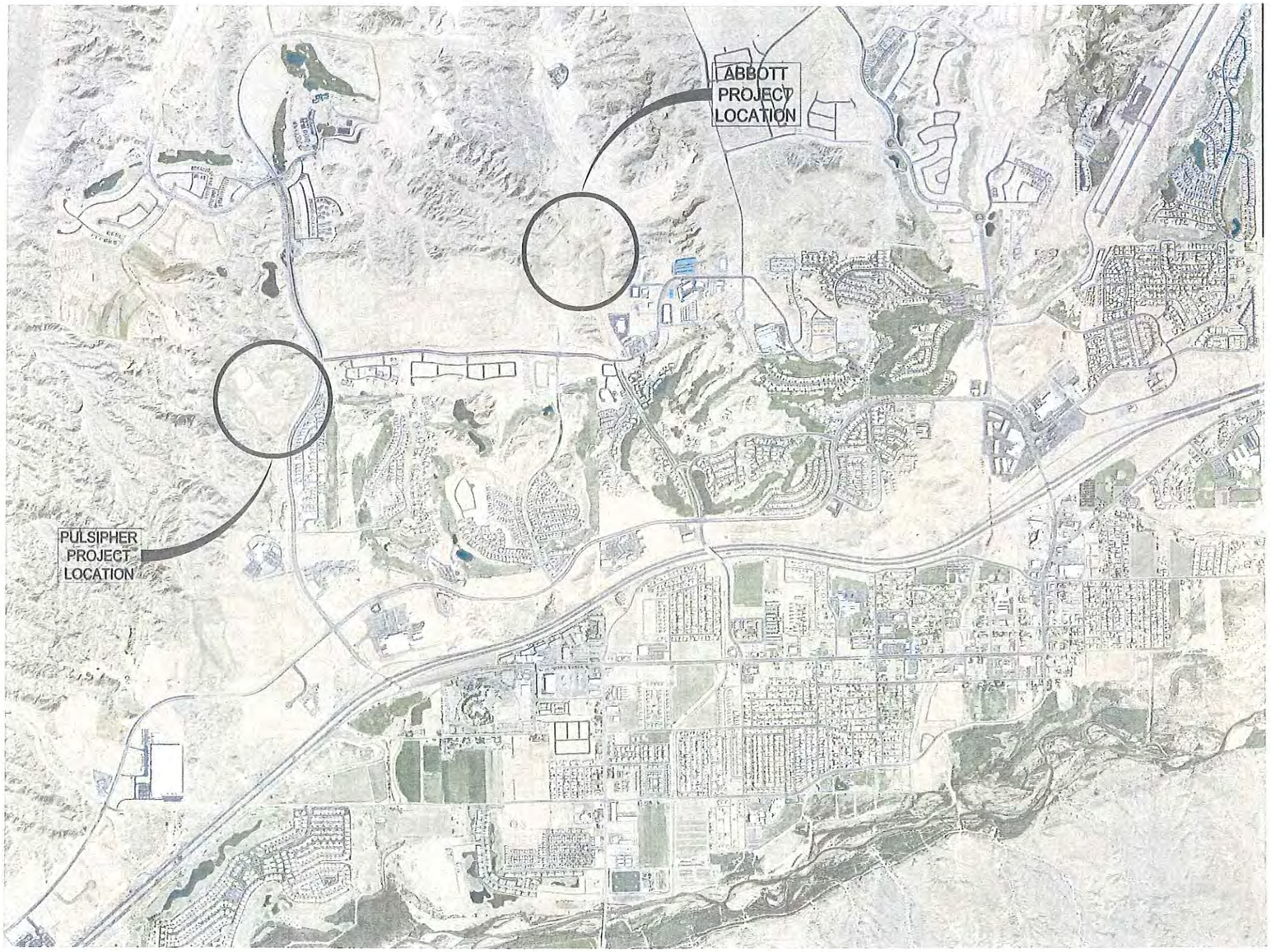
1/21/09

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

THESE DRAWINGS HAVE BEEN PREPARED FOR THE CITY OF MESQUITE AS A RECORD OF THE FINAL GRADES, DIMENSIONS, AND LAYOUTS OF EACH SITE; THEY ARE NOT INTENDED TO BE A COMPLETE SET OF DRAWINGS FOR THE PROJECT. NO SUBSTANTIAL CHANGES WERE MADE IN POND/ BASIN VOLUMES, STRUCTURAL DIMENSIONS, STAGE/ STORAGE/ DISCHARGE CHARACTERISTICS, STRUCTURAL DESIGN, OR ELECTRICAL SYSTEMS. REFER TO THE AUGUST 2006 CONSTRUCTION DRAWINGS FOR DETAILS NOT INCLUDED IN THIS SET

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT, NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.

FA PROJECT NO. 05-06-0075



N

INDEX

SHEET	TITLE
1	COVER SHEET
2	INDEX AND AREA MAP
3	ABBOTT WASH – OVERALL SITE
4	ABBOTT WASH – SOUTH SITE PLAN
5	ABBOTT WASH – NORTH SITE PLAN
6	ABBOTT WASH – SECTIONS
7	PULSIPHER WASH – OVERALL SITE
8	PULSIPHER WASH – WEST SITE PLAN
9	PULSIPHER WASH – EAST SITE PLAN
10	PULSIPHER WASH – SECTIONS

MESQUITE VICINITY MAP

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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DRAWN S. FOERSTER
DESIGNED
APPROVED J. BROOME
QA/QC

ATTENTION
LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"- SCALE ACCORDINGLY)

REGISTERED PROFESSIONAL ENGINEER STATE OF UTAH
JASON T. BROOME
EXP 12/31/10
CIVIL
0170821
12/09

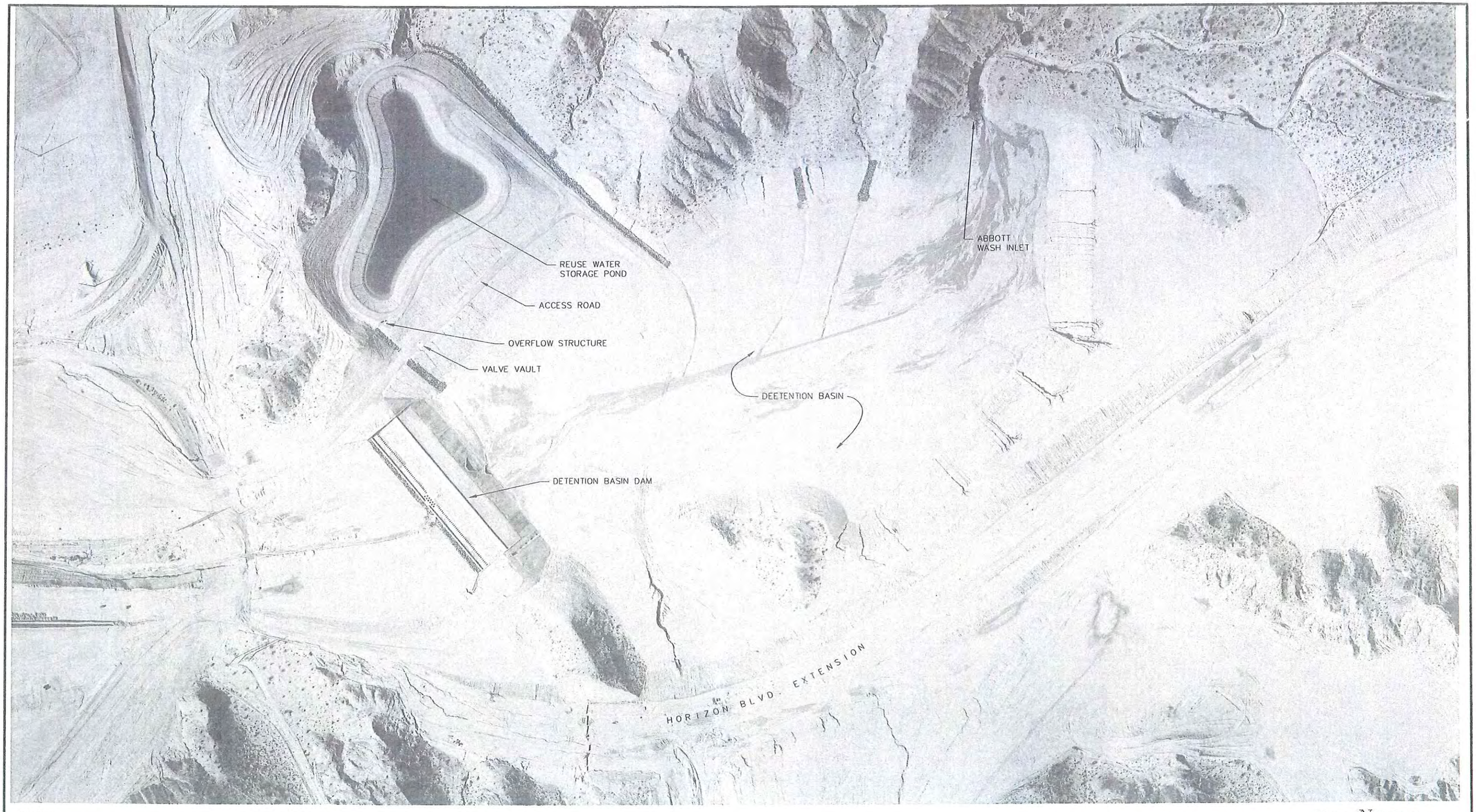
Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

INDEX AND AREA MAP

PROJECT NO: 05-06-0075
SHEET NO. 2
FILE NAME: PAGE NO.: 2



NOTE:

PHOTOGRAPHY BY VTN/
NORTH AMERICAN MAPPING,
TAKEN 2/10/08

ABBOTT WASH - OVERALL

N

GRAPHIC SCALE
0' 50' 100' 200' 300'
Scale: 1"=100'

RECORD DRAWINGS

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APPROVED J. BROOME
QA/QC

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REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
JASON T. BROOME
EXP 12/31/10
CIVIL
017082
1/13/09

Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

ABBOTT WASH - OVERALL SITE

PROJECT NO: 05-06-0075
SHEET NO. 3
FILE NAME: PAGE NO: 3

MATCH LINE SEE SHEET 5

ACCESS ROAD FOR DETENTION BASIN

CONCRETE SEDIMENT CONVEYANCE CHANNEL

HORIZON BLVD. EXTENSION

DAM STRUCTURE (RCC CAPPED EARTHEN EMBANKMENT)

STILLING WELL W/ INLETS

REUSE POND

REUSE POND CONTROL VALVE VAULT

36" SEDIMENT PIPING

72" NORMAL FLOW PIPING

16" REUSE WATER INTO POND

16" REUSE OUT OF POND

16" POND OVERFLOW

OUTLET STRUCTURE

REUSE POND OVERFLOW STRUCTURE

16" REUSE PIPING

ABBOTT WASH CHANNEL

VALVE BOX

ACCESS ROAD TO REUSE POND

RCC CHANNEL CROSSING

16" REUSE PIPING

N

NOTE:

CONTOURS BY VTN/ NORTH AMERICAN MAPPING, TAKEN 2/10/08

ABBOTT WASH (SOUTH SITE PLAN)

GRAPHIC SCALE
0' 30' 60' 120' 180'
Scale: 1"=60'

RECORD DRAWINGS

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JASON T. BROOME, P.E. 12/31/10, CIVIL, 017082, REGISTERED PROFESSIONAL ENGINEER, STATE OF UTAH

Mesquite Nevada

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370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
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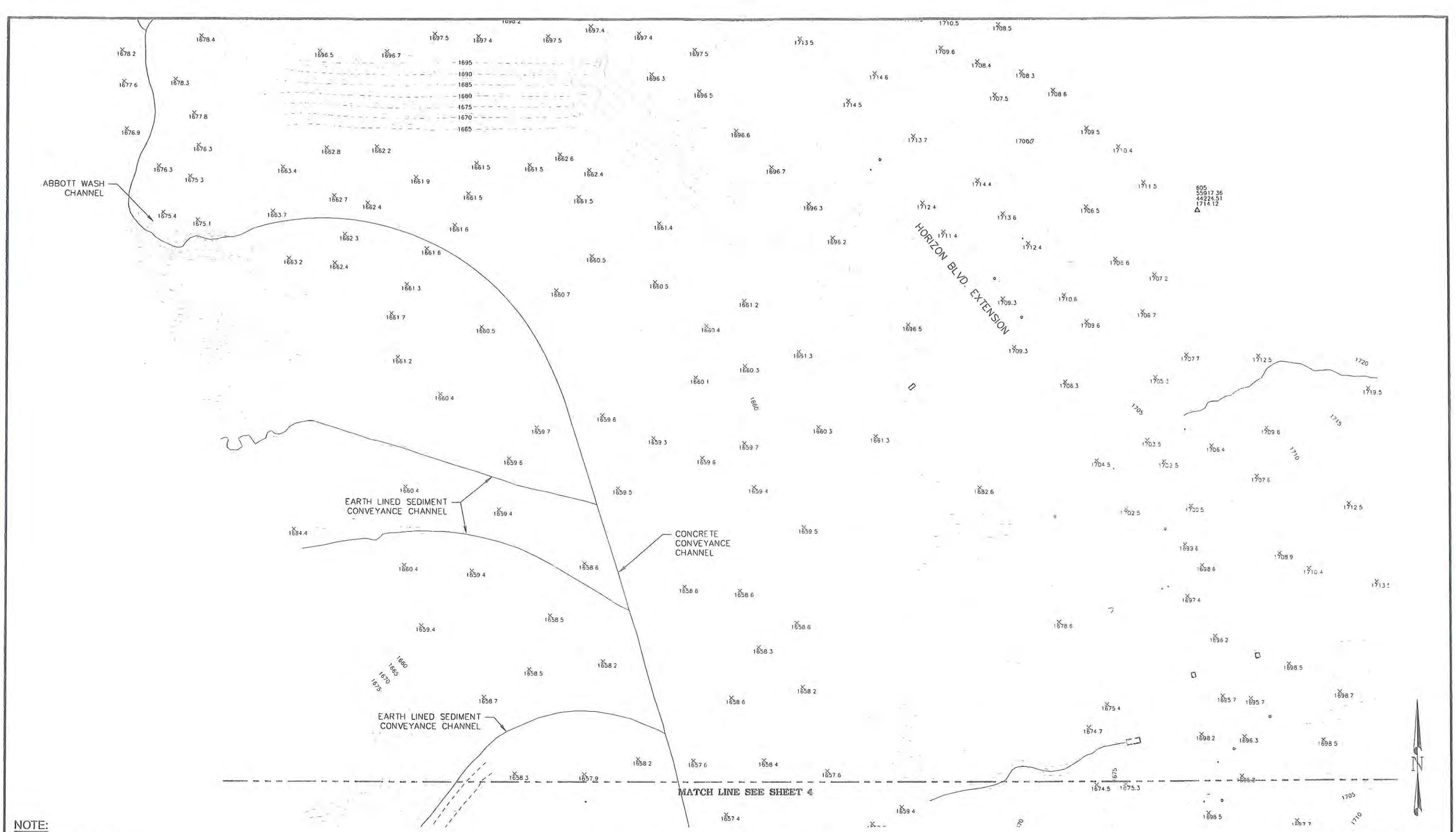
MESQUITE WATER REUSE SYSTEM

ABBOTT WASH - SOUTH SITE PLAN

PROJECT NO: 05-06-0075
SHEET NO. 4
FILE NAME: PAGE NO: 4



NOTE:

CONTOURS BY VTN/ NORTH AMERICAN MAPPING, TAKEN 2/10/08

GRAPHIC SCALE
0' 30' 60' 120' 180'
Scale: 1"=60'

ABBOTT WASH (NORTH SITE PLAN)

RECORD DRAWINGS

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REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
JASON T. BROOME
EXP. 12/31/10
CIVIL
017082
1/21/09

Mesquite Nevada

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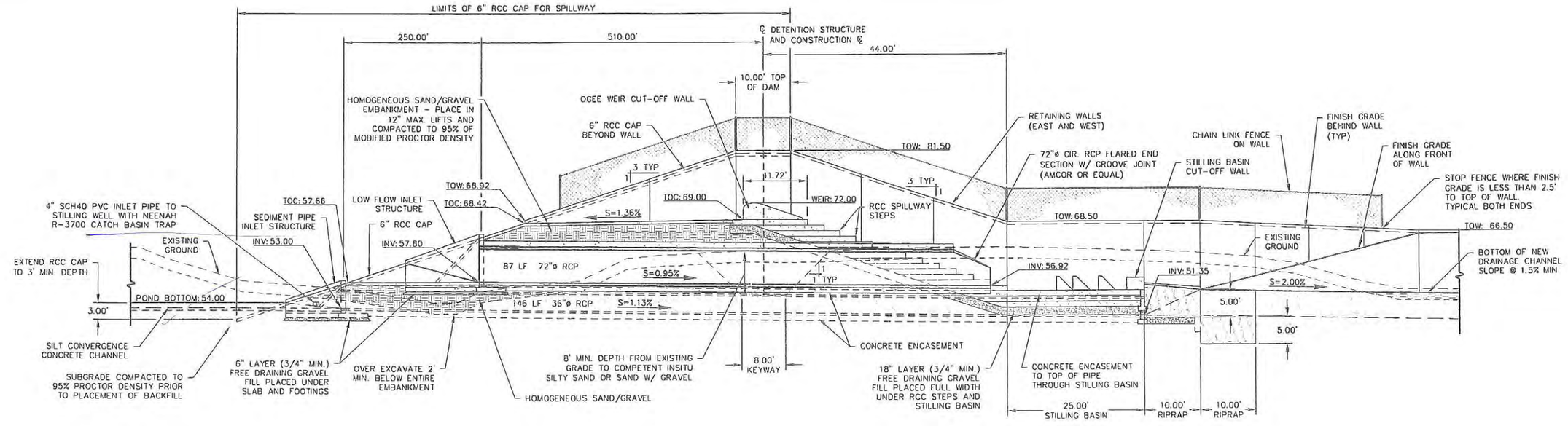
MESQUITE WATER REUSE SYSTEM

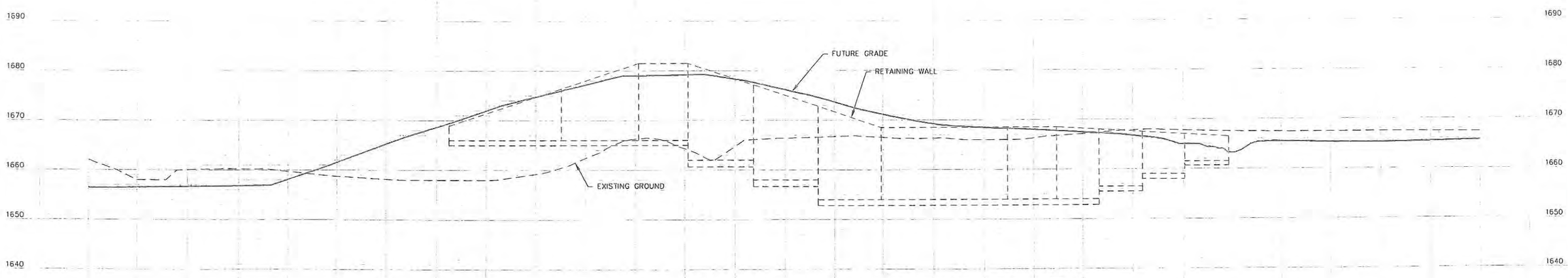
ABBOTT WASH - NORTH SITE PLAN

PROJECT NO: 05-06-0075
SHEET NO. 5
FILE NAME: PAGE NO.: 5



SECTION THRU 72" DIA. RCP PRIMARY OUTLET PIPE (A/4)

SCALE: 1" = 10'



FINISH GRADE SECTION AT NORTHEAST END OF DAM (B/4)

SCALE: 1" = 10'

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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DESIGNED
APPROVED J. BROOME
QA/QC

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REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
JASON T. BROOME
Exp. 12/31/10
CIVIL
07083

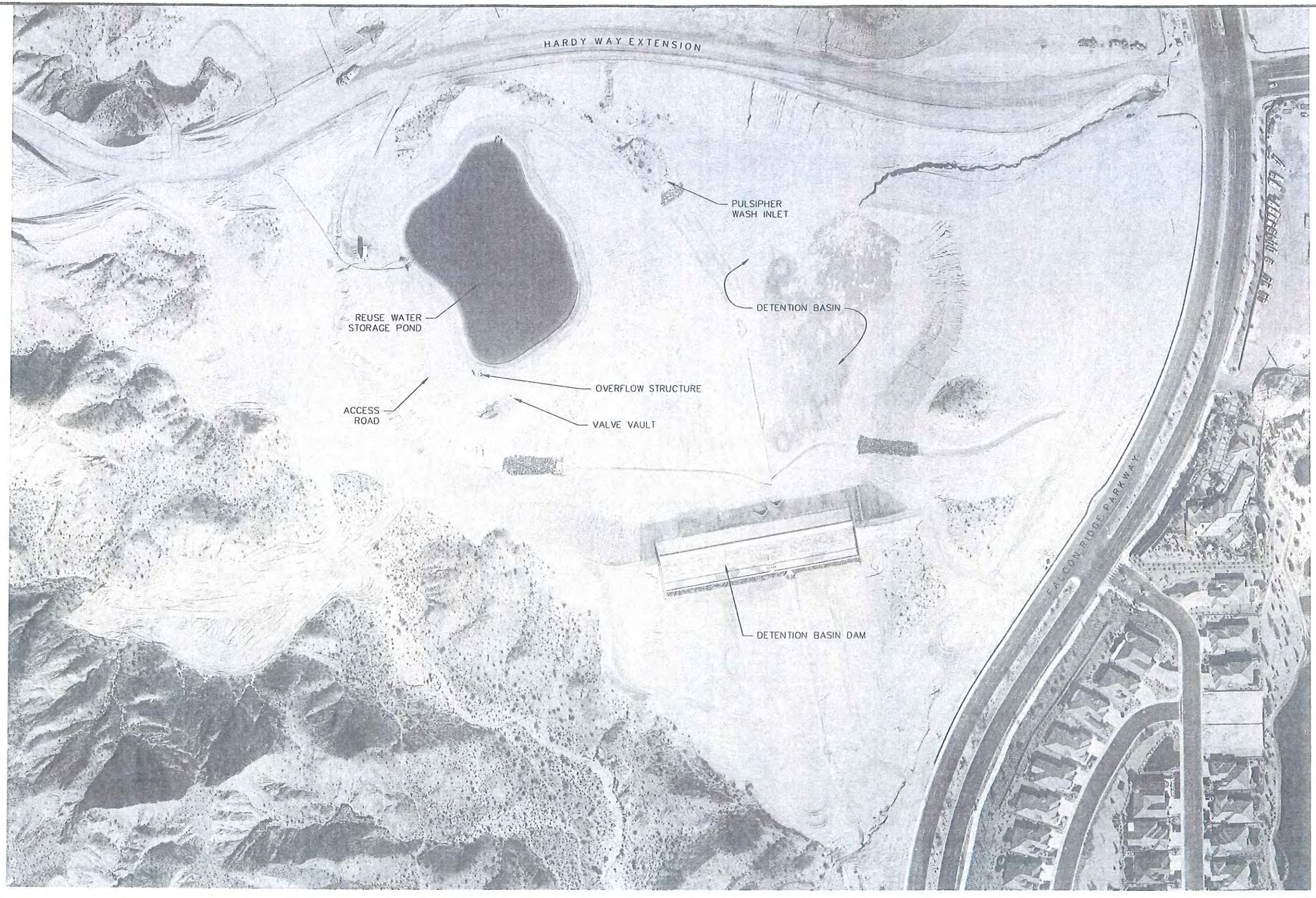
Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

ABBOTT WASH - SECTIONS

PROJECT NO: 05-06-0075
SHEET NO. 6
FILE NAME: PAGE NO. 6



NOTE:

PHOTOGRAPHY BY VTN/
NORTH AMERICAN MAPPING,
TAKEN 2/10/08

PULSIPHER WASH - OVERALL

GRAPHIC SCALE
0' 50' 100' 200' 300'
Scale: 1"=100'

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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APPROVED J. BROOMB
QA/QC

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REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
JASON T. BROOME
EXP. 12/31/10
CIVIL
17082

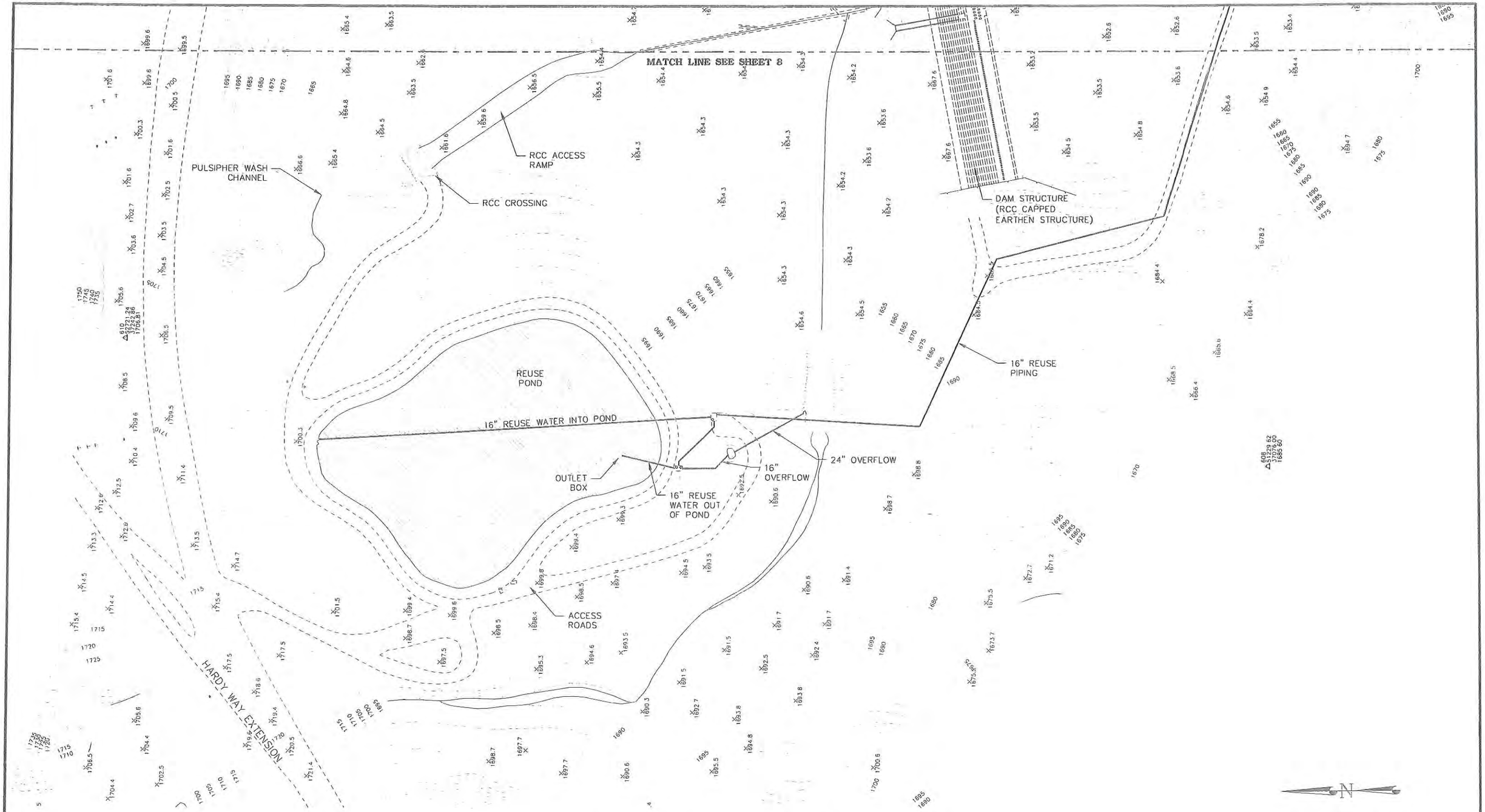
Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

PULSIPHER WASH - OVERALL SITE

PROJECT NO: 05-06-0075
SHEET NO. 7
FILE NAME: PAGE NO.: 7



NOTE:

CONTOURS BY VTN/ NORTH AMERICAN MAPPING, TAKEN 2/10/08

PULSIPHER WASH (WEST SITE PLAN)

GRAPHIC SCALE
0' 30' 60' 120' 180'
Scale: 1"=60'

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
JASON T. BROOME
EXP. 12/31/10
CIVIL
017082

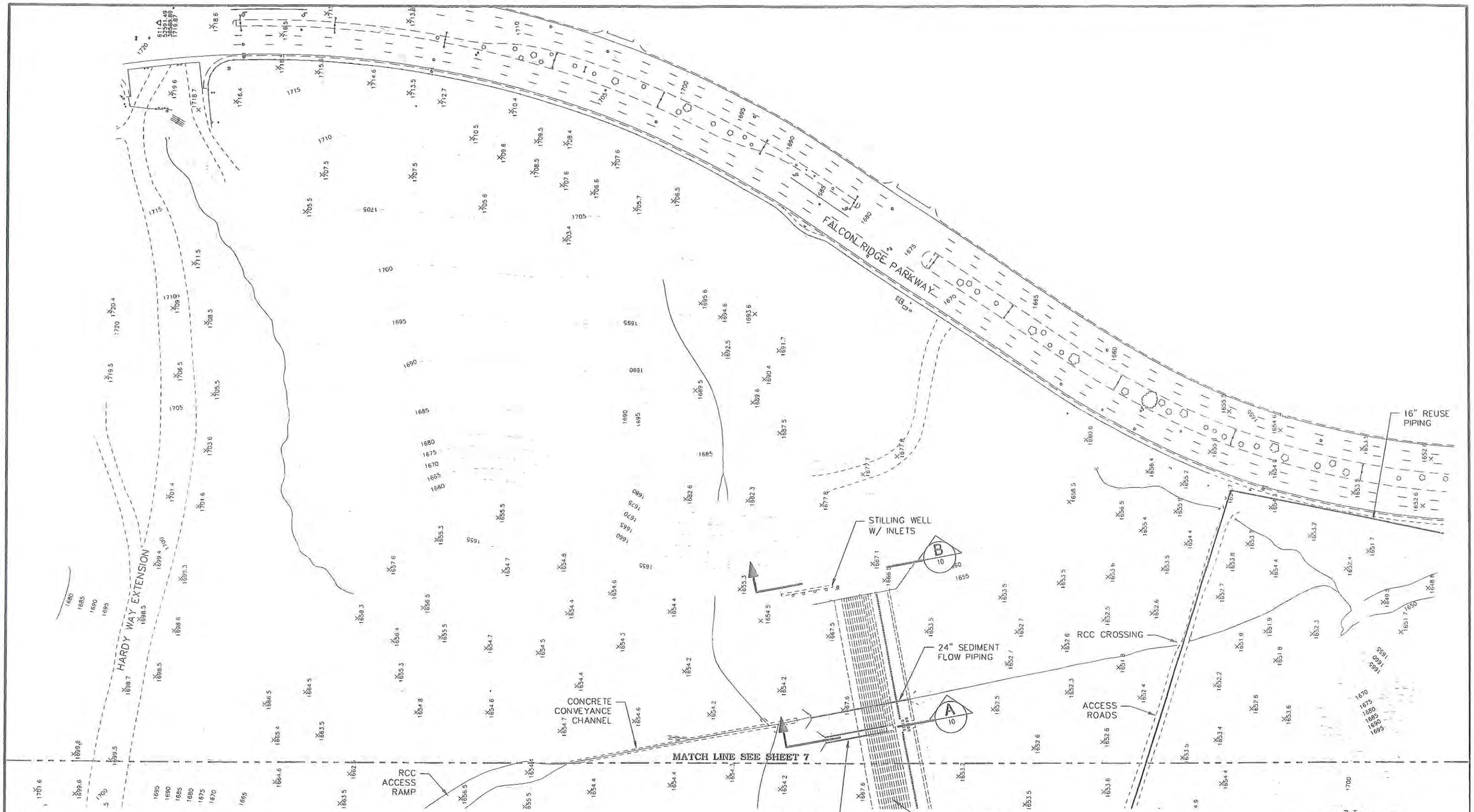
Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

PULSIPHER WASH - WEST SITE PLAN

PROJECT NO: 05-06-0075
SHEET NO. 8
FILE NAME: PAGE NO.: 8



NOTE:

CONTOURS BY VTN/ NORTH AMERICAN MAPPING, TAKEN 2/10/08

PULSIPHER WASH (EAST SITE PLAN)

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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DESIGNED
APPROVED J. BROOME
QA/QC

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(IF NOT 2" - SCALE ACCORDINGLY)

REGISTERED PROFESSIONAL ENGINEER, STATE OF NEVADA
JASON T. BROOME
EXP 12/31/10
CIVIL
017062
12/1/09

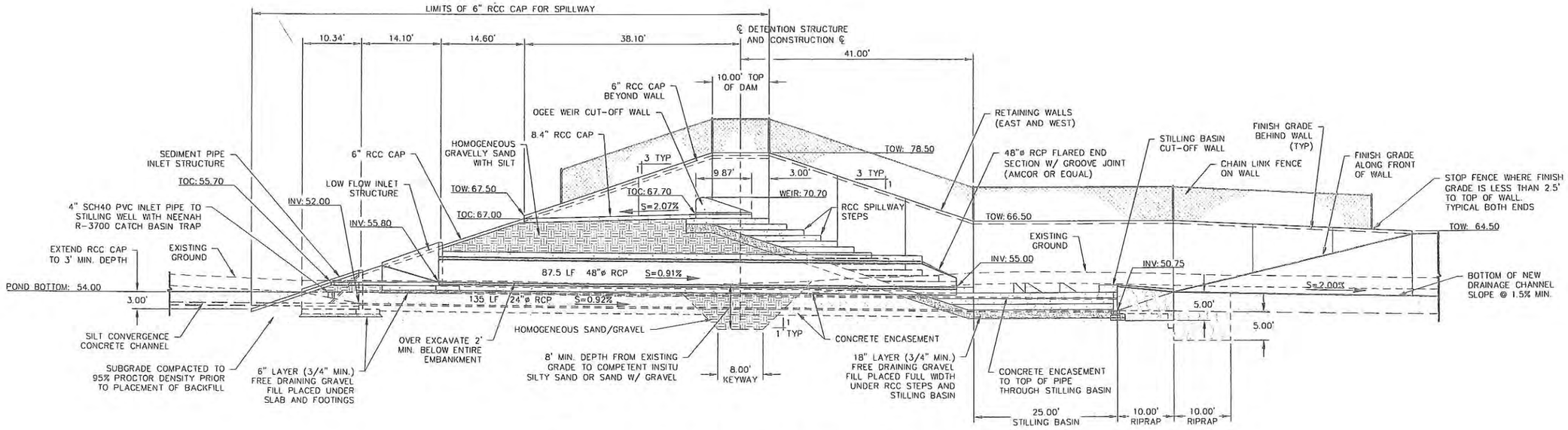
Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

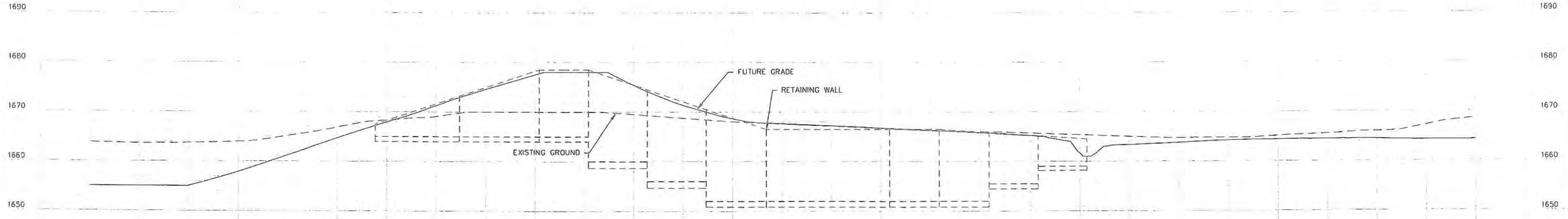
PULSIPHER WASH - EAST SITE PLAN

PROJECT NO.: 05-06-0075
SHEET NO.: 9
FILE NAME: PAGE NO.: 9



SECTION THRU 48" DIA. RCP PRIMARY OUTLET PIPE (A/9)

SCALE: 1" = 10'



SECTION AT EAST END OF DAM (B/9)

SCALE: 1" = 10'

RECORD DRAWINGS

NO.	REVISIONS	BY	DATE

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DRAWN S. FOERSTER
DESIGNED
APPROVED J. BROOME
QA/QC

ATTENTION
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(IF NOT 2"- SCALE ACCORDINGLY)

REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
JASON T. BROOME
Exp. 12/31/10
CIVIL
017080
11/09

Mesquite Nevada

FORSGREN Associates Inc.
370 EAST 500 SOUTH, #200 SALT LAKE CITY, UT 84111
PH: 801.364.4785 FAX: 801.364.4802

MESQUITE WATER REUSE SYSTEM

PULSIPHER WASH - SECTIONS

PROJECT NO: 05-06-0075
SHEET NO. 10
FILE NAME: PAGE NO. 10

PT#	NORTHING	EASTING
1	27002574.75	1085694.61
2	27002585.02	1085636.50
3	27002627.95	1085521.22
4	27002675.44	1085503.12
5	27002715.33	1085501.55
6	27002770.60	1085567.55
7	27002691.57	1085700.55
8	27002800.42	1085724.09
9	27002875.21	1085732.64
10	27002815.03	1085620.06
11	27002912.45	1085754.13
12	27002889.69	1085702.89
13	27002944.13	1085763.44
14	27002946.18	1085854.94
15	27002930.11	1085833.58

PT#	NORTHING	EASTING
16	27002961.97	1085925.65
17	27002944.99	1085936.23
18	27003016.05	1085966.74
19	27003059.29	1086003.88
20	27002948.82	1086189.83
21	27002970.36	1085962.44
22	27003033.49	1086075.85
23	27002920.81	1086144.96
24	27002897.60	1086186.66
25	27002836.27	1086158.01
26	27002857.37	1086125.65
27	27002934.01	1086066.97
28	27002934.17	1085970.45
29	27002905.52	1085857.07
30	27002853.34	1085871.64

PT#	NORTHING	EASTING
31	27002872.91	1085957.03
32	27002869.17	1086020.19
33	27002828.26	1086068.46
34	27002737.60	1086144.24
35	27002714.56	1086137.54
36	27002656.73	1086122.21
37	27002710.57	1086082.06
38	27002802.80	1085886.23
39	27002636.73	1085875.78
40	27002675.22	1085940.02
41	27002664.53	1086013.28
42	27002625.84	1085947.88
43	27005538.73	1091831.45
44	27005608.10	1091765.21
45	27005760.19	1091808.16

PT#	NORTHING	EASTING
46	27005823.17	1091861.12
47	27005825.11	1091943.38
48	27005761.61	1092093.39
49	27005694.70	1091932.96
50	27005627.24	1091895.95
51	27005656.96	1091965.76
52	27005722.38	1092004.57
53	27005673.37	1091690.12
54	27005897.48	1091753.40
55	27005965.24	1091818.20
56	27005949.56	1091910.63
57	27005784.33	1092125.34
58	27005744.01	1091616.55
59	27006026.32	1091696.26
60	27006103.13	1091775.42

PT#	NORTHING	EASTING
61	27006074.23	1091894.18
62	27005807.60	1092155.86
63	27005807.12	1091540.85
64	27006050.77	1091609.65
65	27006190.44	1091753.58
66	27006135.53	1091960.08
67	27005970.17	1092113.90
68	27005887.96	1092162.67
69	27005858.56	1091489.88
70	27006028.55	1091558.29
71	27006147.95	1091542.18
72	27006259.32	1091616.87
73	27006319.00	1091855.38
74	27006260.19	1091972.07
75	27006054.59	1092056.32

Site Volume Table: Unadjusted

Site	Stratum	Surf1	Surf2	Cut	Total
KPN–ABBOTT	kpn–abbott	ex ground abbott		KPN–ABBOTT 17,251 cy	10.69 ACRE FEET
KPN–PULSIPHER	kpn–pulsipher	ex ground pulsipher		KPN–PULSIPHER 15,257 cy	9.46 ACRE FEET

NORTH

SCALE

STATE OF NEVADA — PROFESSIONAL ENGINEER — JERRY E. KRUTZ — No. 7198 — Exp. 12/31/2011

DATE: 6-16-11

REV.	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GCW. APP

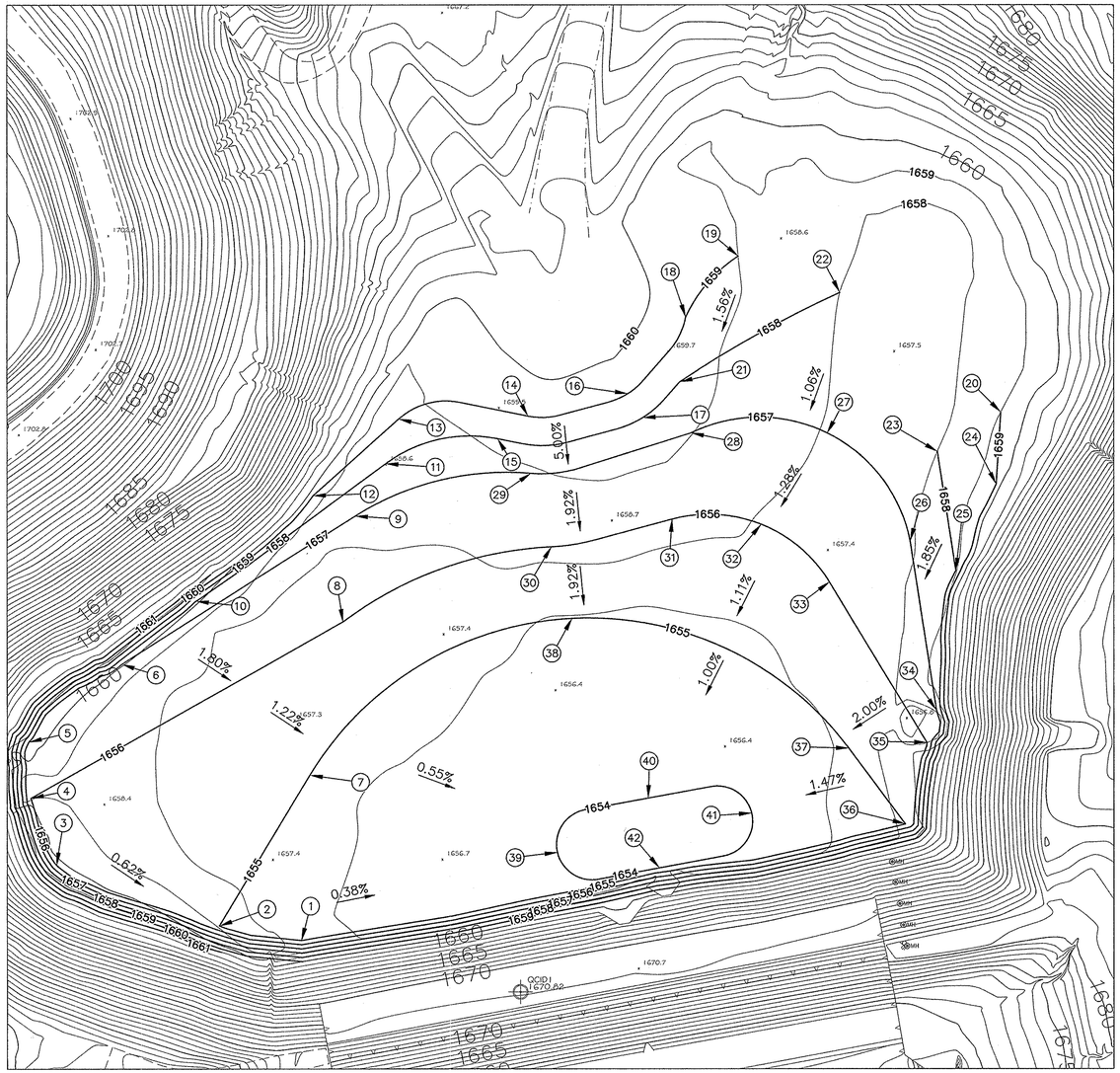
DESIGN:
DRAWN:
CHECK:
ISSUE DATE:
ISSUE EDITOR:
PLOT DATE: 09-01-11
PLOT TIME: 09:10:05

ELEVATION REFERENCE MARKERS (ERM)

REFERENCE NUMBER	ELEVATION REFERENCE MARKER ID	ELEVATION (FT, NAVD 88)	LOCATION DESCRIPTION
131	N.G.S. Z 405	1598.49	BENCHMARK IS LOCATED APPROXIMATELY 200 FEET WEST OF DESERT DRIVE AND 25 FEET NORTH OF MESQUITE BLVD.

BASIS OF BEARING

N 52°13'28"E – BEING THE BEARING ON THE LINE BETWEEN NATIONAL GEODETIC SURVEY MONUMENT "FAA 67L A." AND NEVADA DEPARTMENT OF TRANSPORTATION MONUMENT "1071003M". SAID BEARING IS BASED UPON THE NORTH AMERICAN DATUM OF 1983, EPOCH DATE OF 1994 (NAD83/94) PUBLISHED VALUES AS SHOWN BY THE CLARK COUNTY DEPARTMENT OF PUBLIC WORKS SURVEY TITLED "VIRGIN VALLEY GEODETIC CONTROL MONUMENT"; RECORDED IN FILE 88, PAGE 53 OF SURVEYS IN THE CLARK COUNTY RECORDER'S OFFICE, CLARK COUNTY, NEVADA AND NDOT SURVEY MONUMENT CONTROL PUBLISHED VALUES.



PULSIPHER DETENTION BASIN

SCALE: 1"=50'

50 0 50 100
SCALE FEET

ABBOTT DETENTION BASIN

SCALE: 1"=80'

80 0 80 160
SCALE FEET

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
555 S. RAINBOW BOULEVARD, LAS VEGAS, NV 89145
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

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CLARK COUNTY, NEVADA
REGIONAL FLOOD CONTROL DISTRICT
ABBOTT AND PULSIPHER WASHES LOMR
GRADING PLAN EXHIBIT

DRAWING
EX
OF SHTS

ec2438.dwg 090117.dgn

7. ELECTRONIC FILES

Report PDF
Topo/Survey Files
Detention Basin Calculations/HEC-1 Models
Work Maps
HEC-RAS Models
GIS Shape Files

RESPONSE TO FEMA COMMENTS ON THE LETTER OF MAP REVISION FOR PULSIPHER WASH

CASE NO. 11-09-4157P

AND

RESPONSE TO FEMA COMMENTS ON THE LETTER OF MAP REVISION FOR ABBOTT WASH

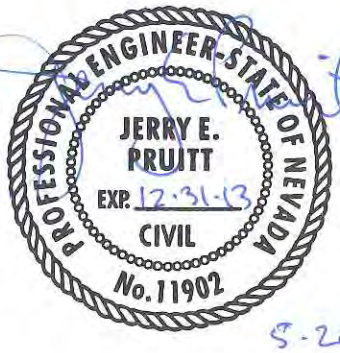
CASE NO. 12-09-0907P

550-048

May 2012

Prepared For:

Clark County Regional Flood Control District
600 S. Grand Central Parkway, Suite #300
Las Vegas, Nevada 89106
Phone: (702) 685-0000
Fax: (702) 685-0001



5-29-12

RESPONSE TO FEMA COMMENTS ON THE LETTER OF MAP REVISION FOR PULSIPHER WASH

CASE NO. 11-09-4157P

550-048

May 2012

Prepared For:

Clark County Regional Flood Control District
600 S. Grand Central Parkway, Suite #300
Las Vegas, Nevada 89106
Phone: (702) 685-0000
Fax: (702) 685-0001

550-048

May 29, 2012 804-2011

Syed Qayum, CFM
LOMR Technical Manager
LOMC Clearinghouse
7390 Coca Cola Drive, Suite 204
Hanover, MD 21076

Re: Case No.: 11-09-4157P
Pulsipher Wash

Dear Syed Qayum:

The purpose of this letter is to address your comments dated March 1, 2012, regarding the above-referenced project. The comments are individually addressed as follows:

Comment: "1. Our review revealed that the submitted Master Plan Update entitled, "City of Mesquite Flood Control Master Plan Update," prepared by PBS&J, dated July 2007 and "The City of Mesquite Flood Control Master plan Update," prepared by Pentacore, dated September 2001, did not include appropriate drainage basin maps. Please submit drainage basin maps that include the topographic information to delineate the subbasins for the Pulsipher Wash drainage basin."

Response: The subbasin boundaries used for this LOMR are referenced from the City of Mesquite Flood Control Master Plan Update 2007 (hereinafter, referred to as the 2007 MPU). The subbasin boundaries presented in the 2007 MPU were referenced from the 2001 MPU, which agrees with the subbasin boundaries presented in the *1998 Abbott and Pulsipher Washes FIS Restudy* (hereinafter, referred to as the 1998 FIS Study). The 1998 FIS Study (accepted by FEMA on September 10, 2001) and the 2001 MPU references the Subbasins from the 1995 MPU. Maps showing the drainage basins from the 2001 MPU and the 1995 MPU have been included in the Appendix for comparison purposes. The hydrology models presented in the 2001 MPU have supported previously approved LOMR requests in the area including the Falcon Ridge Parkway LOMR (FEMA Case 06-09-B051P) and the Abbott Wash at Mesquite Vistas LOMR (FEMA Case 03-09-0236P). There have been no changes to the wash watersheds since the approved previous LOMR's.

Comment: "2. The National Oceanic and Atmospheric Administration's (NOAA) precipitation website (http://hdsc.nws.noaa.gov/hdsc/pfds/) states that the state of Nevada has adopted the use of the Atlas 14 Point Precipitation Frequency Estimates as of 2003. However, the above-referenced Master Plan Update reports used the NOAA Atlas Point Precipitation Frequency Estimates. Please update the submitted existing conditions Abbott Wash HEC-1 model with the

NOAA Atlas 14 Point Precipitation Frequency Estimates or explain why this is not necessary."

Response: Neither Clark County nor Clark County Regional Flood Control District have adopted the NOAA Atlas 14 point precipitation frequency estimates. The NOAA Atlas 2 point precipitation frequency estimates with local adjustment factors continue to be appropriate for the Clark County area. Therefore, no revisions are necessary.

Comment: "3. As required on page 10 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for Pulsipher Wash. This is required to ensure that the effective model's input data has been transferred correctly to the requester's equipment and to ensure that the revised data will be integrated into the effective data to provide a continuous Flood Insurance Study model upstream and downstream of the revised reach."

Response: The current study is a study with completely new aerial topography. Therefore, providing a duplicate effective model seems to be of little value. Note that the upstream study limit for the reach is tied into the existing effective approximate method Zone A floodplain at the upstream side of the Hardy Way Culvert. The downstream study limit for the reach is tied into the existing effective detailed method Zone AE floodplain at Cross Section 200. The boundary condition cross section geometry was updated per the new aerial topography; however, the WSE, although not the same because of the increased flowrate (i.e., 1.2 feet higher), is still calculated to be at critical depth.

In order to be thorough, an additional cross section (Cross Section 150) was added downstream of Cross Section 200 using the original FIS cross section geometry with the new flowrate. The result was identical to the submitted model at Cross Section 200 i.e. critical depth with a WSE of 1559.2 and the WSE at Cross Section 150 was only 0.2 feet higher than the FIS WSE which is less than the acceptable 0.5 feet tie-in requirements. We are not proposing any modifications to the submitted data or floodplain mapping.

Comment: "4. The submitted existing conditions HEC-RAS hydraulic model used critical depth as the starting water-surface elevation (WSEL). Please provide information to support the use of critical depth as the starting WSEL, or revise the existing conditions hydraulic analysis using the slope-area method to compute the starting WSEL."

Response: The downstream boundary condition selection of critical depth is consistent with the effective FIS model as discussed above in the Response to Comment 3. However, as a check, the model was revised to use the slope-area method to compute the starting WSE at Cross Section 200. The result of this model still reverted back to critical depth. Therefore, there is no change to the analyses and results. We are not proposing any modifications to the submitted data or floodplain mapping.

Comment: "5. The base floodplain topwidths shown in the existing conditions HEC-RAS hydraulic analysis at cross sections 200, 300, 400, 580, 2000.1 and 3640 do

not match the approximate base floodplain topwidths shown on the topographic work map entitled, "Abbott and Pulsipher Washes LOMR Pulsipher Wash Cross Section Exhibit, Figure 5," prepared by G. C. Wallace Companies, dated August 31, 2011. Please provide an explanation for these discrepancies, or make the appropriate changes."

Response: The base Zone AE floodplain topwidths at Cross Sections 200, 300, 400 and 580 shown on the revised Figure 5R have been updated to match the existing conditions HEC-RAS hydraulic analysis. In addition, the right bank flowrate of 204 cfs from Cross Section 600 was used to analyze an existing ditch just west of the main wash near the Hafen Lane 12-foot wide by 4-foot high RCB culvert. Based on the discussion with Paul Anderson on March 19, 2012, it was determined that normal depth calculations are acceptable to analyze the breakout flow conveyed in the existing ditch. However, this portion of the floodplain should be labeled Zone A. A normal depth analysis has been provided to determine appropriate western boundary delineation for the Zone A floodplain between Cross Sections 600 and 300. The cross sections have been labeled 30N, 20N and 10N on Figure 5R attached.

100-YEAR DITCH CHARACTERISTICS						
Ditch*	Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	WSE (ft)	Velocity (ft/s)	Topwidth (ft)
30N	0.42	204	4.1	1574.3	5.14	17.7
20N	3.89	204	1.7	1569.7	9.09	24.7
10N	2.61	204	2.4	1566.4	8.55	21.0

*See Figure 5R.

The base floodplain topwidth along Cross Section 2000.1 has been revised to match the existing conditions HEC-RAS hydraulic analysis. Note that the topwidth length is measured along the headwall and cross section and the floodplain delineation follows the contour.

The topwidth of the floodplain at Cross Section 3640 has been conservatively set to match Cross Section 3650 to account for the overtopping of the roadway. Additionally, the cross section end points at this location have been extended vertically to make sure that the cross section end points are equal to or higher than the corresponding WSEL and additional points have been added to Cross Section 3640 to reach across the entire cross section.

Comment: "6. Our detailed review revealed that cross sections 200-400 and 3640 do not reach across the entire floodplain. Please extend the cross sections on the above-reference topographic work map so that they reach across the entire base (1-percent-annual-chance) floodplain."

Response: Cross Sections 200-400 now reach across the entire Zone AE floodplain and the Zone AE floodplain topwidths match the HEC-RAS hydraulic analysis. Note that a Zone A floodplain has been added as discussed in the Response to Comment 5.

Cross Section 3640 has been revised to extend across the entire floodplain as addressed above in the Response to Comment 5.

The revised model is included in the Appendix and the revisions had no impact on the previously submitted results.

Comment: "7. Our detailed review revealed water surface elevations (WSELs) higher than the end points of the cross section at Cross Section 3650 BR D in the existing conditions HEC-RAS hydraulic model along Pulsipher Wash. Please extend the cross sections to that the end points of all cross sections are equal to or higher than the corresponding WSEL."

Response: Cross Section 3650 is the existing culvert, which is undersized and there is flow overtopping. An explanation was provided in the previously submitted report (Page 8, seventh paragraph). However, the cross section end points at this location have been extended vertically to make sure that the cross section end points are equal to or higher than the corresponding WSEL. The revised model is included in the Appendix and the revisions had no impact on the previously submitted results.

Comment: "8. Please provide survey data, certified by a registered professional engineer, for all bridges and culverts in the submitted existing conditions and existing conditions hydraulic analyses. Please be sure to include top-of-road elevations for the area around each culvert and bridge."

Response: The survey data was provided for all bridges and culverts not previously addressed in approved FIS or LOMR. A topographic data certification statement was provided in the report and is attached with this letter for your convenience. For the culverts and bridges previously approved in an FIS or LOMR however, the data has been taken from the effective model and then adjusted, as necessary to the proper datum. Below is a list of all bridge and culverts in the hydraulic model:

Cross Section 3650, 12-foot wide by 4-foot high Culvert: Survey Data Provided.
Cross Section 3050, 12-foot wide by 8-foot high Bertha Howe Avenue Bridge: Referenced from Falcon Ridge Parkway LOMR study (Case No. 06-09-B051P). Referenced Data Provided.
Cross Section 1950, 12-foot wide by 10-foot high I-15 Bridge: Referenced from 1998 FIS study. Referenced Data Provided.
Cross Section 550, Triple Barrel 12-foot wide by 4-foot high Hafen Lane Bridge: Survey Data Provided.

A digital CAD file of survey data was provided with the original submittal. The top-of-road elevations have been highlighted on the attached survey exhibits.

Comment: "9. Please submit evidence of notification of all property owners who will be affected by any increases in width and/or shifting of the base floodplain and/or increases in base flood elevations (BFEs)."

Response: Evidence of notification of all affected property owners will be submitted immediately upon acceptance of the final floodplain boundary analysis and mapping.

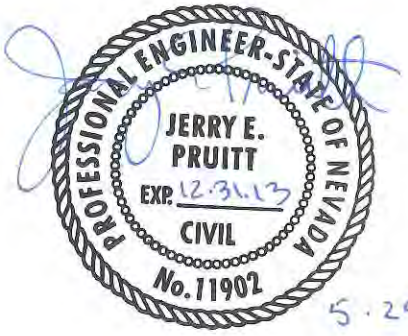
Comment: "10. Paragraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, the hydraulic analyses must be extensive enough to ensure a logical transition between the revised floodplain boundaries and those developed previously for areas not affected by the revision. Our review indicates that the boundary of the base (1-percent-annual-chance) flood shown on the above referenced work map does not logically tie in to the effective base floodplain boundary at the downstream end of the revision. Please revise the boundary delineation at the downstream end of the revision to provide a logical tie in."

Response: The current study ties in exactly at the previously approved limit of detailed study. Note that the effective mapping currently shows a Zone A between two Zone AEs. Also note that the area affected by this comment is currently occupied by a golf course. For floodplain management purposes, further development of this area would require resolution and/or mitigation of this Special Flood Hazard Area by the developer regardless of its designation. Although this existing situation may not be ideal, it was considered beyond the scope and budget of this project to resolve. Therefore, at this point, we would like to avoid the expense and effort to resolve this for little perceived added value.

If you have any questions or require additional information, please contact our office at 804-2000.

Cordially,

G. C. WALLACE, INC.



5.29.12

Jerry E. Pruitt, PE
Senior Vice President
Flood Control Division

JEP/JM/vlr

Enclosures

c: Kevin Eubanks, CCRFCD
Andrew Trelease, CCRFCD
Calvin L. Black, GCW
James Monroe, GCW

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550-048

May 29, 2012 804-2011

Syed Qayum, CFM
LOMR Technical Manager
LOMC Clearinghouse
7390 Coca Cola Drive, Suite 204
Hanover, MD 21076

Re: Case No.: 12-09-0907P
Abbott Wash

Dear Syed Qayum:

The purpose of this letter is to address your comments dated March 1, 2012, regarding the above-referenced project. The comments are individually addressed as follows:

Comment: "1. Our review revealed that the submitted Master Plan Update entitled, "City of Mesquite Flood Control Master Plan Update," prepared by PBS&J, dated July 2007 and "The City of Mesquite Flood Control Master plan Update," prepared by Pentacore, dated September 2001, did not include appropriate drainage basin maps. Please submit drainage basin maps that include the topographic information to delineate the subbasins for the Pulsipher Wash drainage basin."

Response: The subbasin boundaries used for this LOMR are referenced from the City of Mesquite Flood Control Master Plan Update 2007 (hereinafter, referred to as the 2007 MPU). The subbasin boundaries presented in the 2007 MPU were referenced from the 2001 MPU, which agrees with the subbasin boundaries presented in the *1998 Abbott and Pulsipher Washes FIS Restudy* (hereinafter, referred to as the 1998 FIS Study). The 1998 FIS Study (accepted by FEMA on September 10, 2001) and the 2001 MPU references the Subbasins from the 1995 MPU. Maps showing the drainage basins from the 2001 MPU and the 1995 MPU have been included in the Appendix for comparison purposes. The hydrology models presented in the 2001 MPU have supported previously approved LOMR requests in the area including the Falcon Ridge Parkway LOMR (FEMA Case 06-09-B051P) and the Abbott Wash at Mesquite Vistas LOMR (FEMA Case 03-09-0236P). There have been no changes to the wash watersheds since the approved previous LOMR's.

Comment: "2. The National Oceanic and Atmospheric Administration's (NOAA) precipitation website (http://hdsc.nws.noaa.gov/hdsc/pfds/) states that the state of Nevada has adopted the use of the Atlas 14 Point Precipitation Frequency Estimates as of 2003. However, the above-referenced Master Plan Update reports used the NOAA Atlas 2 Point Precipitation Frequency Estimates. Please update the submitted existing conditions Abbott Wash HEC-1 model with the

NOAA Atlas 14 Point Precipitation Frequency Estimates or explain why this is not necessary."

Response: Neither Clark County nor Clark County Regional Flood Control District have adopted the NOAA Atlas 14 point precipitation frequency estimates. The NOAA Atlas 2 point precipitation frequency estimates with local adjustment factors continue to be appropriate for the Clark County area. Therefore, no revisions are necessary.

Comment: "3. Our review revealed that the submitted existing conditions HEC-RAS model uses a known starting water-surface elevation of 1645.86 feet. The submitted report entitled, "Abbott and Pulsipher Washes Letter of Map Revision (LOMR)," prepared by G.C. Wallace Companies, dated September 2011, states that this known water-surface elevation is from a previous Abbott Wash LOMR at cross section 6100. However, the only LOMR on record, 06-09-BD10P states that the water-surface elevation at cross section 6100 is 1600.73. Please revise the submitted HEC-RAS model with the appropriate starting water-surface elevation or explain why this is not necessary."

Response: The stated LOMR on record 06-09-BD10P is not the correct LOMR for the project area. We were not able to verify the WSE of 1600.73 at Cross Section 6100 mentioned above.

However, the starting WSE used (1642.97 feet + 2.89 feet for datum conversion = 1645.86 feet) in this study has been referenced from Abbott Wash at Mesquite Vistas LOMR (Case No. 03-09-0236P). Excerpts from the LOMR are attached for your convenience. Therefore, no revisions are necessary.

Comment: "4. The downstream reach length shown in the submitted hydraulic analysis at cross sections 1135 does not match the approximate downstream reach lengths shown on the topographic work map entitled, "Abbott and Pulsipher Washes LOMR Abbott Wash Cross Section Exhibit, Figure 4," prepared by G.C. Wallace Companies, dated August 31, 2011. Please make the appropriate changes, or explain why this is not necessary."

Response: The reach length in the model is 284.4 feet and the reach length scales on the topographic map to be approximately 280 feet on a 1"=2,000' scale map. This accuracy seems appropriate, so no changes were necessary. This comment was deleted based on telephone conversation with Paul Anderson on March 19, 2012.

Comment: "5. Please provide survey data, certified by a registered professional engineer, for all bridges and culverts in the submitted existing conditions and existing conditions hydraulic analyses. Please be sure to include top-of-road elevations for the area around each culvert and bridge."

Response: The survey data was provided for all bridges and culverts. A topographic data certification statement was provided in the report and is attached with this letter for your convenience. A digital CAD file of survey data was provided with the original

submittal. The top-of-road elevations have been highlighted on the attached survey exhibits.

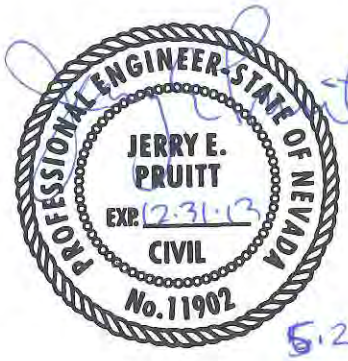
Comment: "6. Please submit evidence of notification of all property owners who will be affected by any increases in width and/or shifting of the base floodplain and/or increases in base flood elevations (BFEs)."

Response: Evidence of notification of all affected property owners will be delivered immediately upon acceptance of the final floodplain boundary analysis and mapping.

If you have any questions or require additional information, please contact our office at 804-2000.

Cordially,

G. C. WALLACE, INC.



5-29-12

Jerry E. Pruitt, PE
Senior Vice President
Flood Control Division

JEP/JM/vlr

c: Kevin Eubanks, CCRFCD
Andrew Trelease, CCRFCD
Calvin L. Black, GCW
James Monroe, GCW

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APPENDIX LAYOUT FOR RESPONSE TO FEMA COMMENTS ON THE LOMR FOR PULSIPHER WASH

1. **BACKUP FOR RESPONSE TO COMMENT #1**
   - Figure 3 from 1995 City of Mesquite Flood Control Master Plan Update
   - Figure 5 from 2001 City of Mesquite Flood Control Master Plan Update

2. **BACKUP FOR RESPONSE TO COMMENT #3**
   - Figure 5R - Pulsipher Wash Cross Section Exhibit
   - Figure 6R - Revised FIRM Map
   - Figure 7R - Annotated FIRM Map
   - HEC-RAS Model: Pulsipher Wash (Cross Section 150 from FIS included)

3. **BACKUP FOR RESPONSE TO COMMENT #5**
   - Figure 5R - Pulsipher Wash Cross Section Exhibit (See Backup for Response to Comment #3)
   - Normal Depth Sections for Pulsipher Wash
   - HEC-RAS Model: Pulsipher Wash
   - Table 2: Pulsipher Wash Zone AE BFE Comparison
   - Table 4: Pulsipher Wash Hydraulic Modeling Summary

4. **BACKUP FOR RESPONSE TO COMMENT #6**
   - Figure 5R - Pulsipher Wash Cross Section Exhibit (See Backup for Response to Comment #3)
   - HEC-RAS Model: Pulsipher Wash
   - Table 2: Pulsipher Wash Zone AE BFE Comparison
   - (See Backup for Response to Comment #5)
   - Table 4: Pulsipher Wash Hydraulic Modeling Summary (See Backup for Response to Comment #5)

5. **BACKUP FOR RESPONSE TO COMMENT #7**
   - HEC-RAS Model: Pulsipher Wash (See Backup for Response to Comment #5)
   - Table 2: Pulsipher Wash Zone AE BFE Comparison
   - (See Backup for Response to Comment #5)
   - Table 4: Pulsipher Wash Hydraulic Modeling Summary (See Backup for Response to Comment #5)

6. **BACKUP FOR RESPONSE TO COMMENT #8**
   - Survey Exhibits and Certification Letter
   - See attached CD for Digital Files

APPENDIX LAYOUT FOR RESPONSE TO FEMA COMMENTS ON THE LOMR FOR ABBOTT WASH

1. **BACKUP FOR RESPONSE TO COMMENT #1**
   - Figure 3 from 1995 City of Mesquite Flood Control Master Plan Update
   - Figure 5 from 2001 City of Mesquite Flood Control Master Plan Update

2. **BACKUP FOR RESPONSE TO COMMENT #3**
   - Excerpts from Abbott Wash at Mesquite Vistas LOMR: Hydraulic Summary Table and Cross Section Location Plan Exhibit

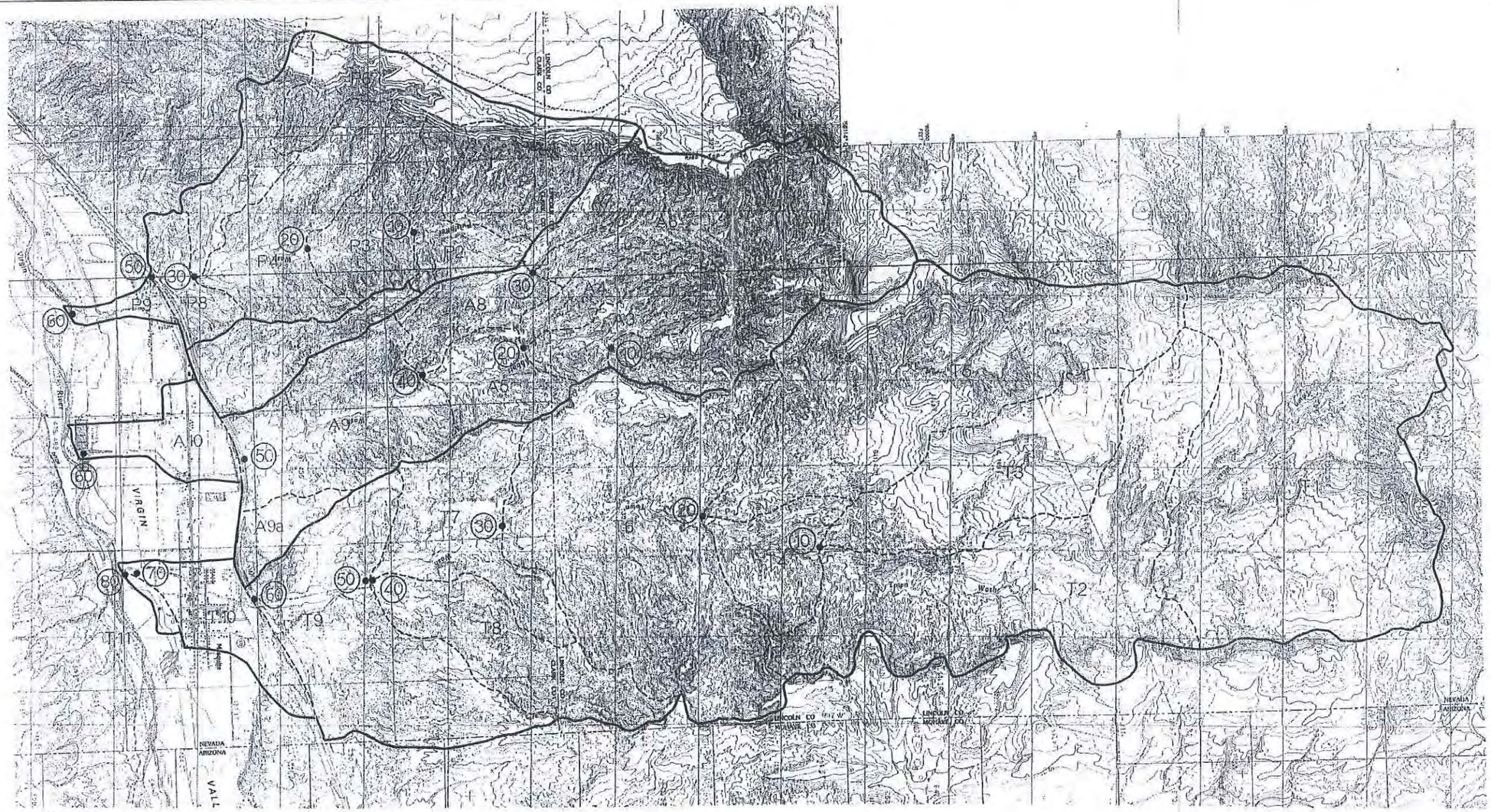
3. **BACKUP FOR RESPONSE TO COMMENT #5**
   - Survey Exhibits and Certification Letter

ELECTRONIC FILES

- Report PDFs
- Topo/Survey Files
- HEC-RAS Models
- GIS Shape Files

1. BACKUP FOR RESPONSE TO COMMENT #1

Figure 3 from 1995 City of Mesquite Flood Control Master Plan Update
Figure 5 from 2001 City of Mesquite Flood Control Master Plan Update



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUBWATERSHED BOUNDARY
- T1 SUBWATERSHED NUMBER
- (10) CONCENTRATION POINT AND NUMBER

0 2000 4000 6000 FEET

FIGURE D-2
EXISTING CONDITION
HYDROLOGIC MAP

CITY OF MESQUITE
FLOOD CONTROL MASTER PLAN UPDATE
CLARK COUNTY REGIONAL FLOOD
CONTROL DISTRICT, NEVADA

SWW39645.A1

CH2MHILL

FIGURE 3

CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

City of Mesquite MPU 2001 Drainage Basins

Watershed Boundaries

Mesquite City Limits

Future Mesquite City Limits

Figure 5

0 1/2 Mile 1 Mile 2 Miles

September 07, 2001

Scale: 1 inch = 1 mile

PENTACORE
Geographic Information Systems
6763 West Charleston Blvd.
Las Vegas, Nevada 89146

For Reference only. Pentacore assumes no liability for the accuracy of the data delineated hereon.

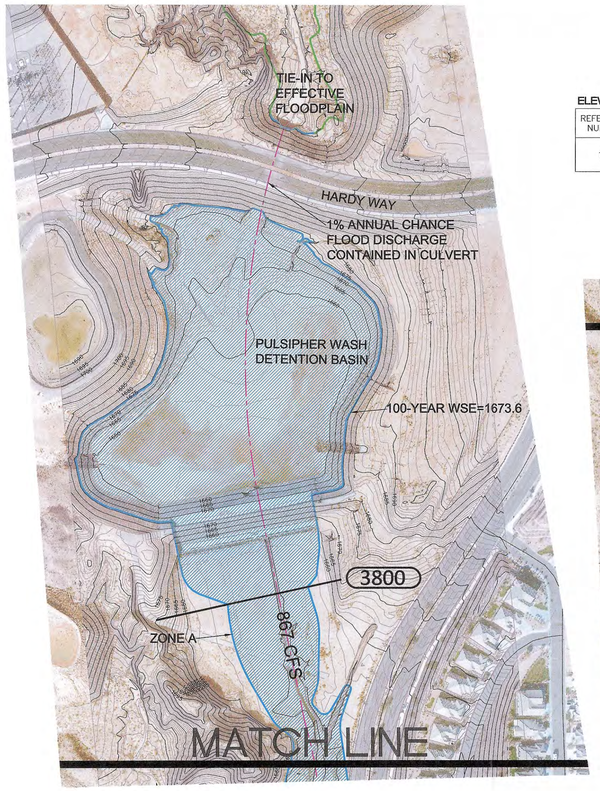
D.N.G.

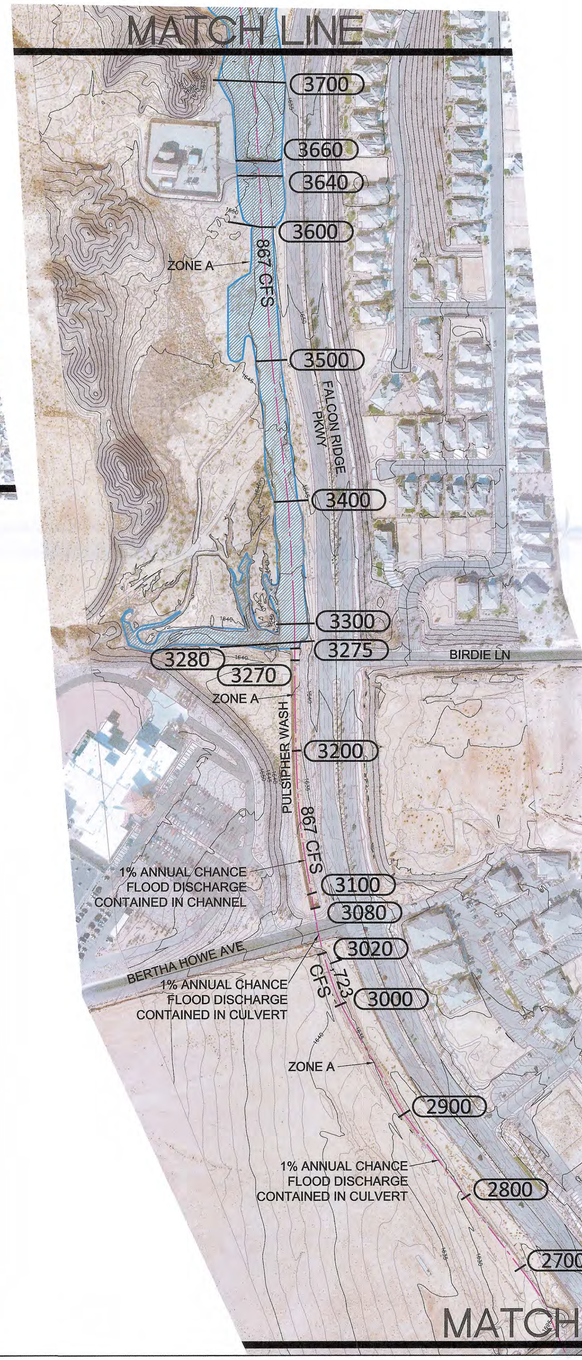
2. BACKUP FOR RESPONSE TO COMMENT #3

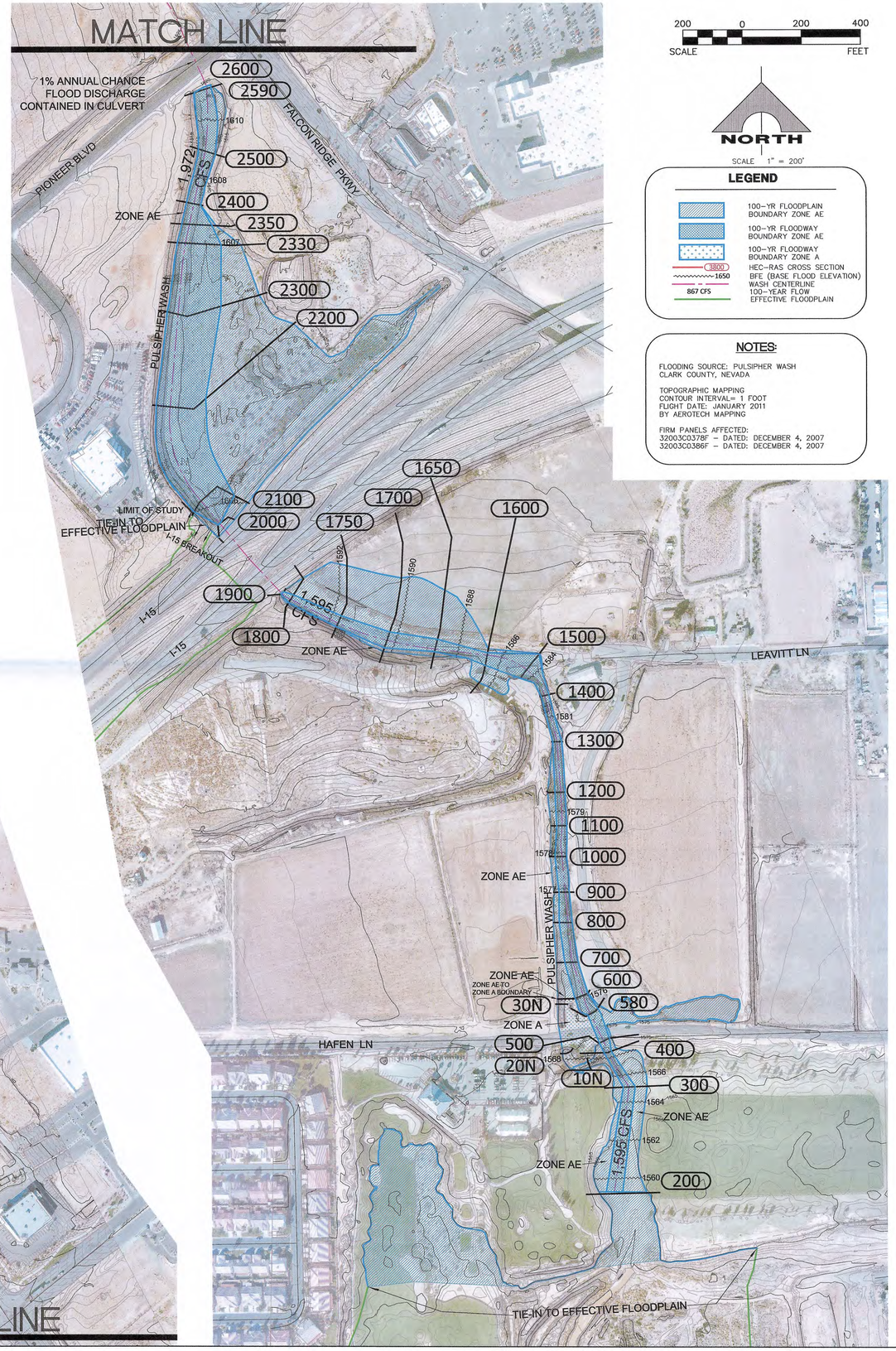
Figure 5R - Pulsipher Wash Cross Section Exhibit
Figure 6R - Revised FIRM Map
Figure 7R - Annotated FIRM Map
HEC-RAS Model: Pulsipher Wash (Cross Section 150 from FIS included)

ELEVATION REFERENCE MARKERS (ERM)

REFERENCE NUMBER	ELEVATION REFERENCE MARKER ID	ELEVATION (FT, NAVD 88)	LOCATION DESCRIPTION
131	N.G.S. Z 405	1598.49	BENCHMARK IS LOCATED APPROXIMATELY 200 FEET WEST OF DESERT DRIVE AND 25 FEET NORTH OF MESQUITE BLVD.







200 0 200 400
SCALE FEET

NORTH
SCALE 1" = 200'

LEGEND

- 100-YR FLOODPLAIN BOUNDARY ZONE AE
- 100-YR FLOODWAY BOUNDARY ZONE AE
- 100-YR FLOODWAY BOUNDARY ZONE A
- 3800 — HEC-RAS CROSS SECTION
- 1650 — BFE (BASE FLOOD ELEVATION)
- 867 CFS — WASH CENTERLINE 100-YEAR FLOW
- EFFECTIVE FLOODPLAIN

NOTES:

FLOODING SOURCE: PULSIPHER WASH
CLARK COUNTY, NEVADA

TOPOGRAPHIC MAPPING
CONTOUR INTERVAL= 1 FOOT
FLIGHT DATE: JANUARY 2011
BY AEROTECH MAPPING

FIRM PANELS AFFECTED:
32003C0378F - DATED: DECEMBER 4, 2007
32003C0386F - DATED: DECEMBER 4, 2007

DATE | DESCRIPTION | REV | DATE | DESIGN: | DRAWN: | CHECK: | ISSUE DATE: | ISSUE EDITOR: | PLOT DATE: 06-01-12 | PLOT TIME: 09:46:58 | DATE | AGEN. APP | DATE | GCW APP

G.C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

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CLARK COUNTY, NEVADA
REGIONAL FLOOD CONTROL DISTRICT
ABBOTT AND PULSIPHER WASHES LOMR
PULSIPHER WASH CROSS SECTION EXHIBIT
FIGURE 5R

DRAWING
FIG 5R
OF SHTS

Fig2438.dwg 060117.jpg

REVISED AREA

ABBOTT WASH

REVISED AREA

TIE-IN

PULSIPHER WASH

TIE-IN

TIE-IN

CITY OF MESQUITE 320035

CITY OF MESQUITE 320035

HARDY WY

FALCON RIDGE PKWY

W PIONEER BLVD

REDD HILLS PKWY

TURTLEBACK RD

MESQUITE HEIGHTS RD

PALMER LA

DASIS BLVD

W OLD MILL RD

W MESQUITE BLVD

SECOND SOUTH ST

W HAFEN LA

LEAVITT LA

PULSIPHER LA

RIVERSIDE RD

N GRAPEVINE RD

S GRAPEVINE RD

S ARROWHEAD M ARROWHEAD LA

DESERT ROSE W

SUNSET GREENS W

JENSEN DR

CALAIS DR

HORIZON BLVD

S I 15
N I 15

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 70 EAST AND TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 71 EAST.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0378F

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 378 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0378	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0378F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0386F

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 386 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARK COUNTY	320033	0386	F
MESQUITE, CITY OF	320035	0386	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0386F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0379F

FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY, NEVADA AND INCORPORATED AREAS

PANEL 379 OF 4000
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MESQUITE, CITY OF	320035	0379	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32003C0378F
MAP REVISED
DECEMBER 4, 2007

Federal Emergency Management Agency

NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 6R

REVISED F.I.R.M.

G. C. WALLACE COMPANIES
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6655 S. CIMARRON ROAD · LAS VEGAS, NV 89113
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

pkoritschakov05-30-12 16:39:18 F:\Projects\500\550-048\Division\Fed\Figures\FEMA RTC\CD\Figures\Fig6R.dwg

LIMIT OF STUDY

ZONE A

REVISED AREA

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ABBOTT WASH

ZONE A

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

REVISED AREA

TIE-IN

TIE-IN

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ZONE A

PULSIPHER WASH

ZONE A

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL

1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ZONE AE

LIMIT OF STUDY

ZONE AE

TIE-IN

CITY OF MESQUITE 320035

CITY OF MESQUITE 320035

HARDY WY

FALCON RIDGE PKWY

MESQUITE HEIGHTS RD

PALMER LA

TURTLEBACK RD

OASIS BLVD

HORIZON BLVD

CALAIS DR

V PIONEER BLVD

REDD HILLS PKWY

V OLD MILL RD

DESERT ROSE W

N GREENVALE RD

S ARROWHEAD N ARROWHEAD LA

W MESQUITE BLVD

PULSIPHER LA

RIVERSIDE RD

LEAVITT LA

SECOND SOUTH ST

S GRAPEVINE RD

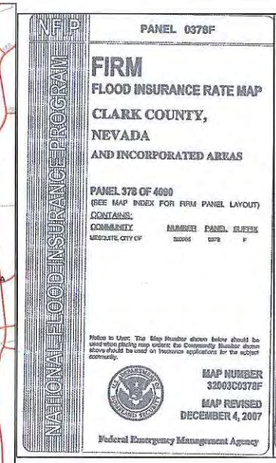
W HAFEN LA

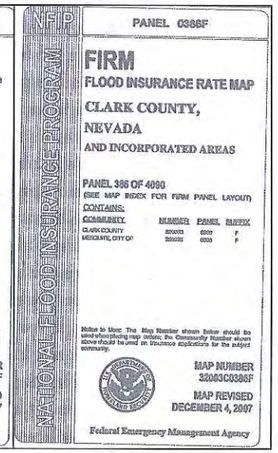
SUNSET GREENS W

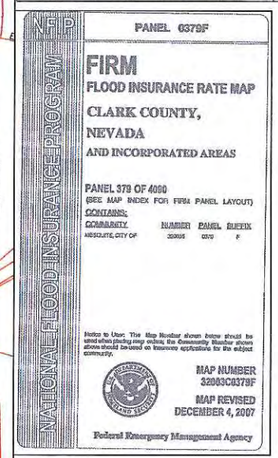
JENSEN DR

I 15 N

I 15 S







NORTH

GRAPHIC SCALE

1500 0 750 1500

(IN FEET)

1 inch = 1500 ft.

CLARK COUNTY REGIIOANL FLOOD CONTROL DISTRICT

ABBOTT AND PULSIPHER WASHES LOMR

FIGURE 7R

ANNOTATED FIRM

G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BLVD · LAS VEGAS, NV 89146
T: 702.804.2000 · F: 702.804.2299 · GCWALLACE.COM

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: PULSIPHER WASH LOMR
Project File : PULSWASH.prj
Run Date and Time: 6/4/2012 2:02:14 PM

Project in English units

Project Description:

PLAN DATA

Plan Title: LOMR2
Plan File : f:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.p04

Geometry Title: LOMR2
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.g03

Flow Title : LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.f07

Plan Description:
LOMR Model With New Topo.

Plan Summary Information:
Number of: Cross Sections = 52 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 4 Lateral Structures = 0

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

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
2600	PF 2	1	1037.67	1062.33
2590	PF 2	1	1040	1100
2500	PF 2	1	1030.12	1106.13
2400	PF 2	1	1293.09	1384.56
2350	PF 2	1	1080	1220.41
2330	PF 2	1	1150	1330.73
2300	PF 2	1	1163.5	1383.27
2200	PF 2	1	1400	1594.9
2100	PF 2	1	1010.56	1206.95
2000.1	PF 2	1	990.1	1094.79
2000	PF 2	1	1044.29	1056.29
1900	PF 2	1	1193.33	1205.33
1800	PF 2	1	1117.33	1148.63
1750	PF 2	1	1278.17	1318.26
1700	PF 2	1	1408.08	1464.52
1650	PF 2	1	1557.78	1600.56
1600	PF 2	1	1462.44	1508.14
1500	PF 2	1	1046	1152.39
1400	PF 2	1	1311.27	1345.71
1300	PF 2	1	1634.75	1667.65
1200	PF 2	1	1624.95	1659.47
1100	PF 2	1	1619.57	1655.53
1000	PF 2	1	1619.06	1659.32
900	PF 2	1	1615.48	1651.44
800	PF 2	1	1601.95	1646.84
700	PF 2	1	1594.24	1641.44
600	PF 2	1	1581.21	1627.65
580	PF 2	1	995	1042.34
500	PF 2	1	1000	1037.34
400	PF 2	1	1501.15	1526.53
300	PF 2	1	1441.01	1481.38
200	PF 2	1	1535.63	1591.46

FLOW DATA

Flow Title: LOMR
Flow File : f:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.f07

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	3800	867	867
RIVER-1	Reach-1	3020	1723	1723
RIVER-1	Reach-1	2500	1972	1972
RIVER-1	Reach-1	2000	1498	1498
RIVER-1	Reach-1	1900	1595	1595
RIVER-1	Reach-1	580	1388.72	1388.72
RIVER-1	Reach-1	300	1595	1595

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	Normal S = 0.014
RIVER-1	Reach-1	PF 2	Critical	Normal S = 0.014

GEOMETRY DATA

Geometry Title: LOMR2
Geometry File : f:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.g03

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3800

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1671	1002.55	1670	1004.98	1669	1007.44	1668	1009.93	1667
1012.44	1666	1014.93	1665	1017.43	1664	1019.96	1663	1022.51	1662
1025.01	1661	1028.37	1660	1033.4	1659	1039.81	1658	1062.59	1657
1109.41	1656	1175.5	1655	1176.9	1654	1182.94	1654	1186.39	1655
1305.1	1656	1372.97	1657	1416.24	1658	1439.98	1659	1445.27	1660
1451.68	1661	1456.68	1662	1462.39	1663	1467.92	1664	1474.06	1665
1480.09	1666	1486.5	1667	1494.56	1668	1506.49	1669	1529.92	1670

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1028.37	.025	1445.27	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1000 1506.49 580 566 553 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.68	Element		0.025	
Vel Head (ft)	0.38	Wt. n-Val.			
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	36.94	44.18	1.43
C & E Loss (ft)	0.09	Cum SA (acres)	9.93	14.49	0.76

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.68	Element		0.025	
Vel Head (ft)	0.38	Wt. n-Val.			
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	14.09	42.62	1.25
C & E Loss (ft)	0.09	Cum SA (acres)	3.18	12.58	0.60

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3700

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1280.37	1657	1280.37	1655	1281.45	1655	1314.63	1655	1322.87	1654
1330.66	1653	1346.03	1652	1356.88	1651	1360.42	1650	1379.62	1650
1381.69	1651	1386.37	1652	1389	1653	1407.85	1654	1447.99	1655
1471.23	1656	1480.45	1657	1483.65	1658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1280.37	.024	1314.63	.025	1447.99	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1314.63 1447.99 222.1 225 219.5 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.03	Element	0.024	0.025	0.040
Vel Head (ft)	0.06	Wt. n-Val.	222.10	225.00	219.50
W.S. Elev (ft)	1655.97	Reach Len. (ft)		414.54	11.01
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	31.66	831.31	4.02
Q Total (cfs)	867.00	Flow (cfs)	34.26	133.36	22.62
Top Width (ft)	190.24	Top Width (ft)	0.95	2.01	0.37
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.97	3.11	0.49
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	1990.0	52245.1	252.8
Conv. Total (cfs)	54487.9	Conv. (cfs)	35.23	134.26	22.64
Length Wtd. (ft)	224.44	Wetted Per. (ft)			

Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.72	40.34	1.36
C & E Loss (ft)	0.00	Cum SA (acres)	9.70	12.13	0.62

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1656.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.024	0.025	0.040
W.S. Elev (ft)	1655.97	Reach Len. (ft)	222.10	225.00	219.50
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	33.34	414.54	11.01
Q Total (cfs)	867.00	Flow (cfs)	31.66	831.31	4.02
Top Width (ft)	190.24	Top Width (ft)	34.26	133.36	22.62
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.95	2.01	0.37
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.97	3.11	0.49
Conv. Total (cfs)	54487.9	Conv. (cfs)	1990.0	52245.1	252.8
Length Wtd. (ft)	224.44	Wetted Per. (ft)	35.23	134.26	22.64
Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.87	38.78	1.18
C & E Loss (ft)	0.00	Cum SA (acres)	2.95	10.22	0.46

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3660

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1053.91	42.6	42.6	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040
W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	36.41	38.62	1.16
C & E Loss (ft)		Cum SA (acres)	9.51	11.64	0.46

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1655.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040
W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	13.56	37.06	0.97
C & E Loss (ft)		Cum SA (acres)	2.77	9.74	0.30

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3650

INPUT
Description: Bridge #1
Distance from Upstream XS = .05
Deck/Roadway Width = 42.5
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
961.8	1653.41	1653.41	978.2	1653.93	1653.93	1000	1654.76	1651.92
1018	1655	1651.92	1030	1655	1651.92	1044.54	1655.2	1652
1080	1656	1653.53	1092.95	1656				

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1053.91	.3	.5

Downstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
978.2	1653.6	1653	1000	1654.76	1651.78	1013.95	1654.76	1651.78
1025.95	1654.76	1651.78	1200	1655	1651.78			

Downstream Bridge Cross Section Data

```
Station Elevation Data    num=      11
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
   956.1     1654   956.1     1653     1000     1653 1004.55     1652 1013.95 1651.78
 1013.95 1647.78 1025.95 1647.78 1025.95 1651.78 1030.32     1652 1041.18     1653
 1056.22     1654

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   956.1     .04 1013.95    .015 1025.95     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1000 1030.32              .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)               1655.96   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)               1655.87   E.G. Elev (ft)             1655.95       1655.95
  Q Total (cfs)                867.00   W.S. Elev (ft)             1655.87       1655.28
  Q Bridge (cfs)               472.60   Crit W.S. (ft)             1655.64       1655.28
  Q Weir (cfs)                 394.40   Max Chl Dpth (ft)             7.96          7.50
  Weir Sta Lft (ft)            961.80   Vel Total (ft/s)              4.91          3.97
  Weir Sta Rgt (ft)           1077.92   Flow Area (sq ft)           176.43        218.36
  Weir Submerg                   0.00   Froude # Chl                  0.32          0.37
  Weir Max Depth (ft)            2.54   Specif Force (cu ft)        523.60        522.47
  Min El Weir Flow (ft)       1653.42   Hydr Depth (ft)               1.57          2.18
  Min El Prs (ft)             1652.00   W.P. Total (ft)             179.21        135.51
  Delta EG (ft)                  1.48   Conv. Total (cfs)
  Delta WS (ft)                  2.27   Top Width (ft)              112.36        100.12
  BR Open Area (sq ft)          48.00   Frctn Loss (ft)
  BR Open Vel (ft/s)             9.85   C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

BRIDGE OUTPUT  Profile #PF 2

  E.G. US. (ft)               1655.96   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)               1655.87   E.G. Elev (ft)             1655.95       1655.95
  Q Total (cfs)                867.00   W.S. Elev (ft)             1655.87       1655.28
  Q Bridge (cfs)               472.60   Crit W.S. (ft)             1655.64       1655.28
  Q Weir (cfs)                 394.40   Max Chl Dpth (ft)             7.96          7.50
  Weir Sta Lft (ft)            961.80   Vel Total (ft/s)              4.91          3.97
  Weir Sta Rgt (ft)           1077.92   Flow Area (sq ft)           176.43        218.36
  Weir Submerg                   0.00   Froude # Chl                  0.32          0.37
  Weir Max Depth (ft)            2.54   Specif Force (cu ft)        523.60        522.47
  Min El Weir Flow (ft)       1653.42   Hydr Depth (ft)               1.57          2.18
  Min El Prs (ft)             1652.00   W.P. Total (ft)             179.21        135.51
  Delta EG (ft)                  1.48   Conv. Total (cfs)
  Delta WS (ft)                  2.27   Top Width (ft)              112.36        100.12
  BR Open Area (sq ft)          48.00   Frctn Loss (ft)
  BR Open Vel (ft/s)             9.85   C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 3640

INPUT
Description:
Station Elevation Data    num=      11
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
   956.1     1654   956.1     1653     1000     1653 1004.55     1652 1013.95 1651.78
 1013.95 1647.78 1025.95 1647.78 1025.95 1651.78 1030.32     1652 1041.18     1653
 1056.22     1654

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   956.1     .04 1013.95    .015 1025.95     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1000 1030.32              143.1   143.1   143.1              .3       .5
```

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1654.47	Element			
Vel Head (ft)	0.87	Wt. n-Val.	0.040	0.028	0.040
W.S. Elev (ft)	1653.60	Reach Len. (ft)	143.10	143.10	143.10
Crit W.S. (ft)	1653.60	Flow Area (sq ft)	26.28	98.35	14.63
E.G. Slope (ft/ft)	0.006509	Area (sq ft)	26.28	98.35	14.63
Q Total (cfs)	867.00	Flow (cfs)	55.44	775.89	35.67
Top Width (ft)	94.08	Top Width (ft)	43.90	30.32	19.86
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	2.11	7.89	2.44
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	0.60	3.24	0.74
Conv. Total (cfs)	10746.1	Conv. (cfs)	687.2	9616.8	442.1
Length Wtd. (ft)	143.10	Wetted Per. (ft)	44.50	38.44	19.93
Min Ch El (ft)	1647.78	Shear (lb/sq ft)	0.24	1.04	0.30
Alpha	1.45	Stream Power (lb/ft s)	0.51	8.20	0.73
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	36.34	38.54	1.15
C & E Loss (ft)	0.05	Cum SA (acres)	9.47	11.60	0.44

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1654.47	Element			
Vel Head (ft)	0.87	Wt. n-Val.	0.040	0.028	0.040
W.S. Elev (ft)	1653.60	Reach Len. (ft)	143.10	143.10	143.10
Crit W.S. (ft)	1653.60	Flow Area (sq ft)	26.28	98.35	14.63
E.G. Slope (ft/ft)	0.006509	Area (sq ft)	26.28	98.35	14.63
Q Total (cfs)	867.00	Flow (cfs)	55.44	775.89	35.67
Top Width (ft)	94.08	Top Width (ft)	43.90	30.32	19.86
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	2.11	7.89	2.44
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	0.60	3.24	0.74
Conv. Total (cfs)	10746.1	Conv. (cfs)	687.2	9616.8	442.1
Length Wtd. (ft)	143.10	Wetted Per. (ft)	44.50	38.44	19.93
Min Ch El (ft)	1647.78	Shear (lb/sq ft)	0.24	1.04	0.30
Alpha	1.45	Stream Power (lb/ft s)	0.51	8.20	0.73
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	13.49	36.98	0.96
C & E Loss (ft)	0.05	Cum SA (acres)	2.73	9.70	0.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3600

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.66	1651	1192.77	1650	1195.19	1649	1195.3	1648	1195.4	1647
1196.31	1646	1222.7	1646	1244.81	1646	1245.9	1647	1246.87	1648
1274.89	1649	1319.68	1650						

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.66	.025	1246.87	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1185.66	1246.87	366.01 370	383	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1649.14	Element			
Vel Head (ft)	1.03	Wt. n-Val.		0.025	0.040
W.S. Elev (ft)	1648.11	Reach Len. (ft)	366.01	370.00	383.00
Crit W.S. (ft)	1648.11	Flow Area (sq ft)		106.20	0.17
E.G. Slope (ft/ft)	0.007625	Area (sq ft)		106.20	0.17
Q Total (cfs)	867.00	Flow (cfs)		866.92	0.08
Top Width (ft)	54.66	Top Width (ft)		51.58	3.08
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)		8.16	0.47
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		2.06	0.05
Conv. Total (cfs)	9929.1	Conv. (cfs)		9928.2	0.9
Length Wtd. (ft)	370.00	Wetted Per. (ft)		53.84	3.08
Min Ch El (ft)	1646.00	Shear (lb/sq ft)		0.94	0.03
Alpha	1.00	Stream Power (lb/ft s)		7.66	0.01
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)	36.30	38.20	1.12
C & E Loss (ft)	0.05	Cum SA (acres)	9.40	11.47	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1649.14	Element			
Vel Head (ft)	1.03	Wt. n-Val.		0.025	0.040
W.S. Elev (ft)	1648.11	Reach Len. (ft)	366.01	370.00	383.00
Crit W.S. (ft)	1648.11	Flow Area (sq ft)		106.20	0.17
E.G. Slope (ft/ft)	0.007625	Area (sq ft)		106.20	0.17
Q Total (cfs)	867.00	Flow (cfs)		866.92	0.08
Top Width (ft)	54.66	Top Width (ft)		51.58	3.08
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)		8.16	0.47
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		2.06	0.05
Conv. Total (cfs)	9929.1	Conv. (cfs)		9928.2	0.9
Length Wtd. (ft)	370.00	Wetted Per. (ft)		53.84	3.08
Min Ch El (ft)	1646.00	Shear (lb/sq ft)		0.94	0.03
Alpha	1.00	Stream Power (lb/ft s)		7.66	0.01
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)	13.44	36.64	0.94
C & E Loss (ft)	0.05	Cum SA (acres)	2.66	9.56	0.24

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there

is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3500

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.43	1649	1191.81	1648	1200.57	1647	1203.67	1646	1203.79	1645
1203.93	1644	1204.11	1643	1271.04	1643	1272.02	1644	1272.99	1645

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.43	.025	1272.99	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1185.43 1272.99 392 394 393 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1645.58	Element			
Vel Head (ft)	0.86	Wt. n-Val.		0.025	
W.S. Elev (ft)	1644.72	Reach Len. (ft)	392.00	394.00	393.00
Crit W.S. (ft)	1644.72	Flow Area (sq ft)		116.69	
E.G. Slope (ft/ft)	0.008069	Area (sq ft)		116.69	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	68.89	Top Width (ft)		68.89	
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		7.43	
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	9652.1	Conv. (cfs)		9652.1	
Length Wtd. (ft)	394.00	Wetted Per. (ft)		71.07	
Min Ch El (ft)	1643.00	Shear (lb/sq ft)		0.83	
Alpha	1.00	Stream Power (lb/ft s)		6.14	
Frctn Loss (ft)	3.15	Cum Volume (acre-ft)	36.30	37.26	1.12
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	10.95	0.39

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1645.58	Element			
Vel Head (ft)	0.86	Wt. n-Val.		0.025	
W.S. Elev (ft)	1644.72	Reach Len. (ft)	392.00	394.00	393.00
Crit W.S. (ft)	1644.72	Flow Area (sq ft)		116.69	
E.G. Slope (ft/ft)	0.008069	Area (sq ft)		116.69	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	68.89	Top Width (ft)		68.89	
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		7.43	
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	9652.1	Conv. (cfs)		9652.1	
Length Wtd. (ft)	394.00	Wetted Per. (ft)		71.07	
Min Ch El (ft)	1643.00	Shear (lb/sq ft)		0.83	
Alpha	1.00	Stream Power (lb/ft s)		6.14	
Frctn Loss (ft)	3.15	Cum Volume (acre-ft)	13.44	35.70	0.93
C & E Loss (ft)	0.00	Cum SA (acres)	2.66	9.05	0.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3400

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1174.01	1645	1182.77	1644	1191.91	1643	1203.38	1642	1203.74	1641
1204.11	1640	1204.45	1639	1205.66	1638	1267.93	1638	1268.7	1639
1269.3	1640	1269.92	1641	1270.52	1642				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1174.01	.025	1270.52	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1174.01 1270.52 347 344 345 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1640.68	Element			
Vel Head (ft)	0.89	Wt. n-Val.		0.025	
W.S. Elev (ft)	1639.79	Reach Len. (ft)	347.00	344.00	345.00
Crit W.S. (ft)	1639.79	Flow Area (sq ft)		114.49	
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		114.49	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	65.00	Top Width (ft)		65.00	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	9739.3	Conv. (cfs)		9739.3	
Length Wtd. (ft)	344.00	Wetted Per. (ft)		66.86	
Min Ch El (ft)	1638.00	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.42	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	36.30	36.21	1.12
C & E Loss (ft)	0.18	Cum SA (acres)	9.40	10.35	0.39

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1640.68	Element		0.025	
Vel Head (ft)	0.89	Wt. n-Val.			
W.S. Elev (ft)	1639.79	Reach Len. (ft)	347.00	344.00	345.00
Crit W.S. (ft)	1639.79	Flow Area (sq ft)		114.49	
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		114.49	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	65.00	Top Width (ft)		65.00	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	9739.3	Conv. (cfs)		9739.3	
Length Wtd. (ft)	344.00	Wetted Per. (ft)		66.86	
Min Ch El (ft)	1638.00	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.42	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	13.44	34.65	0.93
C & E Loss (ft)	0.18	Cum SA (acres)	2.66	8.44	0.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3300

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1144.3	1642	1153.36	1641	1158.42	1640	1162.21	1639	1162.36	1638
1162.51	1637	1162.62	1636	1162.75	1635	1163.8	1634	1189.67	1633
1242.25	1633	1242.79	1634	1243.32	1635	1243.87	1636	1244.41	1637
1244.96	1638	1245.55	1639	1246.13	1640	1251	1641		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1144.3	.025	1251	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1144.3	1251	49	51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1144.3	1189.67	1642	F

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1637.10	Element		0.025	
Vel Head (ft)	0.28	Wt. n-Val.			
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	34.60	1.12
C & E Loss (ft)	0.13	Cum SA (acres)	9.40	9.77	0.39

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1637.10	Element		0.025	
Vel Head (ft)	0.28	Wt. n-Val.			
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	33.04	0.93
C & E Loss (ft)	0.13	Cum SA (acres)	2.66	7.86	0.23

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3280

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1165.69	1641	1173.74	1640	1182.15	1639	1191.29	1638	1197.14	1637
1201.59	1636	1205.39	1635	1206.42	1634	1207.35	1633	1208.6	1632
1232.89	1632	1261.87	1633	1290.19	1634	1295.73	1635	1319.69	1635
1353.86	1635	1373.83	1636	1395.64	1637	1415.94	1638	1430.06	1639

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1165.69	.04	1205.39	.025	1295.73	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1205.39	1295.73	17.5	17.5	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1165.69	1205.39	1655	F
1232.89	1430.06	1655	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1636.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.30	34.30	1.11
C & E Loss (ft)	0.01	Cum SA (acres)	9.40	9.67	0.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1636.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.44	32.74	0.92
C & E Loss (ft)	0.01	Cum SA (acres)	2.65	7.76	0.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3275

INPUT
Description: Start of U Channel

Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1639.64	1037.67	1631.64	1050	1631.49	1062.33	1631.64	1062.33	1639.64

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	33	33	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1636.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	34.24	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.65	0.34

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1636.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	32.68	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.74	0.18

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

is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3270

INPUT
Description:

Station Elevation Data	num=	5							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1639.12	1037.67	1631.12	1050	1630.88	1062.33	1631.12	1062.33	1639.12

Manning's n Values	num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	250	250	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.06	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.36	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1634.36	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003029	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15753.8	Conv. (cfs)		15753.8	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1630.88	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	36.30	34.17	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.63	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.06	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.36	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1634.36	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003029	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15753.8	Conv. (cfs)		15753.8	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1630.88	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	13.44	32.61	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.72	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3200

INPUT
Description:

Station Elevation Data	num=	5							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1635.33	1037.67	1627.33	1050	1627.08	1062.33	1627.33	1062.33	1635.33

Manning's n Values	num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	400	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1632.27	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1630.57	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1630.57	Flow Area (sq ft)		82.90	
E.G. Slope (ft/ft)	0.003021	Area (sq ft)		82.90	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.46	Avg. Vel. (ft/s)		10.46	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15774.5	Conv. (cfs)		15774.5	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1627.08	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.25	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)	36.30	33.70	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.49	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1632.27	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1630.57	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1630.57	Flow Area (sq ft)		82.90	
E.G. Slope (ft/ft)	0.003021	Area (sq ft)		82.90	
Q Total (cfs)	867.00	Flow (cfs)		867.00	

Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.46	Avg. Vel. (ft/s)		10.46	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15774.5	Conv. (cfs)		15774.5	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1627.08	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.25	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)	13.44	32.14	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.58	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3100

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1629.25	1037.67	1621.25	1050	1621	1062.33	1621.25	1062.33	1629.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 40 40 40 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.19	Element		0.015	
Vel Head (ft)	1.70	Wt. n-Val.		40.00	40.00
W.S. Elev (ft)	1624.48	Reach Len. (ft)	40.00	82.84	
Crit W.S. (ft)	1624.48	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003027	Area (sq ft)		867.00	
Q Total (cfs)	867.00	Flow (cfs)		24.66	
Top Width (ft)	24.66	Top Width (ft)		10.47	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		3.36	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		15758.0	
Conv. Total (cfs)	15758.0	Conv. (cfs)		31.13	
Length Wtd. (ft)	40.00	Wetted Per. (ft)		0.50	
Min Ch El (ft)	1621.00	Shear (lb/sq ft)		5.26	
Alpha	1.00	Stream Power (lb/ft s)		32.94	1.11
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	9.26	0.34
C & E Loss (ft)	0.18	Cum SA (acres)	9.40		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.19	Element		0.015	
Vel Head (ft)	1.70	Wt. n-Val.		40.00	40.00
W.S. Elev (ft)	1624.48	Reach Len. (ft)	40.00	82.84	
Crit W.S. (ft)	1624.48	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003027	Area (sq ft)		867.00	
Q Total (cfs)	867.00	Flow (cfs)		24.66	
Top Width (ft)	24.66	Top Width (ft)		10.47	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		3.36	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		15758.0	
Conv. Total (cfs)	15758.0	Conv. (cfs)		31.13	
Length Wtd. (ft)	40.00	Wetted Per. (ft)		0.50	
Min Ch El (ft)	1621.00	Shear (lb/sq ft)		5.26	
Alpha	1.00	Stream Power (lb/ft s)		31.38	0.92
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	7.35	0.18
C & E Loss (ft)	0.18	Cum SA (acres)	2.65		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3080

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 127.2 127.2 127.2 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1628.49

Cross Section Lid num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67 1629.29	1628.49	1062.33 1629.29	1628.49

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1625.88	Element		0.015	
Vel Head (ft)	1.10	Wt. n-Val.		0.10	0.10
W.S. Elev (ft)	1624.78	Reach Len. (ft)	0.10	102.99	
Crit W.S. (ft)	1623.94	Flow Area (sq ft)		102.99	
E.G. Slope (ft/ft)	0.002126	Area (sq ft)		867.00	
Q Total (cfs)	867.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		8.42	
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)		4.29	
Max Chl Dpth (ft)	4.29	Hydr. Depth (ft)			

Conv. Total (cfs)	18801.6	Conv. (cfs)		18801.6	
Length Wtd. (ft)	0.10	Wetted Per. (ft)		41.16	
Min Ch El (ft)	1620.49	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.80	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	36.30	32.85	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.24	0.34

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1625.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.78	Reach Len. (ft)	0.10	0.10	0.10
Crit W.S. (ft)	1623.94	Flow Area (sq ft)		102.99	
E.G. Slope (ft/ft)	0.002126	Area (sq ft)		102.99	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)		8.42	
Max Chl Dpth (ft)	4.29	Hydr. Depth (ft)		4.29	
Conv. Total (cfs)	18801.6	Conv. (cfs)		18801.6	
Length Wtd. (ft)	0.10	Wetted Per. (ft)		41.16	
Min Ch El (ft)	1620.49	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.80	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	13.44	31.29	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.33	0.18

Warning: Divided flow computed for this cross-section.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3050

INPUT
Description: Bertha Howe Avenue Bridge
Distance from Upstream XS = 1
Deck/Roadway Width = 127
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1037.67	1633.33	1627.69	1062.33	1633.33	1627.69

Upstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Coeff Contr. Expan.
1037.67 1062.33 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1628.49

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1037.67	1633.33	1626.67	1062.33	1633.33	1626.67

Downstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1627.47	1037.67	1619.47	1050	1619.47	1062.33	1619.47	1062.33	1627.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Coeff Contr. Expan.
1037.67 1062.33 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.47

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 1050 Downstream= 1050
Upstream num= 2

Width	Elev	Width	Elev
.67	1619.38	.67	1629.38

Downstream num= 2

Width	Elev	Width	Elev
.67	1619.38	.67	1629.38

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

			Inside BR US	Inside BR DS
E.G. US. (ft)	1625.88	Element		
W.S. US. (ft)	1624.78	E.G. Elev (ft)	1625.88	1625.59
Q Total (cfs)	867.00	W.S. Elev (ft)	1624.78	1624.91
Q Bridge (cfs)	867.00	Crit W.S. (ft)	1623.92	1622.91
Q Weir (cfs)		Max Chl Dpth (ft)	4.29	5.44
Weir Sta Lft (ft)		Vel Total (ft/s)	8.43	6.65
Weir Sta Rgt (ft)		Flow Area (sq ft)	102.89	130.44
Weir Submerg		Froude # Chl	0.72	0.50
Weir Max Depth (ft)		Specif Force (cu ft)	447.53	533.58
Min El Weir Flow (ft)	1633.34	Hydr Depth (ft)	4.29	5.44

Min El Prs (ft)	1627.69	W.P. Total (ft)	36.86	40.30
Delta EG (ft)	-1.73	Conv. Total (cfs)	20208.1	28272.9
Delta WS (ft)	-0.13	Top Width (ft)	23.99	23.99
BR Open Area (sq ft)	172.73	Frctn Loss (ft)	0.16	0.00
BR Open Vel (ft/s)	8.43	C & E Loss (ft)	0.12	0.00
Coef of Q		Shear Total (lb/sq ft)	0.32	0.19
Br Sel Method	Energy only	Power Total (lb/ft s)	2.70	1.26

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

BRIDGE OUTPUT Profile #PF 2

			Inside BR US	Inside BR DS
E.G. US. (ft)	1625.88	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1624.78	E.G. Elev (ft)	1625.88	1625.59
Q Total (cfs)	867.00	W.S. Elev (ft)	1624.78	1624.91
Q Bridge (cfs)	867.00	Crit W.S. (ft)	1623.92	1622.91
Q Weir (cfs)		Max Chl Dpth (ft)	4.29	5.44
Weir Sta Lft (ft)		Vel Total (ft/s)	8.43	6.65
Weir Sta Rgt (ft)		Flow Area (sq ft)	102.89	130.44
Weir Submerg		Froude # Chl	0.72	0.50
Weir Max Depth (ft)		Specif Force (cu ft)	447.53	533.58
Min El Weir Flow (ft)	1633.34	Hydr Depth (ft)	4.29	5.44
Min El Prs (ft)	1627.69	W.P. Total (ft)	36.86	40.30
Delta EG (ft)	-1.73	Conv. Total (cfs)	20208.1	28272.9
Delta WS (ft)	-0.13	Top Width (ft)	23.99	23.99
BR Open Area (sq ft)	172.73	Frctn Loss (ft)	0.16	0.00
BR Open Vel (ft/s)	8.43	C & E Loss (ft)	0.12	0.00
Coef of Q		Shear Total (lb/sq ft)	0.32	0.19
Br Sel Method	Energy only	Power Total (lb/ft s)	2.70	1.26

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3020

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1627.47	1037.67	1619.47	1050	1619.47	1062.33	1619.47	1062.33	1627.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 150 150 150 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.47

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67 1628.27	1627.47	1062.33 1628.27	1627.47

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1627.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.91	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1624.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1619.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	36.30	32.51	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.17	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1627.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.91	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1624.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1619.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	13.44	30.95	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.26	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3000

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1626.27	1037.67	1618.27	1050	1618.27	1062.33	1618.27	1062.33	1626.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	350	350	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.07

Cross Section Lid num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1627.07	1626.27	1062.33	1627.07	1626.27

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.41	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1623.71	Reach Len. (ft)	350.00	350.00	350.00
Crit W.S. (ft)	1623.71	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	350.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1618.27	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	36.30	32.06	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	9.08	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.41	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1623.71	Reach Len. (ft)	350.00	350.00	350.00
Crit W.S. (ft)	1623.71	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	350.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1618.27	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	13.44	30.50	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	7.18	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2900

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1623.47	1037.67	1615.47	1050	1615.47	1062.33	1615.47	1062.33	1623.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	290	290	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1623.47

Cross Section Lid num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1624.27	1623.47	1062.33	1624.27	1623.47

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1623.61	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1620.91	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)	1620.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1615.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	36.30	31.01	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	8.89	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1623.61	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	

W.S. Elev (ft)	1620.91	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)	1620.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1615.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	13.44	29.45	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	6.99	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2800

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1621.15	1037.67	1613.15	1050	1613.15	1062.33	1613.15	1062.33	1621.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 250 250 250 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1621.15

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1621.95	1621.15	1062.33	1621.95	1621.15

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1621.29	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.			
W.S. Elev (ft)	1618.59	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1618.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1613.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	36.30	30.14	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	8.73	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1621.29	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.			
W.S. Elev (ft)	1618.59	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1618.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1613.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	13.44	28.58	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	6.83	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2700

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1619.15	1037.67	1611.15	1050	1611.15	1062.33	1611.15	1062.33	1619.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1037.67 1062.33 381.4 381.4 381.4 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1619.15

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1619.95 1619.15	1062.33	1619.95 1619.15

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1619.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1616.59	Reach Len. (ft)	381.40	381.40	381.40
Crit W.S. (ft)	1616.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	381.40	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1611.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	36.30	29.40	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	8.59	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1619.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1616.59	Reach Len. (ft)	381.40	381.40	381.40
Crit W.S. (ft)	1616.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	381.40	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1611.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	13.44	27.84	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	6.69	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2600

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1616.13	1037.67	1608.13	1050	1608.13	1062.33	1608.13	1062.33	1616.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	6.4	6.4	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1615.54

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1616.37 1615.54	1062.33	1616.37 1615.54

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1616.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1613.56	Reach Len. (ft)	6.40	6.40	6.40
Crit W.S. (ft)	1613.56	Flow Area (sq ft)		130.37	
E.G. Slope (ft/ft)	0.004403	Area (sq ft)		130.37	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.22	Avg. Vel. (ft/s)		13.22	
Max Chl Dpth (ft)	5.43	Hydr. Depth (ft)		5.43	
Conv. Total (cfs)	25967.4	Conv. (cfs)		25967.4	
Length Wtd. (ft)	6.40	Wetted Per. (ft)		45.73	
Min Ch El (ft)	1608.13	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.36	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	36.30	28.25	1.11
C & E Loss (ft)	0.41	Cum SA (acres)	9.40	8.38	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1616.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1613.56	Reach Len. (ft)	6.40	6.40	6.40
Crit W.S. (ft)	1613.56	Flow Area (sq ft)		130.37	
E.G. Slope (ft/ft)	0.004403	Area (sq ft)		130.37	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.22	Avg. Vel. (ft/s)		13.22	
Max Chl Dpth (ft)	5.43	Hydr. Depth (ft)		5.43	
Conv. Total (cfs)	25967.4	Conv. (cfs)		25967.4	
Length Wtd. (ft)	6.40	Wetted Per. (ft)		45.73	
Min Ch El (ft)	1608.13	Shear (lb/sq ft)		0.78	

Alpha	1.00	Stream Power (lb/ft s)		10.36	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	13.44	26.69	0.92
C & E Loss (ft)	0.37	Cum SA (acres)	2.65	6.48	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2590

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1620	1001.7	1619	1003.5	1618	1005.3	1617	1007.15	1616
1011.55	1615	1029.4	1614	1030.79	1613	1032.35	1612	1033.81	1611
1036.09	1610	1038.6	1609	1041.03	1608	1096.94	1608	1099.19	1609
1101.26	1610	1103.5	1611	1105.42	1612	1106.67	1613	1107.78	1614
1108.53	1615	1108.92	1617	1117.09	1618	1119.76	1619	1134.31	1620

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1029.4	.025	1108.92	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1029.4	1108.92	226	210	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1612.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.95	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.95	Flow Area (sq ft)		185.10	
E.G. Slope (ft/ft)	0.006797	Area (sq ft)		185.10	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	69.47	Top Width (ft)		69.47	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	2.95	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	20899.7	Conv. (cfs)		20899.7	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		70.70	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		10.34	
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	36.30	28.23	1.11
C & E Loss (ft)	0.16	Cum SA (acres)	9.40	8.38	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1612.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.98	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.98	Flow Area (sq ft)		176.22	
E.G. Slope (ft/ft)	0.007089	Area (sq ft)		176.22	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	60.00	Top Width (ft)		60.00	
Vel Total (ft/s)	9.78	Avg. Vel. (ft/s)		9.78	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.94	
Conv. Total (cfs)	20464.2	Conv. (cfs)		20464.2	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		64.52	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		11.82	
Frctn Loss (ft)	0.95	Cum Volume (acre-ft)	13.44	26.67	0.92
C & E Loss (ft)	0.20	Cum SA (acres)	2.65	6.47	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2500

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1618	1001.47	1618	1006.41	1619	1007.75	1619	1009.23	1618
1010.68	1617	1012.11	1616	1013.57	1615	1015.06	1614	1017.29	1613
1023.14	1612	1030.12	1611	1031.16	1610	1032.29	1609	1033.34	1608
1034.47	1607	1035.75	1606	1037.49	1605	1039.23	1604	1041.39	1603
1069.02	1603	1072.56	1604	1078.76	1605	1081.62	1606	1085.08	1607
1089.07	1608	1093.13	1609	1097.18	1610	1101.44	1611	1104.59	1612
1108.07	1613	1112.23	1614	1120.7	1615	1121.77	1616	1123.24	1617

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1037.49	.025	1078.76	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1030.12	1112.23	186.68	179.72	182.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.08	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.08	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.45	
Conv. Total (cfs)	34602.3	Conv. (cfs)		34602.3	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	36.30	27.13	1.11
C & E Loss (ft)	0.10	Cum SA (acres)	9.40	8.06	0.34

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.07	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.07	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.44	
Conv. Total (cfs)	34599.9	Conv. (cfs)		34599.9	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	13.44	25.59	0.92
C & E Loss (ft)	0.10	Cum SA (acres)	2.65	6.18	0.18

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2400

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.07	1608	1293.09	1608	1300.45	1607	1302.46	1606	1304.44	1605
1306.36	1604	1308.28	1603	1310.28	1602	1335.97	1602	1338.24	1603
1339.94	1604	1342.44	1605	1345.57	1606	1348.73	1607	1351.86	1608
1354.95	1609	1357.99	1610	1360.9	1611	1363.87	1612	1366.81	1613
1369.72	1614	1372.78	1615	1375.77	1616	1378.9	1617	1381.7	1618
1384.56	1619								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1291.07	.025	1338.24	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1293.09	1384.56	57	71	87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.82	
E.G. Slope (ft/ft)	0.008171	Area (sq ft)		179.82	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21815.6	Conv. (cfs)		21815.6	
Length Wtd. (ft)	70.77	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.83	
Alpha	1.00	Stream Power (lb/ft s)		20.02	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	36.30	26.20	1.11
C & E Loss (ft)	0.17	Cum SA (acres)	9.40	7.84	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.84	
E.G. Slope (ft/ft)	0.008169	Area (sq ft)		179.84	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21818.5	Conv. (cfs)		21818.5	
Length Wtd. (ft)	70.60	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.82	
Alpha	1.00	Stream Power (lb/ft s)		20.01	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	13.44	24.67	0.92
C & E Loss (ft)	0.25	Cum SA (acres)	2.65	5.96	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2350

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1001.37	1615	1002.74	1614	1004.1	1613	1005.55	1612
1009.41	1611	1016.33	1610.26	1018.74	1610	1030.03	1610	1034.36	1611
1049.32	1611	1052.39	1610	1054.54	1609	1057.69	1608	1059.67	1607
1086.56	1606	1115.51	1606	1119.27	1606	1120.19	1606	1130.23	1606
1132.99	1605	1135.85	1604	1138.89	1603	1141.9	1602	1146.76	1601
1165.03	1601	1167.57	1602	1170.34	1603	1173.61	1604	1176.83	1605
1180.02	1606	1183.27	1607	1186.49	1608	1189.52	1609	1192.43	1610
1195.36	1611	1196.13	1611.26	1198.3	1612	1201.25	1613	1204.21	1614
1207.17	1615	1210.1	1616	1213.04	1617	1216.66	1618	1220.41	1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1130.23	.025	1167.57	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1130.23	1220.41	64	63	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.94	Wt. n-Val.	0.040	0.030	
Vel Head (ft)	1.29	Reach Len. (ft)	64.00	63.00	63.00
W.S. Elev (ft)	1606.66	Flow Area (sq ft)	34.35	206.04	
Crit W.S. (ft)	1606.54	Area (sq ft)	34.35	206.04	
E.G. Slope (ft/ft)	0.005667	Flow (cfs)	65.31	1906.69	
Q Total (cfs)	1972.00	Top Width (ft)	61.27	51.92	
Top Width (ft)	113.19	Avg. Vel. (ft/s)	1.90	9.25	
Vel Total (ft/s)	8.20	Hydr. Depth (ft)	0.56	3.97	
Max Chl Dpth (ft)	5.65	Conv. (cfs)	867.5	25327.8	
Conv. Total (cfs)	26195.3	Wetted Per. (ft)	61.29	53.60	
Length Wtd. (ft)	63.17	Shear (lb/sq ft)	0.20	1.36	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.38	12.58	
Alpha	1.23	Cum Volume (acre-ft)	36.27	25.89	1.11
Frctn Loss (ft)	0.23	Cum SA (acres)	9.36	7.76	0.34
C & E Loss (ft)	0.26				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1608.00	Wt. n-Val.	0.040	0.030	
Vel Head (ft)	1.02	Reach Len. (ft)	64.00	63.00	63.00
W.S. Elev (ft)	1606.97	Flow Area (sq ft)	48.06	222.72	
Crit W.S. (ft)		Area (sq ft)	48.06	222.72	
E.G. Slope (ft/ft)	0.004332	Flow (cfs)	112.99	1859.01	
Q Total (cfs)	1972.00	Top Width (ft)	50.23	52.95	
Top Width (ft)	103.18	Avg. Vel. (ft/s)	2.35	8.35	
Vel Total (ft/s)	7.28	Hydr. Depth (ft)	0.96	4.21	
Max Chl Dpth (ft)	5.97	Conv. (cfs)	1716.6	28243.5	
Conv. Total (cfs)	29960.1	Wetted Per. (ft)	50.96	54.69	
Length Wtd. (ft)	63.15	Shear (lb/sq ft)	0.26	1.10	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.60	9.19	
Alpha	1.24	Cum Volume (acre-ft)	13.41	24.34	0.92
Frctn Loss (ft)	0.23	Cum SA (acres)	2.62	5.87	0.18
C & E Loss (ft)	0.15				

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2330

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1046.51	1616	1063.63	1615	1065.45	1614	1067.24	1613
1069.01	1612	1070.85	1611	1073.95	1610	1078.23	1609	1080.88	1608
1083.23	1607	1089.39	1606	1115.44	1605.7	1174.84	1605	1183.19	1605
1200.07	1605	1203.77	1605	1233.21	1606	1239.59	1606	1240.83	1606
1244.52	1607	1246.08	1607	1248.05	1606	1249.9	1605	1251.82	1604
1253.68	1603	1255.52	1602	1257.81	1601	1281.08	1601	1282.63	1602
1285.54	1603	1288.64	1604	1291.75	1605	1294.85	1606	1295.24	1606.12
1297.98	1607	1301.06	1608	1304.02	1609	1306.74	1610	1309.48	1611
1312.22	1612	1315.02	1613	1317.72	1614	1320.5	1615	1323.24	1616
1325.92	1617	1328.33	1618	1330.73	1619				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1249.9	.025	1282.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1244.52	1330.73	235	240	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.45	Wt. n-Val.	0.040	0.031	
Vel Head (ft)	0.42	Reach Len. (ft)	235.00	240.00	222.00
W.S. Elev (ft)	1607.03	Flow Area (sq ft)	246.95	223.50	
Crit W.S. (ft)		Area (sq ft)	246.95	223.50	
E.G. Slope (ft/ft)	0.002583	Flow (cfs)	618.50	1353.50	
Q Total (cfs)	1972.00	Top Width (ft)	161.35	53.54	
Top Width (ft)	214.90	Avg. Vel. (ft/s)	2.50	6.06	
Vel Total (ft/s)	4.19	Hydr. Depth (ft)	1.53	4.17	
Max Chl Dpth (ft)	6.03	Conv. (cfs)	12170.7	26634.1	
Conv. Total (cfs)	38804.9	Wetted Per. (ft)	161.60	56.09	
Length Wtd. (ft)	238.03	Shear (lb/sq ft)	0.25	0.64	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.62	3.89	
Alpha	1.54	Cum Volume (acre-ft)	36.07	25.58	1.11
Frctn Loss (ft)	0.16	Cum SA (acres)	9.20	7.68	0.34
C & E Loss (ft)	0.11				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.62	Wt. n-Val.	0.040	0.031	
Vel Head (ft)	0.54	Reach Len. (ft)	235.00	240.00	222.00
W.S. Elev (ft)	1607.09	Flow Area (sq ft)	165.71	226.67	
Crit W.S. (ft)		Area (sq ft)	165.71	226.67	
E.G. Slope (ft/ft)	0.002999				

Q Total (cfs)	1972.00	Flow (cfs)	483.55	1488.45	
Top Width (ft)	148.25	Top Width (ft)	94.52	53.73	
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)	2.92	6.57	
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)	1.75	4.22	
Conv. Total (cfs)	36008.0	Conv. (cfs)	8829.5	27178.6	
Length Wtd. (ft)	238.61	Wetted Per. (ft)	96.47	56.28	
Min Ch El (ft)	1601.00	Shear (lb/sq ft)	0.32	0.75	
Alpha	1.37	Stream Power (lb/ft s)	0.94	4.95	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	13.25	24.01	0.92
C & E Loss (ft)	0.13	Cum SA (acres)	2.52	5.80	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2300

INPUT
Description:
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1619	1001.97	1618	1003.2	1617	1004.55	1616	1005.95	1615
1007.27	1614	1008.69	1613	1010.3	1612	1011.97	1611	1014.13	1610
1018.32	1609	1023.5	1608	1030.44	1607	1039.16	1606	1041.19	1605.6
1044.19	1605	1058.41	1604.13	1060.6	1604	1072.49	1603	1079.21	1603
1084.11	1604	1087.79	1605	1100.7	1605	1125.34	1604	1149.33	1604
1149.99	1604	1187.47	1604	1199.06	1604	1271.41	1604	1273.45	1604
1283.01	1603.19	1285.22	1603	1289.39	1602	1293.61	1602	1296.06	1602
1297.59	1601	1299.25	1600	1303.67	1599	1328.29	1599	1330.08	1600
1332.14	1601	1334.2	1602	1336.96	1603	1340.58	1604	1344.03	1605
1347.34	1606	1351.43	1607	1354.48	1608	1357.2	1609	1359.82	1610
1362.46	1611	1365.05	1612	1367.61	1613	1369.69	1613.8	1370.2	1614
1372.75	1615	1375.34	1616	1378.01	1617	1380.61	1618	1383.27	1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1293.61	.025	1330.08	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1271.41	1383.27	320.42	311.55	310.65 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.18	Element	0.040	0.034	
Vel Head (ft)	0.06	Wt. n-Val.	320.42	311.55	310.65
W.S. Elev (ft)	1607.12	Reach Len. (ft)	701.71	437.00	
Crit W.S. (ft)		Flow Area (sq ft)	701.71	437.00	
E.G. Slope (ft/ft)	0.000313	Area (sq ft)	936.40	1035.60	
Q Total (cfs)	1972.00	Flow (cfs)	241.78	80.38	
Top Width (ft)	322.16	Top Width (ft)	1.33	2.37	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	2.90	5.44	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	52965.6	58576.4	
Conv. Total (cfs)	111542.0	Conv. (cfs)	242.27	82.69	
Length Wtd. (ft)	316.91	Wetted Per. (ft)	0.06	0.10	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.08	0.24	
Alpha	1.27	Stream Power (lb/ft s)	33.51	23.76	1.11
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	8.11	7.31	0.34
C & E Loss (ft)	0.02	Cum SA (acres)			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.24	Element	0.040	0.034	
Vel Head (ft)	0.12	Wt. n-Val.	320.42	311.55	310.65
W.S. Elev (ft)	1607.12	Reach Len. (ft)	337.02	437.48	
Crit W.S. (ft)		Flow Area (sq ft)	337.02	437.48	
E.G. Slope (ft/ft)	0.000539	Area (sq ft)	609.49	1362.51	
Q Total (cfs)	1972.00	Flow (cfs)	107.91	80.40	
Top Width (ft)	188.31	Top Width (ft)	1.81	3.11	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	3.12	5.44	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	26245.9	58672.1	
Conv. Total (cfs)	84918.0	Conv. (cfs)	111.03	82.70	
Length Wtd. (ft)	314.68	Wetted Per. (ft)	0.10	0.18	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.18	0.55	
Alpha	1.19	Stream Power (lb/ft s)	11.90	22.18	0.92
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.97	5.43	0.18
C & E Loss (ft)	0.02	Cum SA (acres)			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2200

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1609	1005.16	1608	1011.92	1607	1047.35	1607	1060.8	1607
1071.4	1606	1077.87	1605	1084.57	1604	1094.26	1603	1116.03	1602
1121.81	1601	1126.68	1600	1175.32	1600	1181.31	1601	1195.36	1601
1199.05	1600	1255.45	1600	1370.28	1601	1372.38	1601	1454	1601
1493.38	1601	1502.82	1601	1504.64	1600	1506.13	1599	1507.62	1598
1513.26	1597	1549.68	1597	1552.37	1598	1554.96	1599	1557.69	1600
1562.2	1601	1566.73	1602	1570.63	1603	1573.43	1604	1576.11	1605
1578.73	1606	1581.03	1607	1583.23	1608	1585.37	1609	1587.38	1610
1589.2	1611	1590.63	1612	1592.04	1613	1593.42	1614	1594.9	1615

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1502.82	.025	1549.68	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1502.82	1594.9	383.01	328.57	273.85 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.14	Element	0.040	0.032	
Vel Head (ft)	0.01	Wt. n-Val.	383.01	328.57	273.85
W.S. Elev (ft)	1607.14	Reach Len. (ft)	2718.63	625.61	
Crit W.S. (ft)		Flow Area (sq ft)	2718.63	625.61	
E.G. Slope (ft/ft)	0.000021	Area (sq ft)	1445.62	526.38	
Q Total (cfs)	1972.00	Flow (cfs)	491.83	78.51	
Top Width (ft)	570.34	Top Width (ft)	0.53	0.84	
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)			

Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)	5.53	7.97	
Conv. Total (cfs)	430287.5	Conv. (cfs)	315431.3	114856.2	
Length Wtd. (ft)	358.84	Wetted Per. (ft)	492.52	81.13	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.01	0.01	
Alpha	1.14	Stream Power (lb/ft s)	0.00	0.01	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	20.93	19.96	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	5.41	6.74	0.34

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.040	0.032	
W.S. Elev (ft)	1607.11	Reach Len. (ft)	383.01	328.57	273.85
Crit W.S. (ft)		Flow Area (sq ft)	628.34	623.56	
E.G. Slope (ft/ft)	0.000108	Area (sq ft)	628.34	623.56	
Q Total (cfs)	1972.00	Flow (cfs)	781.71	1190.29	
Top Width (ft)	181.27	Top Width (ft)	102.82	78.45	
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	1.24	1.91	
Max Chl Dpth (ft)	10.11	Hydr. Depth (ft)	6.11	7.95	
Conv. Total (cfs)	189388.8	Conv. (cfs)	75074.7	114314.1	
Length Wtd. (ft)	349.07	Wetted Per. (ft)	108.93	81.07	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.04	0.05	
Alpha	1.13	Stream Power (lb/ft s)	0.05	0.10	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	8.35	18.39	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	1.19	4.86	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2100

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
953	1608	1000	1601	1013.06	1600	1023.83	1599	1033.3	1598
1040.2	1597	1043.2	1596	1046.03	1595	1051.25	1594	1053.88	1594
1056.33	1595	1058.94	1596	1059.94	1597	1060.67	1598	1075.29	1598.83
1078.2	1599	1087.56	1600	1091.95	1600	1103.88	1599	1107.13	1598
1109.23	1597	1111.33	1596	1116.75	1596	1120.48	1597	1120.85	1597
1124.02	1596	1125.68	1595	1127.35	1594	1132.29	1593	1155.55	1593
1159.58	1593	1160.63	1594	1161.73	1595	1163.48	1596	1167.18	1597
1170.02	1598	1172.71	1599	1175.2	1600	1177.42	1601	1179.65	1602
1182.05	1603	1184.57	1604	1187.21	1605	1189.98	1606	1192.78	1607
1195.62	1608	1198.5	1609	1201.39	1610	1206.95	1611		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
953	.04	1120.48	.025	1163.48	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1120.48	1161.73	67.6	97.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.11	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1199.04	557.99	189.27
E.G. Slope (ft/ft)	0.000028	Area (sq ft)	1199.04	557.99	189.27
Q Total (cfs)	1972.00	Flow (cfs)	878.15	963.65	130.20
Top Width (ft)	234.08	Top Width (ft)	161.48	41.25	31.35
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)	0.73	1.73	0.69
Max Chl Dpth (ft)	14.11	Hydr. Depth (ft)	7.43	13.53	6.04
Conv. Total (cfs)	375679.6	Conv. (cfs)	167292.8	183582.6	24804.2
Length Wtd. (ft)	88.05	Wetted Per. (ft)	164.73	42.85	33.66
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.68	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.71	15.50	0.51
C & E Loss (ft)	0.06	Cum SA (acres)	2.54	6.29	0.24

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.10	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1004.77	557.85	189.16
E.G. Slope (ft/ft)	0.000030	Area (sq ft)	1004.77	557.85	189.16
Q Total (cfs)	1972.00	Flow (cfs)	839.02	998.16	134.83
Top Width (ft)	182.51	Top Width (ft)	109.92	41.25	31.34
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	0.84	1.79	0.71
Max Chl Dpth (ft)	14.10	Hydr. Depth (ft)	9.14	13.52	6.04
Conv. Total (cfs)	362545.2	Conv. (cfs)	154250.0	183508.1	24787.1
Length Wtd. (ft)	88.35	Wetted Per. (ft)	119.60	42.85	33.65
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.02	0.02	0.01
Alpha	1.54	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.17	13.93	0.32
C & E Loss (ft)	0.06	Cum SA (acres)	0.26	4.41	0.08

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2000.1

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990.1	1607	1012.59	1604	1044.29	1601.77	1044.29	1591.77	1056.29	1591.77
1056.29	1601.69	1094.79	1606	1094.79	1606.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990.1	.025	1044.29	.015	1056.29	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1044.29	1056.29	1	1	.1	.1

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.07	Element			
Vel Head (ft)	0.63	Wt. n-Val.	0.025	0.015	0.025
W.S. Elev (ft)	1606.43	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)		Flow Area (sq ft)	134.73	175.97	99.69
E.G. Slope (ft/ft)	0.000594	Area (sq ft)	134.73	175.97	99.69
Q Total (cfs)	1972.00	Flow (cfs)	376.96	1325.86	269.18
Top Width (ft)	100.45	Top Width (ft)	49.95	12.00	38.50
Vel Total (ft/s)	4.81	Avg. Vel. (ft/s)	2.80	7.53	2.70
Max Chl Dpth (ft)	14.66	Hydr. Depth (ft)	2.70	14.66	2.59
Conv. Total (cfs)	80911.3	Conv. (cfs)	15466.7	54400.2	11044.3
Length Wtd. (ft)	1.00	Wetted Per. (ft)	50.19	31.92	39.17
Min Ch El (ft)	1591.77	Shear (lb/sq ft)	0.10	0.20	0.09
Alpha	1.76	Stream Power (lb/ft s)	0.28	1.54	0.25
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	2.67	14.67	0.19
C & E Loss (ft)	0.06	Cum SA (acres)	2.38	6.23	0.16

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.07	Element			
Vel Head (ft)	0.63	Wt. n-Val.	0.025	0.015	0.025
W.S. Elev (ft)	1606.43	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)		Flow Area (sq ft)	134.73	175.97	99.69
E.G. Slope (ft/ft)	0.000594	Area (sq ft)	134.73	175.97	99.69
Q Total (cfs)	1972.00	Flow (cfs)	376.97	1325.84	269.19
Top Width (ft)	100.45	Top Width (ft)	49.95	12.00	38.50
Vel Total (ft/s)	4.81	Avg. Vel. (ft/s)	2.80	7.53	2.70
Max Chl Dpth (ft)	14.66	Hydr. Depth (ft)	2.70	14.66	2.59
Conv. Total (cfs)	80913.8	Conv. (cfs)	15467.7	54401.0	11045.1
Length Wtd. (ft)	1.00	Wetted Per. (ft)	50.19	31.92	39.17
Min Ch El (ft)	1591.77	Shear (lb/sq ft)	0.10	0.20	0.09
Alpha	1.76	Stream Power (lb/ft s)	0.28	1.54	0.25
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.28	13.11	0.00
C & E Loss (ft)	0.06	Cum SA (acres)	0.13	4.35	0.00

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2000

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990.1	1607	1012.59	1604	1044.29	1601.77	1044.29	1591.77	1056.29	1591.77
1056.29	1601.69	1094.79	1606						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990.1	.025	1044.29	.015	1056.29	.025

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1044.29 1056.29 320.07 319.85 303.13 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
990.1	1044.29	1608	F
1056.29	1094.79	1608	F

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.01	Element			
Vel Head (ft)	1.23	Wt. n-Val.		0.015	
W.S. Elev (ft)	1605.77	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1599.63	Flow Area (sq ft)		168.01	
E.G. Slope (ft/ft)	0.000885	Area (sq ft)	103.25	168.01	74.40
Q Total (cfs)	1498.00	Flow (cfs)		1498.00	
Top Width (ft)	93.44	Top Width (ft)	44.98	12.00	36.46
Vel Total (ft/s)	8.92	Avg. Vel. (ft/s)		8.92	
Max Chl Dpth (ft)	14.00	Hydr. Depth (ft)		14.00	
Conv. Total (cfs)	50362.6	Conv. (cfs)		50362.6	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		31.92	
Min Ch El (ft)	1591.77	Shear (lb/sq ft)		0.29	
Alpha	1.00	Stream Power (lb/ft s)		2.59	
Frctn Loss (ft)		Cum Volume (acre-ft)	2.67	14.67	0.19
C & E Loss (ft)		Cum SA (acres)	2.37	6.23	0.16

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1607.01	Element			
Vel Head (ft)	1.23	Wt. n-Val.		0.015	
W.S. Elev (ft)	1605.77	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1599.63	Flow Area (sq ft)		168.01	
E.G. Slope (ft/ft)	0.001195	Area (sq ft)		168.01	
Q Total (cfs)	1498.00	Flow (cfs)		1498.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	
Vel Total (ft/s)	8.92	Avg. Vel. (ft/s)		8.92	
Max Chl Dpth (ft)	14.00	Hydr. Depth (ft)		14.00	
Conv. Total (cfs)	43327.0	Conv. (cfs)		43327.0	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		40.00	
Min Ch El (ft)	1591.77	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.79	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.28	13.11	
C & E Loss (ft)		Cum SA (acres)	0.13	4.35	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 1950

INPUT
Description: I- 15 Bridge
Distance from Upstream XS = .01
Deck/Roadway Width = 319.83
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates

```
    num=        6
      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    990.1 1606.72 1585.08 1044.29 1606.72 1585.08 1044.29 1606.72 1601.77
  1056.29 1606.72 1601.77 1056.29 1606.72 1585.08 1104.82 1606.72 1585.08

Upstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    990.1     1607 1012.59     1604 1044.29 1601.77 1044.29 1591.77 1056.29 1591.77
  1056.29 1601.69 1094.79     1606

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
    990.1    .025 1044.29    .015 1056.29    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
       1044.29 1056.29             .3       .5
Ineffective Flow     num=       2
    Sta L    Sta R    Elev  Permanent
    990.1 1044.29    1608        F
  1056.29 1094.79    1608        F

Downstream  Deck/Roadway Coordinates
    num=        6
      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
     1000 1606.72 1601.77 1104.82 1606.72 1601.77 1193.33 1606.72 1595.08
  1205.33 1606.72 1595.08 1221.37 1606.72 1596.89 1251.33 1606.72    1601

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
  1179.43     1599 1193.33 1595.08 1193.33 1585.08 1205.33 1585.08 1205.33 1595.08
  1251.33     1601

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
  1179.43    .025 1193.33    .015 1205.33    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
       1193.33 1205.33             .3       .5

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .98
Elevation at which weir flow begins           = 1606.72
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Energy

High Flow Method
       Pressure and Weir Flow
           Submerged Inlet Cd             =
           Submerged Inlet + Outlet Cd =.8164966
           Max Low Cord                   = 1601.77

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)              1607.01   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1605.77   E.G. Elev (ft)            1607.01       1606.80
  Q Total (cfs)              1498.00   W.S. Elev (ft)            1605.77       1605.77
  Q Bridge (cfs)             1493.05   Crit W.S. (ft)            1599.63       1592.93
  Q Weir (cfs)                  4.95   Max Chl Dpth (ft)           14.00         20.69
  Weir Sta Lft (ft)          1044.29   Vel Total (ft/s)             0.00         10.66
  Weir Sta Rgt (ft)          1056.29   Flow Area (sq ft)                         140.54
  Weir Submerg                  0.00   Froude # Chl                 0.59          0.48
  Weir Max Depth (ft)           0.29   Specif Force (cu ft)      1660.89       2463.70
  Min El Weir Flow (ft)      1606.73   Hydr Depth (ft)
  Min El Prs (ft)            1601.77   W.P. Total (ft)             44.00         44.00
  Delta EG (ft)                 9.65   Conv. Total (cfs)
  Delta WS (ft)                12.51   Top Width (ft)
  BR Open Area (sq ft)       120.00   Frctn Loss (ft)
  BR Open Vel (ft/s)           12.44   C & E Loss (ft)
  Coef of Q                            Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir   Power Total (lb/ft s)

Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir
        flow.  The momentum answer has been disregarded.
Note:   The downstream water surface is below the minimum elevation for pressure flow.  The sluice
        gate equations were used for pressure flow.
Note:   For the cross section inside the bridge at the upstream end, the water surface and energy have
        been projected from the upstream cross section.  The selected bridge modeling method does
        not compute answers inside the bridge.
Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
        energy was used.
Note:   For the cross section inside the bridge at the downstream end, the energy is based on critical
        depth over the weir.  The water surface has been projected.

BRIDGE OUTPUT  Profile #PF 2

  E.G. US. (ft)              1607.01   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1605.77   E.G. Elev (ft)            1607.01       1606.98
  Q Total (cfs)              1498.00   W.S. Elev (ft)            1605.77       1605.77
  Q Bridge (cfs)             1493.05   Crit W.S. (ft)            1599.63       1592.93
  Q Weir (cfs)                  4.95   Max Chl Dpth (ft)           14.00         20.69
  Weir Sta Lft (ft)          1044.29   Vel Total (ft/s)             0.00          0.00
  Weir Sta Rgt (ft)          1056.29   Flow Area (sq ft)
  Weir Submerg                  0.00   Froude # Chl                 0.59          0.48
  Weir Max Depth (ft)           0.29   Specif Force (cu ft)      1660.89       2463.70
  Min El Weir Flow (ft)      1606.73   Hydr Depth (ft)
  Min El Prs (ft)            1601.77   W.P. Total (ft)             44.00         44.00
  Delta EG (ft)                 9.59   Conv. Total (cfs)
  Delta WS (ft)                11.94   Top Width (ft)
  BR Open Area (sq ft)       120.00   Frctn Loss (ft)
  BR Open Vel (ft/s)           12.44   C & E Loss (ft)
  Coef of Q                            Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir   Power Total (lb/ft s)

Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir
        flow.  The momentum answer has been disregarded.
Note:   The downstream water surface is below the minimum elevation for pressure flow.  The sluice
        gate equations were used for pressure flow.
Note:   For the cross section inside the bridge at the upstream end, the water surface and energy have
        been projected from the upstream cross section.  The selected bridge modeling method does
        not compute answers inside the bridge.
```

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1900

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1179.43	1599	1193.33	1595.08	1193.33	1585.08	1205.33	1585.08	1205.33	1595.08
1251.33	1601								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1179.43	.025	1193.33	.015	1205.33	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1193.33	1205.33	38.8	38.8	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1597.36	Element		0.015	
Vel Head (ft)	4.10	Wt. n-Val.			
W.S. Elev (ft)	1593.26	Reach Len. (ft)	38.80	38.80	38.80
Crit W.S. (ft)	1593.26	Flow Area (sq ft)		98.16	
E.G. Slope (ft/ft)	0.005139	Area (sq ft)		98.16	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	
Vel Total (ft/s)	16.25	Avg. Vel. (ft/s)		16.25	
Max Chl Dpth (ft)	8.18	Hydr. Depth (ft)		8.18	
Conv. Total (cfs)	22249.0	Conv. (cfs)		22249.0	
Length Wtd. (ft)	38.80	Wetted Per. (ft)		28.36	
Min Ch El (ft)	1585.08	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		18.04	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	2.67	13.79	0.19
C & E Loss (ft)	1.51	Cum SA (acres)	2.37	6.23	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1597.41	Element		0.015	
Vel Head (ft)	3.58	Wt. n-Val.			
W.S. Elev (ft)	1593.83	Reach Len. (ft)	38.80	38.80	38.80
Crit W.S. (ft)	1593.24	Flow Area (sq ft)		105.05	
E.G. Slope (ft/ft)	0.004321	Area (sq ft)		105.05	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	
Vel Total (ft/s)	15.18	Avg. Vel. (ft/s)		15.18	
Max Chl Dpth (ft)	8.75	Hydr. Depth (ft)		8.75	
Conv. Total (cfs)	24263.2	Conv. (cfs)		24263.2	
Length Wtd. (ft)	38.80	Wetted Per. (ft)		29.51	
Min Ch El (ft)	1585.08	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)		14.58	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	0.28	12.23	
C & E Loss (ft)	0.71	Cum SA (acres)	0.13	4.35	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1800

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1604	1017.58	1603	1024.71	1602	1031.18	1601	1034.87	1600
1036.64	1599	1038.41	1598	1040.44	1597	1043.07	1596	1046.27	1595
1050.71	1594	1054.41	1593.59	1059.85	1593	1115.02	1592	1116.24	1591
1117.33	1590	1148.63	1590	1150.75	1591	1152.41	1592	1153.93	1593
1155.42	1594	1156.91	1595	1158.3	1596	1160.68	1597	1167.6	1597.96
1167.88	1598	1176.94	1599	1181.79	1600	1190.38	1601	1204.71	1602
1220.3	1603	1235.32	1604						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1115.02	.025	1148.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1115.02	1160.68	173.79	170.93	148.02	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1595.03	Element		0.028	
Vel Head (ft)	1.09	Wt. n-Val.	0.040	0.028	
W.S. Elev (ft)	1593.94	Reach Len. (ft)	173.79	170.93	148.02
Crit W.S. (ft)	1593.94	Flow Area (sq ft)	83.70	144.36	
E.G. Slope (ft/ft)	0.005719	Area (sq ft)	83.70	144.36	
Q Total (cfs)	1595.00	Flow (cfs)	281.61	1313.39	
Top Width (ft)	104.11	Top Width (ft)	63.80	40.32	
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)	3.36	9.10	
Max Chl Dpth (ft)	3.94	Hydr. Depth (ft)	1.31	3.58	
Conv. Total (cfs)	21091.1	Conv. (cfs)	3723.8	17367.3	
Length Wtd. (ft)	171.71	Wetted Per. (ft)	63.86	42.15	
Min Ch El (ft)	1590.00	Shear (lb/sq ft)	0.47	1.22	
Alpha	1.43	Stream Power (lb/ft s)	1.57	11.13	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	2.63	13.68	0.19
C & E Loss (ft)	0.11	Cum SA (acres)	2.35	6.21	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1596.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.15	Wt. n-Val.		0.025	
W.S. Elev (ft)	1594.33	Reach Len. (ft)	173.79	170.93	148.02
Crit W.S. (ft)	1594.33	Flow Area (sq ft)		135.49	
E.G. Slope (ft/ft)	0.007701	Area (sq ft)		135.49	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	31.30	Top Width (ft)		31.30	
Vel Total (ft/s)	11.77	Avg. Vel. (ft/s)		11.77	
Max Chl Dpth (ft)	4.33	Hydr. Depth (ft)		4.33	
Conv. Total (cfs)	18176.1	Conv. (cfs)		18176.1	
Length Wtd. (ft)	170.99	Wetted Per. (ft)		39.96	
Min Ch El (ft)	1590.00	Shear (lb/sq ft)		1.63	
Alpha	1.00	Stream Power (lb/ft s)		19.19	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	0.28	12.12	
C & E Loss (ft)	0.07	Cum SA (acres)	0.13	4.33	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1750

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1606	1003.52	1605.53	1007.44	1605	1014.27	1604	1020.21	1603
1022.71	1602	1025.14	1601	1027.53	1600	1029.98	1599	1032.42	1598
1034.75	1597	1037.08	1596	1039.84	1595	1043.65	1594	1048.74	1593
1078.87	1592.12	1082.85	1592	1139.68	1591	1210.43	1590	1214.54	1590
1232.62	1590	1285.16	1590	1286.97	1589	1291.48	1588	1318.26	1588
1319.5	1589	1320.31	1590	1321.08	1591	1321.91	1592	1322.72	1593
1323.62	1594	1325.25	1595	1327	1596	1328.9	1597	1330.81	1598
1332.7	1599	1334.57	1600	1336.57	1601	1338.39	1602	1340.86	1603
1343.68	1604	1346.59	1605	1349.5	1606	1352.46	1607	1359.2	1608

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1285.16	.025	1320.31	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1285.16	1352.46	171.49	169.33	179.87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1592.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.	0.040	0.026	
W.S. Elev (ft)	1591.61	Reach Len. (ft)	171.49	169.33	179.87
Crit W.S. (ft)	1591.61	Flow Area (sq ft)	209.42	121.10	
E.G. Slope (ft/ft)	0.004592	Area (sq ft)	209.42	121.10	
Q Total (cfs)	1595.00	Flow (cfs)	582.81	1012.19	
Top Width (ft)	216.57	Top Width (ft)	180.15	36.43	
Vel Total (ft/s)	4.83	Avg. Vel. (ft/s)	2.78	8.36	
Max Chl Dpth (ft)	3.61	Hydr. Depth (ft)	1.16	3.32	
Conv. Total (cfs)	23537.2	Conv. (cfs)	8600.5	14936.7	
Length Wtd. (ft)	170.23	Wetted Per. (ft)	180.16	38.40	
Min Ch El (ft)	1588.00	Shear (lb/sq ft)	0.33	0.90	
Alpha	2.03	Stream Power (lb/ft s)	0.93	7.56	
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)	2.05	13.16	0.19
C & E Loss (ft)	0.09	Cum SA (acres)	1.86	6.06	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1594.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.93	Wt. n-Val.	0.040	0.025	
W.S. Elev (ft)	1592.22	Reach Len. (ft)	171.49	169.33	179.87
Crit W.S. (ft)	1592.22	Flow Area (sq ft)	15.51	134.68	
E.G. Slope (ft/ft)	0.006672	Area (sq ft)	15.51	134.68	
Q Total (cfs)	1595.00	Flow (cfs)	66.63	1528.37	
Top Width (ft)	40.09	Top Width (ft)	6.99	33.10	
Vel Total (ft/s)	10.62	Avg. Vel. (ft/s)	4.30	11.35	
Max Chl Dpth (ft)	4.22	Hydr. Depth (ft)	2.22	4.07	
Conv. Total (cfs)	19526.7	Conv. (cfs)	815.7	18711.0	
Length Wtd. (ft)	169.51	Wetted Per. (ft)	9.21	37.69	
Min Ch El (ft)	1588.00	Shear (lb/sq ft)	0.70	1.49	
Alpha	1.10	Stream Power (lb/ft s)	3.01	16.89	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	0.25	11.59	
C & E Loss (ft)	0.15	Cum SA (acres)	0.12	4.20	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1700

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1597	1002.28	1596	1005.58	1595	1012.08	1594	1037.72	1593
1096.14	1592	1104.18	1591.88	1165.67	1591	1234.36	1590	1301	1589
1345.94	1588.26	1361.37	1588	1363.83	1588	1410.67	1589	1430.15	1589

1432.44	1588	1434.69	1587	1464.52	1587	1468.96	1588	1473.24	1589	
1476.62	1590	1480.53	1591	1483.69	1592	1486.72	1593	1489.52	1594	
1492.76	1595	1496	1596	1499.24	1597	1502.4	1598	1504.92	1599	
1506.8	1600	1508.64	1601	1510.47	1602	1512.25	1603	1514.06	1604	
1515.81	1605	1517.41	1606	1519	1607					

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1430.15	.025	1464.52	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1430.15	1519	163.66	161.13	154.63	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1590.61	Element			
Vel Head (ft)	0.43	Wt. n-Val.	0.040	0.029	
W.S. Elev (ft)	1590.18	Reach Len. (ft)	163.66	161.13	154.63
Crit W.S. (ft)		Flow Area (sq ft)	255.02	126.25	
E.G. Slope (ft/ft)	0.004825	Area (sq ft)	255.02	126.25	
Q Total (cfs)	1595.00	Flow (cfs)	753.19	841.81	
Top Width (ft)	255.42	Top Width (ft)	208.24	47.18	
Vel Total (ft/s)	4.18	Avg. Vel. (ft/s)	2.95	6.67	
Max Chl Dpth (ft)	3.18	Hydr. Depth (ft)	1.22	2.68	
Conv. Total (cfs)	22961.7	Conv. (cfs)	10842.9	12118.8	
Length Wtd. (ft)	162.08	Wetted Per. (ft)	208.27	47.99	
Min Ch El (ft)	1587.00	Shear (lb/sq ft)	0.37	0.79	
Alpha	1.58	Stream Power (lb/ft s)	1.09	5.28	
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)	1.13	12.68	0.19
C & E Loss (ft)	0.03	Cum SA (acres)	1.09	5.90	0.16

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1592.57	Element			
Vel Head (ft)	1.41	Wt. n-Val.	0.040	0.025	
W.S. Elev (ft)	1591.16	Reach Len. (ft)	163.66	161.13	154.63
Crit W.S. (ft)		Flow Area (sq ft)	47.64	138.27	
E.G. Slope (ft/ft)	0.005305	Area (sq ft)	47.64	138.27	
Q Total (cfs)	1595.00	Flow (cfs)	202.04	1392.96	
Top Width (ft)	56.44	Top Width (ft)	22.07	34.37	
Vel Total (ft/s)	8.58	Avg. Vel. (ft/s)	4.24	10.07	
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)	2.16	4.02	
Conv. Total (cfs)	21898.8	Conv. (cfs)	2774.0	19124.8	
Length Wtd. (ft)	161.32	Wetted Per. (ft)	24.28	38.95	
Min Ch El (ft)	1587.00	Shear (lb/sq ft)	0.65	1.18	
Alpha	1.24	Stream Power (lb/ft s)	2.76	11.85	
Frctn Loss (ft)	0.96	Cum Volume (acre-ft)	0.13	11.06	
C & E Loss (ft)	0.04	Cum SA (acres)	0.06	4.07	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1650

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1611	1008.24	1610	1015.08	1609	1020.16	1608	1023.18	1607
1025.9	1606	1027.82	1605	1029.73	1604	1031.65	1603	1033.58	1602
1035.52	1601	1037.42	1600	1039.38	1599	1041.29	1598	1043.24	1597
1048.3	1596	1056.24	1595	1078.47	1594	1140.38	1593	1199.86	1592
1212.73	1591.78	1258.28	1591	1320.25	1590	1390.53	1589	1471.72	1588
1520.79	1587.04	1523.08	1587	1523.91	1587	1525.73	1588	1527.64	1588
1541.86	1588	1563.09	1588	1574.76	1587	1576.76	1586	1582.3	1585
1600.56	1585	1603.67	1586	1609.52	1587	1614.51	1588	1617.16	1589
1619.96	1590	1622.21	1591	1624.38	1592	1626.5	1593	1628.43	1594
1631.3	1595	1634.46	1596	1654.44	1597	1662.17	1597		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1563.09	.025	1600.56	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1563.09	1634.46	190.68	175.57	185.82	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1589.69	Element			
Vel Head (ft)	0.69	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	1589.01	Reach Len. (ft)	190.68	175.57	185.82
Crit W.S. (ft)	1589.01	Flow Area (sq ft)	160.49	149.57	
E.G. Slope (ft/ft)	0.006317	Area (sq ft)	160.49	149.57	
Q Total (cfs)	1595.00	Flow (cfs)	450.32	1144.68	
Top Width (ft)	227.05	Top Width (ft)	172.96	54.09	
Vel Total (ft/s)	5.14	Avg. Vel. (ft/s)	2.81	7.65	
Max Chl Dpth (ft)	4.01	Hydr. Depth (ft)	0.93	2.77	
Conv. Total (cfs)	20068.4	Conv. (cfs)	5665.9	14402.4	
Length Wtd. (ft)	177.70	Wetted Per. (ft)	173.24	54.98	
Min Ch El (ft)	1585.00	Shear (lb/sq ft)	0.37	1.07	
Alpha	1.67	Stream Power (lb/ft s)	1.03	8.21	
Frctn Loss (ft)	1.67	Cum Volume (acre-ft)	0.35	12.17	0.19
C & E Loss (ft)	0.03	Cum SA (acres)	0.38	5.71	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1591.57	Element			
Vel Head (ft)	1.82	Wt. n-Val.	0.040	0.025	
W.S. Elev (ft)	1589.75	Reach Len. (ft)	190.68	175.57	185.82
Crit W.S. (ft)	1589.75	Flow Area (sq ft)	9.27	142.91	
E.G. Slope (ft/ft)	0.006723	Area (sq ft)	9.27	142.91	
Q Total (cfs)	1595.00	Flow (cfs)	33.89	1561.11	
Top Width (ft)	42.78	Top Width (ft)	5.31	37.47	
Vel Total (ft/s)	10.48	Avg. Vel. (ft/s)	3.65	10.92	
Max Chl Dpth (ft)	4.75	Hydr. Depth (ft)	1.75	3.81	
Conv. Total (cfs)	19452.8	Conv. (cfs)	413.4	19039.4	
Length Wtd. (ft)	175.73	Wetted Per. (ft)	7.06	42.59	
Min Ch El (ft)	1585.00	Shear (lb/sq ft)	0.55	1.41	

Alpha	1.07	Stream Power (lb/ft s)	2.02	15.39	
Frctn Loss (ft)	1.59	Cum Volume (acre-ft)	0.02	10.54	
C & E Loss (ft)	0.04	Cum SA (acres)	0.01	3.94	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1600

INPUT
Description:
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1593	1056.43	1592	1122.58	1591	1188.64	1590	1249.15	1589
1313.23	1588	1394.68	1587	1398.17	1586	1398.88	1586	1401.29	1587
1448.19	1587	1451.06	1586	1453.96	1585	1462.44	1584	1483.55	1584
1520.36	1585	1546.05	1585.71	1556.34	1586	1562.87	1586.3	1578.37	1587
1580.19	1588	1582.08	1589	1583.99	1590	1585.95	1591	1587.5	1592
1589.07	1593	1590.62	1594	1592.14	1595	1593.7	1596	1595.17	1597
1596.58	1598	1600.83	1599	1606.01	1600	1611.1	1601	1614.69	1602
1616.93	1603								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1453.96	.025	1483.55	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1448.19	1562.87	157	142	133 .1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1556.34	1616.93	1587	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1394.68	1401.29	1587

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1587.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.		0.036	
W.S. Elev (ft)	1586.70	Reach Len. (ft)	157.00	142.00	133.00
Crit W.S. (ft)	1586.70	Flow Area (sq ft)		203.85	
E.G. Slope (ft/ft)	0.015504	Area (sq ft)		207.43	1.75
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	122.63	Top Width (ft)		113.81	8.81
Vel Total (ft/s)	7.82	Avg. Vel. (ft/s)		7.82	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		1.90	
Conv. Total (cfs)	12809.9	Conv. (cfs)		12809.9	
Length Wtd. (ft)	142.00	Wetted Per. (ft)		107.66	
Min Ch El (ft)	1584.00	Shear (lb/sq ft)		1.83	
Alpha	1.00	Stream Power (lb/ft s)		14.34	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)		11.45	0.18
C & E Loss (ft)	0.23	Cum SA (acres)		5.37	0.14

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1589.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.67	Wt. n-Val.		0.033	
W.S. Elev (ft)	1587.54	Reach Len. (ft)	157.00	142.00	133.00
Crit W.S. (ft)	1587.54	Flow Area (sq ft)		153.73	
E.G. Slope (ft/ft)	0.012808	Area (sq ft)		153.73	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	45.70	Top Width (ft)		45.70	
Vel Total (ft/s)	10.38	Avg. Vel. (ft/s)		10.38	
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	14093.3	Conv. (cfs)		14093.3	
Length Wtd. (ft)	142.00	Wetted Per. (ft)		52.13	
Min Ch El (ft)	1584.00	Shear (lb/sq ft)		2.36	
Alpha	1.00	Stream Power (lb/ft s)		24.47	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)		9.94	
C & E Loss (ft)	0.45	Cum SA (acres)		3.77	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1500

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1588	1013.71	1587	1025.92	1586	1041.5	1585	1045.93	1584
1051.42	1583	1084.18	1582	1090.64	1581	1096.18	1580	1100.98	1579

1117.37	1578	1146.16	1578	1147.44	1579	1148.27	1580	1148.93	1581		
1149.7	1582	1150.44	1583	1151.12	1584	1151.82	1585	1152.39	1586		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1041.5	.025	1146.16	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1041.5	1152.39	125	101	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1584.86	Element		0.026	
Vel Head (ft)	0.19	Wt. n-Val.	125.00	113.00	101.00
W.S. Elev (ft)	1584.67	Reach Len. (ft)		459.80	
Crit W.S. (ft)		Flow Area (sq ft)		459.80	
E.G. Slope (ft/ft)	0.000576	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		108.62	
Top Width (ft)	108.62	Top Width (ft)		3.47	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		66483.7	
Conv. Total (cfs)	66483.7	Conv. (cfs)		112.32	
Length Wtd. (ft)	113.00	Wetted Per. (ft)		0.15	
Min Ch El (ft)	1578.00	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		10.36	0.18
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		5.01	0.13
C & E Loss (ft)	0.22	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1584.85	Element		0.026	
Vel Head (ft)	0.19	Wt. n-Val.	125.00	113.00	101.00
W.S. Elev (ft)	1584.67	Reach Len. (ft)		458.45	
Crit W.S. (ft)		Flow Area (sq ft)		458.45	
E.G. Slope (ft/ft)	0.000566	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		105.59	
Top Width (ft)	105.59	Top Width (ft)		3.48	
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)		4.34	
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		67058.3	
Conv. Total (cfs)	67058.3	Conv. (cfs)		109.89	
Length Wtd. (ft)	113.00	Wetted Per. (ft)		0.15	
Min Ch El (ft)	1578.00	Shear (lb/sq ft)		0.51	
Alpha	1.00	Stream Power (lb/ft s)		8.94	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		3.52	
C & E Loss (ft)	0.22	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1400

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.53	1587	1297.66	1586	1302.32	1585	1311.27	1584	1312.95	1583
1313.61	1582	1314.1	1581	1314.53	1580	1314.93	1579	1315.93	1578
1317.87	1577	1320.08	1576	1332.34	1576	1334.31	1577	1335.72	1578
1336.83	1579	1338.1	1580	1339.32	1581	1340.5	1582	1341.8	1583
1343.02	1584	1344.27	1585	1345.71	1586				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1291.53	.04	1311.27	.025	1332.34	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1291.53	1345.71	122.02	161.58	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1584.47	Element		0.030	
Vel Head (ft)	2.38	Wt. n-Val.	122.02	161.58	190.42
W.S. Elev (ft)	1582.09	Reach Len. (ft)		128.81	
Crit W.S. (ft)	1582.09	Flow Area (sq ft)		128.81	
E.G. Slope (ft/ft)	0.009907	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		27.06	
Top Width (ft)	27.06	Top Width (ft)		12.38	
Vel Total (ft/s)	12.38	Avg. Vel. (ft/s)		4.76	
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)		16024.7	
Conv. Total (cfs)	16024.7	Conv. (cfs)		31.98	
Length Wtd. (ft)	161.58	Wetted Per. (ft)		2.49	
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		30.85	
Alpha	1.00	Stream Power (lb/ft s)		9.60	0.18
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)		4.83	0.13
C & E Loss (ft)	0.13	Cum SA (acres)			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1584.47	Element		0.030	
Vel Head (ft)	2.39	Wt. n-Val.	122.02	161.58	190.42
W.S. Elev (ft)	1582.08	Reach Len. (ft)		128.68	
Crit W.S. (ft)	1582.08	Flow Area (sq ft)		128.68	
E.G. Slope (ft/ft)	0.009933	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		27.05	
Top Width (ft)	27.05	Top Width (ft)		12.40	
Vel Total (ft/s)	12.40	Avg. Vel. (ft/s)		4.76	
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)		16003.4	
Conv. Total (cfs)	16003.4	Conv. (cfs)		31.96	
Length Wtd. (ft)	161.58	Wetted Per. (ft)		2.50	
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		30.94	
Alpha	1.00	Stream Power (lb/ft s)		8.18	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)		3.35	
C & E Loss (ft)	0.31	Cum SA (acres)			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1300

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1630.46	1582	1632.6	1581	1634.55	1580	1636.49	1579	1638.34	1578
1639.9	1577	1641.33	1576	1642.75	1575	1644.42	1574	1646.14	1573
1656.34	1573	1658.07	1574	1659.77	1575	1661.13	1576	1662.51	1577
1663.8	1578	1665.15	1579	1666.47	1580	1667.71	1581	1668.93	1582
1670.11	1583	1671.28	1584						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1630.46	.04	1642.75	.025	1659.77	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1630.46	1671.28	198.91	176.37 153.42	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1581.76	Element			
Vel Head (ft)	1.94	Wt. n-Val.		0.033	
W.S. Elev (ft)	1579.82	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)	1579.54	Flow Area (sq ft)		142.61	
E.G. Slope (ft/ft)	0.009488	Area (sq ft)		142.61	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	31.34	Top Width (ft)		31.34	
Vel Total (ft/s)	11.18	Avg. Vel. (ft/s)		11.18	
Max Chl Dpth (ft)	6.82	Hydr. Depth (ft)		4.55	
Conv. Total (cfs)	16375.0	Conv. (cfs)		16375.0	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		35.40	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		2.39	
Alpha	1.00	Stream Power (lb/ft s)		26.69	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)		9.10	0.18
C & E Loss (ft)	0.36	Cum SA (acres)		4.72	0.13

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1582.06	Element			
Vel Head (ft)	1.35	Wt. n-Val.		0.033	
W.S. Elev (ft)	1580.70	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)		Flow Area (sq ft)		170.84	
E.G. Slope (ft/ft)	0.005835	Area (sq ft)		170.84	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	32.59	Top Width (ft)		32.59	
Vel Total (ft/s)	9.34	Avg. Vel. (ft/s)		9.34	
Max Chl Dpth (ft)	7.70	Hydr. Depth (ft)		5.24	
Conv. Total (cfs)	20880.7	Conv. (cfs)		20880.7	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		37.79	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		1.65	
Alpha	1.00	Stream Power (lb/ft s)		15.38	
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)		7.63	
C & E Loss (ft)	0.06	Cum SA (acres)		3.24	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1200

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1624.95	1580	1626.44	1579	1627.97	1578	1629.5	1577	1630.7	1576
1631.99	1575	1633.31	1574	1634.65	1573	1636.15	1572	1646.88	1572
1648.31	1573	1649.99	1574	1651.83	1575	1653.82	1576	1675.3	1577
1680.92	1578	1683	1578.66	1684.06	1579	1687.77	1580	1691.11	1581

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1624.95	.04	1636.15	.025	1646.88	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1624.95	1691.11	111.55	110.23 110.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1580.13	Element			
Vel Head (ft)	0.76	Wt. n-Val.		0.038	
W.S. Elev (ft)	1579.38	Reach Len. (ft)	111.55	110.23	110.23
Crit W.S. (ft)		Flow Area (sq ft)		228.21	
E.G. Slope (ft/ft)	0.005689	Area (sq ft)		228.21	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	59.57	Top Width (ft)		59.57	
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)		6.99	
Max Chl Dpth (ft)	7.38	Hydr. Depth (ft)		3.83	
Conv. Total (cfs)	21146.8	Conv. (cfs)		21146.8	
Length Wtd. (ft)	110.23	Wetted Per. (ft)		63.35	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.28	
Alpha	1.00	Stream Power (lb/ft s)		8.94	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		8.34	0.18
C & E Loss (ft)	0.00	Cum SA (acres)		4.54	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1580.95	Element			

Vel Head (ft)	1.14	Wt. n-Val.			0.036	
W.S. Elev (ft)	1579.81	Reach Len. (ft)		111.55	110.23	110.23
Crit W.S. (ft)		Flow Area (sq ft)			186.01	
E.G. Slope (ft/ft)	0.005957	Area (sq ft)			186.01	
Q Total (cfs)	1595.00	Flow (cfs)			1595.00	
Top Width (ft)	34.24	Top Width (ft)			34.24	
Vel Total (ft/s)	8.57	Avg. Vel. (ft/s)			8.57	
Max Chl Dpth (ft)	7.81	Hydr. Depth (ft)			5.43	
Conv. Total (cfs)	20665.4	Conv. (cfs)			20665.4	
Length Wtd. (ft)	110.23	Wetted Per. (ft)			41.39	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.67	
Alpha	1.00	Stream Power (lb/ft s)			14.33	
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)			6.90	
C & E Loss (ft)	0.01	Cum SA (acres)			3.11	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1100

INPUT
Description:

Station Elevation Data	num=	20							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1619.57	1580	1621.29	1579	1622.97	1578	1624.61	1577	1626.31	1576
1628.02	1575	1629.57	1574	1630.8	1573	1632	1572	1645.32	1572
1647.11	1573	1648.89	1574	1650.95	1575	1663.2	1575	1664.69	1575
1667.66	1576	1670.65	1577	1672.81	1578	1675.07	1579	1677.38	1580

Manning's n Values	num=	4			
Sta	n Val	Sta	n Val	Sta	n Val
1619.57	.04	1632	.025	1645.32	.04	1677.38	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1619.57	1677.38	102.45	103.7	103.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1579.54	Element		Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.			0.037	
W.S. Elev (ft)	1578.74	Reach Len. (ft)		102.45	103.70	103.70
Crit W.S. (ft)		Flow Area (sq ft)			222.56	
E.G. Slope (ft/ft)	0.005019	Area (sq ft)			222.56	
Q Total (cfs)	1595.00	Flow (cfs)			1595.00	
Top Width (ft)	52.77	Top Width (ft)			52.77	
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)			7.17	
Max Chl Dpth (ft)	6.74	Hydr. Depth (ft)			4.22	
Conv. Total (cfs)	22513.5	Conv. (cfs)			22513.5	
Length Wtd. (ft)	103.70	Wetted Per. (ft)			56.27	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.24	
Alpha	1.00	Stream Power (lb/ft s)			8.88	
Frctn Loss (ft)	0.65	Cum Volume (acre-ft)			7.77	0.18
C & E Loss (ft)	0.01	Cum SA (acres)			4.40	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1580.25	Element		Left OB	Channel	Right OB
Vel Head (ft)	1.26	Wt. n-Val.			0.035	
W.S. Elev (ft)	1578.98	Reach Len. (ft)		102.45	103.70	103.70
Crit W.S. (ft)		Flow Area (sq ft)			176.80	
E.G. Slope (ft/ft)	0.006629	Area (sq ft)			176.80	
Q Total (cfs)	1595.00	Flow (cfs)			1595.00	
Top Width (ft)	34.21	Top Width (ft)			34.21	
Vel Total (ft/s)	9.02	Avg. Vel. (ft/s)			9.02	
Max Chl Dpth (ft)	6.98	Hydr. Depth (ft)			5.17	
Conv. Total (cfs)	19590.1	Conv. (cfs)			19590.1	
Length Wtd. (ft)	103.70	Wetted Per. (ft)			41.06	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.78	
Alpha	1.00	Stream Power (lb/ft s)			16.08	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)			6.45	
C & E Loss (ft)	0.06	Cum SA (acres)			3.02	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1000

INPUT
Description:

Station Elevation Data	num=	16							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1619.06	1579	1620.6	1578	1622.05	1577	1623.54	1576	1625.04	1575
1626.53	1574	1628.01	1573	1629.5	1572	1647.23	1572	1649.07	1573
1650.89	1574	1652.74	1575	1669.86	1576	1674.48	1577	1677.9	1578
1681.44	1579								

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
1619.06	.04	1647.23	.025	1649.07	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1619.06	1681.44	116.93	118.27	121.55	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1578.88	Element		Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.			0.040	
W.S. Elev (ft)	1577.95	Reach Len. (ft)		116.93	118.27	121.55
Crit W.S. (ft)		Flow Area (sq ft)			206.59	
E.G. Slope (ft/ft)	0.008097	Area (sq ft)			206.59	
Q Total (cfs)	1595.00	Flow (cfs)			1595.00	
Top Width (ft)	57.06	Top Width (ft)			57.06	
Vel Total (ft/s)	7.72	Avg. Vel. (ft/s)			7.72	
Max Chl Dpth (ft)	5.95	Hydr. Depth (ft)			3.62	
Conv. Total (cfs)	17725.3	Conv. (cfs)			17725.3	
Length Wtd. (ft)	118.27	Wetted Per. (ft)			59.92	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)			1.74	
Alpha	1.00	Stream Power (lb/ft s)			13.46	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)			7.26	0.18
C & E Loss (ft)	0.02	Cum SA (acres)			4.27	0.13

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1579.49	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.06	Wt. n-Val.		0.039		
W.S. Elev (ft)	1578.43	Reach Len. (ft)	116.93	118.27	121.55	
Crit W.S. (ft)		Flow Area (sq ft)		193.01		
E.G. Slope (ft/ft)	0.006911	Area (sq ft)		193.01		
Q Total (cfs)	1595.00	Flow (cfs)		1595.00		
Top Width (ft)	39.37	Top Width (ft)		39.37		
Vel Total (ft/s)	8.26	Avg. Vel. (ft/s)		8.26		
Max Chl Dpth (ft)	6.42	Hydr. Depth (ft)		4.90		
Conv. Total (cfs)	19186.7	Conv. (cfs)		19186.7		
Length Wtd. (ft)	118.27	Wetted Per. (ft)		45.15		
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.84		
Alpha	1.00	Stream Power (lb/ft s)		15.24		
Frctn Loss (ft)	0.91	Cum Volume (acre-ft)		6.00		
C & E Loss (ft)	0.04	Cum SA (acres)		2.93		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 900

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1601.29	1579	1615.48	1578	1617.19	1577	1618.89	1576	1620.39	1575
1621.56	1574	1622.7	1573	1623.85	1572	1627.4	1570	1636.36	1570
1639.19	1572	1644.13	1573	1649.05	1574	1666.38	1575	1667.9	1576
1669.58	1577	1672.3	1578						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1601.29	.04	1627.4	.025	1636.36	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1601.29 1672.3 102.08 103.62 108.33 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1577.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.12	Wt. n-Val.		0.038	
W.S. Elev (ft)	1576.72	Reach Len. (ft)	102.08	103.62	108.33
Crit W.S. (ft)		Flow Area (sq ft)		187.66	
E.G. Slope (ft/ft)	0.009077	Area (sq ft)		187.66	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	51.45	Top Width (ft)		51.45	
Vel Total (ft/s)	8.50	Avg. Vel. (ft/s)		8.50	
Max Chl Dpth (ft)	6.72	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	16741.4	Conv. (cfs)		16741.4	
Length Wtd. (ft)	103.62	Wetted Per. (ft)		54.96	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.93	
Alpha	1.00	Stream Power (lb/ft s)		16.45	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		6.73	0.18
C & E Loss (ft)	0.13	Cum SA (acres)		4.12	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1578.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.42	Wt. n-Val.		0.037	
W.S. Elev (ft)	1577.13	Reach Len. (ft)	102.08	103.62	108.33
Crit W.S. (ft)		Flow Area (sq ft)		166.94	
E.G. Slope (ft/ft)	0.008557	Area (sq ft)		166.94	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	34.46	Top Width (ft)		34.46	
Vel Total (ft/s)	9.55	Avg. Vel. (ft/s)		9.55	
Max Chl Dpth (ft)	7.13	Hydr. Depth (ft)		4.84	
Conv. Total (cfs)	17242.1	Conv. (cfs)		17242.1	
Length Wtd. (ft)	103.62	Wetted Per. (ft)		40.54	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		2.20	
Alpha	1.00	Stream Power (lb/ft s)		21.02	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		5.52	
C & E Loss (ft)	0.15	Cum SA (acres)		2.83	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 800

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1601.95	1578	1603.41	1577	1604.87	1576	1606.28	1575	1607.03	1574
1607.49	1573	1607.94	1572	1610.31	1570	1622.39	1570	1627.75	1572
1630.97	1573	1649.72	1573	1656.19	1573	1659.75	1574	1663.07	1575
1666.04	1576	1668.67	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1601.95	.04	1610.31	.025	1622.39	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1601.95 1668.67 134 133 133 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1577.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.		0.038	
W.S. Elev (ft)	1576.31	Reach Len. (ft)	134.00	133.00	133.00
Crit W.S. (ft)		Flow Area (sq ft)		237.34	
E.G. Slope (ft/ft)	0.005265	Area (sq ft)		237.34	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	62.45	Top Width (ft)		62.45	
Vel Total (ft/s)	6.72	Avg. Vel. (ft/s)		6.72	
Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)		3.80	
Conv. Total (cfs)	21980.8	Conv. (cfs)		21980.8	
Length Wtd. (ft)	133.00	Wetted Per. (ft)		66.40	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.17	
Alpha	1.00	Stream Power (lb/ft s)		7.90	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		6.22	0.18
C & E Loss (ft)	0.05	Cum SA (acres)		3.98	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1577.69	Element	Left OB	Channel	Right OB

				0.037	
Vel Head (ft)	0.92	Wt. n-Val.		133.00	133.00
W.S. Elev (ft)	1576.77	Reach Len. (ft)	134.00		
Crit W.S. (ft)		Flow Area (sq ft)		207.49	
E.G. Slope (ft/ft)	0.005473	Area (sq ft)		207.49	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	43.10	Top Width (ft)		43.10	
Vel Total (ft/s)	7.69	Avg. Vel. (ft/s)		7.69	
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)		4.81	
Conv. Total (cfs)	21560.0	Conv. (cfs)		21560.0	
Length Wtd. (ft)	133.00	Wetted Per. (ft)		50.46	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.40	
Alpha	1.00	Stream Power (lb/ft s)		10.80	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)		5.07	
C & E Loss (ft)	0.02	Cum SA (acres)		2.74	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 700

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1594.24	1578	1595.79	1577	1597.29	1576	1598.78	1575	1600.22	1574
1601.71	1573	1603.56	1572	1607.53	1570	1622.94	1570	1628.9	1572
1641.44	1573	1655.8	1573	1658.53	1572	1662.47	1572	1665.1	1573
1667.19	1574	1668.72	1575	1670.24	1576	1671.81	1577		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1594.24	.04	1607.53	.025	1622.94	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1594.24	1671.81	109	119	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1576.37	Element		0.037	
Vel Head (ft)	0.53	Wt. n-Val.	109.00	119.00	125.00
W.S. Elev (ft)	1575.84	Reach Len. (ft)		273.28	
Crit W.S. (ft)		Flow Area (sq ft)		273.28	
E.G. Slope (ft/ft)	0.003846	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		72.47	
Top Width (ft)	72.47	Top Width (ft)		5.84	
Vel Total (ft/s)	5.84	Avg. Vel. (ft/s)		3.77	
Max Chl Dpth (ft)	5.84	Hydr. Depth (ft)		25717.7	
Conv. Total (cfs)	25717.7	Conv. (cfs)		75.57	
Length Wtd. (ft)	119.38	Wetted Per. (ft)		0.87	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		5.07	
Alpha	1.00	Stream Power (lb/ft s)		5.44	0.18
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		3.78	0.13
C & E Loss (ft)	0.00	Cum SA (acres)			

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1576.86	Element		0.036	
Vel Head (ft)	1.12	Wt. n-Val.	109.00	119.00	125.00
W.S. Elev (ft)	1575.74	Reach Len. (ft)		187.55	
Crit W.S. (ft)		Flow Area (sq ft)		187.55	
E.G. Slope (ft/ft)	0.006821	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		43.76	
Top Width (ft)	43.76	Top Width (ft)		8.50	
Vel Total (ft/s)	8.50	Avg. Vel. (ft/s)		4.29	
Max Chl Dpth (ft)	5.74	Hydr. Depth (ft)		19312.8	
Conv. Total (cfs)	19312.8	Conv. (cfs)		48.43	
Length Wtd. (ft)	119.00	Wetted Per. (ft)		1.65	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		14.02	
Alpha	1.00	Stream Power (lb/ft s)		4.47	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)		2.61	
C & E Loss (ft)	0.08	Cum SA (acres)			

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 600

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1567.15	1577	1581.21	1576	1582.7	1575	1584.21	1574	1585.7	1573
1587.59	1572	1591.73	1570	1593.77	1569	1610.31	1569	1617.2	1570
1622.17	1572	1623.98	1572.99	1624	1573	1625.86	1574	1627.65	1575
1661.89	1575	1664.15	1574	1666.35	1573	1668.81	1572	1671.47	1571
1675.87	1571	1679.03	1572	1681.85	1573	1683.37	1574	1684.93	1575
1686.5	1576	1688.2	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1567.15	.04	1591.73	.025	1610.31	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1581.21	1627.65	65.6	65.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1575.97	Element		0.035	0.040
Vel Head (ft)	0.56	Wt. n-Val.	65.60	65.60	65.60
W.S. Elev (ft)	1575.41	Reach Len. (ft)		219.29	82.24
Crit W.S. (ft)		Flow Area (sq ft)		219.29	82.24
E.G. Slope (ft/ft)	0.002910	Area (sq ft)		1391.12	203.88
Q Total (cfs)	1595.00	Flow (cfs)		45.56	57.92
Top Width (ft)	103.48	Top Width (ft)		6.34	2.48
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		4.81	1.42
Max Chl Dpth (ft)	6.41	Hydr. Depth (ft)		25786.3	3779.2
Conv. Total (cfs)	29565.6	Conv. (cfs)		48.46	59.77
Length Wtd. (ft)	65.60	Wetted Per. (ft)		0.82	0.25
Min Ch El (ft)	1569.00	Shear (lb/sq ft)		5.22	0.62
Alpha	1.28	Stream Power (lb/ft s)		4.77	0.06
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		3.62	0.04
C & E Loss (ft)	0.04	Cum SA (acres)			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1576.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.035	
W.S. Elev (ft)	1575.29	Reach Len. (ft)	65.60	65.60	65.60
Crit W.S. (ft)		Flow Area (sq ft)		214.05	
E.G. Slope (ft/ft)	0.004160	Area (sq ft)		214.05	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	45.39	Top Width (ft)		45.39	
Vel Total (ft/s)	7.45	Avg. Vel. (ft/s)		7.45	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		4.72	
Conv. Total (cfs)	24729.7	Conv. (cfs)		24729.7	
Length Wtd. (ft)	65.60	Wetted Per. (ft)		48.54	
Min Ch El (ft)	1569.00	Shear (lb/sq ft)		1.15	
Alpha	1.00	Stream Power (lb/ft s)		8.53	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		3.92	
C & E Loss (ft)	0.13	Cum SA (acres)		2.49	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 580

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
947	1579	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1094.34	1580				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
947	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1037.34	102.1	102.1	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1575.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.015	
W.S. Elev (ft)	1575.45	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1571.90	Flow Area (sq ft)		262.72	
E.G. Slope (ft/ft)	0.000323	Area (sq ft)		262.72	
Q Total (cfs)	1388.72	Flow (cfs)		1388.72	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		5.29	
Max Chl Dpth (ft)	7.04	Hydr. Depth (ft)		7.04	
Conv. Total (cfs)	77213.8	Conv. (cfs)		77213.8	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		51.41	
Min Ch El (ft)	1568.41	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.55	
Frctn Loss (ft)		Cum Volume (acre-ft)		4.41	
C & E Loss (ft)		Cum SA (acres)		3.55	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1575.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.		0.015	
W.S. Elev (ft)	1575.55	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1571.90	Flow Area (sq ft)		266.53	
E.G. Slope (ft/ft)	0.000310	Area (sq ft)		266.53	
Q Total (cfs)	1388.72	Flow (cfs)		1388.72	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	5.21	Avg. Vel. (ft/s)		5.21	
Max Chl Dpth (ft)	7.14	Hydr. Depth (ft)		7.14	
Conv. Total (cfs)	78876.7	Conv. (cfs)		78876.7	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		51.62	
Min Ch El (ft)	1568.41	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.52	
Frctn Loss (ft)		Cum Volume (acre-ft)		3.56	
C & E Loss (ft)		Cum SA (acres)		2.42	

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 550

INPUT
Description: Hafen Lane Bridge

Distance from Upstream XS = .01
Deck/Roadway Width = 102
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1575.59	1572.41	1037.34	1575.59	1572.41

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
857.5	1576.11	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1187.34	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
857.5	.025	1000	.015	1037.34	.015

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1037.34	.3	.5

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1575.59	1571.36	1037.34	1575.59	1571.36

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	1576.11	1000	1575.59	1000	1571.36	1000	1567.36	1037.34	1567.36
1037.34	1571.36	1037.34	1575.59	1231.44	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1037.34	.3	.5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 1575.55
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 1012.34 Downstream= 1012.34
Upstream num= 2
Width Elev Width Elev
.67 1569.51 .67 1575
Downstream num= 2
Width Elev Width Elev
.67 1569.51 .67 1575

Pier Data
Pier Station Upstream= 1025 Downstream= 1025
Upstream num= 2
Width Elev Width Elev
.67 1569.51 .67 1575
Downstream num= 2
Width Elev Width Elev
.67 1569.51 .67 1575

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Yarnell KVal = 1.25
Selected Low Flow Methods = Yarnell

High Flow Method
Pressure and Weir Flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd =.8164966
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

			Inside BR US	Inside BR DS
E.G. US. (ft)	1575.88	Element		
W.S. US. (ft)	1575.45	E.G. Elev (ft)	1575.88	1575.88
Q Total (cfs)	1388.72	W.S. Elev (ft)	1575.45	1575.45
Q Bridge (cfs)	1352.58	Crit W.S. (ft)	1572.00	1570.95
Q Weir (cfs)	36.12	Max Chl Dpth (ft)	7.04	8.09
Weir Sta Lft (ft)	920.55	Vel Total (ft/s)	8.03	8.10
Weir Sta Rgt (ft)	1083.11	Flow Area (sq ft)	172.98	171.49
Weir Submerg	0.00	Froude # Chl	0.64	0.60
Weir Max Depth (ft)	0.29	Specif Force (cu ft)	1141.11	1292.31
Min El Weir Flow (ft)	1575.60	Hydr Depth (ft)		
Min El Prs (ft)	1572.41	W.P. Total (ft)	96.00	96.00
Delta EG (ft)	3.27	Conv. Total (cfs)		
Delta WS (ft)	4.60	Top Width (ft)		
BR Open Area (sq ft)	144.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.39	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical depth. The Yarnell solution has been disregarded.
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE OUTPUT Profile #PF 2

			Inside BR US	Inside BR DS
E.G. US. (ft)	1575.97	Element		
W.S. US. (ft)	1575.55	E.G. Elev (ft)	1575.97	1575.97
Q Total (cfs)	1388.72	W.S. Elev (ft)	1575.55	1575.55
Q Bridge (cfs)	1361.70	Crit W.S. (ft)	1572.00	1570.95
Q Weir (cfs)	27.02	Max Chl Dpth (ft)	7.14	8.19
Weir Sta Lft (ft)	995.00	Vel Total (ft/s)	8.61	0.00
Weir Sta Rgt (ft)	1042.34	Flow Area (sq ft)	161.25	
Weir Submerg	0.00	Froude # Chl	0.64	0.59
Weir Max Depth (ft)	0.38	Specif Force (cu ft)	1155.77	1306.98
Min El Weir Flow (ft)	1575.60	Hydr Depth (ft)		
Min El Prs (ft)	1572.41	W.P. Total (ft)	96.00	96.00
Delta EG (ft)	3.36	Conv. Total (cfs)		
Delta WS (ft)	4.69	Top Width (ft)		
BR Open Area (sq ft)	144.00	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.46	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical depth. The Yarnell solution has been disregarded.
Note: Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow. The Yarnell answer has been disregarded.
Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.
Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 500

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	1576.11	1000	1575.59	1000	1571.36	1000	1567.36	1037.34	1567.36
1037.34	1571.36	1037.34	1575.59	1231.44	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1037.34	40.6	40.6	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1572.61	Element		0.015	
Vel Head (ft)	1.77	Wt. n-Val.	40.60	40.60	40.60
W.S. Elev (ft)	1570.85	Reach Len. (ft)		130.23	
Crit W.S. (ft)	1570.85	Flow Area (sq ft)		130.23	
E.G. Slope (ft/ft)	0.002753	Area (sq ft)		1388.72	
Q Total (cfs)	1388.72	Flow (cfs)		37.34	
Top Width (ft)	37.34	Top Width (ft)		10.66	
Vel Total (ft/s)	10.66	Avg. Vel. (ft/s)		3.49	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		26469.2	
Conv. Total (cfs)	26469.2	Conv. (cfs)		44.32	
Length Wtd. (ft)	40.60	Wetted Per. (ft)		0.51	
Min Ch El (ft)	1567.36	Shear (lb/sq ft)		5.39	
Alpha	1.00	Stream Power (lb/ft s)		4.07	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		3.55	
C & E Loss (ft)	0.23	Cum SA (acres)			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1572.61	Element		0.015	
Vel Head (ft)	1.76	Wt. n-Val.	40.60	40.60	40.60
W.S. Elev (ft)	1570.85	Reach Len. (ft)		130.45	
Crit W.S. (ft)	1570.85	Flow Area (sq ft)		130.45	
E.G. Slope (ft/ft)	0.002738	Area (sq ft)		1388.72	
Q Total (cfs)	1388.72	Flow (cfs)		37.34	
Top Width (ft)	37.34	Top Width (ft)		10.65	
Vel Total (ft/s)	10.65	Avg. Vel. (ft/s)		3.49	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		26538.7	
Conv. Total (cfs)	26538.7	Conv. (cfs)		44.33	
Length Wtd. (ft)	40.60	Wetted Per. (ft)		0.50	
Min Ch El (ft)	1567.36	Shear (lb/sq ft)		5.36	
Alpha	1.00	Stream Power (lb/ft s)		3.22	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)		2.42	
C & E Loss (ft)	0.48	Cum SA (acres)			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 400

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1401.03	1573	1416.44	1572	1433.23	1571	1455.07	1570	1472.49	1569
1487.08	1568	1492.83	1567	1496.2	1566	1499.92	1565	1507.96	1564
1515.18	1564	1521.97	1564	1526.3	1565	1530.56	1566	1535.1	1567
1540.51	1568	1546.78	1569	1554.77	1570	1571.65	1571	1596.55	1572
1609.08	1573								

Manning's n Values num= 1

Sta	n Val
1401.03	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1401.03	1609.08	132.08	134.41	158.2	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1569.57	Element		0.030	
Vel Head (ft)	1.30	Wt. n-Val.	132.08	134.41	158.20
W.S. Elev (ft)	1568.27	Reach Len. (ft)		151.84	
Crit W.S. (ft)	1568.27	Flow Area (sq ft)		151.84	
E.G. Slope (ft/ft)	0.009870	Area (sq ft)		1388.72	
Q Total (cfs)	1388.72	Flow (cfs)		59.03	
Top Width (ft)	59.03	Top Width (ft)		9.15	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		2.57	
Max Chl Dpth (ft)	4.27	Hydr. Depth (ft)		13978.4	
Conv. Total (cfs)	13978.4	Conv. (cfs)		59.92	
Length Wtd. (ft)	134.41	Wetted Per. (ft)		1.56	
Min Ch El (ft)	1564.00	Shear (lb/sq ft)		14.28	
Alpha	1.00	Stream Power (lb/ft s)		3.94	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)		3.51	
C & E Loss (ft)	0.11	Cum SA (acres)			

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1571.00	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.27	Wt. n-Val.		0.030		
W.S. Elev (ft)	1568.74	Reach Len. (ft)	132.08	134.41	158.20	
Crit W.S. (ft)	1568.74	Flow Area (sq ft)		114.93		
E.G. Slope (ft/ft)	0.011332	Area (sq ft)		114.93		
Q Total (cfs)	1388.72	Flow (cfs)		1388.72		
Top Width (ft)	25.38	Top Width (ft)		25.38		
Vel Total (ft/s)	12.08	Avg. Vel. (ft/s)		12.08		
Max Chl Dpth (ft)	4.74	Hydr. Depth (ft)		4.53		
Conv. Total (cfs)	13045.8	Conv. (cfs)		13045.8		
Length Wtd. (ft)	134.41	Wetted Per. (ft)		33.12		
Min Ch El (ft)	1564.00	Shear (lb/sq ft)		2.45		
Alpha	1.00	Stream Power (lb/ft s)		29.66		
Frctn Loss (ft)	1.47	Cum Volume (acre-ft)		3.11		
C & E Loss (ft)	0.13	Cum SA (acres)		2.39		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 300

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1326.59	1566	1398.97	1565	1411.4	1564	1429.8	1563	1447.74	1562
1478.25	1562	1494.89	1563	1505.16	1564	1508.73	1564.29	1517.3	1565
1546.71	1566								

Manning's n Values num= 1

Sta	n Val
1326.59	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1326.59	1546.71	364.63	352.07 359.83	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1565.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.030	
W.S. Elev (ft)	1564.77	Reach Len. (ft)	364.63	352.07	359.83
Crit W.S. (ft)	1564.77	Flow Area (sq ft)		207.18	
E.G. Slope (ft/ft)	0.010764	Area (sq ft)		207.18	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	112.79	Top Width (ft)		112.79	
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)		7.70	
Max Chl Dpth (ft)	2.77	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	15373.4	Conv. (cfs)		15373.4	
Length Wtd. (ft)	352.07	Wetted Per. (ft)		112.99	
Min Ch El (ft)	1562.00	Shear (lb/sq ft)		1.23	
Alpha	1.00	Stream Power (lb/ft s)		9.49	
Frctn Loss (ft)	3.96	Cum Volume (acre-ft)		3.38	
C & E Loss (ft)	0.05	Cum SA (acres)		3.24	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1567.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.84	Wt. n-Val.		0.030	
W.S. Elev (ft)	1565.67	Reach Len. (ft)	364.63	352.07	359.83
Crit W.S. (ft)	1565.67	Flow Area (sq ft)		146.65	
E.G. Slope (ft/ft)	0.010626	Area (sq ft)		146.65	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	40.37	Top Width (ft)		40.37	
Vel Total (ft/s)	10.88	Avg. Vel. (ft/s)		10.88	
Max Chl Dpth (ft)	3.67	Hydr. Depth (ft)		3.63	
Conv. Total (cfs)	15473.3	Conv. (cfs)		15473.3	
Length Wtd. (ft)	352.07	Wetted Per. (ft)		47.17	
Min Ch El (ft)	1562.00	Shear (lb/sq ft)		2.06	
Alpha	1.00	Stream Power (lb/ft s)		22.43	
Frctn Loss (ft)	3.74	Cum Volume (acre-ft)		2.70	
C & E Loss (ft)	0.11	Cum SA (acres)		2.29	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 200

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1408.98	1562	1430.03	1561	1443.63	1560	1456.15	1559	1483.33	1558
1511.65	1558	1529.54	1558	1535.63	1557	1591.46	1557	1598.86	1558
1605.41	1559	1611.46	1560	1616.72	1561	1621.82	1562	1626.85	1563
1633.43	1564	1640.24	1565	1646.85	1566	1659.32	1567		

Manning's n Values num= 1

Sta	n Val
1408.98	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1408.98	1659.32	235.94	235.94 235.94	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1559.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.030	
W.S. Elev (ft)	1559.22	Reach Len. (ft)	235.94	235.94	235.94
Crit W.S. (ft)	1559.22	Flow Area (sq ft)		228.23	
E.G. Slope (ft/ft)	0.011742	Area (sq ft)		228.23	

Q Total (cfs)	1595.00	Flow (cfs)	1595.00
Top Width (ft)	153.34	Top Width (ft)	153.34
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)	6.99
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.49
Conv. Total (cfs)	14719.3	Conv. (cfs)	14719.3
Length Wtd. (ft)	235.94	Wetted Per. (ft)	153.61
Min Ch El (ft)	1557.00	Shear (lb/sq ft)	1.09
Alpha	1.00	Stream Power (lb/ft s)	7.61
Frctn Loss (ft)	2.67	Cum Volume (acre-ft)	1.62
C & E Loss (ft)	0.14	Cum SA (acres)	2.17

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1561.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.		0.030	
W.S. Elev (ft)	1559.93	Reach Len. (ft)	235.94	235.94	235.94
Crit W.S. (ft)	1559.93	Flow Area (sq ft)		163.37	
E.G. Slope (ft/ft)	0.010602	Area (sq ft)		163.37	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	55.83	Top Width (ft)		55.83	
Vel Total (ft/s)	9.76	Avg. Vel. (ft/s)		9.76	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		2.93	
Conv. Total (cfs)	15490.6	Conv. (cfs)		15490.6	
Length Wtd. (ft)	235.94	Wetted Per. (ft)		61.68	
Min Ch El (ft)	1557.00	Shear (lb/sq ft)		1.75	
Alpha	1.00	Stream Power (lb/ft s)		17.11	
Frctn Loss (ft)	2.54	Cum Volume (acre-ft)		1.45	
C & E Loss (ft)	0.36	Cum SA (acres)		1.90	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 150

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1560.29	1034.67	1558.29	1042.91	1556.29	1047.56	1554.29	1089.01	1552.29
1722.79	1552.29	1746.89	1562.29	1751.64	1564.29	1758.04	1566.29	1764.19	1568.29
1764.91	1568.29	1793.21	1568.29						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.03	1000	.025	1764.19	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1764.19	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1553.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.025	
W.S. Elev (ft)	1552.87	Reach Len. (ft)			
Crit W.S. (ft)	1552.87	Flow Area (sq ft)		371.69	
E.G. Slope (ft/ft)	0.010922	Area (sq ft)		371.69	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	647.21	Top Width (ft)		647.21	
Vel Total (ft/s)	4.29	Avg. Vel. (ft/s)		4.29	
Max Chl Dpth (ft)	0.58	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	15261.9	Conv. (cfs)		15261.9	
Length Wtd. (ft)		Wetted Per. (ft)		647.34	
Min Ch El (ft)	1552.29	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		1.68	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1553.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.025	
W.S. Elev (ft)	1552.87	Reach Len. (ft)			
Crit W.S. (ft)	1552.87	Flow Area (sq ft)		371.69	
E.G. Slope (ft/ft)	0.010922	Area (sq ft)		371.69	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	647.21	Top Width (ft)		647.21	
Vel Total (ft/s)	4.29	Avg. Vel. (ft/s)		4.29	
Max Chl Dpth (ft)	0.58	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	15261.9	Conv. (cfs)		15261.9	
Length Wtd. (ft)		Wetted Per. (ft)		647.34	
Min Ch El (ft)	1552.29	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		1.68	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3	n4
Reach-1	3800	.04	.025	.04	
Reach-1	3700	.024	.025	.04	
Reach-1	3660	.04	.015	.04	
Reach-1	3650	Bridge			
Reach-1	3640	.04	.015	.04	
Reach-1	3600	.025	.04		
Reach-1	3500	.025	.04		

Reach-1	3400		.025	.04	
Reach-1	3300		.025	.04	
Reach-1	3280		.04	.025	.04
Reach-1	3275		.015	.015	.015
Reach-1	3270		.015	.015	.015
Reach-1	3200		.015	.015	.015
Reach-1	3100		.015	.015	.015
Reach-1	3080		.015	.015	.015
Reach-1	3050	Bridge			
Reach-1	3020		.015	.015	.015
Reach-1	3000		.015	.015	.015
Reach-1	2900		.015	.015	.015
Reach-1	2800		.015	.015	.015
Reach-1	2700		.015	.015	.015
Reach-1	2600		.015	.015	.015
Reach-1	2590		.04	.025	.04
Reach-1	2500		.04	.025	.04
Reach-1	2400		.025	.04	
Reach-1	2350		.04	.025	.04
Reach-1	2330		.04	.025	.04
Reach-1	2300		.04	.025	.04
Reach-1	2200		.04	.025	.04
Reach-1	2100		.04	.025	.04
Reach-1	2000.1		.025	.015	.025
Reach-1	2000		.025	.015	.025
Reach-1	1950	Bridge			
Reach-1	1900		.025	.015	.025
Reach-1	1800		.04	.025	.04
Reach-1	1750		.04	.025	.04
Reach-1	1700		.04	.025	.04
Reach-1	1650		.04	.025	.04
Reach-1	1600		.04	.025	.04
Reach-1	1500		.04	.025	.04
Reach-1	1400		.04	.025	.04
Reach-1	1300		.04	.025	.04
Reach-1	1200		.04	.025	.04
Reach-1	1100		.04	.025	.04
Reach-1	1000		.04	.025	.04
Reach-1	900		.04	.025	.04
Reach-1	800		.04	.025	.04
Reach-1	700		.04	.025	.04
Reach-1	600		.04	.025	.04
Reach-1	580		.025	.015	.025
Reach-1	550	Bridge			
Reach-1	500		.025	.015	.025
Reach-1	400		.03		
Reach-1	300		.03		
Reach-1	200		.03		
Reach-1	150		.03	.025	.03

,04

SUMMARY OF REACH LENGTHS

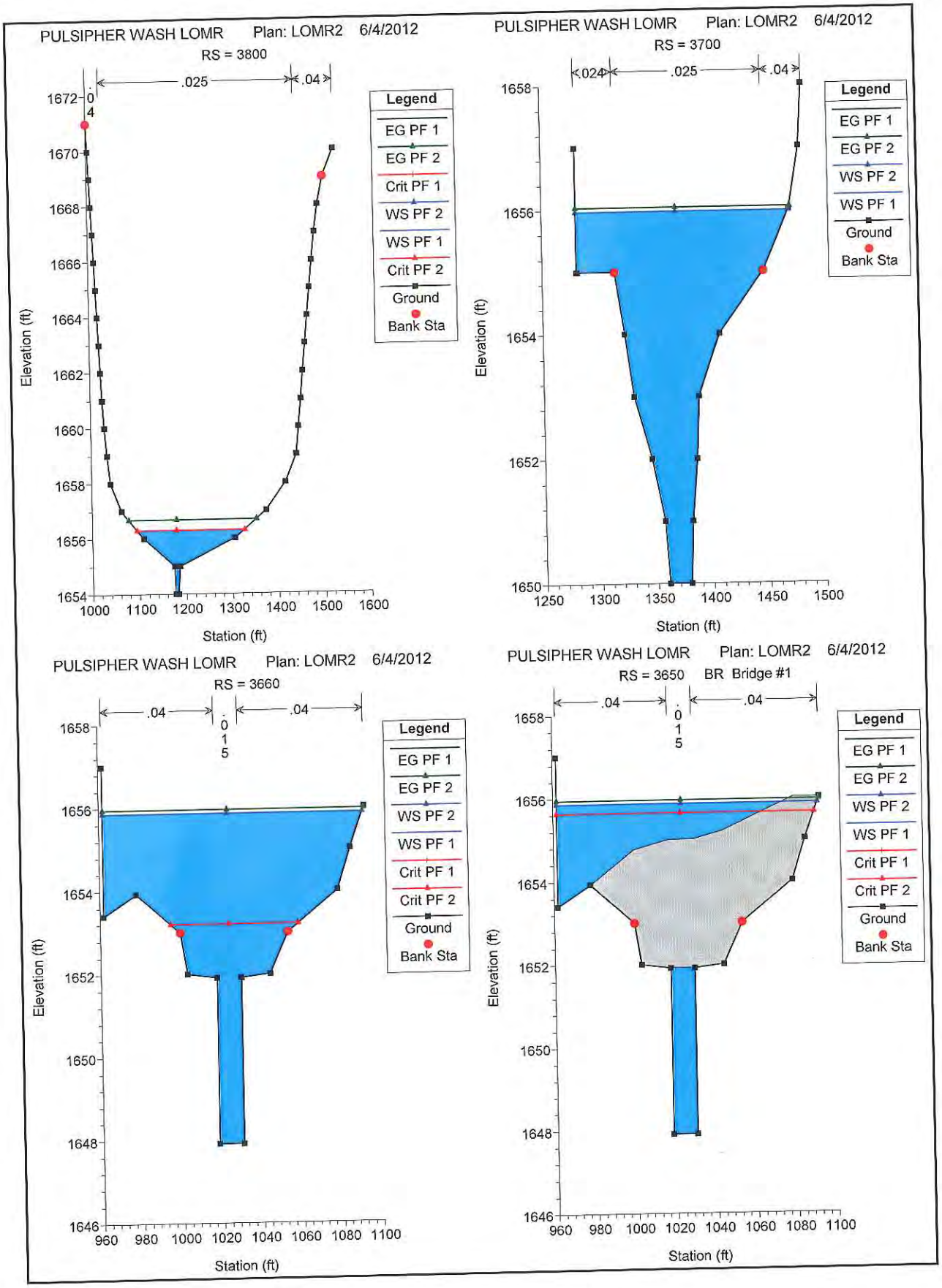
River: RIVER-1

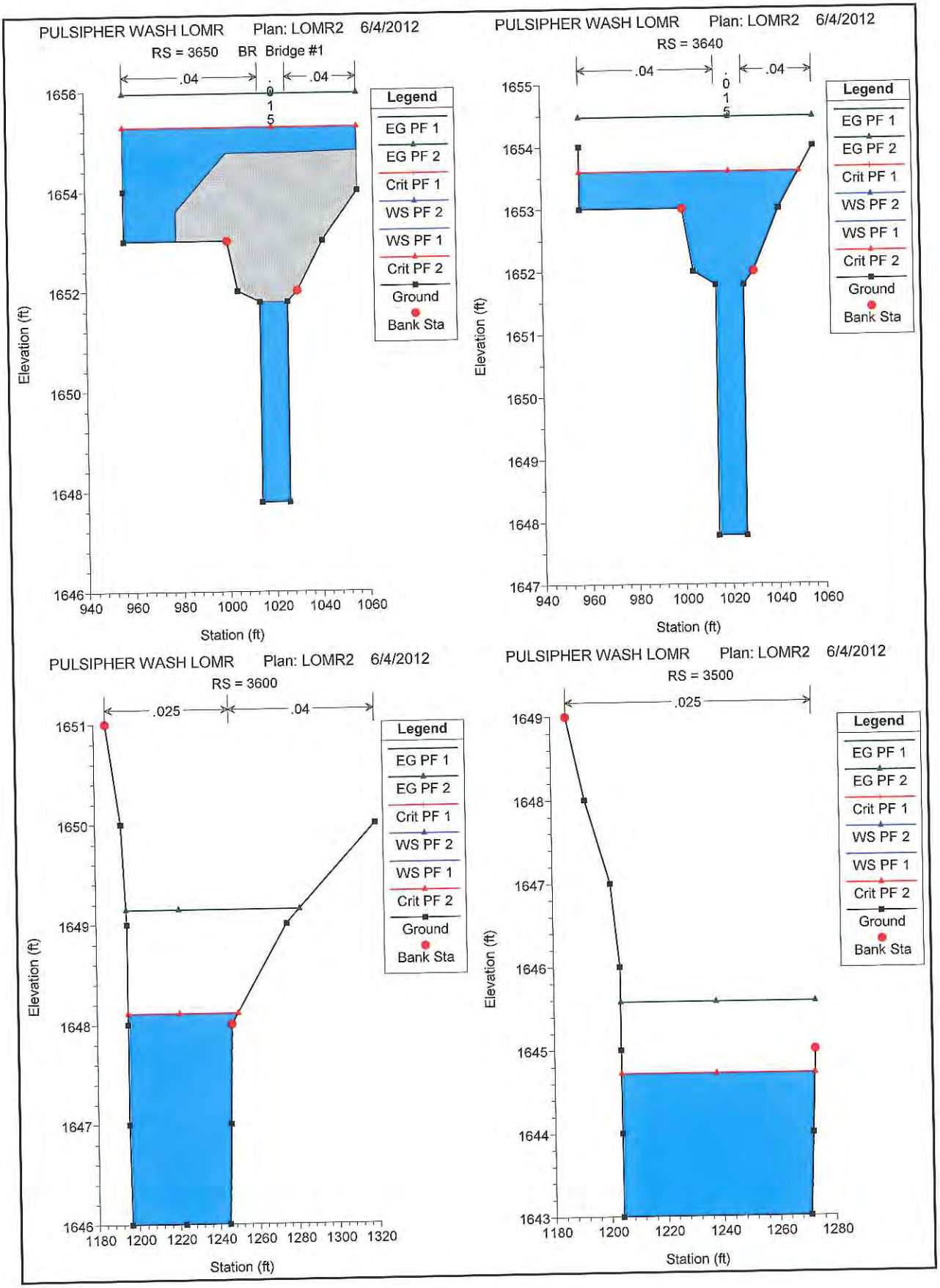
Reach	River Sta.	Left	Channel	Right
Reach-1	3800	580	566	553
Reach-1	3700	222.1	225	219.5
Reach-1	3660	42.6	42.6	42.6
Reach-1	3650	Bridge		
Reach-1	3640	143.1	143.1	143.1
Reach-1	3600	366.01	370	383
Reach-1	3500	392	394	393
Reach-1	3400	347	344	345
Reach-1	3300	49	51	53
Reach-1	3280	17.5	17.5	17.5
Reach-1	3275	33	33	33
Reach-1	3270	250	250	250
Reach-1	3200	400	400	400
Reach-1	3100	40	40	40
Reach-1	3080	127.2	127.2	127.2
Reach-1	3050	Bridge		
Reach-1	3020	150	150	150
Reach-1	3000	350	350	350
Reach-1	2900	290	290	290
Reach-1	2800	250	250	250
Reach-1	2700	381.4	381.4	381.4
Reach-1	2600	6.4	6.4	6.4
Reach-1	2590	226	210	201
Reach-1	2500	186.68	179.72	182.96
Reach-1	2400	57	71	87
Reach-1	2350	64	63	63
Reach-1	2330	235	240	222
Reach-1	2300	320.42	311.55	310.65
Reach-1	2200	383.01	328.57	273.85
Reach-1	2100	67.6	97.6	97.6
Reach-1	2000.1	1	1	1
Reach-1	2000	320.07	319.85	303.13
Reach-1	1950	Bridge		
Reach-1	1900	38.8	38.8	38.8
Reach-1	1800	173.79	170.93	148.02
Reach-1	1750	171.49	169.33	179.87
Reach-1	1700	163.66	161.13	154.63
Reach-1	1650	190.68	175.57	185.82
Reach-1	1600	157	142	133
Reach-1	1500	125	113	101
Reach-1	1400	122.02	161.58	190.42
Reach-1	1300	198.91	176.37	153.42
Reach-1	1200	111.55	110.23	110.23
Reach-1	1100	102.45	103.7	103.7
Reach-1	1000	116.93	118.27	121.55
Reach-1	900	102.08	103.62	108.33
Reach-1	800	134	133	133
Reach-1	700	109	119	125
Reach-1	600	65.6	65.6	65.6
Reach-1	580	102.1	102.1	102.1
Reach-1	550	Bridge		
Reach-1	500	40.6	40.6	40.6
Reach-1	400	132.08	134.41	158.2
Reach-1	300	364.63	352.07	359.83
Reach-1	200	235.94	235.94	235.94
Reach-1	150	0	0	0

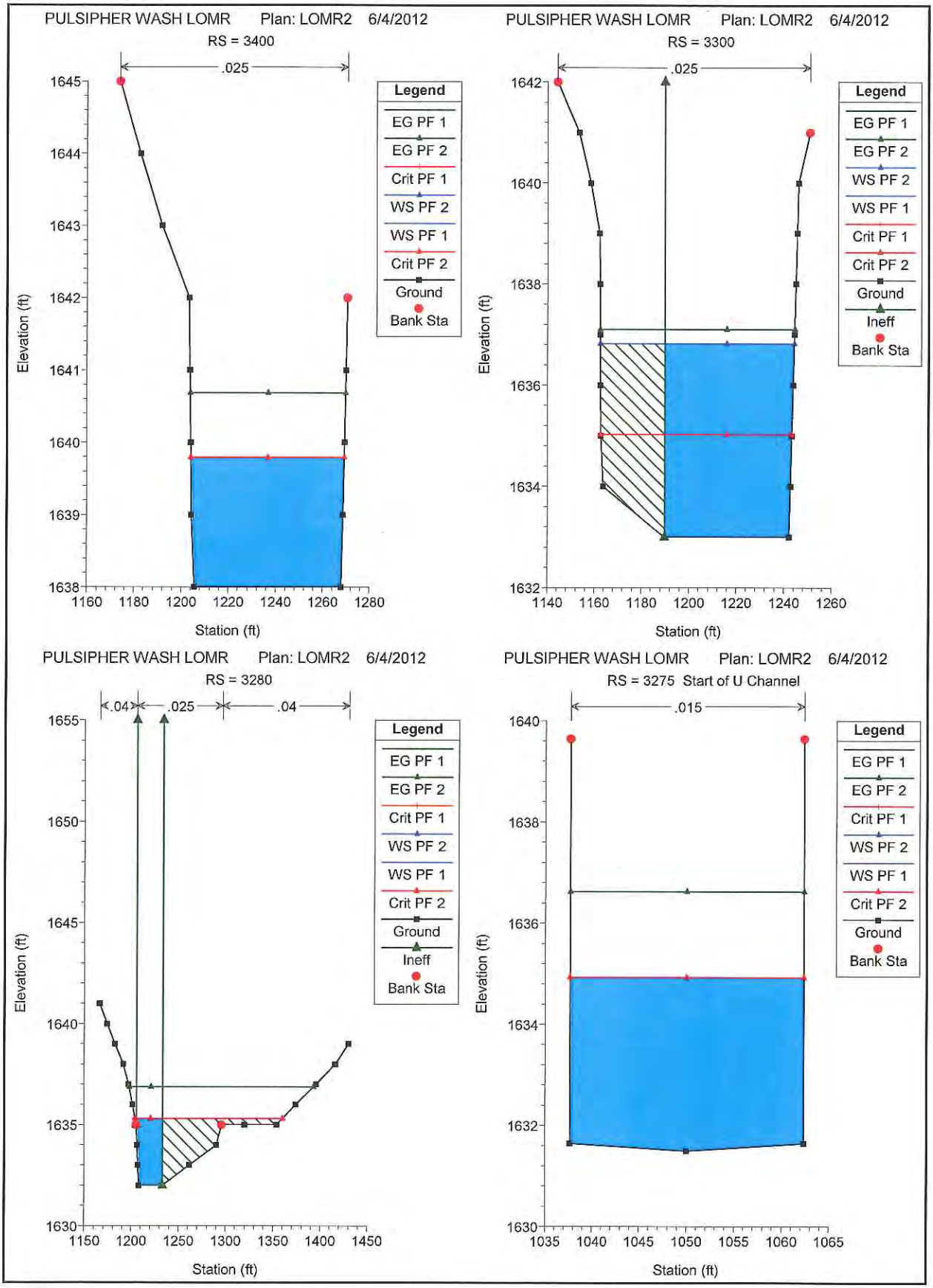
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER-1

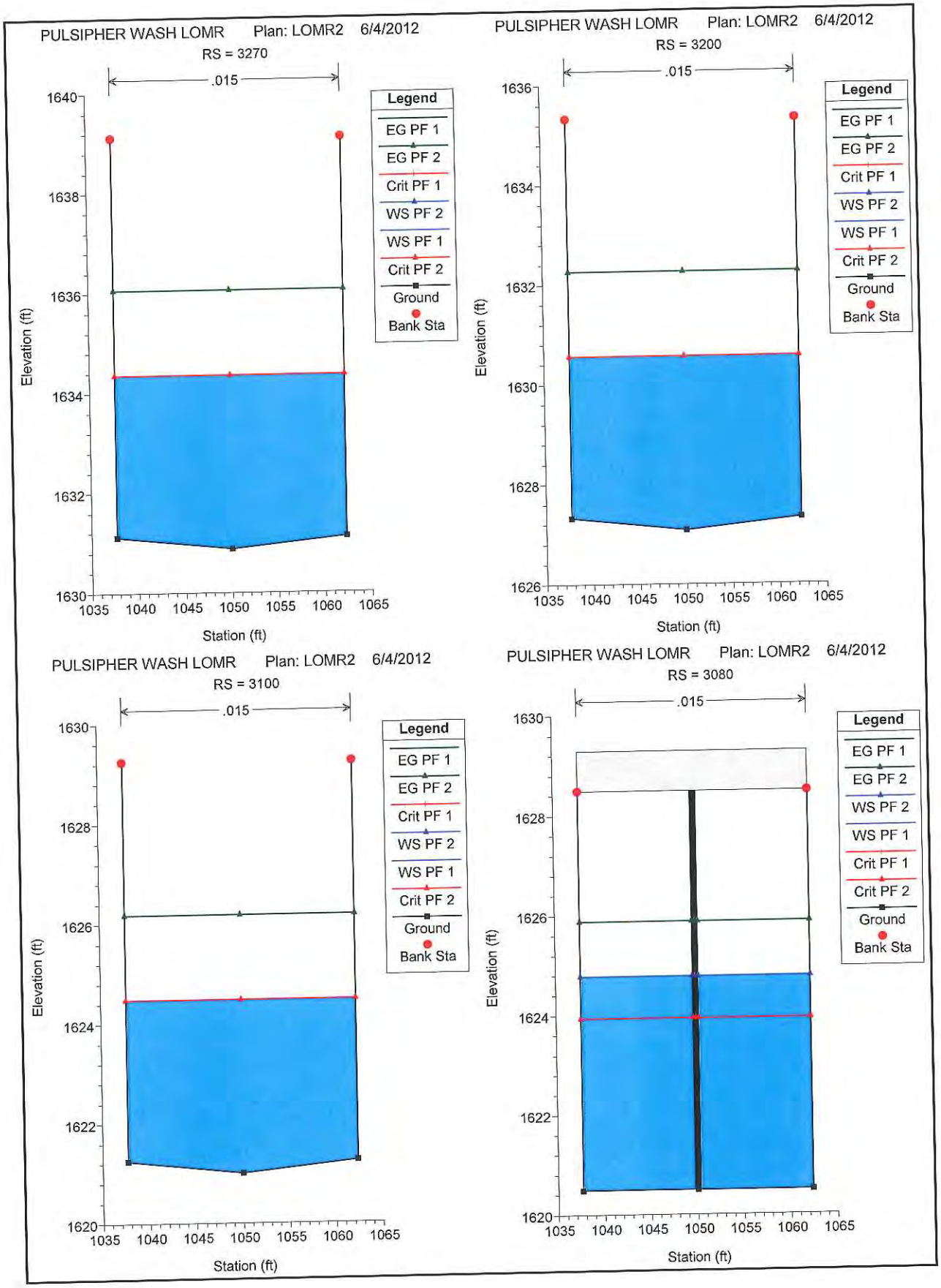
Reach	River Sta.	Contr.	Expan.
Reach-1	3800	.1	.3
Reach-1	3700	.1	.3
Reach-1	3660	.3	.5
Reach-1	3650	Bridge	

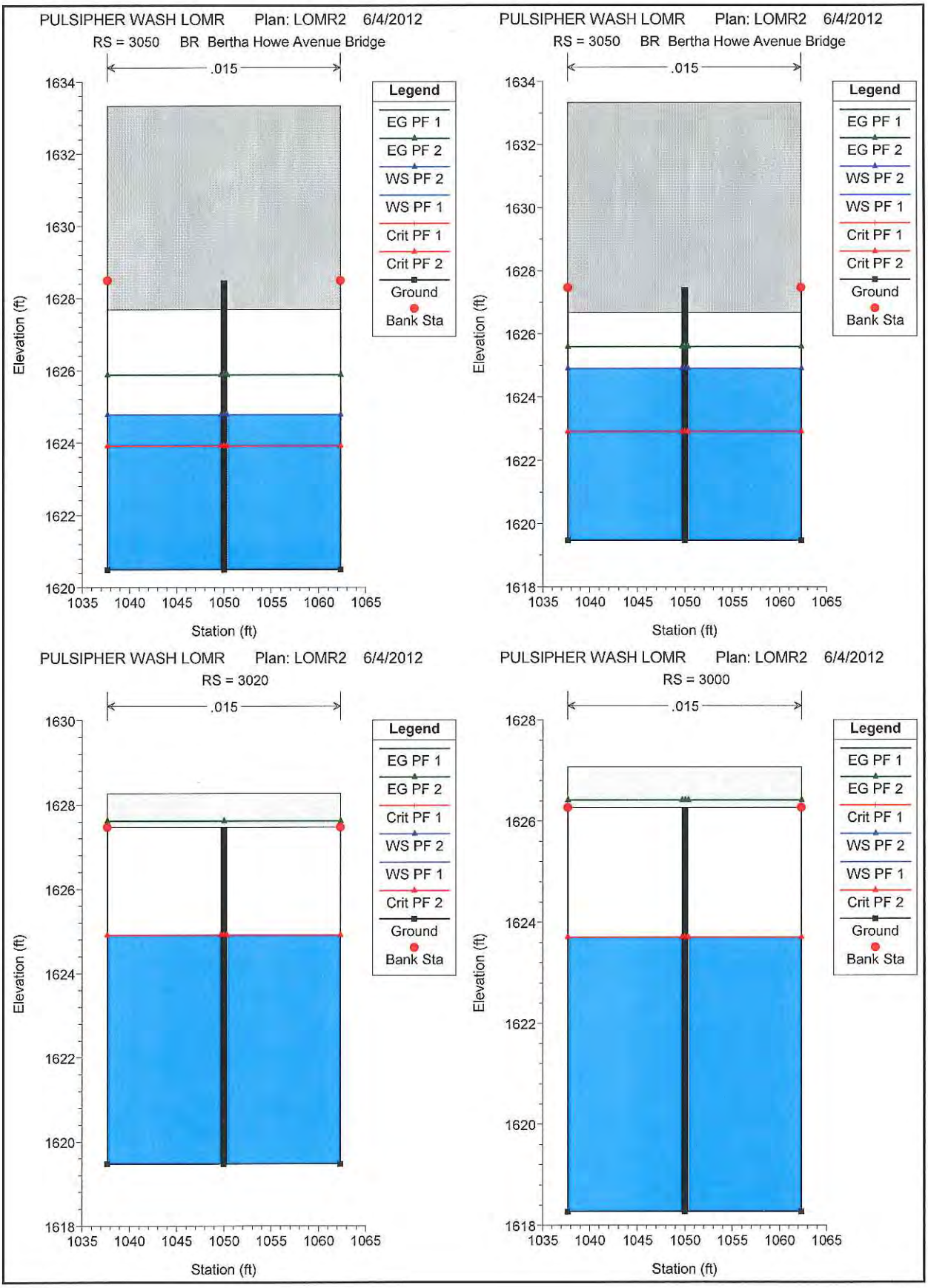
Reach-1	3640		.3	.5
Reach-1	3600		.1	.3
Reach-1	3500		.1	.3
Reach-1	3400		.1	.3
Reach-1	3300		.1	.3
Reach-1	3280		.1	.3
Reach-1	3275		.1	.3
Reach-1	3270		.1	.3
Reach-1	3200		.1	.3
Reach-1	3100		.1	.3
Reach-1	3080		.1	.3
Reach-1	3050	Bridge		
Reach-1	3020		.1	.3
Reach-1	3000		.1	.3
Reach-1	2900		.1	.3
Reach-1	2800		.1	.3
Reach-1	2700		.1	.3
Reach-1	2600		.1	.3
Reach-1	2590		.1	.3
Reach-1	2500		.1	.3
Reach-1	2400		.1	.3
Reach-1	2350		.1	.3
Reach-1	2330		.1	.3
Reach-1	2300		.1	.3
Reach-1	2200		.1	.3
Reach-1	2100		.1	.3
Reach-1	2000.1		.1	.1
Reach-1	2000		.3	.5
Reach-1	1950	Bridge		
Reach-1	1900		.3	.5
Reach-1	1800		.1	.3
Reach-1	1750		.1	.3
Reach-1	1700		.1	.3
Reach-1	1650		.1	.3
Reach-1	1600		.1	.3
Reach-1	1500		.1	.3
Reach-1	1400		.1	.3
Reach-1	1300		.1	.3
Reach-1	1200		.1	.3
Reach-1	1100		.1	.3
Reach-1	1000		.1	.3
Reach-1	900		.1	.3
Reach-1	800		.1	.3
Reach-1	700		.1	.3
Reach-1	600		.1	.3
Reach-1	580		.3	.5
Reach-1	550	Bridge		
Reach-1	500		.3	.5
Reach-1	400		.1	.3
Reach-1	300		.1	.3
Reach-1	200		.1	.3
Reach-1	150		.1	.3

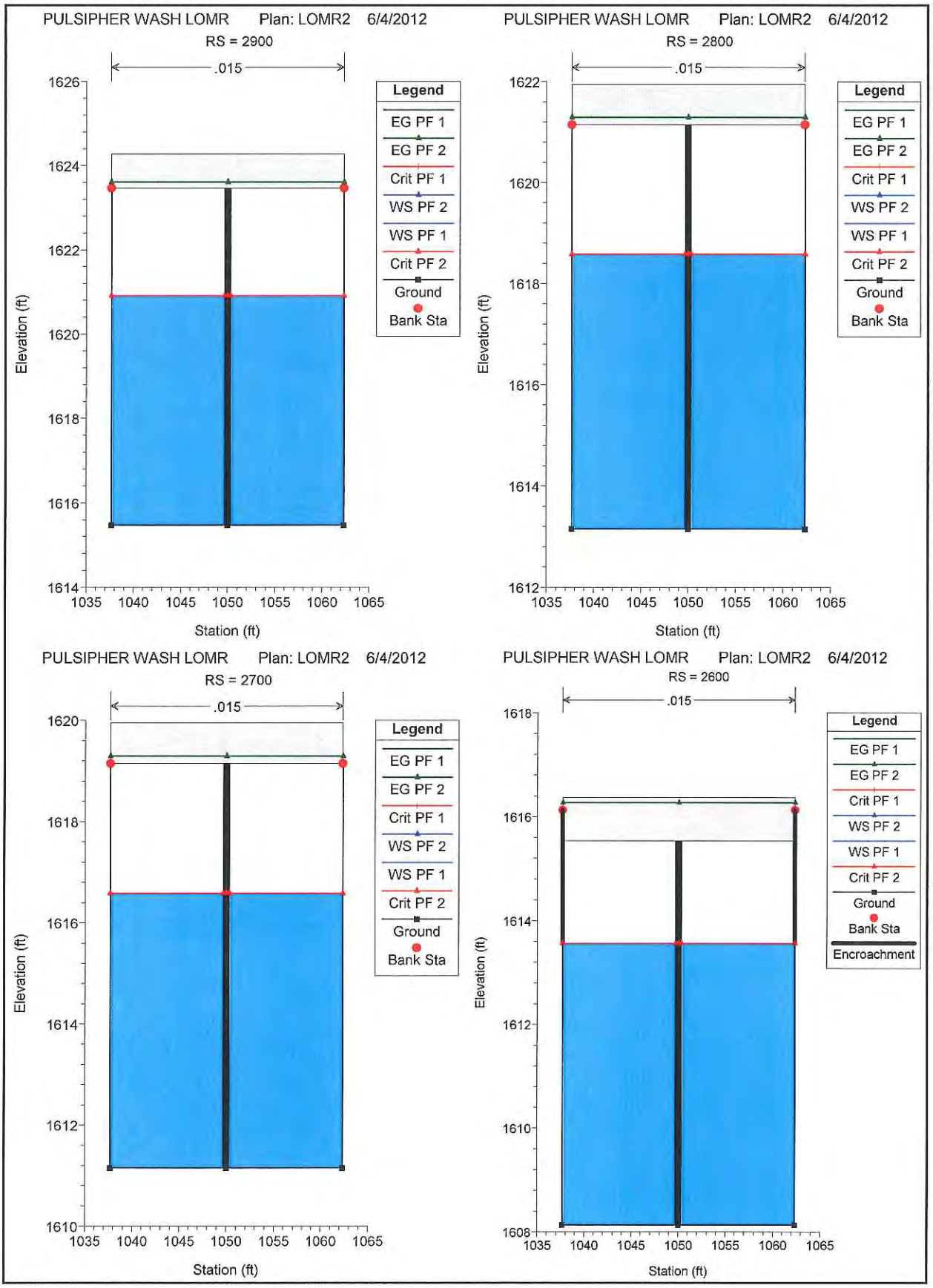

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3800
.04
.025
.04
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3700
.024
.025
.04
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3660
.04
.015
.04
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3650 BR Bridge #1
.04
.015
.04
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

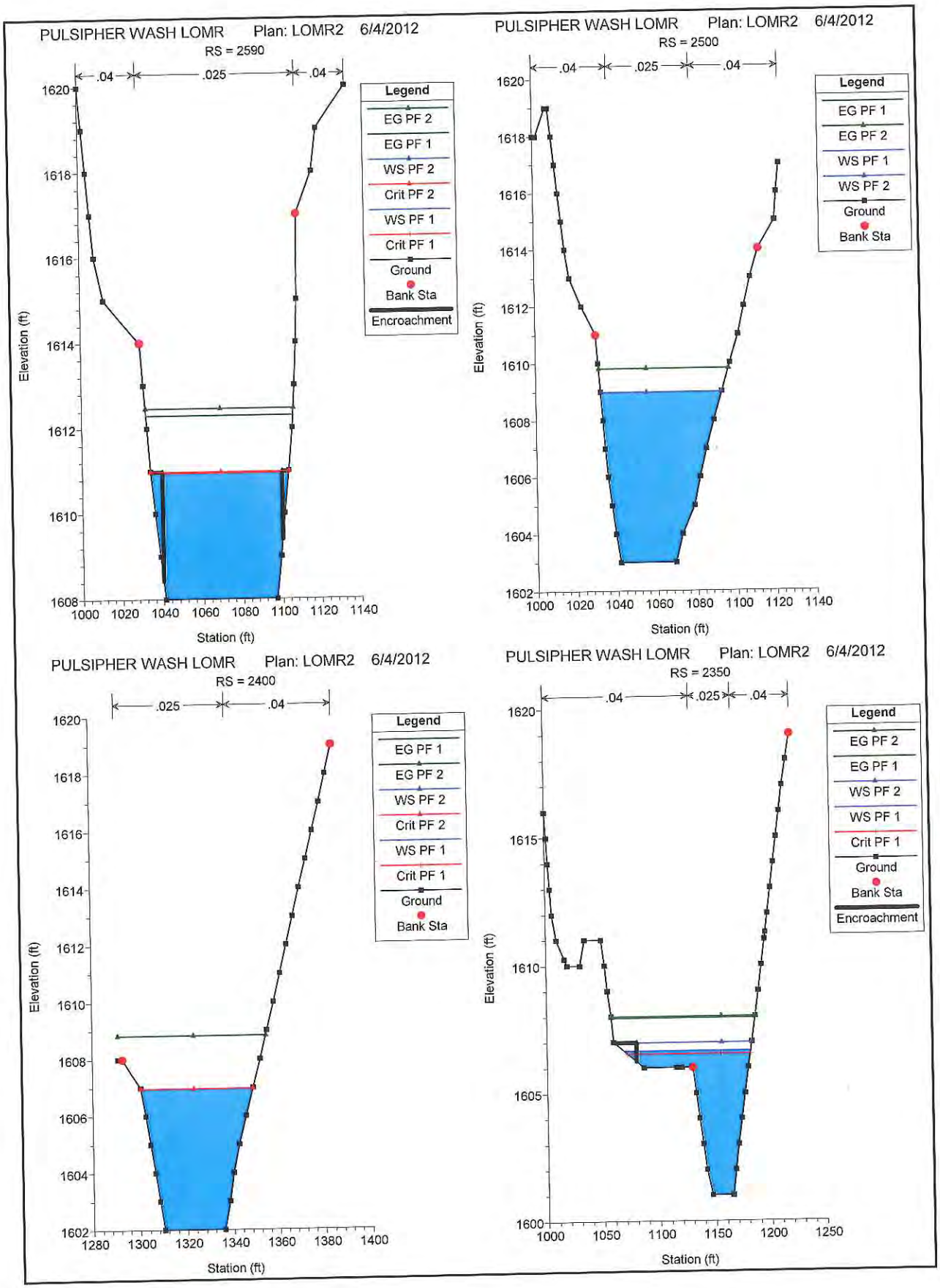

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3650 BR Bridge #1
.04
.015
.04
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3640
.04
.015
.04
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3600
.025
.04
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3500
.025
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

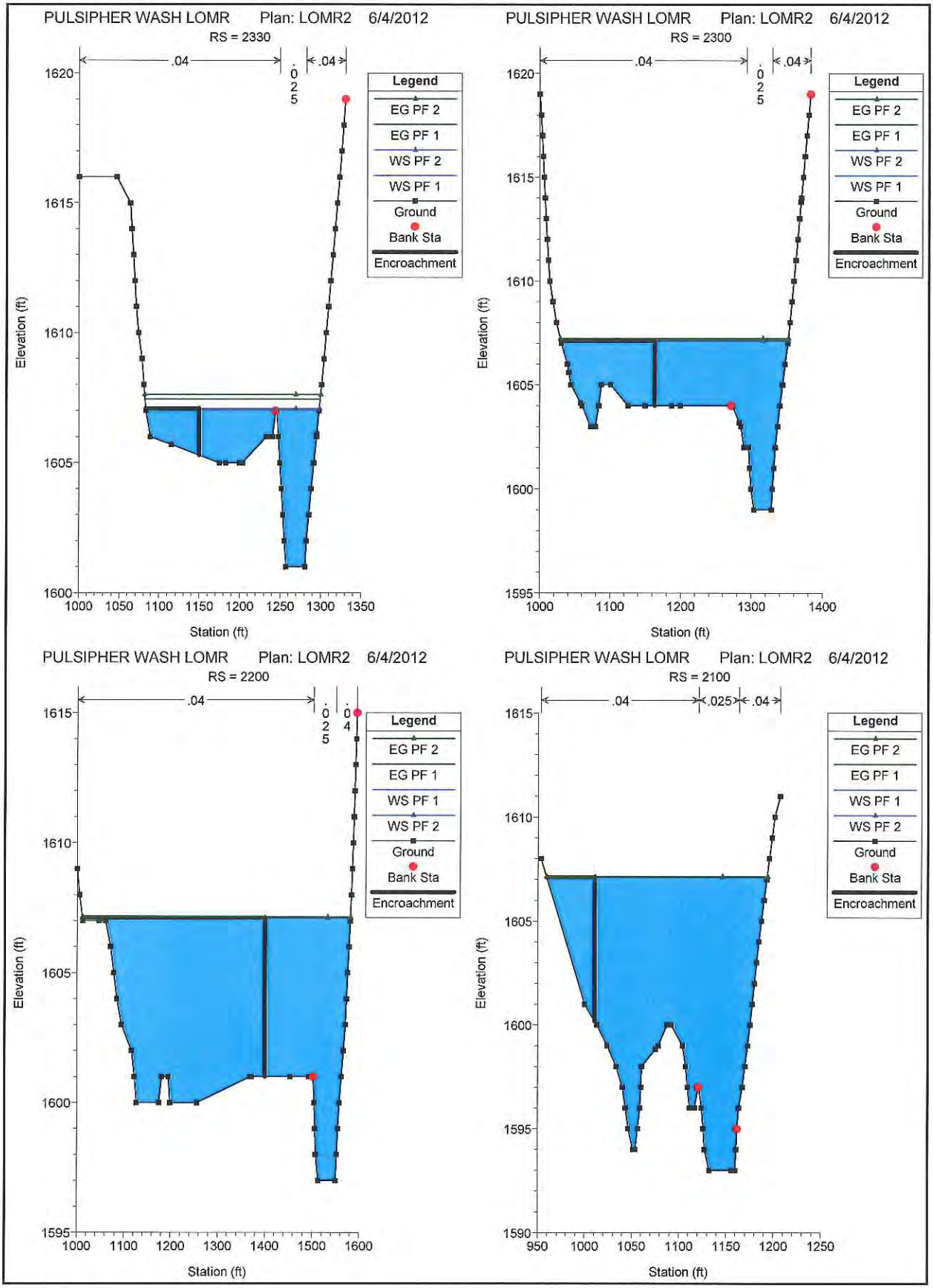

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3400
.025
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3300
.025
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3280
.04
.025
.04
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3275 Start of U Channel
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

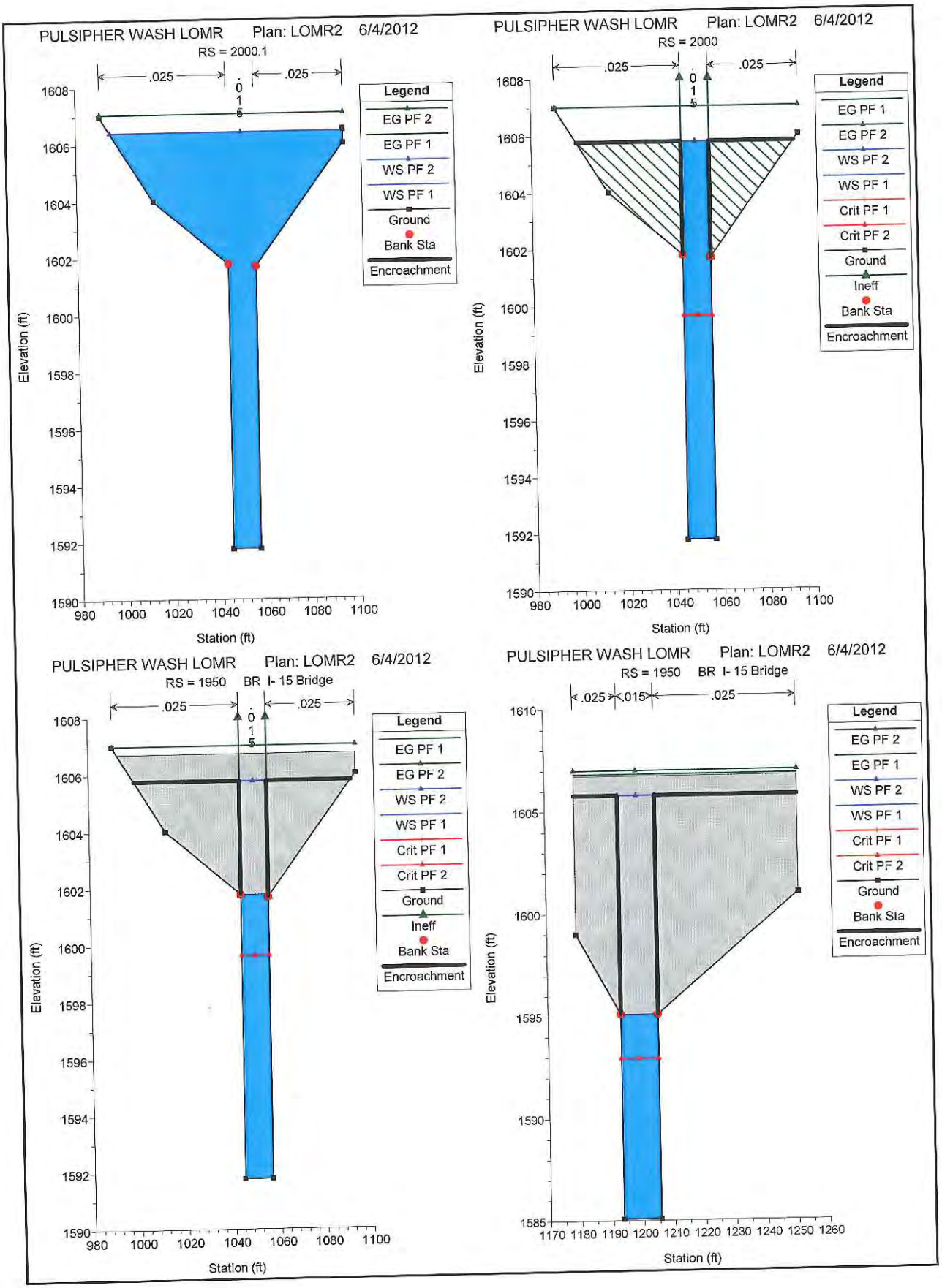

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3270
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3200
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3100
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3080
.015
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

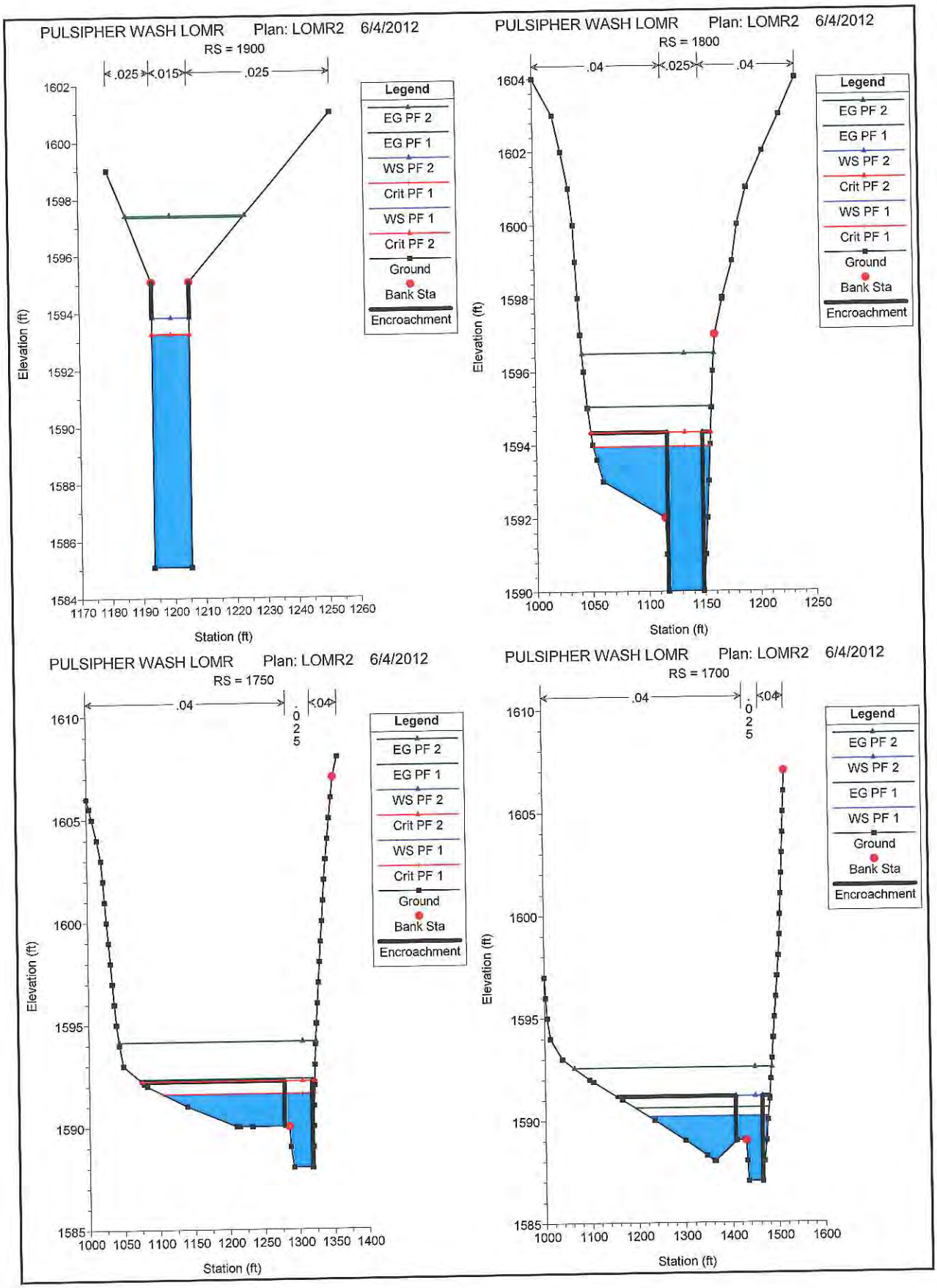

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3020
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 3000
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

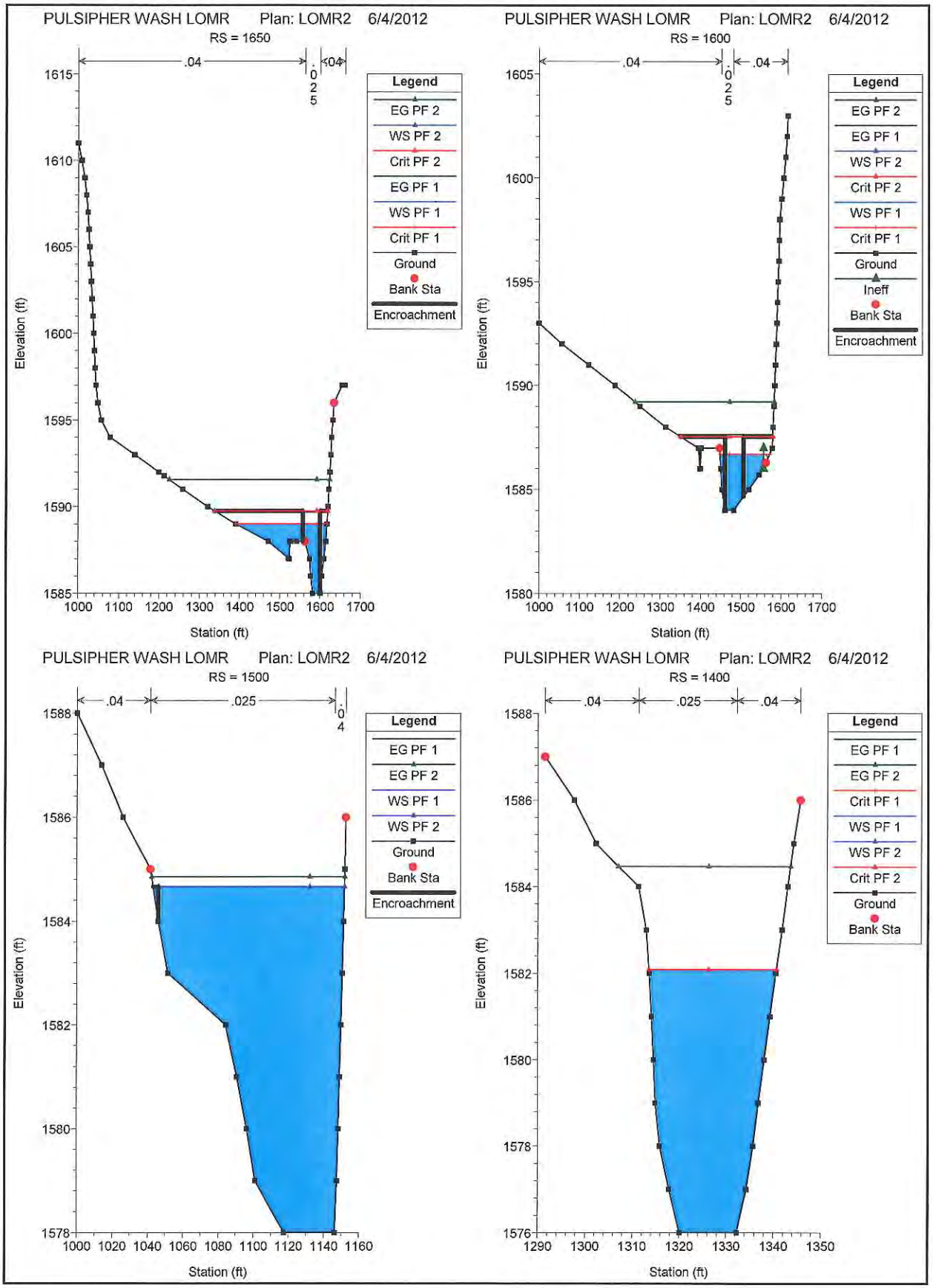

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2900
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2800
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2700
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2600
.015
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

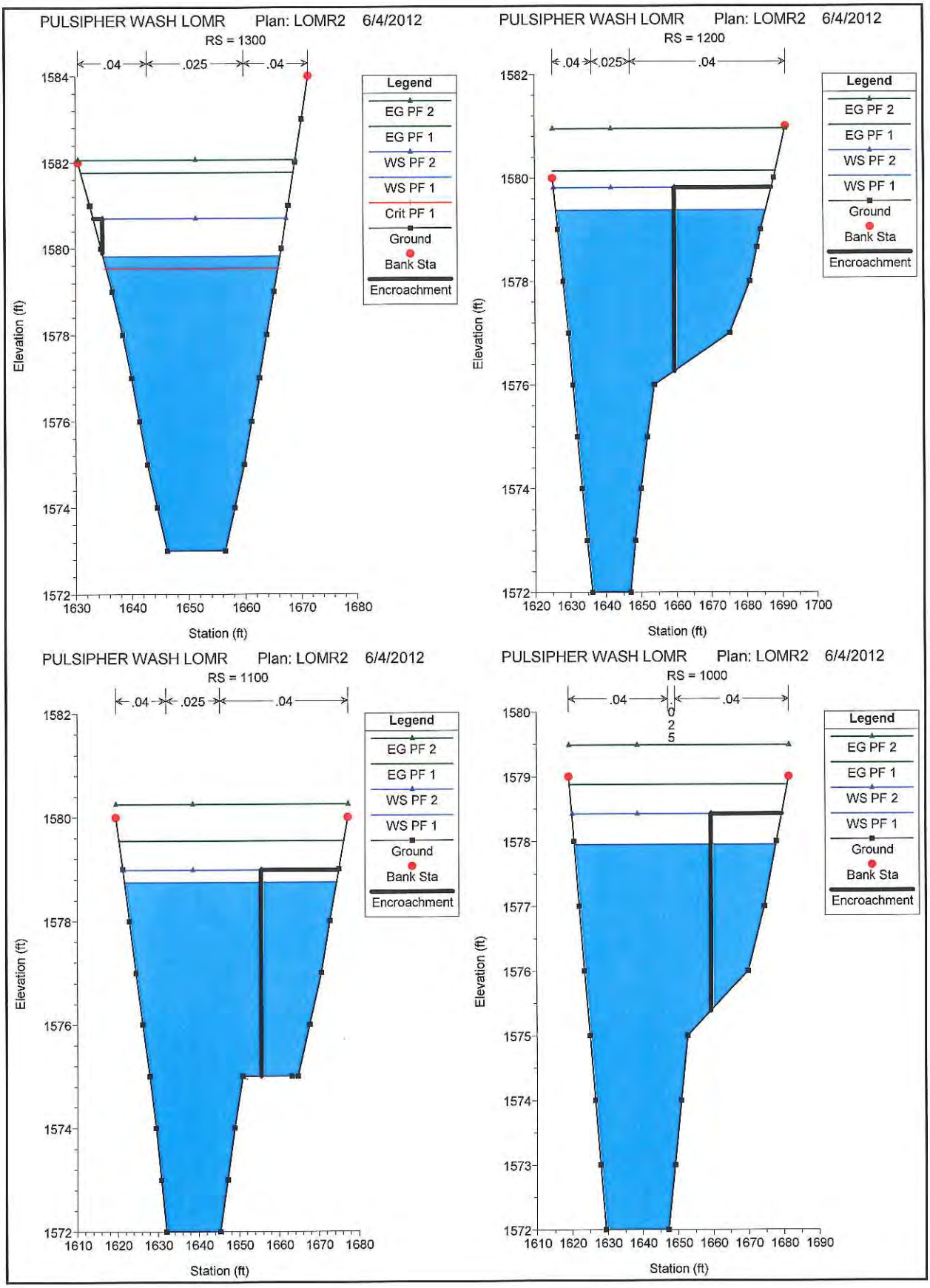

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2590
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2500
Legend
EG PF 1
EG PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2400
Legend
EG PF 1
EG PF 2
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2350
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

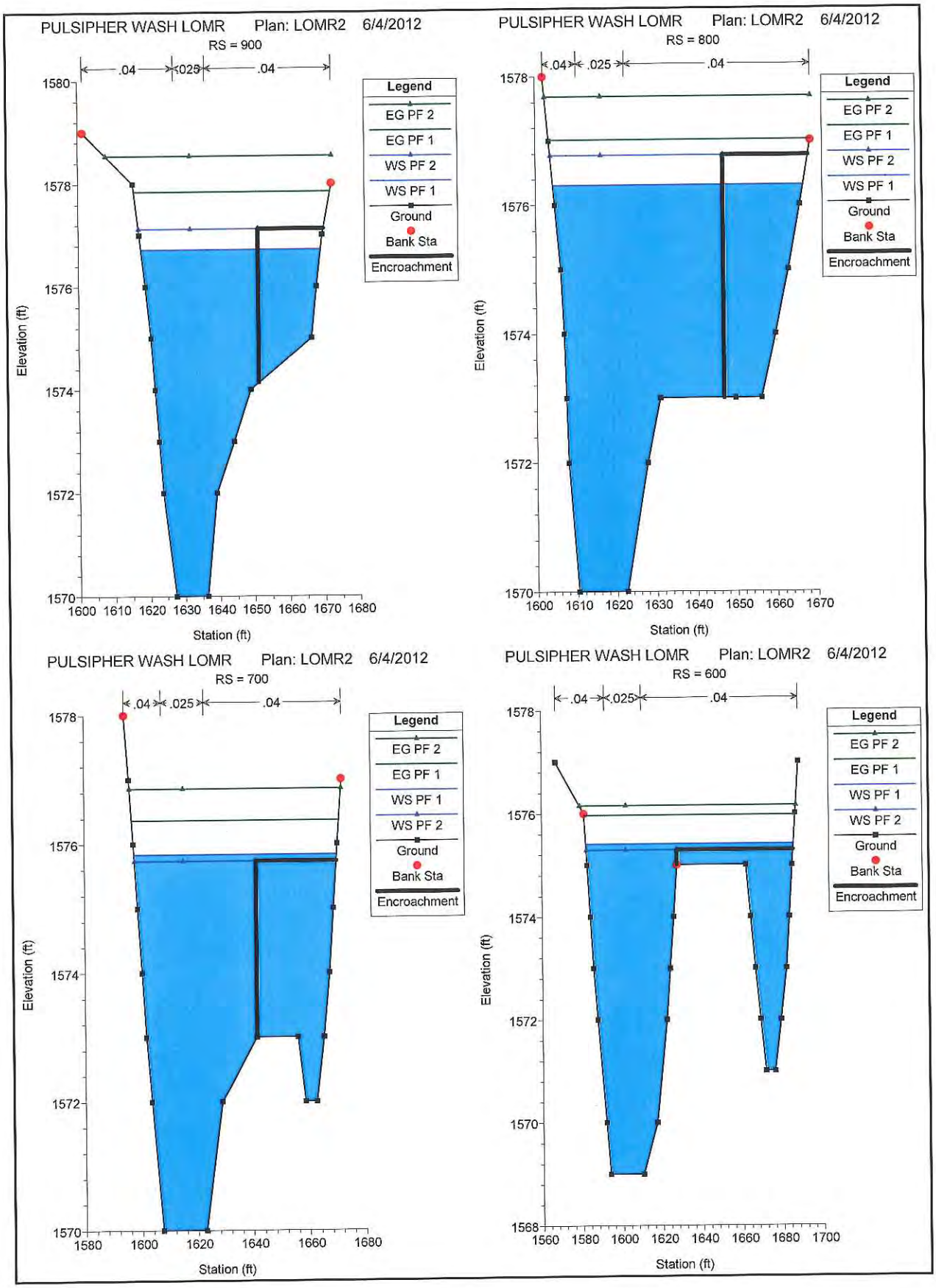

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2330
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2300
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2200
.04
.025
.04
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2100
.04
.025
.04

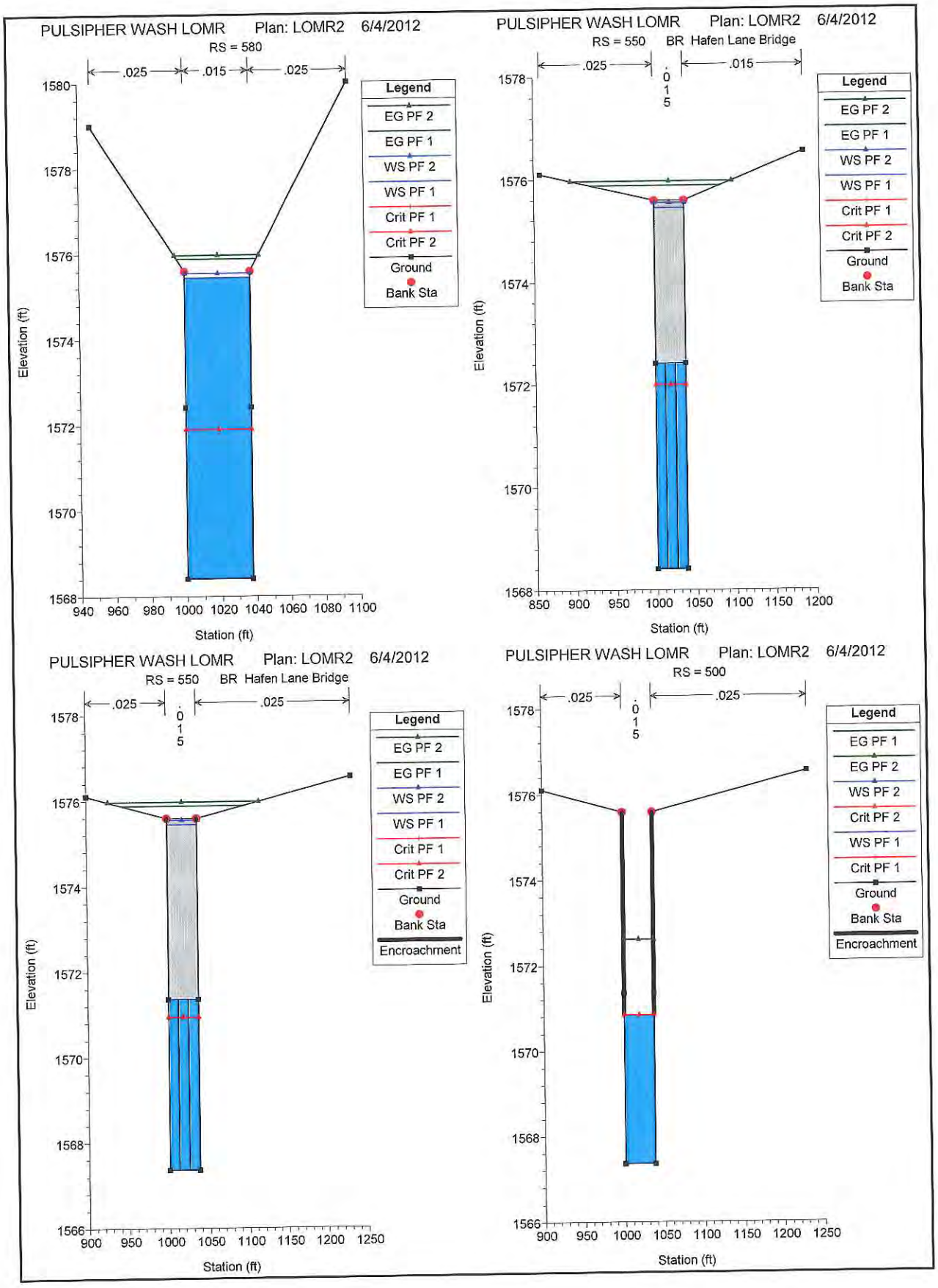

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2000.1
.025
.025
.015
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 2000
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta
Encroachment
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1950 BR I- 15 Bridge
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1950 BR I- 15 Bridge

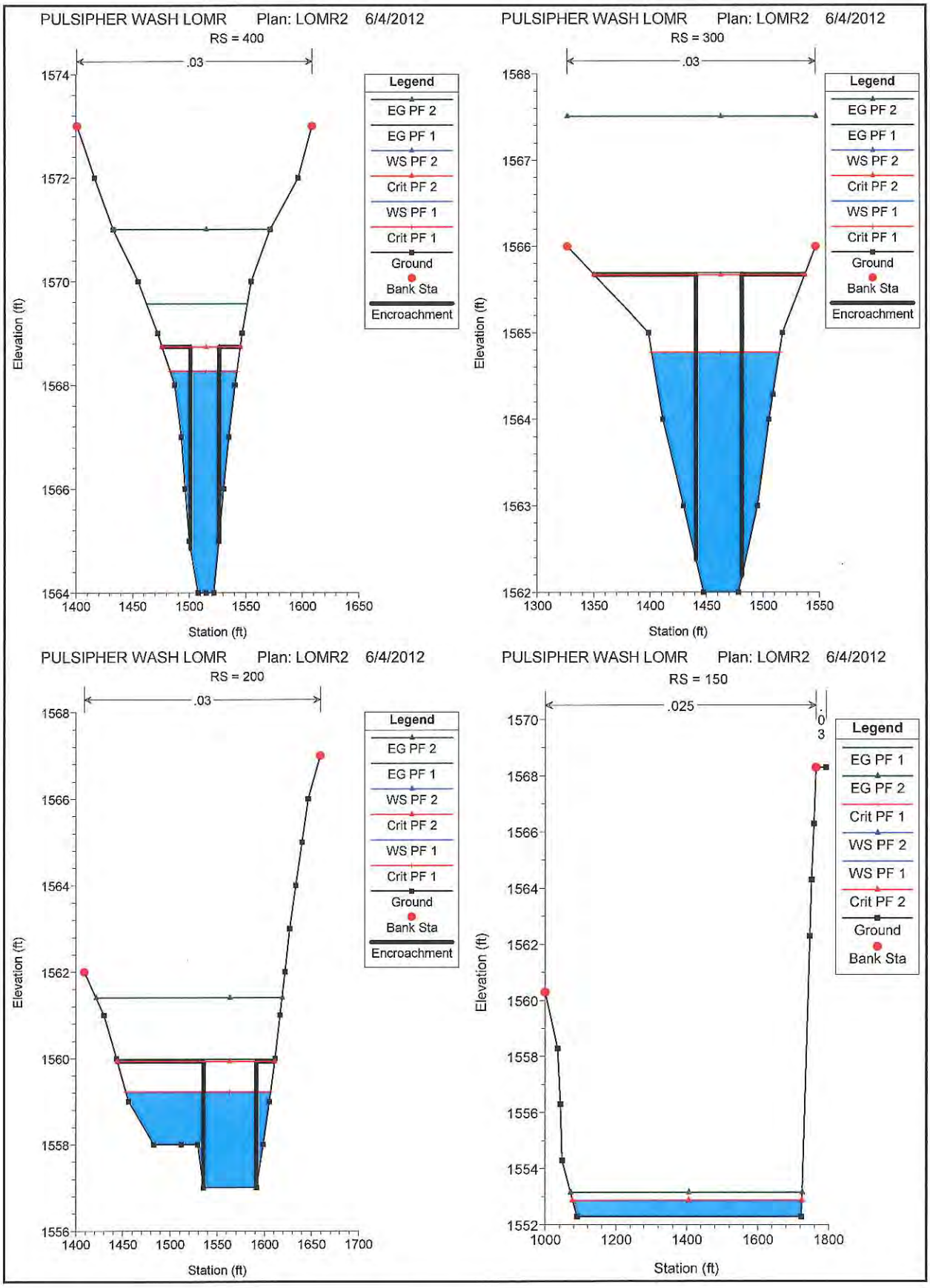

PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1900
.025
.015
.025
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 1
WS PF 1
Crit PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1800
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1750
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1700
.04
.025
.04
Legend
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1650
.04
.025
.04
Legend
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1600
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1500
Legend
EG PF 1
EG PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1400
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1300
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1200
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1100
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 1000
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 900
.04
.025
.04
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 800
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 700
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 600


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 580
.025
.015
.025
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 550 BR Hafen Lane Bridge
.025
.015
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 550 BR Hafen Lane Bridge
.025
.025
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 500
.025
.025
Legend
EG PF 1
EG PF 2
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 400
.03
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 300
.03
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 200
.03
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RS = 150
.025
.03
Legend
EG PF 1
EG PF 2
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: LOMR2 River: RIVER-1 Reach: Reach-1

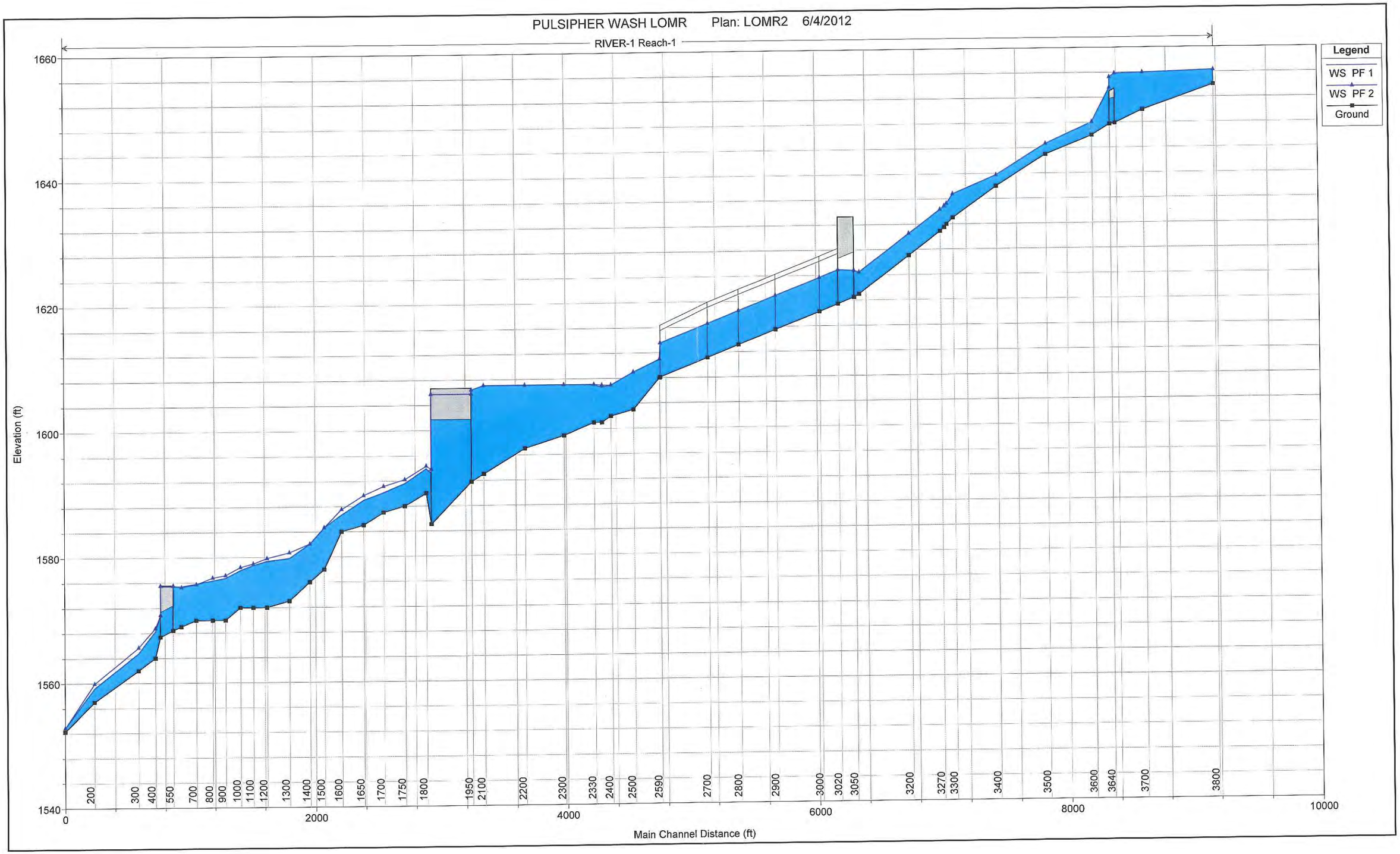
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	3800	PF 1	867.00	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3800	PF 2	867.00	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3700	PF 1	867.00	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3700	PF 2	867.00	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3660	PF 1	867.00	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3660	PF 2	867.00	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3650		Bridge									
Reach-1	3640	PF 1	867.00	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3640	PF 2	867.00	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3600	PF 1	867.00	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3600	PF 2	867.00	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3500	PF 1	867.00	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3500	PF 2	867.00	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3400	PF 1	867.00	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3400	PF 2	867.00	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3300	PF 1	867.00	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3300	PF 2	867.00	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3280	PF 1	867.00	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3280	PF 2	867.00	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3275	PF 1	867.00	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3275	PF 2	867.00	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3270	PF 1	867.00	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3270	PF 2	867.00	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3200	PF 1	867.00	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3200	PF 2	867.00	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3100	PF 1	867.00	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3100	PF 2	867.00	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3080	PF 1	867.00	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3080	PF 2	867.00	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3050		Bridge									
Reach-1	3020	PF 1	1723.00	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3020	PF 2	1723.00	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3000	PF 1	1723.00	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	3000	PF 2	1723.00	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	2900	PF 1	1723.00	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2900	PF 2	1723.00	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2800	PF 1	1723.00	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2800	PF 2	1723.00	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	PF 1	1723.00	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	PF 2	1723.00	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2600	PF 1	1723.00	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2600	PF 2	1723.00	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2590	PF 1	1723.00	1608.0	1611.0	1611.0	1612.3	0.006797	9.3	185.1	69	1.00
Reach-1	2590	PF 2	1723.00	1608.0	1611.0	1611.0	1612.5	0.007089	9.8	176.2	60	1.01
Reach-1	2500	PF 1	1972.00	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2500	PF 2	1972.00	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2400	PF 1	1972.00	1602.0	1607.0	1607.0	1608.8	0.008171	11.0	179.8	48	1.00
Reach-1	2400	PF 2	1972.00	1602.0	1607.0	1607.0	1608.8	0.008169	11.0	179.8	48	1.00
Reach-1	2350	PF 1	1972.00	1601.0	1606.7	1606.5	1607.9	0.005667	9.3	240.4	113	0.82
Reach-1	2350	PF 2	1972.00	1601.0	1607.0		1608.0	0.004332	8.3	270.8	103	0.72

HEC-RAS Plan: LOMR2 River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	2330	PF 1	1972.00	1601.0	1607.0		1607.4	0.002583	6.1	470.4	215	0.52
Reach-1	2330	PF 2	1972.00	1601.0	1607.1		1607.6	0.002999	6.6	392.4	148	0.56
Reach-1	2300	PF 1	1972.00	1599.0	1607.1		1607.2	0.000313	2.4	1138.7	322	0.18
Reach-1	2300	PF 2	1972.00	1599.0	1607.1		1607.2	0.000539	3.1	774.5	188	0.24
Reach-1	2200	PF 1	1972.00	1597.0	1607.1		1607.1	0.000021	0.8	3344.2	570	0.05
Reach-1	2200	PF 2	1972.00	1597.0	1607.1		1607.2	0.000108	1.9	1251.9	181	0.12
Reach-1	2100	PF 1	1972.00	1593.0	1607.1		1607.1	0.000028	1.7	1946.3	234	0.08
Reach-1	2100	PF 2	1972.00	1593.0	1607.1		1607.1	0.000030	1.8	1751.8	183	0.09
Reach-1	2000.1	PF 1	1972.00	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000.1	PF 2	1972.00	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000	PF 1	1498.00	1591.8	1605.8	1599.6	1607.0	0.000885	8.9	168.0	93	0.42
Reach-1	2000	PF 2	1498.00	1591.8	1605.8	1599.6	1607.0	0.001195	8.9	168.0	12	0.42
Reach-1	1950		Bridge									
Reach-1	1900	PF 1	1595.00	1585.1	1593.3	1593.3	1597.4	0.005139	16.2	98.2	12	1.00
Reach-1	1900	PF 2	1595.00	1585.1	1593.8	1593.2	1597.4	0.004321	15.2	105.1	12	0.90
Reach-1	1800	PF 1	1595.00	1590.0	1593.9	1593.9	1595.0	0.005719	9.1	228.1	104	0.85
Reach-1	1800	PF 2	1595.00	1590.0	1594.3	1594.3	1596.5	0.007701	11.8	135.5	31	1.00
Reach-1	1750	PF 1	1595.00	1588.0	1591.6	1591.6	1592.3	0.004592	8.4	330.5	217	0.81
Reach-1	1750	PF 2	1595.00	1588.0	1592.2	1592.2	1594.1	0.006672	11.3	150.2	40	0.99
Reach-1	1700	PF 1	1595.00	1587.0	1590.2		1590.6	0.004825	6.7	381.3	255	0.72
Reach-1	1700	PF 2	1595.00	1587.0	1591.2		1592.6	0.005305	10.1	185.9	56	0.89
Reach-1	1650	PF 1	1595.00	1585.0	1589.0	1589.0	1589.7	0.006317	7.7	310.1	227	0.81
Reach-1	1650	PF 2	1595.00	1585.0	1589.7	1589.7	1591.6	0.006723	10.9	152.2	43	0.99
Reach-1	1600	PF 1	1595.00	1584.0	1586.7	1586.7	1587.6	0.015504	7.8	203.9	123	1.00
Reach-1	1600	PF 2	1595.00	1584.0	1587.5	1587.5	1589.2	0.012808	10.4	153.7	46	1.00
Reach-1	1500	PF 1	1595.00	1578.0	1584.7		1584.9	0.000576	3.5	459.8	109	0.30
Reach-1	1500	PF 2	1595.00	1578.0	1584.7		1584.9	0.000566	3.5	458.4	106	0.29
Reach-1	1400	PF 1	1595.00	1576.0	1582.1	1582.1	1584.5	0.009907	12.4	128.8	27	1.00
Reach-1	1400	PF 2	1595.00	1576.0	1582.1	1582.1	1584.5	0.009933	12.4	128.7	27	1.00
Reach-1	1300	PF 1	1595.00	1573.0	1579.8	1579.5	1581.8	0.009488	11.2	142.6	31	0.92
Reach-1	1300	PF 2	1595.00	1573.0	1580.7		1582.1	0.005835	9.3	170.8	33	0.72
Reach-1	1200	PF 1	1595.00	1572.0	1579.4		1580.1	0.005689	7.0	228.2	60	0.63
Reach-1	1200	PF 2	1595.00	1572.0	1579.8		1581.0	0.005957	8.6	186.0	34	0.65
Reach-1	1100	PF 1	1595.00	1572.0	1578.7		1579.5	0.005019	7.2	222.6	53	0.61
Reach-1	1100	PF 2	1595.00	1572.0	1579.0		1580.2	0.006629	9.0	176.8	34	0.70
Reach-1	1000	PF 1	1595.00	1572.0	1578.0		1578.9	0.008097	7.7	206.6	57	0.72
Reach-1	1000	PF 2	1595.00	1572.0	1578.4		1579.5	0.006911	8.3	193.0	39	0.66
Reach-1	900	PF 1	1595.00	1570.0	1576.7		1577.8	0.009077	8.5	187.7	51	0.78
Reach-1	900	PF 2	1595.00	1570.0	1577.1		1578.5	0.008557	9.6	166.9	34	0.76
Reach-1	800	PF 1	1595.00	1570.0	1576.3		1577.0	0.005265	6.7	237.3	62	0.61
Reach-1	800	PF 2	1595.00	1570.0	1576.8		1577.7	0.005473	7.7	207.5	43	0.62
Reach-1	700	PF 1	1595.00	1570.0	1575.8		1576.4	0.003846	5.8	273.3	72	0.53
Reach-1	700	PF 2	1595.00	1570.0	1575.7		1576.9	0.006821	8.5	187.5	44	0.72
Reach-1	600	PF 1	1595.00	1569.0	1575.4		1576.0	0.002910	6.3	301.5	103	0.51
Reach-1	600	PF 2	1595.00	1569.0	1575.3		1576.2	0.004160	7.5	214.0	45	0.60
Reach-1	580	PF 1	1388.72	1568.4	1575.4	1571.9	1575.9	0.000323	5.3	262.7	37	0.35
Reach-1	580	PF 2	1388.72	1568.4	1575.5	1571.9	1576.0	0.000310	5.2	266.5	37	0.34
Reach-1	550		Bridge									
Reach-1	500	PF 1	1388.72	1567.4	1570.8	1570.8	1572.6	0.002753	10.7	130.2	37	1.01
Reach-1	500	PF 2	1388.72	1567.4	1570.9	1570.9	1572.6	0.002738	10.6	130.5	37	1.00

HEC-RAS Plan: LOMR2 River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	400	PF 1	1388.72	1564.0	1568.3	1568.3	1569.6	0.009870	9.1	151.8	59	1.01
Reach-1	400	PF 2	1388.72	1564.0	1568.7	1568.7	1571.0	0.011332	12.1	114.9	25	1.00
Reach-1	300	PF 1	1595.00	1562.0	1564.8	1564.8	1565.7	0.010764	7.7	207.2	113	1.00
Reach-1	300	PF 2	1595.00	1562.0	1565.7	1565.7	1567.5	0.010626	10.9	146.6	40	1.01
Reach-1	200	PF 1	1595.00	1557.0	1559.2	1559.2	1560.0	0.011742	7.0	228.2	153	1.01
Reach-1	200	PF 2	1595.00	1557.0	1559.9	1559.9	1561.4	0.010602	9.8	163.4	56	1.01
Reach-1	150	PF 1	1595.00	1552.3	1552.9	1552.9	1553.2	0.010922	4.3	371.7	647	1.00
Reach-1	150	PF 2	1595.00	1552.3	1552.9	1552.9	1553.2	0.010922	4.3	371.7	647	1.00


PULSIPHER WASH LOMR Plan: LOMR2 6/4/2012
RIVER-1 Reach-1
Legend
WS PF 1
WS PF 2
Ground
Elevation (ft)
1660
1640
1620
1600
1580
1560
1540
200
300
400
550
700
800
900
1000
1100
1200
1300
1400
1500
1600
1650
1700
1750
1800
1950
2100
2200
2300
2330
2400
2500
2590
2700
2800
2900
3000
3020
3050
3200
3270
3300
3400
3500
3600
3640
3700
3800
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

3. BACKUP FOR RESPONSE TO COMMENT #5

Figure 5R - Pulsipher Wash Cross Section Exhibit
(See Backup for Response to Comment #3)
Normal Depth Sections for Pulsipher Wash
HEC-RAS Model: Pulsipher Wash
Table 2: Pulsipher Wash Zone AE BFE Comparison
Table 4: Pulsipher Wash Hydraulic Modeling Summary

100-YEAR DITCH CHARACTERISTICS						
Ditch	Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	WSE (ft)	Velocity (ft/s)	Top Width (ft)
30N	0.42	204	4.1	1574.3	5.14	17.67
20N	3.89	204	1.7	1569.7	9.09	24.74
10N	2.61	204	2.4	1566.4	8.55	21.01

Worksheet for Cross Section 10N

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02610	ft/ft
Discharge	204.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1569.00
10+04.16	1568.00
10+07.88	1567.00
10+11.82	1566.00
10+14.44	1565.00
10+17.26	1564.00
10+22.51	1565.00
10+28.49	1566.00
10+35.50	1567.00
10+40.40	1568.00
10+45.62	1569.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1569.00)	(10+45.62, 1569.00)	0.030

Results

Normal Depth		2.40	ft
Elevation Range	1564.00 to 1569.00 ft		
Flow Area		23.86	ft^2
Wetted Perimeter		21.62	ft
Top Width		21.01	ft
Normal Depth		2.40	ft
Critical Depth		2.74	ft

Worksheet for Cross Section 10N

Results

Critical Slope		0.01252	ft/ft
Velocity		8.55	ft/s
Velocity Head		1.14	ft
Specific Energy		3.53	ft
Froude Number		1.41	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity	ft/s
Upstream Velocity		Infinity	ft/s
Normal Depth		2.40	ft
Critical Depth		2.74	ft
Channel Slope		0.02610	ft/ft
Critical Slope		0.01252	ft/ft

Cross Section for Cross Section 10N

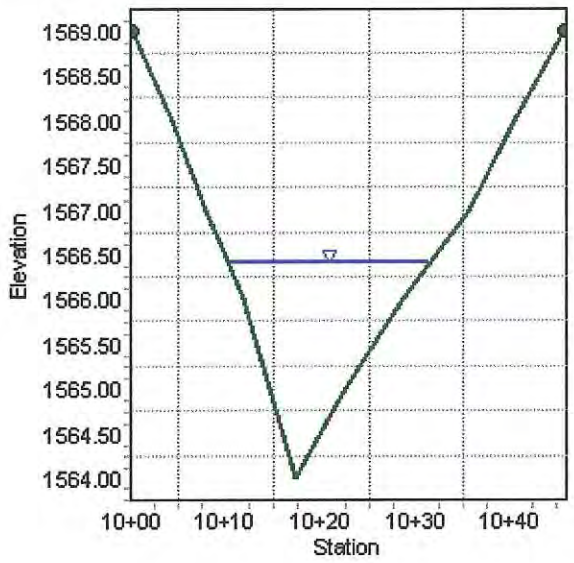
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02610	ft/ft
Normal Depth	2.40	ft
Discharge	204.00	ft^3/s

Cross Section Image



Worksheet for Cross Section 20N

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03890	ft/ft
Discharge	204.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1574.00
10+01.74	1573.00
10+04.05	1572.00
10+06.35	1571.00
10+09.63	1570.00
10+13.99	1569.00
10+19.77	1568.00
10+29.95	1569.00
10+37.94	1570.00
10+40.60	1571.00
10+43.20	1572.00
10+46.24	1573.00
10+51.96	1574.00
10+54.75	1575.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1574.00)	(10+54.75, 1575.00)	0.030

Results

Normal Depth		1.71	ft
Elevation Range	1568.00 to 1575.00 ft		
Flow Area		22.44	ft²
Wetted Perimeter		25.00	ft

Worksheet for Cross Section 20N

Results

Top Width		24.74	ft
Normal Depth		1.71	ft
Critical Depth		2.12	ft
Critical Slope		0.01270	ft/ft
Velocity		9.09	ft/s
Velocity Head		1.28	ft
Specific Energy		3.00	ft
Froude Number		1.68	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.71	ft
Critical Depth	2.12	ft
Channel Slope	0.03890	ft/ft
Critical Slope	0.01270	ft/ft

Cross Section for Cross Section 20N

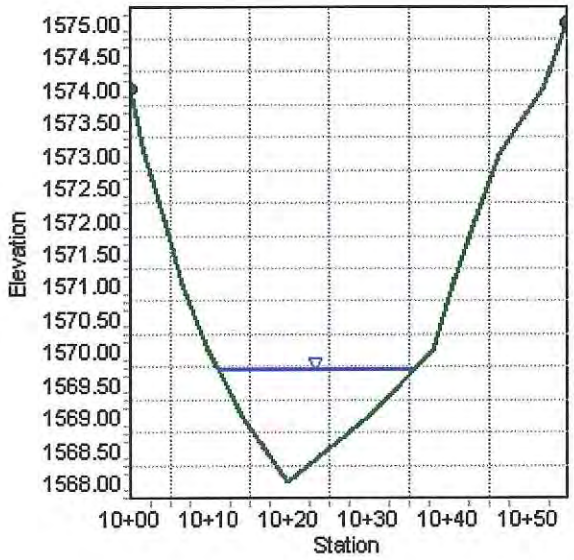
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03890	ft/ft
Normal Depth	1.71	ft
Discharge	204.00	ft^3/s

Cross Section Image



Worksheet for Cross Section 30N

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00420	ft/ft
Discharge	204.00	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1576.00
10+11.90	1575.00
10+13.50	1574.00
10+15.10	1573.00
10+17.30	1572.00
10+20.60	1571.00
10+23.30	1570.23
10+24.70	1571.00
10+26.60	1572.00
10+28.60	1573.00
10+30.30	1574.00
10+31.80	1575.00
10+33.50	1576.00
10+35.44	1577.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1576.00)	(10+35.44, 1577.00)	0.030

Results

Normal Depth	4.05	ft
Elevation Range	1570.23 to 1577.00 ft	
Flow Area	39.65	ft^2
Wetted Perimeter	19.55	ft

Worksheet for Cross Section 30N

Results

Top Width		17.67	ft
Normal Depth		4.05	ft
Critical Depth		3.28	ft
Critical Slope		0.01222	ft/ft
Velocity		5.14	ft/s
Velocity Head		0.41	ft
Specific Energy		4.46	ft
Froude Number		0.61	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity	ft/s
Upstream Velocity		Infinity	ft/s
Normal Depth		4.05	ft
Critical Depth		3.28	ft
Channel Slope		0.00420	ft/ft
Critical Slope		0.01222	ft/ft

Cross Section for Cross Section 30N

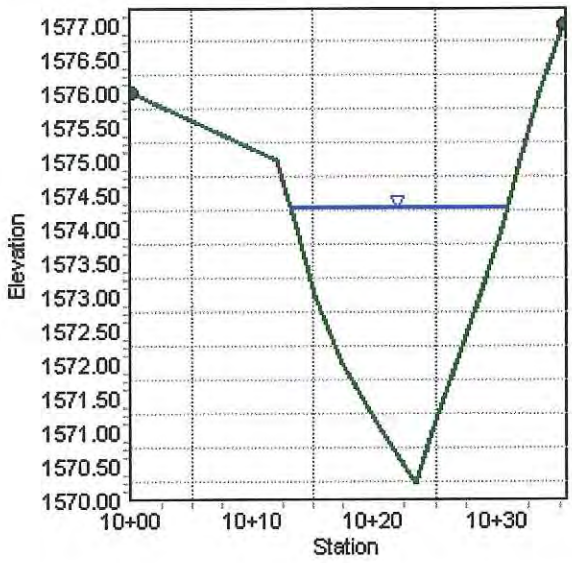
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00420	ft/ft
Normal Depth	4.05	ft
Discharge	204.00	ft^3/s

Cross Section Image



HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: PULSIPHER WASH LOMR
Project File : PULSWASH.prj
Run Date and Time: 4/20/2012 3:02:58 PM

Project in English units

Project Description:

PLAN DATA

Plan Title: LOMR
Plan File : F:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.p02

Geometry Title: LOMR
Geometry File : F:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.g02

Flow Title : LOMR
Flow File : F:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.f07

Plan Description:
LOMR Model With New Topo.

Plan Summary Information:
Number of: Cross Sections = 51 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 4 Lateral Structures = 0

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

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

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = RIVER-1		Reach = Reach-1		
RS	Profile	Method	Value1	Value2
2600	PF 2	1	1037.67	1062.33
2590	PF 2	1	1040	1100
2500	PF 2	1	1030.12	1106.13
2400	PF 2	1	1293.09	1384.56
2350	PF 2	1	1080	1220.41
2330	PF 2	1	1150	1330.73
2300	PF 2	1	1163.5	1383.27
2200	PF 2	1	1400	1594.9
2100	PF 2	1	1010.56	1206.95
2000.1	PF 2	1	990.1	1094.79
2000	PF 2	1	1044.29	1056.29
1900	PF 2	1	1193.33	1205.33
1800	PF 2	1	1117.33	1148.63
1750	PF 2	1	1278.17	1318.26
1700	PF 2	1	1408.08	1464.52
1650	PF 2	1	1557.78	1600.56
1600	PF 2	1	1462.44	1508.14
1500	PF 2	1	1046	1152.39
1400	PF 2	1	1311.27	1345.71
1300	PF 2	1	1634.75	1667.65
1200	PF 2	1	1624.95	1659.47
1100	PF 2	1	1619.57	1655.53
1000	PF 2	1	1619.06	1659.32
900	PF 2	1	1615.48	1651.44
800	PF 2	1	1601.95	1646.84
700	PF 2	1	1594.24	1641.44
600	PF 2	1	1581.21	1627.65
580	PF 2	1	995	1042.34
500	PF 2	1	1000	1037.34
400	PF 2	1	1501.15	1526.53
300	PF 2	1	1441.01	1481.38
200	PF 2	1	1535.63	1591.46

FLOW DATA

Flow Title: LOMR
Flow File : F:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.f07

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
RIVER-1	Reach-1	3800	867	867
RIVER-1	Reach-1	3020	1723	1723
RIVER-1	Reach-1	2500	1972	1972
RIVER-1	Reach-1	2000	1498	1498
RIVER-1	Reach-1	1900	1595	1595
RIVER-1	Reach-1	580	1388.72	1388.72
RIVER-1	Reach-1	300	1595	1595

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1	Critical	Normal S = 0.014
RIVER-1	Reach-1	PF 2	Critical	Normal S = 0.014

GEOMETRY DATA

Geometry Title: LOMR
Geometry File : F:\Projects\500\550-048\Division\Fctl\Calcs\FEMA-RTC\HEC-RAS-PUL\PULSWASH.g02

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3800

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1671	1002.55	1670	1004.98	1669	1007.44	1668	1009.93	1667
1012.44	1666	1014.93	1665	1017.43	1664	1019.96	1663	1022.51	1662
1025.01	1661	1028.37	1660	1033.4	1659	1039.81	1658	1062.59	1657
1109.41	1656	1175.5	1655	1176.9	1654	1182.94	1654	1186.39	1655
1305.1	1656	1372.97	1657	1416.24	1658	1439.98	1659	1445.27	1660
1451.68	1661	1456.68	1662	1462.39	1663	1467.92	1664	1474.06	1665
1480.09	1666	1486.5	1667	1494.56	1668	1506.49	1669	1529.92	1670

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1028.37	.025	1445.27	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1506.49	580	553	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.68	Element		0.025	
Vel Head (ft)	0.38	Wt. n-Val.			
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	36.94	42.55	1.43
C & E Loss (ft)	0.09	Cum SA (acres)	9.93	12.32	0.76

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.68	Element		0.025	
Vel Head (ft)	0.38	Wt. n-Val.			
W.S. Elev (ft)	1656.30	Reach Len. (ft)	580.00	566.00	553.00
Crit W.S. (ft)	1656.30	Flow Area (sq ft)		176.08	
E.G. Slope (ft/ft)	0.009844	Area (sq ft)		176.08	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	230.33	Top Width (ft)		230.33	
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)		4.92	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.76	
Conv. Total (cfs)	8738.2	Conv. (cfs)		8738.2	
Length Wtd. (ft)	566.23	Wetted Per. (ft)		230.81	
Min Ch El (ft)	1654.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		2.31	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	14.09	41.17	1.25
C & E Loss (ft)	0.09	Cum SA (acres)	3.18	10.68	0.60

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3700

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1280.37	1657	1280.37	1655	1281.45	1655	1314.63	1655	1322.87	1654
1330.66	1653	1346.03	1652	1356.88	1651	1360.42	1650	1379.62	1650
1381.69	1651	1386.37	1652	1389	1653	1407.85	1654	1447.99	1655
1471.23	1656	1480.45	1657	1483.65	1658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1280.37	.024	1314.63	.025	1447.99	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1314.63	1447.99	222.1	225	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1656.03	Element	0.024	0.025	0.040
Vel Head (ft)	0.06	Wt. n-Val.	222.10	225.00	219.50
W.S. Elev (ft)	1655.97	Reach Len. (ft)	33.34	414.54	11.01
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	31.66	831.31	4.02
Q Total (cfs)	867.00	Flow (cfs)	34.26	133.36	22.62
Top Width (ft)	190.24	Top Width (ft)	0.95	2.01	0.37
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.97	3.11	0.49
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	1990.0	52245.1	252.8
Conv. Total (cfs)	54487.9	Conv. (cfs)	35.23	134.26	22.64
Length Wtd. (ft)	224.44	Wetted Per. (ft)			

Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.72	38.71	1.36
C & E Loss (ft)	0.00	Cum SA (acres)	9.70	9.96	0.62

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1656.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.024	0.025	0.040
W.S. Elev (ft)	1655.97	Reach Len. (ft)	222.10	225.00	219.50
Crit W.S. (ft)		Flow Area (sq ft)	33.34	414.54	11.01
E.G. Slope (ft/ft)	0.000253	Area (sq ft)	33.34	414.54	11.01
Q Total (cfs)	867.00	Flow (cfs)	31.66	831.31	4.02
Top Width (ft)	190.24	Top Width (ft)	34.26	133.36	22.62
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	0.95	2.01	0.37
Max Chl Dpth (ft)	5.97	Hydr. Depth (ft)	0.97	3.11	0.49
Conv. Total (cfs)	54487.9	Conv. (cfs)	1990.0	52245.1	252.8
Length Wtd. (ft)	224.44	Wetted Per. (ft)	35.23	134.26	22.64
Min Ch El (ft)	1650.00	Shear (lb/sq ft)	0.01	0.05	0.01
Alpha	1.09	Stream Power (lb/ft s)	0.01	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.87	37.33	1.18
C & E Loss (ft)	0.00	Cum SA (acres)	2.95	8.32	0.46

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3660

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1053.91	42.6	42.6	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1655.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040
W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	36.41	36.99	1.16
C & E Loss (ft)		Cum SA (acres)	9.51	9.47	0.46

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1655.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.040	0.033	0.040
W.S. Elev (ft)	1655.87	Reach Len. (ft)	0.05	0.05	0.05
Crit W.S. (ft)	1653.21	Flow Area (sq ft)	88.44	252.60	71.42
E.G. Slope (ft/ft)	0.000508	Area (sq ft)	88.44	252.60	71.42
Q Total (cfs)	867.00	Flow (cfs)	124.32	651.94	90.74
Top Width (ft)	130.19	Top Width (ft)	38.20	53.91	38.08
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.41	2.58	1.27
Max Chl Dpth (ft)	7.96	Hydr. Depth (ft)	2.32	4.69	1.88
Conv. Total (cfs)	38449.6	Conv. (cfs)	5513.2	28912.2	4024.2
Length Wtd. (ft)	0.05	Wetted Per. (ft)	40.69	62.11	38.23
Min Ch El (ft)	1647.91	Shear (lb/sq ft)	0.07	0.13	0.06
Alpha	1.24	Stream Power (lb/ft s)	0.10	0.33	0.08
Frctn Loss (ft)		Cum Volume (acre-ft)	13.56	35.61	0.97
C & E Loss (ft)		Cum SA (acres)	2.77	7.83	0.30

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3650

INPUT
Description: Bridge #1
Distance from Upstream XS = .05
Deck/Roadway Width = 42.5
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
961.8	1653.41	1653.41	978.2	1653.93	1653.93	1000	1654.76	1651.92
1018	1655	1651.92	1030	1655	1651.92	1044.54	1655.2	1652
1080	1656	1653.53	1092.95	1656				

Upstream Bridge Cross Section Data
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
961.8	1657	961.8	1653.41	978.2	1653.93	1000	1653	1003.3	1652
1018	1651.91	1018	1647.91	1030	1647.91	1030	1651.91	1044.54	1652
1053.91	1653	1079.15	1654	1085.65	1655	1092.95	1656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
961.8	.04	1018	.015	1030	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1053.91	.3	.5

Downstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
978.2	1653.6	1653	1000	1654.76	1651.78	1013.95	1654.76	1651.78
1025.95	1654.76	1651.78	1200	1655	1651.78			

Downstream Bridge Cross Section Data

```
Station Elevation Data    num=      11
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    956.1     1654    956.1     1653     1000     1653 1004.55     1652 1013.95 1651.78
 1013.95 1647.78 1025.95 1647.78 1025.95 1651.78 1030.32     1652 1041.18     1653
 1056.22     1654

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
    956.1     .04 1013.95    .015 1025.95     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1000 1030.32             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)              1655.96   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1655.87   E.G. Elev (ft)            1655.95       1655.95
  Q Total (cfs)               867.00   W.S. Elev (ft)            1655.87       1655.28
  Q Bridge (cfs)              472.60   Crit W.S. (ft)            1655.64       1655.28
  Q Weir (cfs)                394.40   Max Chl Dpth (ft)            7.96          7.50
  Weir Sta Lft (ft)           961.80   Vel Total (ft/s)             4.91          3.97
  Weir Sta Rgt (ft)          1077.92   Flow Area (sq ft)          176.43        218.36
  Weir Submerg                  0.00   Froude # Chl                 0.32          0.37
  Weir Max Depth (ft)           2.54   Specif Force (cu ft)       523.60        522.47
  Min El Weir Flow (ft)      1653.42   Hydr Depth (ft)              1.57          2.18
  Min El Prs (ft)            1652.00   W.P. Total (ft)            179.21        135.51
  Delta EG (ft)                 1.48   Conv. Total (cfs)
  Delta WS (ft)                 2.27   Top Width (ft)             112.36        100.12
  BR Open Area (sq ft)         48.00   Frctn Loss (ft)
  BR Open Vel (ft/s)            9.85   C & E Loss (ft)
  Coef of Q                            Shear Total (lb/sq ft)
  Br Sel Method          Press/Weir    Power Total (lb/ft s)


Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

BRIDGE OUTPUT  Profile #PF 2

  E.G. US. (ft)              1655.96   Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1655.87   E.G. Elev (ft)            1655.95       1655.95
  Q Total (cfs)               867.00   W.S. Elev (ft)            1655.87       1655.28
  Q Bridge (cfs)              472.60   Crit W.S. (ft)            1655.64       1655.28
  Q Weir (cfs)                394.40   Max Chl Dpth (ft)            7.96          7.50
  Weir Sta Lft (ft)           961.80   Vel Total (ft/s)             4.91          3.97
  Weir Sta Rgt (ft)          1077.92   Flow Area (sq ft)          176.43        218.36
  Weir Submerg                  0.00   Froude # Chl                 0.32          0.37
  Weir Max Depth (ft)           2.54   Specif Force (cu ft)       523.60        522.47
  Min El Weir Flow (ft)      1653.42   Hydr Depth (ft)              1.57          2.18
  Min El Prs (ft)            1652.00   W.P. Total (ft)            179.21        135.51
  Delta EG (ft)                 1.48   Conv. Total (cfs)
  Delta WS (ft)                 2.27   Top Width (ft)             112.36        100.12
  BR Open Area (sq ft)         48.00   Frctn Loss (ft)
  BR Open Vel (ft/s)            9.85   C & E Loss (ft)
  Coef of Q                            Shear Total (lb/sq ft)
  Br Sel Method          Press/Weir    Power Total (lb/ft s)


Note:    The downstream water surface is above the minimum elevation required for orifice flow.  The
         orifice flow equation was used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Note:    For the cross section inside the bridge at the downstream end, the water surface is based on
         critical depth over the weir.  The energy has been projected.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION


RIVER: RIVER-1
REACH: Reach-1            RS: 3640

INPUT
Description:
Station Elevation Data    num=      11
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    956.1     1654    956.1     1653     1000     1653 1004.55     1652 1013.95 1651.78
 1013.95 1647.78 1025.95 1647.78 1025.95 1651.78 1030.32     1652 1041.18     1653
 1056.22     1654

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
    956.1     .04 1013.95    .015 1025.95     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1000 1030.32             143.1   143.1   143.1             .3       .5
```

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1654.47	Element			
Vel Head (ft)	0.87	Wt. n-Val.	0.040	0.028	0.040
W.S. Elev (ft)	1653.60	Reach Len. (ft)	143.10	143.10	143.10
Crit W.S. (ft)	1653.60	Flow Area (sq ft)	26.28	98.35	14.63
E.G. Slope (ft/ft)	0.006509	Area (sq ft)	26.28	98.35	14.63
Q Total (cfs)	867.00	Flow (cfs)	55.44	775.89	35.67
Top Width (ft)	94.08	Top Width (ft)	43.90	30.32	19.86
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	2.11	7.89	2.44
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	0.60	3.24	0.74
Conv. Total (cfs)	10746.1	Conv. (cfs)	687.2	9616.8	442.1
Length Wtd. (ft)	143.10	Wetted Per. (ft)	44.50	38.44	19.93
Min Ch El (ft)	1647.78	Shear (lb/sq ft)	0.24	1.04	0.30
Alpha	1.45	Stream Power (lb/ft s)	0.51	8.20	0.73
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	36.34	36.91	1.15
C & E Loss (ft)	0.05	Cum SA (acres)	9.47	9.43	0.44

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1654.47	Element			
Vel Head (ft)	0.87	Wt. n-Val.	0.040	0.028	0.040
W.S. Elev (ft)	1653.60	Reach Len. (ft)	143.10	143.10	143.10
Crit W.S. (ft)	1653.60	Flow Area (sq ft)	26.28	98.35	14.63
E.G. Slope (ft/ft)	0.006509	Area (sq ft)	26.28	98.35	14.63
Q Total (cfs)	867.00	Flow (cfs)	55.44	775.89	35.67
Top Width (ft)	94.08	Top Width (ft)	43.90	30.32	19.86
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)	2.11	7.89	2.44
Max Chl Dpth (ft)	5.82	Hydr. Depth (ft)	0.60	3.24	0.74
Conv. Total (cfs)	10746.1	Conv. (cfs)	687.2	9616.8	442.1
Length Wtd. (ft)	143.10	Wetted Per. (ft)	44.50	38.44	19.93
Min Ch El (ft)	1647.78	Shear (lb/sq ft)	0.24	1.04	0.30
Alpha	1.45	Stream Power (lb/ft s)	0.51	8.20	0.73
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	13.49	35.53	0.96
C & E Loss (ft)	0.05	Cum SA (acres)	2.73	7.79	0.28

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3600

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.66	1651	1192.77	1650	1195.19	1649	1195.3	1648	1195.4	1647		
1196.31	1646	1222.7	1646	1244.81	1646	1245.9	1647	1246.87	1648		
1274.89	1649	1319.68	1650								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.66	.025	1246.87	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1185.66	1246.87	366.01	370 383	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1649.14	Element			
Vel Head (ft)	1.03	Wt. n-Val.		0.025	0.040
W.S. Elev (ft)	1648.11	Reach Len. (ft)	366.01	370.00	383.00
Crit W.S. (ft)	1648.11	Flow Area (sq ft)		106.20	0.17
E.G. Slope (ft/ft)	0.007625	Area (sq ft)		106.20	0.17
Q Total (cfs)	867.00	Flow (cfs)		866.92	0.08
Top Width (ft)	54.66	Top Width (ft)		51.58	3.08
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)		8.16	0.47
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		2.06	0.05
Conv. Total (cfs)	9929.1	Conv. (cfs)		9928.2	0.9
Length Wtd. (ft)	370.00	Wetted Per. (ft)		53.84	3.08
Min Ch El (ft)	1646.00	Shear (lb/sq ft)		0.94	0.03
Alpha	1.00	Stream Power (lb/ft s)		7.66	0.01
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)	36.30	36.58	1.12
C & E Loss (ft)	0.05	Cum SA (acres)	9.40	9.30	0.40

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1649.14	Element			
Vel Head (ft)	1.03	Wt. n-Val.		0.025	0.040
W.S. Elev (ft)	1648.11	Reach Len. (ft)	366.01	370.00	383.00
Crit W.S. (ft)	1648.11	Flow Area (sq ft)		106.20	0.17
E.G. Slope (ft/ft)	0.007625	Area (sq ft)		106.20	0.17
Q Total (cfs)	867.00	Flow (cfs)		866.92	0.08
Top Width (ft)	54.66	Top Width (ft)		51.58	3.08
Vel Total (ft/s)	8.15	Avg. Vel. (ft/s)		8.16	0.47
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		2.06	0.05
Conv. Total (cfs)	9929.1	Conv. (cfs)		9928.2	0.9
Length Wtd. (ft)	370.00	Wetted Per. (ft)		53.84	3.08
Min Ch El (ft)	1646.00	Shear (lb/sq ft)		0.94	0.03
Alpha	1.00	Stream Power (lb/ft s)		7.66	0.01
Frctn Loss (ft)	2.90	Cum Volume (acre-ft)	13.44	35.20	0.94
C & E Loss (ft)	0.05	Cum SA (acres)	2.66	7.66	0.24

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there

is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3500

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1185.43	1649	1191.81	1648	1200.57	1647	1203.67	1646	1203.79	1645
1203.93	1644	1204.11	1643	1271.04	1643	1272.02	1644	1272.99	1645

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1185.43	.025	1272.99	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1185.43	1272.99	392	394	393	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1645.58	Wt. n-Val.		0.025	
Vel Head (ft)	0.86	Reach Len. (ft)	392.00	394.00	393.00
W.S. Elev (ft)	1644.72	Flow Area (sq ft)		116.69	
Crit W.S. (ft)	1644.72	Area (sq ft)		116.69	
E.G. Slope (ft/ft)	0.008069	Flow (cfs)		867.00	
Q Total (cfs)	867.00	Top Width (ft)		68.89	
Top Width (ft)	68.89	Avg. Vel. (ft/s)		7.43	
Vel Total (ft/s)	7.43	Hydr. Depth (ft)		1.69	
Max Chl Dpth (ft)	1.72	Conv. (cfs)		9652.1	
Conv. Total (cfs)	9652.1	Wetted Per. (ft)		71.07	
Length Wtd. (ft)	394.00	Shear (lb/sq ft)		0.83	
Min Ch El (ft)	1643.00	Stream Power (lb/ft s)		6.14	
Alpha	1.00	Cum Volume (acre-ft)	36.30	35.63	1.12
Frctn Loss (ft)	3.15	Cum SA (acres)	9.40	8.79	0.39
C & E Loss (ft)	0.00				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1645.58	Wt. n-Val.		0.025	
Vel Head (ft)	0.86	Reach Len. (ft)	392.00	394.00	393.00
W.S. Elev (ft)	1644.72	Flow Area (sq ft)		116.69	
Crit W.S. (ft)	1644.72	Area (sq ft)		116.69	
E.G. Slope (ft/ft)	0.008069	Flow (cfs)		867.00	
Q Total (cfs)	867.00	Top Width (ft)		68.89	
Top Width (ft)	68.89	Avg. Vel. (ft/s)		7.43	
Vel Total (ft/s)	7.43	Hydr. Depth (ft)		1.69	
Max Chl Dpth (ft)	1.72	Conv. (cfs)		9652.1	
Conv. Total (cfs)	9652.1	Wetted Per. (ft)		71.07	
Length Wtd. (ft)	394.00	Shear (lb/sq ft)		0.83	
Min Ch El (ft)	1643.00	Stream Power (lb/ft s)		6.14	
Alpha	1.00	Cum Volume (acre-ft)	13.44	34.25	0.93
Frctn Loss (ft)	3.15	Cum SA (acres)	2.66	7.15	0.23
C & E Loss (ft)	0.00				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3400

INPUT
Description:
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1174.01	1645	1182.77	1644	1191.91	1643	1203.38	1642	1203.74	1641
1204.11	1640	1204.45	1639	1205.66	1638	1267.93	1638	1268.7	1639
1269.3	1640	1269.92	1641	1270.52	1642				

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1174.01	.025	1270.52	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1174.01	1270.52	347	344	345	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1640.68	Wt. n-Val.		0.025	
Vel Head (ft)	0.89	Reach Len. (ft)	347.00	344.00	345.00
W.S. Elev (ft)	1639.79	Flow Area (sq ft)		114.49	
Crit W.S. (ft)	1639.79	Area (sq ft)		114.49	
E.G. Slope (ft/ft)	0.007925	Flow (cfs)		867.00	
Q Total (cfs)	867.00	Top Width (ft)		65.00	
Top Width (ft)	65.00	Avg. Vel. (ft/s)		7.57	
Vel Total (ft/s)	7.57	Hydr. Depth (ft)		1.76	
Max Chl Dpth (ft)	1.79	Conv. (cfs)		9739.3	
Conv. Total (cfs)	9739.3	Wetted Per. (ft)		66.86	
Length Wtd. (ft)	344.00	Shear (lb/sq ft)		0.85	
Min Ch El (ft)	1638.00	Stream Power (lb/ft s)		6.42	
Alpha	1.00	Cum Volume (acre-ft)	36.30	34.59	1.12
Frctn Loss (ft)	0.70	Cum SA (acres)	9.40	8.18	0.39
C & E Loss (ft)	0.18				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1640.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.025	
W.S. Elev (ft)	1639.79	Reach Len. (ft)	347.00	344.00	345.00
Crit W.S. (ft)	1639.79	Flow Area (sq ft)		114.49	
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		114.49	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	65.00	Top Width (ft)		65.00	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	1.79	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	9739.3	Conv. (cfs)		9739.3	
Length Wtd. (ft)	344.00	Wetted Per. (ft)		66.86	
Min Ch El (ft)	1638.00	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.42	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	13.44	33.21	0.93
C & E Loss (ft)	0.18	Cum SA (acres)	2.66	6.54	0.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3300

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1144.3	1642	1153.36	1641	1158.42	1640	1162.21	1639	1162.36	1638
1162.51	1637	1162.62	1636	1162.75	1635	1163.8	1634	1189.67	1633
1242.25	1633	1242.79	1634	1243.32	1635	1243.87	1636	1244.41	1637
1244.96	1638	1245.55	1639	1246.13	1640	1251	1641		

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1144.3	.025	1251	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1144.3 1251 49 51 53 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1144.3	1189.67	1642	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1637.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.025	
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	32.98	1.12
C & E Loss (ft)	0.13	Cum SA (acres)	9.40	7.60	0.39

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1637.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.025	
W.S. Elev (ft)	1636.82	Reach Len. (ft)	49.00	51.00	53.00
Crit W.S. (ft)	1635.02	Flow Area (sq ft)		204.99	
E.G. Slope (ft/ft)	0.000917	Area (sq ft)		293.62	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	81.79	Top Width (ft)		81.79	
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		3.75	
Conv. Total (cfs)	28624.3	Conv. (cfs)		28624.3	
Length Wtd. (ft)	51.00	Wetted Per. (ft)		56.93	
Min Ch El (ft)	1633.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.87	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	31.59	0.93
C & E Loss (ft)	0.13	Cum SA (acres)	2.66	5.96	0.23

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3280

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1165.69	1641	1173.74	1640	1182.15	1639	1191.29	1638	1197.14	1637
1201.59	1636	1205.39	1635	1206.42	1634	1207.35	1633	1208.6	1632
1232.89	1632	1261.87	1633	1290.19	1634	1295.73	1635	1319.69	1635
1353.86	1635	1373.83	1636	1395.64	1637	1415.94	1638	1430.06	1639

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1165.69	.04	1205.39	.025	1295.73	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1205.39 1295.73 17.5 17.5 17.5 .1 .3
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1165.69	1205.39	1655	F
1232.89	1430.06	1655	F

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.87	Element			
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	36.30	32.67	1.11
C & E Loss (ft)	0.01	Cum SA (acres)	9.40	7.50	0.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.87	Element			
Vel Head (ft)	1.57	Wt. n-Val.		0.025	
W.S. Elev (ft)	1635.30	Reach Len. (ft)	17.50	17.50	17.50
Crit W.S. (ft)	1635.30	Flow Area (sq ft)		86.24	
E.G. Slope (ft/ft)	0.006595	Area (sq ft)	0.17	222.99	18.54
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	155.67	Top Width (ft)	1.15	90.34	64.18
Vel Total (ft/s)	10.05	Avg. Vel. (ft/s)		10.05	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		3.14	
Conv. Total (cfs)	10675.8	Conv. (cfs)		10675.8	
Length Wtd. (ft)	17.50	Wetted Per. (ft)		28.69	
Min Ch El (ft)	1632.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		12.44	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	13.44	31.29	0.92
C & E Loss (ft)	0.01	Cum SA (acres)	2.65	5.86	0.19

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3275

INPUT
Description: Start of U Channel
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1639.64	1037.67	1631.64	1050	1631.49	1062.33	1631.64	1062.33	1639.64

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	33	33	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.63	Element			
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	32.61	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	7.48	0.34

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

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.63	Element			
Vel Head (ft)	1.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.93	Reach Len. (ft)	33.00	33.00	33.00
Crit W.S. (ft)	1634.93	Flow Area (sq ft)		83.02	
E.G. Slope (ft/ft)	0.003020	Area (sq ft)		83.02	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.44	Avg. Vel. (ft/s)		10.44	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		3.37	
Conv. Total (cfs)	15777.2	Conv. (cfs)		15777.2	
Length Wtd. (ft)	33.00	Wetted Per. (ft)		31.24	
Min Ch El (ft)	1631.49	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.23	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	31.23	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.84	0.18

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

is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3270

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1639.12	1037.67	1631.12	1050	1630.88	1062.33	1631.12	1062.33	1639.12

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	250	250	250	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.06	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.36	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1634.36	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003029	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15753.8	Conv. (cfs)		15753.8	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1630.88	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	36.30	32.55	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	7.46	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1636.06	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1634.36	Reach Len. (ft)	250.00	250.00	250.00
Crit W.S. (ft)	1634.36	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003029	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15753.8	Conv. (cfs)		15753.8	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1630.88	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	13.44	31.17	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.82	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3200

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1635.33	1037.67	1627.33	1050	1627.08	1062.33	1627.33	1062.33	1635.33

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	400	400	400	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1632.27	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1630.57	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1630.57	Flow Area (sq ft)		82.90	
E.G. Slope (ft/ft)	0.003021	Area (sq ft)		82.90	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.46	Avg. Vel. (ft/s)		10.46	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15774.5	Conv. (cfs)		15774.5	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1627.08	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.25	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)	36.30	32.07	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	7.32	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1632.27	Element			
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1630.57	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)	1630.57	Flow Area (sq ft)		82.90	
E.G. Slope (ft/ft)	0.003021	Area (sq ft)		82.90	
Q Total (cfs)	867.00	Flow (cfs)		867.00	

Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.46	Avg. Vel. (ft/s)		10.46	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15774.5	Conv. (cfs)		15774.5	
Length Wtd. (ft)	400.00	Wetted Per. (ft)		31.14	
Min Ch El (ft)	1627.08	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.25	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)	13.44	30.69	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.68	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3100

INPUT
Description:

Station Elevation Data	num=	5							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1629.25	1037.67	1621.25	1050	1621	1062.33	1621.25	1062.33	1629.25

Manning's n Values	num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	40	40	40	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1626.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.48	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	1624.48	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003027	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15758.0	Conv. (cfs)		15758.0	
Length Wtd. (ft)	40.00	Wetted Per. (ft)		31.13	
Min Ch El (ft)	1621.00	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	36.30	31.31	1.11
C & E Loss (ft)	0.18	Cum SA (acres)	9.40	7.09	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1626.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.70	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.48	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	1624.48	Flow Area (sq ft)		82.84	
E.G. Slope (ft/ft)	0.003027	Area (sq ft)		82.84	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.66	Top Width (ft)		24.66	
Vel Total (ft/s)	10.47	Avg. Vel. (ft/s)		10.47	
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	15758.0	Conv. (cfs)		15758.0	
Length Wtd. (ft)	40.00	Wetted Per. (ft)		31.13	
Min Ch El (ft)	1621.00	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		5.26	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	13.44	29.93	0.92
C & E Loss (ft)	0.18	Cum SA (acres)	2.65	5.45	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3080

INPUT
Description:

Station Elevation Data	num=	5							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

Manning's n Values	num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	127.2	127.2	127.2	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1628.49

Cross Section Lid

num=	2				
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1037.67	1629.29	1628.49	1062.33	1629.29	1628.49

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1625.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.78	Reach Len. (ft)	0.10	0.10	0.10
Crit W.S. (ft)	1623.94	Flow Area (sq ft)		102.99	
E.G. Slope (ft/ft)	0.002126	Area (sq ft)		102.99	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)		8.42	
Max Chl Dpth (ft)	4.29	Hydr. Depth (ft)		4.29	

Conv. Total (cfs)	18801.6	Conv. (cfs)		18801.6	
Length Wtd. (ft)	0.10	Wetted Per. (ft)		41.16	
Min Ch El (ft)	1620.49	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.80	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	36.30	31.23	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	7.07	0.34

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1625.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.10	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.78	Reach Len. (ft)	0.10	0.10	0.10
Crit W.S. (ft)	1623.94	Flow Area (sq ft)		102.99	
E.G. Slope (ft/ft)	0.002126	Area (sq ft)		102.99	
Q Total (cfs)	867.00	Flow (cfs)		867.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	8.42	Avg. Vel. (ft/s)		8.42	
Max Chl Dpth (ft)	4.29	Hydr. Depth (ft)		4.29	
Conv. Total (cfs)	18801.6	Conv. (cfs)		18801.6	
Length Wtd. (ft)	0.10	Wetted Per. (ft)		41.16	
Min Ch El (ft)	1620.49	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.80	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	13.44	29.85	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.43	0.18

Warning: Divided flow computed for this cross-section.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 3050

INPUT
Description: Bertha Howe Avenue Bridge
Distance from Upstream XS = .1
Deck/Roadway Width = 127
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1633.33 1627.69	1062.33	1633.33 1627.69

Upstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1628.49	1037.67	1620.49	1050	1620.49	1062.33	1620.49	1062.33	1628.49

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Coeff Contr. Expan.
1037.67 1062.33 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1628.49

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1633.33 1626.67	1062.33	1633.33 1626.67

Downstream Bridge Cross Section Data
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1627.47	1037.67	1619.47	1050	1619.47	1062.33	1619.47	1062.33	1627.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left Right Coeff Contr. Expan.
1037.67 1062.33 .1 .3
Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.47

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 1050 Downstream= 1050
Upstream num= 2

Width	Elev	Width	Elev
.67	1619.38	.67	1629.38

Downstream num= 2

Width	Elev	Width	Elev
.67	1619.38	.67	1629.38

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

			Inside BR US	Inside BR DS
E.G. US. (ft)	1625.88	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1624.78	E.G. Elev (ft)	1625.88	1625.59
Q Total (cfs)	867.00	W.S. Elev (ft)	1624.78	1624.91
Q Bridge (cfs)	867.00	Crit W.S. (ft)	1623.92	1622.81
Q Weir (cfs)		Max Chl Dpth (ft)	4.29	5.44
Weir Sta Lft (ft)		Vel Total (ft/s)	8.43	6.65
Weir Sta Rgt (ft)		Flow Area (sq ft)	102.89	130.44
Weir Submerg		Froude # Chl	0.72	0.50
Weir Max Depth (ft)		Specif Force (cu ft)	447.53	533.58
Min El Weir Flow (ft)	1633.34	Hydr Depth (ft)	4.29	5.44

Min El Prs (ft)	1627.69	W.P. Total (ft)	36.86	40.30
Delta EG (ft)	-1.73	Conv. Total (cfs)	20208.1	28272.9
Delta WS (ft)	-0.13	Top Width (ft)	23.99	23.99
BR Open Area (sq ft)	172.73	Frctn Loss (ft)	0.16	0.00
BR Open Vel (ft/s)	8.43	C & E Loss (ft)	0.12	0.00
Coef of Q		Shear Total (lb/sq ft)	0.32	0.19
Br Sel Method	Energy only	Power Total (lb/ft s)	2.70	1.26

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

BRIDGE OUTPUT Profile #PF 2

E.G. US. (ft)	1625.88	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1624.78	E.G. Elev (ft)	1625.88	1625.59
Q Total (cfs)	867.00	W.S. Elev (ft)	1624.78	1624.91
Q Bridge (cfs)	867.00	Crit W.S. (ft)	1623.92	1622.91
Q Weir (cfs)		Max Chl Dpth (ft)	4.29	5.44
Weir Sta Lft (ft)		Vel Total (ft/s)	8.43	6.65
Weir Sta Rgt (ft)		Flow Area (sq ft)	102.89	130.44
Weir Submerg		Froude # Chl	0.72	0.50
Weir Max Depth (ft)		Specif Force (cu ft)	447.53	533.58
Min El Weir Flow (ft)	1633.34	Hydr Depth (ft)	4.29	5.44
Min El Prs (ft)	1627.69	W.P. Total (ft)	36.86	40.30
Delta EG (ft)	-1.73	Conv. Total (cfs)	20208.1	28272.9
Delta WS (ft)	-0.13	Top Width (ft)	23.99	23.99
BR Open Area (sq ft)	172.73	Frctn Loss (ft)	0.16	0.00
BR Open Vel (ft/s)	8.43	C & E Loss (ft)	0.12	0.00
Coef of Q		Shear Total (lb/sq ft)	0.32	0.19
Br Sel Method	Energy only	Power Total (lb/ft s)	2.70	1.26

Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3020

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1627.47	1037.67	1619.47	1050	1619.47	1062.33	1619.47	1062.33	1627.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	150	150	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.47

Cross Section Lid
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1037.67	1628.27	1627.47	1062.33	1628.27	1627.47

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1627.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.91	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1624.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1619.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	36.30	30.89	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	7.00	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1627.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1624.91	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1624.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1619.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	13.44	29.51	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.36	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3000

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1626.27	1037.67	1618.27	1050	1618.27	1062.33	1618.27	1062.33	1626.27

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	350	350	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1627.07

Cross Section Lid num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1627.07	1626.27	1062.33	1627.07	1626.27

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.41	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.		350.00	350.00
W.S. Elev (ft)	1623.71	Reach Len. (ft)	350.00	130.50	
Crit W.S. (ft)	1623.71	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		1723.00	
Q Total (cfs)	1723.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		13.20	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		26000.5	
Conv. Total (cfs)	26000.5	Conv. (cfs)		45.75	
Length Wtd. (ft)	350.00	Wetted Per. (ft)		0.78	
Min Ch El (ft)	1618.27	Shear (lb/sq ft)		10.33	
Alpha	1.00	Stream Power (lb/ft s)			
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	36.30	30.44	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	6.92	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1626.41	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.		350.00	350.00
W.S. Elev (ft)	1623.71	Reach Len. (ft)	350.00	130.50	
Crit W.S. (ft)	1623.71	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		1723.00	
Q Total (cfs)	1723.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		13.20	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		26000.5	
Conv. Total (cfs)	26000.5	Conv. (cfs)		45.75	
Length Wtd. (ft)	350.00	Wetted Per. (ft)		0.78	
Min Ch El (ft)	1618.27	Shear (lb/sq ft)		10.33	
Alpha	1.00	Stream Power (lb/ft s)			
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	13.44	29.06	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.28	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2900

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1623.47	1037.67	1615.47	1050	1615.47	1062.33	1615.47	1062.33	1623.47

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	290	290	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1623.47

Cross Section Lid num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1624.27	1623.47	1062.33	1624.27	1623.47

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1623.61	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.		290.00	290.00
W.S. Elev (ft)	1620.91	Reach Len. (ft)	290.00	130.50	
Crit W.S. (ft)	1620.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		1723.00	
Q Total (cfs)	1723.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		13.20	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		26001.2	
Conv. Total (cfs)	26001.2	Conv. (cfs)		45.75	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		0.78	
Min Ch El (ft)	1615.47	Shear (lb/sq ft)		10.32	
Alpha	1.00	Stream Power (lb/ft s)			
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	36.30	29.39	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	6.72	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1623.61	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.			

W.S. Elev (ft)	1620.91	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)	1620.91	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26001.2	Conv. (cfs)		26001.2	
Length Wtd. (ft)	290.00	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1615.47	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.32	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	13.44	28.01	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	5.08	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2800

INPUT
Description:

Station Elevation Data	num=	5			
Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1621.15	1037.67	1613.15	1050	1613.15
1062.33	1613.15	1062.33	1621.15		

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	250	250	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1621.15

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1621.95	1062.33	1621.95

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1621.29	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.	250.00	250.00	250.00
W.S. Elev (ft)	1618.59	Reach Len. (ft)		130.50	
Crit W.S. (ft)	1618.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		1723.00	
Q Total (cfs)	1723.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		13.20	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		26000.5	
Conv. Total (cfs)	26000.5	Conv. (cfs)		45.75	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		0.78	
Min Ch El (ft)	1613.15	Shear (lb/sq ft)		10.33	
Alpha	1.00	Stream Power (lb/ft s)		28.52	1.11
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	36.30	6.56	0.34
C & E Loss (ft)	0.00	Cum SA (acres)	9.40		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1621.29	Element		0.015	
Vel Head (ft)	2.71	Wt. n-Val.	250.00	250.00	250.00
W.S. Elev (ft)	1618.59	Reach Len. (ft)		130.50	
Crit W.S. (ft)	1618.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		1723.00	
Q Total (cfs)	1723.00	Flow (cfs)		24.00	
Top Width (ft)	24.00	Top Width (ft)		13.20	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		26000.5	
Conv. Total (cfs)	26000.5	Conv. (cfs)		45.75	
Length Wtd. (ft)	250.00	Wetted Per. (ft)		0.78	
Min Ch El (ft)	1613.15	Shear (lb/sq ft)		10.33	
Alpha	1.00	Stream Power (lb/ft s)		27.14	0.92
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	13.44	4.92	0.18
C & E Loss (ft)	0.00	Cum SA (acres)	2.65		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2700

INPUT
Description:

Station Elevation Data	num=	5			
Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1619.15	1037.67	1611.15	1050	1611.15
1062.33	1611.15	1062.33	1619.15		

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	381.4	381.4	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1619.15

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1619.95 1619.15	1062.33	1619.95 1619.15

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1619.29	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1616.59	Reach Len. (ft)	381.40	381.40	381.40
Crit W.S. (ft)	1616.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	381.40	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1611.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	36.30	27.77	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	9.40	6.43	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1619.29	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1616.59	Reach Len. (ft)	381.40	381.40	381.40
Crit W.S. (ft)	1616.59	Flow Area (sq ft)		130.50	
E.G. Slope (ft/ft)	0.004391	Area (sq ft)		130.50	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.20	Avg. Vel. (ft/s)		13.20	
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)		5.44	
Conv. Total (cfs)	26000.5	Conv. (cfs)		26000.5	
Length Wtd. (ft)	381.40	Wetted Per. (ft)		45.75	
Min Ch El (ft)	1611.15	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.33	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	13.44	26.39	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	2.65	4.78	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2600

INPUT
Description:
Station Elevation Data num= 5

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1037.67	1616.13	1037.67	1608.13	1050	1608.13	1062.33	1608.13	1062.33	1616.13

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1037.67	.015	1037.67	.015	1062.33	.015

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1037.67	1062.33	6.4	6.4	.1	.3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1049.67	1050.33	1615.54

Cross Section Lid
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1037.67	1616.37 1615.54	1062.33	1616.37 1615.54

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1616.27	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1613.56	Reach Len. (ft)	6.40	6.40	6.40
Crit W.S. (ft)	1613.56	Flow Area (sq ft)		130.37	
E.G. Slope (ft/ft)	0.004403	Area (sq ft)		130.37	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.22	Avg. Vel. (ft/s)		13.22	
Max Chl Dpth (ft)	5.43	Hydr. Depth (ft)		5.43	
Conv. Total (cfs)	25967.4	Conv. (cfs)		25967.4	
Length Wtd. (ft)	6.40	Wetted Per. (ft)		45.73	
Min Ch El (ft)	1608.13	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		10.36	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	36.30	26.63	1.11
C & E Loss (ft)	0.41	Cum SA (acres)	9.40	6.22	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1616.27	Element			
Vel Head (ft)	2.71	Wt. n-Val.		0.015	
W.S. Elev (ft)	1613.56	Reach Len. (ft)	6.40	6.40	6.40
Crit W.S. (ft)	1613.56	Flow Area (sq ft)		130.37	
E.G. Slope (ft/ft)	0.004403	Area (sq ft)		130.37	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	24.00	Top Width (ft)		24.00	
Vel Total (ft/s)	13.22	Avg. Vel. (ft/s)		13.22	
Max Chl Dpth (ft)	5.43	Hydr. Depth (ft)		5.43	
Conv. Total (cfs)	25967.4	Conv. (cfs)		25967.4	
Length Wtd. (ft)	6.40	Wetted Per. (ft)		45.73	
Min Ch El (ft)	1608.13	Shear (lb/sq ft)		0.78	

Alpha	1.00	Stream Power (lb/ft s)		10.36	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	13.44	25.25	0.92
C & E Loss (ft)	0.37	Cum SA (acres)	2.65	4.57	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2590

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1620	1001.7	1619	1003.5	1618	1005.3	1617	1007.15	1616
1011.55	1615	1029.4	1614	1030.78	1613	1032.35	1612	1033.81	1611
1036.09	1610	1038.6	1609	1041.03	1608	1096.94	1608	1099.19	1609
1101.26	1610	1103.5	1611	1105.42	1612	1106.67	1613	1107.78	1614
1108.53	1615	1108.92	1617	1117.09	1618	1119.76	1619	1134.31	1620

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1029.4	.025	1108.92	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1029.4	1108.92	226	210	201	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1612.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.95	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.95	Flow Area (sq ft)		185.10	
E.G. Slope (ft/ft)	0.006797	Area (sq ft)		185.10	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	69.47	Top Width (ft)		69.47	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	2.95	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	20899.7	Conv. (cfs)		20899.7	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		70.70	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		10.34	
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	36.30	26.61	1.11
C & E Loss (ft)	0.16	Cum SA (acres)	9.40	6.21	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1612.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.		0.025	
W.S. Elev (ft)	1610.98	Reach Len. (ft)	226.00	210.00	201.00
Crit W.S. (ft)	1610.98	Flow Area (sq ft)		176.22	
E.G. Slope (ft/ft)	0.007089	Area (sq ft)		176.22	
Q Total (cfs)	1723.00	Flow (cfs)		1723.00	
Top Width (ft)	60.00	Top Width (ft)		60.00	
Vel Total (ft/s)	9.78	Avg. Vel. (ft/s)		9.78	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.94	
Conv. Total (cfs)	20464.2	Conv. (cfs)		20464.2	
Length Wtd. (ft)	210.00	Wetted Per. (ft)		64.52	
Min Ch El (ft)	1608.00	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		11.82	
Frctn Loss (ft)	0.95	Cum Volume (acre-ft)	13.44	25.22	0.92
C & E Loss (ft)	0.20	Cum SA (acres)	2.65	4.57	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2500

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1618	1001.47	1618	1006.41	1619	1007.75	1619	1009.23	1618
1010.68	1617	1012.11	1616	1013.57	1615	1015.06	1614	1017.29	1613
1023.14	1612	1030.12	1611	1031.16	1610	1032.29	1609	1033.34	1608
1034.47	1607	1035.75	1606	1037.49	1605	1039.23	1604	1041.39	1603
1069.02	1603	1072.56	1604	1078.76	1605	1081.62	1606	1085.08	1607
1089.07	1608	1093.13	1609	1097.18	1610	1101.44	1611	1104.59	1612
1108.07	1613	1112.23	1614	1120.7	1615	1121.77	1616	1123.24	1617

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1037.49	.025	1078.76	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1030.12	1112.23	186.68	179.72	182.96	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.08	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.08	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.45	
Conv. Total (cfs)	34602.3	Conv. (cfs)		34602.3	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	36.30	25.51	1.11
C & E Loss (ft)	0.10	Cum SA (acres)	9.40	5.89	0.34

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1609.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.030	
W.S. Elev (ft)	1608.98	Reach Len. (ft)	186.68	179.72	182.96
Crit W.S. (ft)		Flow Area (sq ft)		270.07	
E.G. Slope (ft/ft)	0.003248	Area (sq ft)		270.07	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	60.76	Top Width (ft)		60.76	
Vel Total (ft/s)	7.30	Avg. Vel. (ft/s)		7.30	
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)		4.44	
Conv. Total (cfs)	34599.9	Conv. (cfs)		34599.9	
Length Wtd. (ft)	179.72	Wetted Per. (ft)		63.40	
Min Ch El (ft)	1603.00	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		6.31	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	13.44	24.15	0.92
C & E Loss (ft)	0.10	Cum SA (acres)	2.65	4.28	0.18

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2400

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.07	1608	1293.09	1608	1300.45	1607	1302.46	1606	1304.44	1605
1306.36	1604	1308.28	1603	1310.28	1602	1335.97	1602	1338.24	1603
1339.94	1604	1342.44	1605	1345.57	1606	1348.73	1607	1351.86	1608
1354.95	1609	1357.99	1610	1360.9	1611	1363.87	1612	1366.81	1613
1369.72	1614	1372.78	1615	1375.77	1616	1378.9	1617	1381.7	1618
1384.56	1619								

Manning's n Values num= 2

Sta	n Val	Sta	n Val
1291.07	.025	1338.24	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1293.09	1384.56	57	71	87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.82	
E.G. Slope (ft/ft)	0.008171	Area (sq ft)		179.82	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21815.6	Conv. (cfs)		21815.6	
Length Wtd. (ft)	70.77	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.83	
Alpha	1.00	Stream Power (lb/ft s)		20.02	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	36.30	24.58	1.11
C & E Loss (ft)	0.17	Cum SA (acres)	9.40	5.67	0.34

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1608.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.87	Wt. n-Val.		0.029	
W.S. Elev (ft)	1606.96	Reach Len. (ft)	57.00	71.00	87.00
Crit W.S. (ft)	1606.96	Flow Area (sq ft)		179.84	
E.G. Slope (ft/ft)	0.008169	Area (sq ft)		179.84	
Q Total (cfs)	1972.00	Flow (cfs)		1972.00	
Top Width (ft)	48.09	Top Width (ft)		48.09	
Vel Total (ft/s)	10.97	Avg. Vel. (ft/s)		10.97	
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		3.74	
Conv. Total (cfs)	21818.5	Conv. (cfs)		21818.5	
Length Wtd. (ft)	70.60	Wetted Per. (ft)		50.26	
Min Ch El (ft)	1602.00	Shear (lb/sq ft)		1.82	
Alpha	1.00	Stream Power (lb/ft s)		20.01	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	13.44	23.22	0.92
C & E Loss (ft)	0.25	Cum SA (acres)	2.65	4.05	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2350

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1001.37	1615	1002.74	1614	1004.1	1613	1005.55	1612
1009.41	1611	1016.33	1610.26	1018.74	1610	1030.03	1610	1034.36	1611
1049.32	1611	1052.39	1610	1054.54	1609	1057.69	1608	1059.67	1607
1086.56	1606	1115.51	1606	1119.27	1606	1120.19	1606	1130.23	1606
1132.99	1605	1135.85	1604	1138.89	1603	1141.9	1602	1146.76	1601
1165.03	1601	1167.57	1602	1170.34	1603	1173.61	1604	1176.83	1605
1180.02	1606	1183.27	1607	1186.49	1608	1189.52	1609	1192.43	1610
1195.36	1611	1196.13	1611.26	1198.3	1612	1201.25	1613	1204.21	1614
1207.17	1615	1210.1	1616	1213.04	1617	1216.66	1618	1220.41	1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1130.23	.025	1167.57	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1130.23	1220.41	64	63	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.94	Wt. n-Val.	0.040	0.030	
Vel Head (ft)	1.29	Reach Len. (ft)	64.00	63.00	63.00
W.S. Elev (ft)	1606.66	Flow Area (sq ft)	34.35	206.04	
Crit W.S. (ft)	1606.54	Area (sq ft)	34.35	206.04	
E.G. Slope (ft/ft)	0.005667	Flow (cfs)	65.31	1906.69	
Q Total (cfs)	1972.00	Top Width (ft)	61.27	51.92	
Top Width (ft)	113.19	Avg. Vel. (ft/s)	1.90	9.25	
Vel Total (ft/s)	8.20	Hydr. Depth (ft)	0.56	3.97	
Max Chl Dpth (ft)	5.65	Conv. (cfs)	867.5	25327.8	
Conv. Total (cfs)	26195.3	Wetted Per. (ft)	61.29	53.60	
Length Wtd. (ft)	63.17	Shear (lb/sq ft)	0.20	1.36	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.38	12.58	
Alpha	1.23	Cum Volume (acre-ft)	36.27	24.27	1.11
Frctn Loss (ft)	0.23	Cum SA (acres)	9.36	5.59	0.34
C & E Loss (ft)	0.26				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1608.00	Wt. n-Val.	0.040	0.030	
Vel Head (ft)	1.02	Reach Len. (ft)	64.00	63.00	63.00
W.S. Elev (ft)	1606.97	Flow Area (sq ft)	48.06	222.72	
Crit W.S. (ft)		Area (sq ft)	48.06	222.72	
E.G. Slope (ft/ft)	0.004332	Flow (cfs)	112.99	1859.01	
Q Total (cfs)	1972.00	Top Width (ft)	50.23	52.95	
Top Width (ft)	103.18	Avg. Vel. (ft/s)	2.35	8.35	
Vel Total (ft/s)	7.28	Hydr. Depth (ft)	0.96	4.21	
Max Chl Dpth (ft)	5.97	Conv. (cfs)	1716.6	28243.5	
Conv. Total (cfs)	29960.1	Wetted Per. (ft)	50.96	54.69	
Length Wtd. (ft)	63.15	Shear (lb/sq ft)	0.26	1.10	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.60	9.19	
Alpha	1.24	Cum Volume (acre-ft)	13.41	22.89	0.92
Frctn Loss (ft)	0.23	Cum SA (acres)	2.62	3.97	0.18
C & E Loss (ft)	0.15				

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2330

INPUT
Description:
Station Elevation Data num= 48

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1616	1046.51	1616	1063.63	1615	1065.45	1614	1067.24	1613
1069.01	1612	1070.85	1611	1073.95	1610	1078.23	1609	1080.88	1608
1083.23	1607	1089.39	1606	1115.44	1605.7	1174.84	1605	1183.19	1605
1200.07	1605	1203.77	1605	1233.21	1606	1239.59	1606	1240.83	1606
1244.52	1607	1246.08	1607	1248.05	1606	1249.9	1605	1251.82	1604
1253.68	1603	1255.52	1602	1257.81	1601	1281.08	1601	1282.63	1602
1285.54	1603	1288.64	1604	1291.75	1605	1294.85	1606	1295.24	1606.12
1297.98	1607	1301.06	1608	1304.02	1609	1306.74	1610	1309.48	1611
1312.22	1612	1315.02	1613	1317.72	1614	1320.5	1615	1323.24	1616
1325.92	1617	1328.33	1618	1330.73	1619				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1249.9	.025	1282.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1244.52	1330.73	235	240	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.45	Wt. n-Val.	0.040	0.031	
Vel Head (ft)	0.42	Reach Len. (ft)	235.00	240.00	222.00
W.S. Elev (ft)	1607.03	Flow Area (sq ft)	246.95	223.50	
Crit W.S. (ft)		Area (sq ft)	246.95	223.50	
E.G. Slope (ft/ft)	0.002583	Flow (cfs)	618.50	1353.50	
Q Total (cfs)	1972.00	Top Width (ft)	161.35	53.54	
Top Width (ft)	214.90	Avg. Vel. (ft/s)	2.50	6.06	
Vel Total (ft/s)	4.19	Hydr. Depth (ft)	1.53	4.17	
Max Chl Dpth (ft)	6.03	Conv. (cfs)	12170.7	26634.1	
Conv. Total (cfs)	38804.9	Wetted Per. (ft)	161.60	56.09	
Length Wtd. (ft)	238.03	Shear (lb/sq ft)	0.25	0.64	
Min Ch El (ft)	1601.00	Stream Power (lb/ft s)	0.62	3.89	
Alpha	1.54	Cum Volume (acre-ft)	36.07	23.95	1.11
Frctn Loss (ft)	0.16	Cum SA (acres)	9.20	5.51	0.34
C & E Loss (ft)	0.11				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.62	Wt. n-Val.	0.040	0.031	
Vel Head (ft)	0.54	Reach Len. (ft)	235.00	240.00	222.00
W.S. Elev (ft)	1607.09	Flow Area (sq ft)	165.71	226.67	
Crit W.S. (ft)		Area (sq ft)	165.71	226.67	
E.G. Slope (ft/ft)	0.002999				

Q Total (cfs)	1972.00	Flow (cfs)	483.55	1488.45	
Top Width (ft)	148.25	Top Width (ft)	94.52	53.73	
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)	2.92	6.57	
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)	1.75	4.22	
Conv. Total (cfs)	36008.0	Conv. (cfs)	8829.5	27178.6	
Length Wtd. (ft)	238.61	Wetted Per. (ft)	96.47	56.28	
Min Ch El (ft)	1601.00	Shear (lb/sq ft)	0.32	0.75	
Alpha	1.37	Stream Power (lb/ft s)	0.94	4.95	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	13.25	22.57	0.92
C & E Loss (ft)	0.13	Cum SA (acres)	2.52	3.89	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2300

INPUT
Description:
Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1619	1001.97	1618	1003.2	1617	1004.55	1616	1005.95	1615
1007.27	1614	1008.69	1613	1010.3	1612	1011.97	1611	1014.13	1610
1018.32	1609	1023.5	1608	1030.44	1607	1039.16	1606	1041.19	1605.6
1044.19	1605	1058.41	1604.13	1060.6	1604	1072.49	1603	1079.21	1603
1084.11	1604	1087.79	1605	1100.7	1605	1125.34	1604	1149.33	1604
1149.99	1604	1187.47	1604	1199.06	1604	1271.41	1604	1273.45	1604
1283.01	1603.19	1285.22	1603	1289.39	1602	1293.61	1602	1296.06	1602
1297.59	1601	1299.25	1600	1303.67	1599	1328.29	1599	1330.08	1600
1332.14	1601	1334.2	1602	1336.96	1603	1340.58	1604	1344.03	1605
1347.34	1606	1351.43	1607	1354.48	1608	1357.2	1609	1359.82	1610
1362.46	1611	1365.05	1612	1367.61	1613	1369.69	1613.8	1370.2	1614
1372.75	1615	1375.34	1616	1378.01	1617	1380.61	1618	1383.27	1619

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1293.61	.025	1330.08	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1271.41	1383.27	320.42	311.55	310.65 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.040	0.034	
W.S. Elev (ft)	1607.12	Reach Len. (ft)	320.42	311.55	310.65
Crit W.S. (ft)		Flow Area (sq ft)	701.71	437.00	
E.G. Slope (ft/ft)	0.000313	Area (sq ft)	701.71	437.00	
Q Total (cfs)	1972.00	Flow (cfs)	936.40	1035.60	
Top Width (ft)	322.16	Top Width (ft)	241.78	80.38	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	1.33	2.37	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	2.90	5.44	
Conv. Total (cfs)	111542.0	Conv. (cfs)	52965.6	58576.4	
Length Wtd. (ft)	316.91	Wetted Per. (ft)	242.27	82.69	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.06	0.10	
Alpha	1.27	Stream Power (lb/ft s)	0.08	0.24	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	33.51	22.14	1.11
C & E Loss (ft)	0.02	Cum SA (acres)	8.11	5.14	0.34

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.040	0.034	
W.S. Elev (ft)	1607.12	Reach Len. (ft)	320.42	311.55	310.65
Crit W.S. (ft)		Flow Area (sq ft)	337.02	437.48	
E.G. Slope (ft/ft)	0.000539	Area (sq ft)	337.02	437.48	
Q Total (cfs)	1972.00	Flow (cfs)	609.49	1362.51	
Top Width (ft)	188.31	Top Width (ft)	107.91	80.40	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	1.81	3.11	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	3.12	5.44	
Conv. Total (cfs)	84918.0	Conv. (cfs)	26245.9	58672.1	
Length Wtd. (ft)	314.68	Wetted Per. (ft)	111.03	82.70	
Min Ch El (ft)	1599.00	Shear (lb/sq ft)	0.10	0.18	
Alpha	1.19	Stream Power (lb/ft s)	0.18	0.55	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	11.90	20.74	0.92
C & E Loss (ft)	0.02	Cum SA (acres)	1.97	3.52	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2200

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1609	1005.16	1608	1011.92	1607	1047.35	1607	1060.8	1607
1071.4	1606	1077.87	1605	1084.57	1604	1094.26	1603	1116.03	1602
1121.81	1601	1126.68	1600	1175.32	1600	1181.31	1601	1195.36	1601
1199.05	1600	1255.45	1600	1370.28	1601	1372.38	1601	1454	1601
1493.38	1601	1502.82	1601	1504.64	1600	1506.13	1599	1507.62	1598
1513.26	1597	1549.68	1597	1552.37	1598	1554.96	1599	1557.69	1600
1562.2	1601	1566.73	1602	1570.63	1603	1573.43	1604	1576.11	1605
1578.73	1606	1581.03	1607	1583.23	1608	1585.37	1609	1587.38	1610
1589.2	1611	1590.63	1612	1592.04	1613	1593.42	1614	1594.9	1615

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1502.82	.025	1549.68	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1502.82	1594.9	383.01	328.57	273.85 .1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.040	0.032	
W.S. Elev (ft)	1607.14	Reach Len. (ft)	383.01	328.57	273.85
Crit W.S. (ft)		Flow Area (sq ft)	2718.63	625.61	
E.G. Slope (ft/ft)	0.000021	Area (sq ft)	2718.63	625.61	
Q Total (cfs)	1972.00	Flow (cfs)	1445.62	526.38	
Top Width (ft)	570.34	Top Width (ft)	491.83	78.51	
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.53	0.84	

Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)	5.53	7.97	
Conv. Total (cfs)	430287.5	Conv. (cfs)	315431.3	114856.2	
Length Wtd. (ft)	358.84	Wetted Per. (ft)	492.52	81.13	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.01	0.01	
Alpha	1.14	Stream Power (lb/ft s)	0.00	0.01	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	20.93	18.34	1.11
C & E Loss (ft)	0.00	Cum SA (acres)	5.41	4.58	0.34

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.040	0.032	
W.S. Elev (ft)	1607.11	Reach Len. (ft)	383.01	328.57	273.85
Crit W.S. (ft)		Flow Area (sq ft)	628.34	623.56	
E.G. Slope (ft/ft)	0.000108	Area (sq ft)	628.34	623.56	
Q Total (cfs)	1972.00	Flow (cfs)	781.71	1190.29	
Top Width (ft)	181.27	Top Width (ft)	102.82	78.45	
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	1.24	1.91	
Max Chl Dpth (ft)	10.11	Hydr. Depth (ft)	6.11	7.95	
Conv. Total (cfs)	189388.8	Conv. (cfs)	75074.7	114314.1	
Length Wtd. (ft)	349.07	Wetted Per. (ft)	108.93	81.07	
Min Ch El (ft)	1597.00	Shear (lb/sq ft)	0.04	0.05	
Alpha	1.13	Stream Power (lb/ft s)	0.05	0.10	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	8.35	16.94	0.92
C & E Loss (ft)	0.00	Cum SA (acres)	1.19	2.96	0.18

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2100

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
953	1608	1000	1601	1013.06	1600	1023.83	1599	1033.3	1598
1040.2	1597	1043.2	1596	1046.03	1595	1051.25	1594	1053.88	1594
1056.33	1595	1058.94	1596	1059.94	1597	1060.67	1598	1075.29	1598.83
1078.2	1599	1087.56	1600	1091.95	1600	1103.88	1599	1107.13	1598
1109.23	1597	1111.33	1596	1116.75	1596	1120.48	1597	1120.85	1597
1124.02	1596	1125.68	1595	1127.35	1594	1132.29	1593	1155.55	1593
1159.58	1593	1160.63	1594	1161.73	1595	1163.48	1596	1167.18	1597
1170.02	1598	1172.71	1599	1175.2	1600	1177.42	1601	1179.65	1602
1182.05	1603	1184.57	1604	1187.21	1605	1189.98	1606	1192.78	1607
1195.62	1608	1198.5	1609	1201.39	1610	1206.95	1611		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
953	.04	1120.48	.025	1163.48	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1120.48	1161.73	67.6	97.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.11	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1199.04	557.99	189.27
E.G. Slope (ft/ft)	0.000028	Area (sq ft)	1199.04	557.99	189.27
Q Total (cfs)	1972.00	Flow (cfs)	878.15	963.65	130.20
Top Width (ft)	234.08	Top Width (ft)	161.48	41.25	31.35
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)	0.73	1.73	0.69
Max Chl Dpth (ft)	14.11	Hydr. Depth (ft)	7.43	13.53	6.04
Conv. Total (cfs)	375679.6	Conv. (cfs)	167292.8	183582.6	24804.2
Length Wtd. (ft)	88.05	Wetted Per. (ft)	164.73	42.85	33.66
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.68	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.71	13.87	0.51
C & E Loss (ft)	0.06	Cum SA (acres)	2.54	4.12	0.24

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1607.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.040	0.025	0.037
W.S. Elev (ft)	1607.10	Reach Len. (ft)	67.60	97.60	97.60
Crit W.S. (ft)		Flow Area (sq ft)	1004.77	557.85	189.16
E.G. Slope (ft/ft)	0.000030	Area (sq ft)	1004.77	557.85	189.16
Q Total (cfs)	1972.00	Flow (cfs)	839.02	998.16	134.83
Top Width (ft)	182.51	Top Width (ft)	109.92	41.25	31.34
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	0.84	1.79	0.71
Max Chl Dpth (ft)	14.10	Hydr. Depth (ft)	9.14	13.52	6.04
Conv. Total (cfs)	362545.2	Conv. (cfs)	154250.0	183508.1	24787.1
Length Wtd. (ft)	88.35	Wetted Per. (ft)	119.60	42.85	33.65
Min Ch El (ft)	1593.00	Shear (lb/sq ft)	0.02	0.02	0.01
Alpha	1.54	Stream Power (lb/ft s)	0.01	0.04	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.17	12.49	0.32
C & E Loss (ft)	0.06	Cum SA (acres)	0.26	2.50	0.08

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2000.1

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990.1	1607	1012.59	1604	1044.29	1601.77	1044.29	1591.77	1056.29	1591.77
1056.29	1601.69	1094.79	1606	1094.79	1606.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990.1	.025	1044.29	.015	1056.29	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1044.29	1056.29	1	1	.1	.1

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.07	Wt. n-Val.	0.025	0.015	0.025
Vel Head (ft)	0.63	Reach Len. (ft)	1.00	1.00	1.00
W.S. Elev (ft)	1606.43	Flow Area (sq ft)	134.73	175.97	99.69
Crit W.S. (ft)		Area (sq ft)	134.73	175.97	99.69
E.G. Slope (ft/ft)	0.000594	Flow (cfs)	376.96	1325.86	269.18
Q Total (cfs)	1972.00	Top Width (ft)	49.95	12.00	38.50
Top Width (ft)	100.45	Avg. Vel. (ft/s)	2.80	7.53	2.70
Vel Total (ft/s)	4.81	Hydr. Depth (ft)	2.70	14.66	2.59
Max Chl Dpth (ft)	14.66	Conv. (cfs)	15466.7	54400.2	11044.3
Conv. Total (cfs)	80911.3	Wetted Per. (ft)	50.19	31.92	39.17
Length Wtd. (ft)	1.00	Shear (lb/sq ft)	0.10	0.20	0.09
Min Ch El (ft)	1591.77	Stream Power (lb/ft s)	0.28	1.54	0.25
Alpha	1.76	Cum Volume (acre-ft)	2.67	13.05	0.19
Frctn Loss (ft)	0.00	Cum SA (acres)	2.38	4.06	0.16
C & E Loss (ft)	0.06				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.07	Wt. n-Val.	0.025	0.015	0.025
Vel Head (ft)	0.63	Reach Len. (ft)	1.00	1.00	1.00
W.S. Elev (ft)	1606.43	Flow Area (sq ft)	134.73	175.97	99.69
Crit W.S. (ft)		Area (sq ft)	134.73	175.97	99.69
E.G. Slope (ft/ft)	0.000594	Flow (cfs)	376.97	1325.84	269.19
Q Total (cfs)	1972.00	Top Width (ft)	49.95	12.00	38.50
Top Width (ft)	100.45	Avg. Vel. (ft/s)	2.80	7.53	2.70
Vel Total (ft/s)	4.81	Hydr. Depth (ft)	2.70	14.66	2.59
Max Chl Dpth (ft)	14.66	Conv. (cfs)	15467.7	54401.0	11045.1
Conv. Total (cfs)	80913.8	Wetted Per. (ft)	50.19	31.92	39.17
Length Wtd. (ft)	1.00	Shear (lb/sq ft)	0.10	0.20	0.09
Min Ch El (ft)	1591.77	Stream Power (lb/ft s)	0.28	1.54	0.25
Alpha	1.76	Cum Volume (acre-ft)	0.28	11.67	0.00
Frctn Loss (ft)	0.00	Cum SA (acres)	0.13	2.44	0.00
C & E Loss (ft)	0.06				

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2000

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
990.1	1607	1012.59	1604	1044.29	1601.77	1044.29	1591.77	1056.29	1591.77
1056.29	1601.69	1094.79	1606						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
990.1	.025	1044.29	.015	1056.29	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1044.29	1056.29	320.07	319.85 303.13	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
990.1	1044.29	1608	F
1056.29	1094.79	1608	F

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.01	Wt. n-Val.		0.015	
Vel Head (ft)	1.23	Reach Len. (ft)	0.01	0.01	0.01
W.S. Elev (ft)	1605.77	Flow Area (sq ft)		168.01	
Crit W.S. (ft)	1599.63	Area (sq ft)	103.25	168.01	74.40
E.G. Slope (ft/ft)	0.000885	Flow (cfs)		1498.00	
Q Total (cfs)	1498.00	Top Width (ft)	44.98	12.00	36.46
Top Width (ft)	93.44	Avg. Vel. (ft/s)		8.92	
Vel Total (ft/s)	8.92	Hydr. Depth (ft)		14.00	
Max Chl Dpth (ft)	14.00	Conv. (cfs)		50362.6	
Conv. Total (cfs)	50362.6	Wetted Per. (ft)		31.92	
Length Wtd. (ft)	0.01	Shear (lb/sq ft)		0.29	
Min Ch El (ft)	1591.77	Stream Power (lb/ft s)		2.59	
Alpha	1.00	Cum Volume (acre-ft)	2.67	13.05	0.19
Frctn Loss (ft)		Cum SA (acres)	2.37	4.06	0.16
C & E Loss (ft)					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1607.01	Wt. n-Val.		0.015	
Vel Head (ft)	1.23	Reach Len. (ft)	0.01	0.01	0.01
W.S. Elev (ft)	1605.77	Flow Area (sq ft)		168.01	
Crit W.S. (ft)	1599.63	Area (sq ft)		168.01	
E.G. Slope (ft/ft)	0.001195	Flow (cfs)		1498.00	
Q Total (cfs)	1498.00	Top Width (ft)		12.00	
Top Width (ft)	12.00	Avg. Vel. (ft/s)		8.92	
Vel Total (ft/s)	8.92	Hydr. Depth (ft)		14.00	
Max Chl Dpth (ft)	14.00	Conv. (cfs)		43327.0	
Conv. Total (cfs)	43327.0	Wetted Per. (ft)		40.00	
Length Wtd. (ft)	0.01	Shear (lb/sq ft)		0.31	
Min Ch El (ft)	1591.77	Stream Power (lb/ft s)		2.79	
Alpha	1.00	Cum Volume (acre-ft)	0.28	11.66	
Frctn Loss (ft)		Cum SA (acres)	0.13	2.44	
C & E Loss (ft)					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 1950

INPUT
Description: I- 15 Bridge
Distance from Upstream XS = .01
Deck/Roadway Width = 319.83
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates

```
    num=       6
      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
   990.1 1606.72 1585.08 1044.29 1606.72 1585.08 1044.29 1606.72 1601.77
 1056.29 1606.72 1601.77 1056.29 1606.72 1585.08 1104.82 1606.72 1585.08

Upstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
   990.1     1607 1012.59     1604 1044.29 1601.77 1044.29 1591.77 1056.29 1591.77
 1056.29 1601.69 1094.79     1606

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
   990.1    .025 1044.29    .015 1056.29    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
      1044.29 1056.29              .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
   990.1 1044.29    1608       F
 1056.29 1094.79    1608       F

Downstream  Deck/Roadway Coordinates
    num=       6
      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    1000 1606.72 1601.77 1104.82 1606.72 1601.77 1193.33 1606.72 1595.08
 1205.33 1606.72 1595.08 1221.37 1606.72 1596.89 1251.33 1606.72    1601

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
 1179.43     1599 1193.33 1595.08 1193.33 1585.08 1205.33 1585.08 1205.33 1595.08
 1251.33     1601

Manning's n Values        num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
 1179.43    .025 1193.33    .015 1205.33    .025

Bank Sta: Left   Right    Coeff Contr.   Expan.
      1193.33 1205.33              .3       .5

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .98
Elevation at which weir flow begins           = 1606.72
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Energy

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd                =
          Submerged Inlet + Outlet Cd =.8164966
          Max Low Cord                      = 1601.77

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)              1607.01    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1605.77    E.G. Elev (ft)            1607.01       1606.80
  Q Total (cfs)              1498.00    W.S. Elev (ft)            1605.77       1605.77
  Q Bridge (cfs)             1493.05    Crit W.S. (ft)            1599.63       1592.93
  Q Weir (cfs)                  4.95    Max Chl Dpth (ft)           14.00         20.69
  Weir Sta Lft (ft)          1044.29    Vel Total (ft/s)             0.00         10.66
  Weir Sta Rgt (ft)          1056.29    Flow Area (sq ft)                        140.54
  Weir Submerg                  0.00    Froude # Chl                 0.59          0.48
  Weir Max Depth (ft)           0.29    Specif Force (cu ft)      1660.89       2463.70
  Min El Weir Flow (ft)      1606.73    Hydr Depth (ft)
  Min El Prs (ft)            1601.77    W.P. Total (ft)             44.00         44.00
  Delta EG (ft)                 9.65    Conv. Total (cfs)
  Delta WS (ft)                12.51    Top Width (ft)
  BR Open Area (sq ft)        120.00    Frctn Loss (ft)
  BR Open Vel (ft/s)           12.44    C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir
        flow.  The momentum answer has been disregarded.
Note:   The downstream water surface is below the minimum elevation for pressure flow.  The sluice
        gate equations were used for pressure flow.
Note:   For the cross section inside the bridge at the upstream end, the water surface and energy have
        been projected from the upstream cross section.  The selected bridge modeling method does
        not compute answers inside the bridge.
Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
        energy was used.
Note:   For the cross section inside the bridge at the downstream end, the energy is based on critical
        depth over the weir.  The water surface has been projected.

BRIDGE OUTPUT  Profile #PF 2

  E.G. US. (ft)              1607.01    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1605.77    E.G. Elev (ft)            1607.01       1606.98
  Q Total (cfs)              1498.00    W.S. Elev (ft)            1605.77       1605.77
  Q Bridge (cfs)             1493.05    Crit W.S. (ft)            1599.63       1592.93
  Q Weir (cfs)                  4.95    Max Chl Dpth (ft)           14.00         20.69
  Weir Sta Lft (ft)          1044.29    Vel Total (ft/s)             0.00          0.00
  Weir Sta Rgt (ft)          1056.29    Flow Area (sq ft)
  Weir Submerg                  0.00    Froude # Chl                 0.59          0.48
  Weir Max Depth (ft)           0.29    Specif Force (cu ft)      1660.89       2463.70
  Min El Weir Flow (ft)      1606.73    Hydr Depth (ft)
  Min El Prs (ft)            1601.77    W.P. Total (ft)             44.00         44.00
  Delta EG (ft)                 9.59    Conv. Total (cfs)
  Delta WS (ft)                11.94    Top Width (ft)
  BR Open Area (sq ft)        120.00    Frctn Loss (ft)
  BR Open Vel (ft/s)           12.44    C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Note:   Momentum answer is not valid if the water surface is above the low chord or if there is weir
        flow.  The momentum answer has been disregarded.
Note:   The downstream water surface is below the minimum elevation for pressure flow.  The sluice
        gate equations were used for pressure flow.
Note:   For the cross section inside the bridge at the upstream end, the water surface and energy have
        been projected from the upstream cross section.  The selected bridge modeling method does
        not compute answers inside the bridge.
```

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1900

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1179.43	1599	1193.33	1595.08	1193.33	1585.08	1205.33	1585.08	1205.33	1595.08
1251.33	1601								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1179.43	.025	1193.33	.015	1205.33	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1193.33	1205.33	38.8	38.8	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1597.36	Element			
Vel Head (ft)	4.10	Wt. n-Val.		0.015	
W.S. Elev (ft)	1593.26	Reach Len. (ft)	38.80	38.80	38.80
Crit W.S. (ft)	1593.26	Flow Area (sq ft)		98.16	
E.G. Slope (ft/ft)	0.005139	Area (sq ft)		98.16	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	
Vel Total (ft/s)	16.25	Avg. Vel. (ft/s)		16.25	
Max Chl Dpth (ft)	8.18	Hydr. Depth (ft)		8.18	
Conv. Total (cfs)	22249.0	Conv. (cfs)		22249.0	
Length Wtd. (ft)	38.80	Wetted Per. (ft)		28.36	
Min Ch El (ft)	1585.08	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		18.04	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	2.67	12.16	0.19
C & E Loss (ft)	1.51	Cum SA (acres)	2.37	4.06	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1597.41	Element			
Vel Head (ft)	3.58	Wt. n-Val.		0.015	
W.S. Elev (ft)	1593.83	Reach Len. (ft)	38.80	38.80	38.80
Crit W.S. (ft)	1593.24	Flow Area (sq ft)		105.05	
E.G. Slope (ft/ft)	0.004321	Area (sq ft)		105.05	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	12.00	Top Width (ft)		12.00	
Vel Total (ft/s)	15.18	Avg. Vel. (ft/s)		15.18	
Max Chl Dpth (ft)	8.75	Hydr. Depth (ft)		8.75	
Conv. Total (cfs)	24263.2	Conv. (cfs)		24263.2	
Length Wtd. (ft)	38.80	Wetted Per. (ft)		29.51	
Min Ch El (ft)	1585.08	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)		14.58	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	0.28	10.78	
C & E Loss (ft)	0.71	Cum SA (acres)	0.13	2.44	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1800

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1604	1017.58	1603	1024.71	1602	1031.18	1601	1034.87	1600
1036.64	1599	1038.41	1598	1040.44	1597	1043.07	1596	1046.27	1595
1050.71	1594	1054.41	1593.59	1059.85	1593	1115.02	1592	1116.24	1591
1117.33	1590	1148.63	1590	1150.75	1591	1152.41	1592	1153.93	1593
1155.42	1594	1156.91	1595	1158.3	1596	1160.68	1597	1167.6	1597.96
1167.88	1598	1176.94	1599	1181.79	1600	1190.38	1601	1204.71	1602
1220.3	1603	1235.32	1604						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1115.02	.025	1148.63	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1115.02	1160.68	173.79	170.93	148.02	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1595.03	Element			
Vel Head (ft)	1.09	Wt. n-Val.	0.040	0.028	
W.S. Elev (ft)	1593.94	Reach Len. (ft)	173.79	170.93	148.02
Crit W.S. (ft)	1593.94	Flow Area (sq ft)	83.70	144.36	
E.G. Slope (ft/ft)	0.005719	Area (sq ft)	83.70	144.36	
Q Total (cfs)	1595.00	Flow (cfs)	281.61	1313.39	
Top Width (ft)	104.11	Top Width (ft)	63.80	40.32	
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)	3.36	9.10	
Max Chl Dpth (ft)	3.94	Hydr. Depth (ft)	1.31	3.58	
Conv. Total (cfs)	21091.1	Conv. (cfs)	3723.8	17367.3	
Length Wtd. (ft)	171.71	Wetted Per. (ft)	63.86	42.15	
Min Ch El (ft)	1590.00	Shear (lb/sq ft)	0.47	1.22	
Alpha	1.43	Stream Power (lb/ft s)	1.57	11.13	
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	2.63	12.06	0.19
C & E Loss (ft)	0.11	Cum SA (acres)	2.35	4.04	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1596.48	Element		0.025	
Vel Head (ft)	2.15	Wt. n-Val.		170.93	148.02
W.S. Elev (ft)	1594.33	Reach Len. (ft)	173.79	135.49	
Crit W.S. (ft)	1594.33	Flow Area (sq ft)		135.49	
E.G. Slope (ft/ft)	0.007701	Area (sq ft)		1595.00	
Q Total (cfs)	1595.00	Flow (cfs)		31.30	
Top Width (ft)	31.30	Top Width (ft)		11.77	
Vel Total (ft/s)	11.77	Avg. Vel. (ft/s)		4.33	
Max Chl Dpth (ft)	4.33	Hydr. Depth (ft)		18176.1	
Conv. Total (cfs)	18176.1	Conv. (cfs)		39.96	
Length Wtd. (ft)	170.99	Wetted Per. (ft)		1.63	
Min Ch El (ft)	1590.00	Shear (lb/sq ft)		19.19	
Alpha	1.00	Stream Power (lb/ft s)		10.67	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	0.28	2.43	
C & E Loss (ft)	0.07	Cum SA (acres)	0.13		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1750

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1606	1003.52	1605.53	1007.44	1605	1014.27	1604	1020.21	1603
1022.71	1602	1025.14	1601	1027.53	1600	1029.98	1599	1032.42	1598
1034.75	1597	1037.08	1596	1039.84	1595	1043.65	1594	1048.74	1593
1078.87	1592.12	1082.85	1592	1139.68	1591	1210.43	1590	1214.54	1590
1232.62	1590	1285.16	1590	1286.97	1589	1291.48	1588	1318.26	1588
1319.5	1589	1320.31	1590	1321.08	1591	1321.91	1592	1322.72	1593
1323.62	1594	1325.25	1595	1327	1596	1328.9	1597	1330.81	1598
1332.7	1599	1334.57	1600	1336.57	1601	1338.39	1602	1340.86	1603
1343.68	1604	1346.59	1605	1349.5	1606	1352.46	1607	1359.2	1608

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1285.16	.025	1320.31	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1285.16	1352.46	171.49	169.33 179.87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1592.34	Element		0.026	
Vel Head (ft)	0.73	Wt. n-Val.	0.040	169.33	179.87
W.S. Elev (ft)	1591.61	Reach Len. (ft)	171.49	121.10	
Crit W.S. (ft)	1591.61	Flow Area (sq ft)	209.42	121.10	
E.G. Slope (ft/ft)	0.004592	Area (sq ft)	209.42	1012.19	
Q Total (cfs)	1595.00	Flow (cfs)	582.81	36.43	
Top Width (ft)	216.57	Top Width (ft)	180.15	3.32	
Vel Total (ft/s)	4.83	Avg. Vel. (ft/s)	2.78	8.36	
Max Chl Dpth (ft)	3.61	Hydr. Depth (ft)	1.16	14936.7	
Conv. Total (cfs)	23537.2	Conv. (cfs)	8600.5	38.40	
Length Wtd. (ft)	170.23	Wetted Per. (ft)	180.16	0.90	
Min Ch El (ft)	1588.00	Shear (lb/sq ft)	0.33	7.56	
Alpha	2.03	Stream Power (lb/ft s)	0.93	11.54	0.19
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)	2.05	3.89	0.16
C & E Loss (ft)	0.09	Cum SA (acres)	1.86		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1594.15	Element		0.025	
Vel Head (ft)	1.93	Wt. n-Val.	0.040	169.33	179.87
W.S. Elev (ft)	1592.22	Reach Len. (ft)	171.49	134.68	
Crit W.S. (ft)	1592.22	Flow Area (sq ft)	15.51	134.68	
E.G. Slope (ft/ft)	0.006672	Area (sq ft)	15.51	1528.37	
Q Total (cfs)	1595.00	Flow (cfs)	66.63	33.10	
Top Width (ft)	40.09	Top Width (ft)	6.99	11.35	
Vel Total (ft/s)	10.62	Avg. Vel. (ft/s)	4.30	4.07	
Max Chl Dpth (ft)	4.22	Hydr. Depth (ft)	2.22	18711.0	
Conv. Total (cfs)	19526.7	Conv. (cfs)	815.7	37.69	
Length Wtd. (ft)	169.51	Wetted Per. (ft)	9.21	1.49	
Min Ch El (ft)	1588.00	Shear (lb/sq ft)	0.70	16.89	
Alpha	1.10	Stream Power (lb/ft s)	3.01	10.14	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	0.25	2.30	
C & E Loss (ft)	0.15	Cum SA (acres)	0.12		

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1700

INPUT
Description:
Station Elevation Data num= 38

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1597	1002.28	1596	1005.58	1595	1012.08	1594	1037.72	1593
1096.14	1592	1104.18	1591.88	1165.67	1591	1234.36	1590	1301	1589
1345.94	1588.26	1361.37	1588	1363.83	1588	1410.67	1589	1430.15	1589

1432.44	1588	1434.69	1587	1464.52	1587	1468.96	1588	1473.24	1589
1476.62	1590	1480.53	1591	1483.69	1592	1486.72	1593	1489.52	1594
1492.76	1595	1496	1596	1499.24	1597	1502.4	1598	1504.92	1599
1506.8	1600	1508.64	1601	1510.47	1602	1512.25	1603	1514.06	1604
1515.81	1605	1517.41	1606	1519	1607				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1430.15	.025	1464.52	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1430.15	1519	163.66	161.13 154.63	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1590.61	Wt. n-Val.	0.040	0.029	
Vel Head (ft)	0.43	Reach Len. (ft)	163.66	161.13	154.63
W.S. Elev (ft)	1590.18	Flow Area (sq ft)	255.02	126.25	
Crit W.S. (ft)		Area (sq ft)	255.02	126.25	
E.G. Slope (ft/ft)	0.004825	Flow (cfs)	753.19	841.81	
Q Total (cfs)	1595.00	Top Width (ft)	208.24	47.18	
Top Width (ft)	255.42	Avg. Vel. (ft/s)	2.95	6.67	
Vel Total (ft/s)	4.18	Hydr. Depth (ft)	1.22	2.68	
Max Chl Dpth (ft)	3.18	Conv. (cfs)	10842.9	12118.8	
Conv. Total (cfs)	22961.7	Wetted Per. (ft)	208.27	47.99	
Length Wtd. (ft)	162.08	Shear (lb/sq ft)	0.37	0.79	
Min Ch El (ft)	1587.00	Stream Power (lb/ft s)	1.09	5.28	
Alpha	1.58	Cum Volume (acre-ft)	1.13	11.05	0.19
Frctn Loss (ft)	0.89	Cum SA (acres)	1.09	3.73	0.16
C & E Loss (ft)	0.03				

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1592.57	Wt. n-Val.	0.040	0.025	
Vel Head (ft)	1.41	Reach Len. (ft)	163.66	161.13	154.63
W.S. Elev (ft)	1591.16	Flow Area (sq ft)	47.64	138.27	
Crit W.S. (ft)		Area (sq ft)	47.64	138.27	
E.G. Slope (ft/ft)	0.005305	Flow (cfs)	202.04	1392.96	
Q Total (cfs)	1595.00	Top Width (ft)	22.07	34.37	
Top Width (ft)	56.44	Avg. Vel. (ft/s)	4.24	10.07	
Vel Total (ft/s)	8.58	Hydr. Depth (ft)	2.16	4.02	
Max Chl Dpth (ft)	4.16	Conv. (cfs)	2774.0	19124.8	
Conv. Total (cfs)	21898.8	Wetted Per. (ft)	24.28	38.95	
Length Wtd. (ft)	161.32	Shear (lb/sq ft)	0.65	1.18	
Min Ch El (ft)	1587.00	Stream Power (lb/ft s)	2.76	11.85	
Alpha	1.24	Cum Volume (acre-ft)	0.13	9.61	
Frctn Loss (ft)	0.96	Cum SA (acres)	0.06	2.17	
C & E Loss (ft)	0.04				

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1650

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1611	1008.24	1610	1015.08	1609	1020.16	1608	1023.18	1607
1025.9	1606	1027.82	1605	1029.73	1604	1031.65	1603	1033.58	1602
1035.52	1601	1037.42	1600	1039.38	1599	1041.29	1598	1043.24	1597
1048.3	1596	1056.24	1595	1078.47	1594	1140.38	1593	1199.86	1592
1212.73	1591.78	1258.28	1591	1320.25	1590	1390.53	1589	1471.72	1588
1520.79	1587.04	1523.08	1587	1523.91	1587	1525.73	1588	1527.64	1588
1541.86	1588	1563.09	1588	1574.76	1587	1576.76	1586	1582.3	1585
1600.56	1585	1603.67	1586	1609.52	1587	1614.51	1588	1617.16	1589
1619.96	1590	1622.21	1591	1624.38	1592	1626.5	1593	1628.43	1594
1631.3	1595	1634.46	1596	1654.44	1597	1662.17	1597		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1563.09	.025	1600.56	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1563.09	1634.46	190.68	175.57 185.82	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1589.69	Wt. n-Val.	0.040	0.030	
Vel Head (ft)	0.69	Reach Len. (ft)	190.68	175.57	185.82
W.S. Elev (ft)	1589.01	Flow Area (sq ft)	160.49	149.57	
Crit W.S. (ft)	1589.01	Area (sq ft)	160.49	149.57	
E.G. Slope (ft/ft)	0.006317	Flow (cfs)	450.32	1144.68	
Q Total (cfs)	1595.00	Top Width (ft)	172.96	54.09	
Top Width (ft)	227.05	Avg. Vel. (ft/s)	2.81	7.65	
Vel Total (ft/s)	5.14	Hydr. Depth (ft)	0.93	2.77	
Max Chl Dpth (ft)	4.01	Conv. (cfs)	5665.9	14402.4	
Conv. Total (cfs)	20068.4	Wetted Per. (ft)	173.24	54.98	
Length Wtd. (ft)	177.70	Shear (lb/sq ft)	0.37	1.07	
Min Ch El (ft)	1585.00	Stream Power (lb/ft s)	1.03	8.21	
Alpha	1.67	Cum Volume (acre-ft)	0.35	10.54	0.19
Frctn Loss (ft)	1.67	Cum SA (acres)	0.38	3.54	0.16
C & E Loss (ft)	0.03				

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

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1591.57	Wt. n-Val.	0.040	0.025	
Vel Head (ft)	1.82	Reach Len. (ft)	190.68	175.57	185.82
W.S. Elev (ft)	1589.75	Flow Area (sq ft)	9.27	142.91	
Crit W.S. (ft)	1589.75	Area (sq ft)	9.27	142.91	
E.G. Slope (ft/ft)	0.006723	Flow (cfs)	33.89	1561.11	
Q Total (cfs)	1595.00	Top Width (ft)	5.31	37.47	
Top Width (ft)	42.78	Avg. Vel. (ft/s)	3.65	10.92	
Vel Total (ft/s)	10.48	Hydr. Depth (ft)	1.75	3.81	
Max Chl Dpth (ft)	4.75	Conv. (cfs)	413.4	19039.4	
Conv. Total (cfs)	19452.8	Wetted Per. (ft)	7.06	42.59	
Length Wtd. (ft)	175.73	Shear (lb/sq ft)	0.55	1.41	
Min Ch El (ft)	1585.00				

Alpha	1.07	Stream Power (lb/ft s)	2.02	15.39	
Frctn Loss (ft)	1.59	Cum Volume (acre-ft)	0.02	9.09	
C & E Loss (ft)	0.04	Cum SA (acres)	0.01	2.03	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1600

INPUT
Description:
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1593	1056.43	1592	1122.58	1591	1188.64	1590	1249.15	1589
1313.23	1588	1394.68	1587	1398.17	1586	1398.88	1586	1401.29	1587
1448.19	1587	1451.06	1586	1453.96	1585	1462.44	1584	1483.55	1584
1520.36	1585	1546.05	1585.71	1556.34	1586	1562.87	1586.3	1578.37	1587
1580.19	1588	1582.08	1589	1583.99	1590	1585.95	1591	1587.5	1592
1589.07	1593	1590.62	1594	1592.14	1595	1593.7	1596	1595.17	1597
1596.58	1598	1600.83	1599	1606.01	1600	1611.1	1601	1614.69	1602
1616.93	1603								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1453.96	.025	1483.55	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1448.19	1562.87	157	142	133	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
1556.34	1616.93	1587	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
1394.68	1401.29	1587

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1587.65	Element		0.036	
Vel Head (ft)	0.95	Wt. n-Val.			
W.S. Elev (ft)	1586.70	Reach Len. (ft)	157.00	142.00	133.00
Crit W.S. (ft)	1586.70	Flow Area (sq ft)		203.85	
E.G. Slope (ft/ft)	0.015504	Area (sq ft)		207.43	1.75
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	122.63	Top Width (ft)		113.81	8.81
Vel Total (ft/s)	7.82	Avg. Vel. (ft/s)		7.82	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		1.90	
Conv. Total (cfs)	12809.9	Conv. (cfs)		12809.9	
Length Wtd. (ft)	142.00	Wetted Per. (ft)		107.66	
Min Ch El (ft)	1584.00	Shear (lb/sq ft)		1.83	
Alpha	1.00	Stream Power (lb/ft s)		14.34	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)		9.82	0.18
C & E Loss (ft)	0.23	Cum SA (acres)		3.20	0.14

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1589.22	Element		0.033	
Vel Head (ft)	1.67	Wt. n-Val.			
W.S. Elev (ft)	1587.54	Reach Len. (ft)	157.00	142.00	133.00
Crit W.S. (ft)	1587.54	Flow Area (sq ft)		153.73	
E.G. Slope (ft/ft)	0.012808	Area (sq ft)		153.73	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	45.70	Top Width (ft)		45.70	
Vel Total (ft/s)	10.38	Avg. Vel. (ft/s)		10.38	
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)		3.36	
Conv. Total (cfs)	14093.3	Conv. (cfs)		14093.3	
Length Wtd. (ft)	142.00	Wetted Per. (ft)		52.13	
Min Ch El (ft)	1584.00	Shear (lb/sq ft)		2.36	
Alpha	1.00	Stream Power (lb/ft s)		24.47	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)		8.50	
C & E Loss (ft)	0.45	Cum SA (acres)		1.87	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: Critical depth could not be determined within the specified number of iterations. The program used the iteration with the lowest energy.
Warning: The cross section had to be extended vertically during the critical depth calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1500

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	1588	1013.71	1587	1025.92	1586	1041.5	1585	1045.93	1584
1051.42	1583	1084.18	1582	1090.64	1581	1096.18	1580	1100.98	1579

1117.37	1578 1146.16	1578 1147.44	1579 1148.27	1580 1148.93	1581		
1149.7	1582 1150.44	1583 1151.12	1584 1151.82	1585 1152.39	1586		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.04	1041.5	.025	1146.16	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1041.5	1152.39	125	113	101	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1584.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.026	
W.S. Elev (ft)	1584.67	Reach Len. (ft)	125.00	113.00	101.00
Crit W.S. (ft)		Flow Area (sq ft)		459.80	
E.G. Slope (ft/ft)	0.000576	Area (sq ft)		459.80	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	108.62	Top Width (ft)		108.62	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		3.47	
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		4.23	
Conv. Total (cfs)	66483.7	Conv. (cfs)		66483.7	
Length Wtd. (ft)	113.00	Wetted Per. (ft)		112.32	
Min Ch El (ft)	1578.00	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.51	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		8.74	0.18
C & E Loss (ft)	0.22	Cum SA (acres)		2.84	0.13

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1584.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.026	
W.S. Elev (ft)	1584.67	Reach Len. (ft)	125.00	113.00	101.00
Crit W.S. (ft)		Flow Area (sq ft)		458.45	
E.G. Slope (ft/ft)	0.000566	Area (sq ft)		458.45	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	105.59	Top Width (ft)		105.59	
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)		3.48	
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)		4.34	
Conv. Total (cfs)	67058.3	Conv. (cfs)		67058.3	
Length Wtd. (ft)	113.00	Wetted Per. (ft)		109.89	
Min Ch El (ft)	1578.00	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.51	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		7.50	
C & E Loss (ft)	0.22	Cum SA (acres)		1.62	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1400

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1291.53	1587	1297.66	1586	1302.32	1585	1311.27	1584	1312.95	1583
1313.61	1582	1314.1	1581	1314.53	1580	1314.93	1579	1315.93	1578
1317.87	1577	1320.08	1576	1332.34	1576	1334.31	1577	1335.72	1578
1336.83	1579	1338.1	1580	1339.32	1581	1340.5	1582	1341.8	1583
1343.02	1584	1344.27	1585	1345.71	1586				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1291.53	.04	1311.27	.025	1332.34	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1291.53	1345.71	122.02	161.58	190.42	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1584.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.38	Wt. n-Val.		0.030	
W.S. Elev (ft)	1582.09	Reach Len. (ft)	122.02	161.58	190.42
Crit W.S. (ft)	1582.09	Flow Area (sq ft)		128.81	
E.G. Slope (ft/ft)	0.009907	Area (sq ft)		128.81	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	27.06	Top Width (ft)		27.06	
Vel Total (ft/s)	12.38	Avg. Vel. (ft/s)		12.38	
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)		4.76	
Conv. Total (cfs)	16024.7	Conv. (cfs)		16024.7	
Length Wtd. (ft)	161.58	Wetted Per. (ft)		31.98	
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		2.49	
Alpha	1.00	Stream Power (lb/ft s)		30.85	
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)		7.97	0.18
C & E Loss (ft)	0.13	Cum SA (acres)		2.66	0.13

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1584.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	1582.08	Reach Len. (ft)	122.02	161.58	190.42
Crit W.S. (ft)	1582.08	Flow Area (sq ft)		128.68	
E.G. Slope (ft/ft)	0.009933	Area (sq ft)		128.68	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	27.05	Top Width (ft)		27.05	
Vel Total (ft/s)	12.40	Avg. Vel. (ft/s)		12.40	
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)		4.76	
Conv. Total (cfs)	16003.4	Conv. (cfs)		16003.4	
Length Wtd. (ft)	161.58	Wetted Per. (ft)		31.96	
Min Ch El (ft)	1576.00	Shear (lb/sq ft)		2.50	
Alpha	1.00	Stream Power (lb/ft s)		30.94	
Frctn Loss (ft)	1.21	Cum Volume (acre-ft)		6.74	
C & E Loss (ft)	0.31	Cum SA (acres)		1.45	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1300

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1630.46	1582	1632.6	1581	1634.55	1580	1636.49	1579	1638.34	1578
1639.9	1577	1641.33	1576	1642.75	1575	1644.42	1574	1646.14	1573
1656.34	1573	1658.07	1574	1659.77	1575	1661.13	1576	1662.51	1577
1663.8	1578	1665.15	1579	1666.47	1580	1667.71	1581	1668.93	1582
1670.11	1583	1671.28	1584						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1630.46	.04	1642.75	.025	1659.77	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1630.46	1671.28	198.91	176.37 153.42	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1581.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.		0.033	
W.S. Elev (ft)	1579.82	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)	1579.54	Flow Area (sq ft)		142.61	
E.G. Slope (ft/ft)	0.009488	Area (sq ft)		142.61	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	31.34	Top Width (ft)		31.34	
Vel Total (ft/s)	11.18	Avg. Vel. (ft/s)		11.18	
Max Chl Dpth (ft)	6.82	Hydr. Depth (ft)		4.55	
Conv. Total (cfs)	16375.0	Conv. (cfs)		16375.0	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		35.40	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		2.39	
Alpha	1.00	Stream Power (lb/ft s)		26.69	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)		7.47	0.18
C & E Loss (ft)	0.36	Cum SA (acres)		2.55	0.13

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1582.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.033	
W.S. Elev (ft)	1580.70	Reach Len. (ft)	198.91	176.37	153.42
Crit W.S. (ft)		Flow Area (sq ft)		170.84	
E.G. Slope (ft/ft)	0.005835	Area (sq ft)		170.84	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	32.59	Top Width (ft)		32.59	
Vel Total (ft/s)	9.34	Avg. Vel. (ft/s)		9.34	
Max Chl Dpth (ft)	7.70	Hydr. Depth (ft)		5.24	
Conv. Total (cfs)	20880.7	Conv. (cfs)		20880.7	
Length Wtd. (ft)	176.37	Wetted Per. (ft)		37.79	
Min Ch El (ft)	1573.00	Shear (lb/sq ft)		1.65	
Alpha	1.00	Stream Power (lb/ft s)		15.38	
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)		6.18	
C & E Loss (ft)	0.06	Cum SA (acres)		1.34	

Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1200

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1624.95	1580	1626.44	1579	1627.97	1578	1629.5	1577	1630.7	1576
1631.99	1575	1633.31	1574	1634.65	1573	1636.15	1572	1646.88	1572
1648.31	1573	1649.99	1574	1651.83	1575	1653.82	1576	1675.3	1577
1680.92	1578	1683	1578.66	1684.06	1579	1687.77	1580	1691.11	1581

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1624.95	.04	1636.15	.025	1646.88	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1624.95	1691.11	111.55	110.23 110.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1580.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.038	
W.S. Elev (ft)	1579.38	Reach Len. (ft)	111.55	110.23	110.23
Crit W.S. (ft)		Flow Area (sq ft)		228.21	
E.G. Slope (ft/ft)	0.005689	Area (sq ft)		228.21	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	59.57	Top Width (ft)		59.57	
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)		6.99	
Max Chl Dpth (ft)	7.38	Hydr. Depth (ft)		3.83	
Conv. Total (cfs)	21146.8	Conv. (cfs)		21146.8	
Length Wtd. (ft)	110.23	Wetted Per. (ft)		63.35	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.28	
Alpha	1.00	Stream Power (lb/ft s)		8.94	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		6.72	0.18
C & E Loss (ft)	0.00	Cum SA (acres)		2.37	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1580.95	Element	Left OB	Channel	Right OB

Vel Head (ft)	1.14	Wt. n-Val.			0.036	
W.S. Elev (ft)	1579.81	Reach Len. (ft)	111.55	110.23	110.23	
Crit W.S. (ft)		Flow Area (sq ft)		186.01		
E.G. Slope (ft/ft)	0.005957	Area (sq ft)		186.01		
Q Total (cfs)	1595.00	Flow (cfs)		1595.00		
Top Width (ft)	34.24	Top Width (ft)		34.24		
Vel Total (ft/s)	8.57	Avg. Vel. (ft/s)		8.57		
Max Chl Dpth (ft)	7.81	Hydr. Depth (ft)		5.43		
Conv. Total (cfs)	20665.4	Conv. (cfs)		20665.4		
Length Wtd. (ft)	110.23	Wetted Per. (ft)		41.39		
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.67		
Alpha	1.00	Stream Power (lb/ft s)		14.33		
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)		5.46		
C & E Loss (ft)	0.01	Cum SA (acres)		1.20		

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1100

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1619.57	1580	1621.29	1579	1622.97	1578	1624.61	1577	1626.31	1576
1628.02	1575	1629.57	1574	1630.8	1573	1632	1572	1645.32	1572
1647.11	1573	1648.89	1574	1650.95	1575	1663.2	1575	1664.69	1575
1667.66	1576	1670.65	1577	1672.81	1578	1675.07	1579	1677.38	1580

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1619.57	.04	1632	.025	1645.32	.04	1677.38	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1619.57	1677.38	102.45	103.7	103.7	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1579.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.037	
W.S. Elev (ft)	1578.74	Reach Len. (ft)	102.45	103.70	103.70
Crit W.S. (ft)		Flow Area (sq ft)		222.56	
E.G. Slope (ft/ft)	0.005019	Area (sq ft)		222.56	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	52.77	Top Width (ft)		52.77	
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)		7.17	
Max Chl Dpth (ft)	6.74	Hydr. Depth (ft)		4.22	
Conv. Total (cfs)	22513.5	Conv. (cfs)		22513.5	
Length Wtd. (ft)	103.70	Wetted Per. (ft)		56.27	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.24	
Alpha	1.00	Stream Power (lb/ft s)		8.88	
Frctn Loss (ft)	0.65	Cum Volume (acre-ft)		6.15	0.18
C & E Loss (ft)	0.01	Cum SA (acres)		2.23	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1580.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.26	Wt. n-Val.		0.035	
W.S. Elev (ft)	1578.98	Reach Len. (ft)	102.45	103.70	103.70
Crit W.S. (ft)		Flow Area (sq ft)		176.80	
E.G. Slope (ft/ft)	0.006629	Area (sq ft)		176.80	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	34.21	Top Width (ft)		34.21	
Vel Total (ft/s)	9.02	Avg. Vel. (ft/s)		9.02	
Max Chl Dpth (ft)	6.98	Hydr. Depth (ft)		5.17	
Conv. Total (cfs)	19590.1	Conv. (cfs)		19590.1	
Length Wtd. (ft)	103.70	Wetted Per. (ft)		41.06	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		16.08	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		5.00	
C & E Loss (ft)	0.06	Cum SA (acres)		1.12	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1000

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1619.06	1579	1620.6	1578	1622.05	1577	1623.54	1576	1625.04	1575
1626.53	1574	1628.01	1573	1629.5	1572	1647.23	1572	1649.07	1573
1650.89	1574	1652.74	1575	1669.86	1576	1674.48	1577	1677.9	1578
1681.44	1579								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1619.06	.04	1647.23	.025	1649.07	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1619.06	1681.44	116.93	118.27	121.55	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1578.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.		0.040	
W.S. Elev (ft)	1577.95	Reach Len. (ft)	116.93	118.27	121.55
Crit W.S. (ft)		Flow Area (sq ft)		206.59	
E.G. Slope (ft/ft)	0.008097	Area (sq ft)		206.59	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	57.06	Top Width (ft)		57.06	
Vel Total (ft/s)	7.72	Avg. Vel. (ft/s)		7.72	
Max Chl Dpth (ft)	5.95	Hydr. Depth (ft)		3.62	
Conv. Total (cfs)	17725.3	Conv. (cfs)		17725.3	
Length Wtd. (ft)	118.27	Wetted Per. (ft)		59.92	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.74	
Alpha	1.00	Stream Power (lb/ft s)		13.46	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)		5.64	0.18
C & E Loss (ft)	0.02	Cum SA (acres)		2.10	0.13

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1579.49	Element		0.039	
Vel Head (ft)	1.06	Wt. n-Val.			
W.S. Elev (ft)	1578.43	Reach Len. (ft)	116.93	118.27	121.55
Crit W.S. (ft)		Flow Area (sq ft)		193.01	
E.G. Slope (ft/ft)	0.006911	Area (sq ft)		193.01	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	39.37	Top Width (ft)		39.37	
Vel Total (ft/s)	8.26	Avg. Vel. (ft/s)		8.26	
Max Chl Dpth (ft)	6.42	Hydr. Depth (ft)		4.90	
Conv. Total (cfs)	19186.7	Conv. (cfs)		19186.7	
Length Wtd. (ft)	118.27	Wetted Per. (ft)		45.15	
Min Ch El (ft)	1572.00	Shear (lb/sq ft)		1.84	
Alpha	1.00	Stream Power (lb/ft s)		15.24	
Frctn Loss (ft)	0.91	Cum Volume (acre-ft)		4.56	
C & E Loss (ft)	0.04	Cum SA (acres)		1.03	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 900

INPUT
Description:

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1601.29	1579	1615.48	1578	1617.19	1577	1618.89	1576	1620.39	1575
1621.56	1574	1622.7	1573	1623.85	1572	1627.4	1570	1636.36	1570
1639.19	1572	1644.13	1573	1649.05	1574	1666.38	1575	1667.9	1576
1669.58	1577	1672.3	1578						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1601.29	.04	1627.4	.025	1636.36	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1601.29	1672.3	102.08	103.62	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1577.84	Element		0.038	
Vel Head (ft)	1.12	Wt. n-Val.			
W.S. Elev (ft)	1576.72	Reach Len. (ft)	102.08	103.62	108.33
Crit W.S. (ft)		Flow Area (sq ft)		187.66	
E.G. Slope (ft/ft)	0.009077	Area (sq ft)		187.66	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	51.45	Top Width (ft)		51.45	
Vel Total (ft/s)	8.50	Avg. Vel. (ft/s)		8.50	
Max Chl Dpth (ft)	6.72	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	16741.4	Conv. (cfs)		16741.4	
Length Wtd. (ft)	103.62	Wetted Per. (ft)		54.96	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.93	
Alpha	1.00	Stream Power (lb/ft s)		16.45	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		5.10	0.18
C & E Loss (ft)	0.13	Cum SA (acres)		1.95	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1578.54	Element		0.037	
Vel Head (ft)	1.42	Wt. n-Val.			
W.S. Elev (ft)	1577.13	Reach Len. (ft)	102.08	103.62	108.33
Crit W.S. (ft)		Flow Area (sq ft)		166.94	
E.G. Slope (ft/ft)	0.008557	Area (sq ft)		166.94	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	34.46	Top Width (ft)		34.46	
Vel Total (ft/s)	9.55	Avg. Vel. (ft/s)		9.55	
Max Chl Dpth (ft)	7.13	Hydr. Depth (ft)		4.84	
Conv. Total (cfs)	17242.1	Conv. (cfs)		17242.1	
Length Wtd. (ft)	103.62	Wetted Per. (ft)		40.54	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		2.20	
Alpha	1.00	Stream Power (lb/ft s)		21.02	
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)		4.07	
C & E Loss (ft)	0.15	Cum SA (acres)		0.93	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 800

INPUT
Description:

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1601.95	1578	1603.41	1577	1604.87	1576	1606.28	1575	1607.03	1574
1607.49	1573	1607.94	1572	1610.31	1570	1622.39	1570	1627.75	1572
1630.97	1573	1649.72	1573	1656.19	1573	1659.75	1574	1663.07	1575
1666.04	1576	1668.67	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1601.95	.04	1610.31	.025	1622.39	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1601.95	1668.67	134	133	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1577.02	Element		0.038	
Vel Head (ft)	0.70	Wt. n-Val.			
W.S. Elev (ft)	1576.31	Reach Len. (ft)	134.00	133.00	133.00
Crit W.S. (ft)		Flow Area (sq ft)		237.34	
E.G. Slope (ft/ft)	0.005265	Area (sq ft)		237.34	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	62.45	Top Width (ft)		62.45	
Vel Total (ft/s)	6.72	Avg. Vel. (ft/s)		6.72	
Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)		3.80	
Conv. Total (cfs)	21980.8	Conv. (cfs)		21980.8	
Length Wtd. (ft)	133.00	Wetted Per. (ft)		66.40	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.17	
Alpha	1.00	Stream Power (lb/ft s)		7.90	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		4.60	0.18
C & E Loss (ft)	0.05	Cum SA (acres)		1.82	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1577.69	Element			

Vel Head (ft)	0.92	Wt. n-Val.		0.037	
W.S. Elev (ft)	1576.77	Reach Len. (ft)	134.00	133.00	133.00
Crit W.S. (ft)		Flow Area (sq ft)		207.48	
E.G. Slope (ft/ft)	0.005473	Area (sq ft)		207.48	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	43.10	Top Width (ft)		43.10	
Vel Total (ft/s)	7.69	Avg. Vel. (ft/s)		7.69	
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)		4.81	
Conv. Total (cfs)	21559.2	Conv. (cfs)		21559.2	
Length Wtd. (ft)	133.00	Wetted Per. (ft)		50.46	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.40	
Alpha	1.00	Stream Power (lb/ft s)		10.80	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)		3.63	
C & E Loss (ft)	0.02	Cum SA (acres)		0.84	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 700

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1594.24	1578	1595.79	1577	1597.29	1576	1598.78	1575	1600.22	1574
1601.71	1573	1603.56	1572	1607.53	1570	1622.94	1570	1628.9	1572
1641.44	1573	1655.8	1573	1658.53	1572	1662.47	1572	1665.1	1573
1667.19	1574	1668.72	1575	1670.24	1576	1671.81	1577		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1594.24	.04	1607.53	.025	1622.94	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1594.24	1671.81	109	119	125	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1576.37	Element			
Vel Head (ft)	0.53	Wt. n-Val.		0.037	
W.S. Elev (ft)	1575.84	Reach Len. (ft)	109.00	119.00	125.00
Crit W.S. (ft)		Flow Area (sq ft)		273.28	
E.G. Slope (ft/ft)	0.003846	Area (sq ft)		273.28	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	72.47	Top Width (ft)		72.47	
Vel Total (ft/s)	5.84	Avg. Vel. (ft/s)		5.84	
Max Chl Dpth (ft)	5.84	Hydr. Depth (ft)		3.77	
Conv. Total (cfs)	25717.7	Conv. (cfs)		25717.7	
Length Wtd. (ft)	119.38	Wetted Per. (ft)		75.57	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)		5.07	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		3.82	0.18
C & E Loss (ft)	0.00	Cum SA (acres)		1.61	0.13

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1576.86	Element			
Vel Head (ft)	1.12	Wt. n-Val.		0.036	
W.S. Elev (ft)	1575.74	Reach Len. (ft)	109.00	119.00	125.00
Crit W.S. (ft)		Flow Area (sq ft)		187.53	
E.G. Slope (ft/ft)	0.006823	Area (sq ft)		187.53	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	43.76	Top Width (ft)		43.76	
Vel Total (ft/s)	8.51	Avg. Vel. (ft/s)		8.51	
Max Chl Dpth (ft)	5.74	Hydr. Depth (ft)		4.29	
Conv. Total (cfs)	19309.6	Conv. (cfs)		19309.6	
Length Wtd. (ft)	119.00	Wetted Per. (ft)		48.43	
Min Ch El (ft)	1570.00	Shear (lb/sq ft)		1.65	
Alpha	1.00	Stream Power (lb/ft s)		14.03	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)		3.02	
C & E Loss (ft)	0.08	Cum SA (acres)		0.70	

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 600

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1567.15	1577	1581.21	1576	1582.7	1575	1584.21	1574	1585.7	1573
1587.59	1572	1591.73	1570	1593.77	1569	1610.31	1569	1617.2	1570
1622.17	1572	1623.98	1572.99	1624	1573	1625.86	1574	1627.65	1575
1661.89	1575	1664.15	1574	1666.35	1573	1668.81	1572	1671.47	1571
1675.87	1571	1679.03	1572	1681.85	1573	1683.37	1574	1684.93	1575
1686.5	1576	1688.2	1577						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1567.15	.04	1591.73	.025	1610.31	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1581.21	1627.65	65.6	65.6	65.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1575.97	Element			
Vel Head (ft)	0.56	Wt. n-Val.		0.035	0.040
W.S. Elev (ft)	1575.41	Reach Len. (ft)	65.60	65.60	65.60
Crit W.S. (ft)		Flow Area (sq ft)		219.29	82.24
E.G. Slope (ft/ft)	0.002910	Area (sq ft)		219.29	82.24
Q Total (cfs)	1595.00	Flow (cfs)		1391.12	203.88
Top Width (ft)	103.48	Top Width (ft)		45.56	57.92
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		6.34	2.48
Max Chl Dpth (ft)	6.41	Hydr. Depth (ft)		4.81	1.42
Conv. Total (cfs)	29565.6	Conv. (cfs)		25786.3	3779.2
Length Wtd. (ft)	65.60	Wetted Per. (ft)		48.46	59.77
Min Ch El (ft)	1569.00	Shear (lb/sq ft)		0.82	0.25
Alpha	1.28	Stream Power (lb/ft s)		5.22	0.62
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		3.15	0.06
C & E Loss (ft)	0.04	Cum SA (acres)		1.45	0.04

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1576.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.035	
W.S. Elev (ft)	1575.29	Reach Len. (ft)	65.60	65.60	65.60
Crit W.S. (ft)		Flow Area (sq ft)		214.01	
E.G. Slope (ft/ft)	0.004162	Area (sq ft)		214.01	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	45.39	Top Width (ft)		45.39	
Vel Total (ft/s)	7.45	Avg. Vel. (ft/s)		7.45	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		4.72	
Conv. Total (cfs)	24723.3	Conv. (cfs)		24723.3	
Length Wtd. (ft)	65.60	Wetted Per. (ft)		48.54	
Min Ch El (ft)	1569.00	Shear (lb/sq ft)		1.15	
Alpha	1.00	Stream Power (lb/ft s)		8.54	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		2.47	
C & E Loss (ft)	0.13	Cum SA (acres)		0.58	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 580

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
947	1579	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1094.34	1580				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
947	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1037.34	102.1	102.1	102.1	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1575.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.015	
W.S. Elev (ft)	1575.45	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1571.90	Flow Area (sq ft)		262.72	
E.G. Slope (ft/ft)	0.000323	Area (sq ft)		262.72	
Q Total (cfs)	1388.72	Flow (cfs)		1388.72	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		5.29	
Max Chl Dpth (ft)	7.04	Hydr. Depth (ft)		7.04	
Conv. Total (cfs)	77213.8	Conv. (cfs)		77213.8	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		51.41	
Min Ch El (ft)	1568.41	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.55	
Frctn Loss (ft)		Cum Volume (acre-ft)		2.78	
C & E Loss (ft)		Cum SA (acres)		1.39	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1575.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.		0.015	
W.S. Elev (ft)	1575.55	Reach Len. (ft)	0.01	0.01	0.01
Crit W.S. (ft)	1571.90	Flow Area (sq ft)		266.50	
E.G. Slope (ft/ft)	0.000310	Area (sq ft)		266.50	
Q Total (cfs)	1388.72	Flow (cfs)		1388.72	
Top Width (ft)	37.34	Top Width (ft)		37.34	
Vel Total (ft/s)	5.21	Avg. Vel. (ft/s)		5.21	
Max Chl Dpth (ft)	7.14	Hydr. Depth (ft)		7.14	
Conv. Total (cfs)	78864.7	Conv. (cfs)		78864.7	
Length Wtd. (ft)	0.01	Wetted Per. (ft)		51.61	
Min Ch El (ft)	1568.41	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.52	
Frctn Loss (ft)		Cum Volume (acre-ft)		2.11	
C & E Loss (ft)		Cum SA (acres)		0.52	

BRIDGE

RIVER: RIVER-1
REACH: Reach-1 RS: 550

INPUT
Description: Hafen Lane Bridge

Distance from Upstream XS = .01
Deck/Roadway Width = 102
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1575.59	1572.41	1037.34	1575.59	1572.41

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
857.5	1576.11	1000	1575.59	1000	1572.41	1000	1568.41	1037.34	1568.41
1037.34	1572.41	1037.34	1575.59	1187.34	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
857.5	.025	1000	.015	1037.34	.015

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1037.34	.3	.5

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
1000	1575.59	1571.36	1037.34	1575.59	1571.36

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	1576.11	1000	1575.59	1000	1571.36	1000	1567.36	1037.34	1567.36
1037.34	1571.36	1037.34	1575.59	1231.44	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Coeff Contr.	Expan.
1000	1037.34	.3	.5

```
Upstream Embankment side slope              =      0 horiz. to 1.0 vertical
Downstream Embankment side slope            =      0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =    .98
Elevation at which weir flow begins         = 1575.55
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  2

Pier Data
Pier Station     Upstream= 1012.34    Downstream= 1012.34
Upstream     num=        2
    Width   Elev    Width   Elev
     .67 1569.51     .67   1575
Downstream     num=      2
    Width   Elev    Width   Elev
     .67 1569.51     .67   1575

Pier Data
Pier Station     Upstream=    1025    Downstream=    1025
Upstream     num=        2
    Width   Elev    Width   Elev
     .67 1569.51     .67   1575
Downstream     num=      2
    Width   Elev    Width   Elev
     .67 1569.51     .67   1575

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Yarnell                KVal =    1.25
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd             =
           Submerged Inlet + Outlet Cd =.8164966
           Max Low Cord                   =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #PF 1

  E.G. US. (ft)              1575.88    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1575.45    E.G. Elev (ft)           1575.88       1575.88
  Q Total (cfs)              1388.72    W.S. Elev (ft)           1575.45       1575.45
  Q Bridge (cfs)             1352.58    Crit W.S. (ft)           1572.00       1570.95
  Q Weir (cfs)                 36.12    Max Chl Dpth (ft)           7.04          8.09
  Weir Sta Lft (ft)           920.55    Vel Total (ft/s)            8.03          8.10
  Weir Sta Rgt (ft)          1083.11    Flow Area (sq ft)         172.98        171.49
  Weir Submerg                  0.00    Froude # Chl                0.64          0.60
  Weir Max Depth (ft)           0.29    Specif Force (cu ft)     1141.11       1292.31
  Min El Weir Flow (ft)      1575.60    Hydr Depth (ft)
  Min El Prs (ft)            1572.41    W.P. Total (ft)            96.00         96.00
  Delta EG (ft)                 3.27    Conv. Total (cfs)
  Delta WS (ft)                 4.60    Top Width (ft)
  BR Open Area (sq ft)        144.00    Frctn Loss (ft)
  BR Open Vel (ft/s)            9.39    C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical
         depth.  The Yarnell solution has been disregarded.
Note:    Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
         The Yarnell answer has been disregarded.
Note:    Momentum answer is not valid if the water surface is above the low chord or if there is weir
         flow.  The momentum answer has been disregarded.
Note:    The downstream water surface is below the minimum elevation for pressure flow.  The sluice
         gate equations were used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Note:    For the cross section inside the bridge at the downstream end, the water surface and energy
         have been projected from the downstream cross section.  The selected bridge modeling
         method does not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

BRIDGE OUTPUT  Profile #PF 2

  E.G. US. (ft)              1575.97    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              1575.55    E.G. Elev (ft)           1575.97       1575.97
  Q Total (cfs)              1388.72    W.S. Elev (ft)           1575.55       1575.55
  Q Bridge (cfs)             1361.43    Crit W.S. (ft)           1572.00       1570.95
  Q Weir (cfs)                 27.29    Max Chl Dpth (ft)           7.14          8.19
  Weir Sta Lft (ft)           995.00    Vel Total (ft/s)            8.61          0.00
  Weir Sta Rgt (ft)          1042.34    Flow Area (sq ft)         161.22
  Weir Submerg                  0.00    Froude # Chl                0.64          0.59
  Weir Max Depth (ft)           0.38    Specif Force (cu ft)     1155.66       1306.87
  Min El Weir Flow (ft)      1575.60    Hydr Depth (ft)
  Min El Prs (ft)            1572.41    W.P. Total (ft)            96.00         96.00
  Delta EG (ft)                 3.36    Conv. Total (cfs)
  Delta WS (ft)                 4.69    Top Width (ft)
  BR Open Area (sq ft)        144.00    Frctn Loss (ft)
  BR Open Vel (ft/s)            9.45    C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method           Press/Weir    Power Total (lb/ft s)


Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Warning: The water surface upstream of the bridge computed by the Yarnell method was below critical
         depth.  The Yarnell solution has been disregarded.
Note:    Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
         The Yarnell answer has been disregarded.
Note:    Momentum answer is not valid if the water surface is above the low chord or if there is weir
         flow.  The momentum answer has been disregarded.
Note:    The downstream water surface is below the minimum elevation for pressure flow.  The sluice
         gate equations were used for pressure flow.
Note:    For the cross section inside the bridge at the upstream end, the water surface and energy have
         been projected from the upstream cross section.  The selected bridge modeling method does
         not compute answers inside the bridge.
Note:    For the cross section inside the bridge at the downstream end, the water surface and energy
         have been projected from the downstream cross section.  The selected bridge modeling
         method does not compute answers inside the bridge.

CROSS SECTION
```

RIVER: RIVER-1
REACH: Reach-1 RS: 500

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
900	1576.11	1000	1575.59	1000	1571.36	1000	1567.36	1037.34	1567.36
1037.34	1571.36	1037.34	1575.59	1231.44	1576.54				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
900	.025	1000	.015	1037.34	.025

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1000	1037.34	40.6	40.6	.3	.5

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1572.61	Wt. n-Val.		0.015	
Vel Head (ft)	1.77	Reach Len. (ft)	40.60	40.60	40.60
W.S. Elev (ft)	1570.85	Flow Area (sq ft)		130.23	
Crit W.S. (ft)	1570.85	Area (sq ft)		130.23	
E.G. Slope (ft/ft)	0.002753	Flow (cfs)		1388.72	
Q Total (cfs)	1388.72	Top Width (ft)		37.34	
Top Width (ft)	37.34	Avg. Vel. (ft/s)		10.66	
Vel Total (ft/s)	10.66	Hydr. Depth (ft)		3.49	
Max Chl Dpth (ft)	3.49	Conv. (cfs)		26469.2	
Conv. Total (cfs)	26469.2	Wetted Per. (ft)		44.32	
Length Wtd. (ft)	40.60	Shear (lb/sq ft)		0.51	
Min Ch El (ft)	1567.36	Stream Power (lb/ft s)		5.39	
Alpha	1.00	Cum Volume (acre-ft)		2.44	
Frctn Loss (ft)	0.19	Cum SA (acres)		1.39	
C & E Loss (ft)	0.23				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1572.61	Wt. n-Val.		0.015	
Vel Head (ft)	1.76	Reach Len. (ft)	40.60	40.60	40.60
W.S. Elev (ft)	1570.85	Flow Area (sq ft)		130.48	
Crit W.S. (ft)	1570.85	Area (sq ft)		130.48	
E.G. Slope (ft/ft)	0.002737	Flow (cfs)		1388.72	
Q Total (cfs)	1388.72	Top Width (ft)		37.34	
Top Width (ft)	37.34	Avg. Vel. (ft/s)		10.64	
Vel Total (ft/s)	10.64	Hydr. Depth (ft)		3.49	
Max Chl Dpth (ft)	3.49	Conv. (cfs)		26545.9	
Conv. Total (cfs)	26545.9	Wetted Per. (ft)		44.33	
Length Wtd. (ft)	40.60	Shear (lb/sq ft)		0.50	
Min Ch El (ft)	1567.36	Stream Power (lb/ft s)		5.35	
Alpha	1.00	Cum Volume (acre-ft)		1.77	
Frctn Loss (ft)	0.07	Cum SA (acres)		0.52	
C & E Loss (ft)	0.48				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 400

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1401.03	1573	1416.44	1572	1433.23	1571	1455.07	1570	1472.49	1569
1487.08	1568	1492.83	1567	1496.2	1566	1499.92	1565	1507.96	1564
1515.18	1564	1521.97	1564	1526.3	1565	1530.56	1566	1535.1	1567
1540.51	1568	1546.78	1569	1554.77	1570	1571.65	1571	1596.55	1572
1609.08	1573								

Manning's n Values num= 1

Sta	n Val
1401.03	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1401.03	1609.08	132.08	134.41	158.2	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1569.57	Wt. n-Val.		0.030	
Vel Head (ft)	1.30	Reach Len. (ft)	132.08	134.41	158.20
W.S. Elev (ft)	1568.27	Flow Area (sq ft)		151.84	
Crit W.S. (ft)	1568.27	Area (sq ft)		151.84	
E.G. Slope (ft/ft)	0.009870	Flow (cfs)		1388.72	
Q Total (cfs)	1388.72	Top Width (ft)		59.03	
Top Width (ft)	59.03	Avg. Vel. (ft/s)		9.15	
Vel Total (ft/s)	9.15	Hydr. Depth (ft)		2.57	
Max Chl Dpth (ft)	4.27	Conv. (cfs)		13978.4	
Conv. Total (cfs)	13978.4	Wetted Per. (ft)		59.92	
Length Wtd. (ft)	134.41	Shear (lb/sq ft)		1.56	
Min Ch El (ft)	1564.00	Stream Power (lb/ft s)		14.28	
Alpha	1.00	Cum Volume (acre-ft)		2.31	
Frctn Loss (ft)	1.39	Cum SA (acres)		1.34	
C & E Loss (ft)	0.11				

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1571.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	1568.74	Reach Len. (ft)	132.08	134.41	158.20
Crit W.S. (ft)	1568.74	Flow Area (sq ft)		114.95	
E.G. Slope (ft/ft)	0.011325	Area (sq ft)		114.95	
Q Total (cfs)	1388.72	Flow (cfs)		1388.72	
Top Width (ft)	25.38	Top Width (ft)		25.38	
Vel Total (ft/s)	12.08	Avg. Vel. (ft/s)		12.08	
Max Chl Dpth (ft)	4.74	Hydr. Depth (ft)		4.53	
Conv. Total (cfs)	13049.4	Conv. (cfs)		13049.4	
Length Wtd. (ft)	134.41	Wetted Per. (ft)		33.13	
Min Ch El (ft)	1564.00	Shear (lb/sq ft)		2.45	
Alpha	1.00	Stream Power (lb/ft s)		29.64	
Frctn Loss (ft)	1.46	Cum Volume (acre-ft)		1.66	
C & E Loss (ft)	0.13	Cum SA (acres)		0.49	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 300

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1326.59	1566	1398.97	1565	1411.4	1564	1429.8	1563	1447.74	1562
1478.25	1562	1494.89	1563	1505.16	1564	1508.73	1564.29	1517.3	1565
1546.71	1566								

Manning's n Values num= 1

Sta	n Val
1326.59	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1326.59	1546.71	364.63	352.07 359.83	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1565.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.		0.030	
W.S. Elev (ft)	1564.77	Reach Len. (ft)	364.63	352.07	359.83
Crit W.S. (ft)	1564.77	Flow Area (sq ft)		207.18	
E.G. Slope (ft/ft)	0.010764	Area (sq ft)		207.18	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	112.79	Top Width (ft)		112.79	
Vel Total (ft/s)	7.70	Avg. Vel. (ft/s)		7.70	
Max Chl Dpth (ft)	2.77	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	15373.4	Conv. (cfs)		15373.4	
Length Wtd. (ft)	352.07	Wetted Per. (ft)		112.99	
Min Ch El (ft)	1562.00	Shear (lb/sq ft)		1.23	
Alpha	1.00	Stream Power (lb/ft s)		9.49	
Frctn Loss (ft)	3.96	Cum Volume (acre-ft)		1.76	
C & E Loss (ft)	0.05	Cum SA (acres)		1.08	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1567.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	
W.S. Elev (ft)	1565.69	Reach Len. (ft)	364.63	352.07	359.83
Crit W.S. (ft)	1565.69	Flow Area (sq ft)		147.19	
E.G. Slope (ft/ft)	0.010504	Area (sq ft)		147.19	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	40.37	Top Width (ft)		40.37	
Vel Total (ft/s)	10.84	Avg. Vel. (ft/s)		10.84	
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	15562.9	Conv. (cfs)		15562.9	
Length Wtd. (ft)	352.07	Wetted Per. (ft)		47.19	
Min Ch El (ft)	1562.00	Shear (lb/sq ft)		2.05	
Alpha	1.00	Stream Power (lb/ft s)		22.16	
Frctn Loss (ft)	3.71	Cum Volume (acre-ft)		1.26	
C & E Loss (ft)	0.10	Cum SA (acres)		0.39	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 200

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1408.98	1562	1430.03	1561	1443.63	1560	1456.15	1559	1483.33	1558
1511.65	1558	1529.54	1558	1535.63	1557	1591.46	1557	1598.86	1558
1605.41	1559	1611.46	1560	1616.72	1561	1621.82	1562	1626.85	1563
1633.43	1564	1640.24	1565	1646.85	1566	1659.32	1567		

Manning's n Values num= 1

Sta	n Val
1408.98	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1408.98	1659.32	0	0 0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1559.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.030	
W.S. Elev (ft)	1559.22	Reach Len. (ft)			
Crit W.S. (ft)	1559.22	Flow Area (sq ft)		228.23	
E.G. Slope (ft/ft)	0.011742	Area (sq ft)		228.23	

Q Total (cfs)	1595.00	Flow (cfs)	1595.00
Top Width (ft)	153.34	Top Width (ft)	153.34
Vel Total (ft/s)	6.99	Avg. Vel. (ft/s)	6.99
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.49
Conv. Total (cfs)	14719.3	Conv. (cfs)	14719.3
Length Wtd. (ft)		Wetted Per. (ft)	153.61
Min Ch El (ft)	1557.00	Shear (lb/sq ft)	1.09
Alpha	1.00	Stream Power (lb/ft s)	7.61
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1561.41	Element		0.030	
Vel Head (ft)	1.48	Wt. n-Val.			
W.S. Elev (ft)	1559.93	Reach Len. (ft)			
Crit W.S. (ft)	1559.93	Flow Area (sq ft)		163.48	
E.G. Slope (ft/ft)	0.010579	Area (sq ft)		163.48	
Q Total (cfs)	1595.00	Flow (cfs)		1595.00	
Top Width (ft)	55.83	Top Width (ft)		55.83	
Vel Total (ft/s)	9.76	Avg. Vel. (ft/s)		9.76	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		2.93	
Conv. Total (cfs)	15507.2	Conv. (cfs)		15507.2	
Length Wtd. (ft)		Wetted Per. (ft)		61.69	
Min Ch El (ft)	1557.00	Shear (lb/sq ft)		1.75	
Alpha	1.00	Stream Power (lb/ft s)		17.08	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical depth). Water surface set to critical depth.

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3	n4
Reach-1	3800	.04	.025	.04	
Reach-1	3700	.024	.025	.04	
Reach-1	3660	.04	.015	.04	
Reach-1	3650	Bridge			
Reach-1	3640	.04	.015	.04	
Reach-1	3600	.025	.04		
Reach-1	3500	.025	.04		
Reach-1	3400	.025	.04		
Reach-1	3300	.025	.04		
Reach-1	3280	.04	.025	.04	
Reach-1	3275	.015	.015	.015	
Reach-1	3270	.015	.015	.015	
Reach-1	3200	.015	.015	.015	
Reach-1	3100	.015	.015	.015	
Reach-1	3080	.015	.015	.015	
Reach-1	3050	Bridge			
Reach-1	3020	.015	.015	.015	
Reach-1	3000	.015	.015	.015	
Reach-1	2900	.015	.015	.015	
Reach-1	2800	.015	.015	.015	
Reach-1	2700	.015	.015	.015	
Reach-1	2600	.015	.015	.015	
Reach-1	2590	.04	.025	.04	
Reach-1	2500	.04	.025	.04	
Reach-1	2400	.025	.04		
Reach-1	2350	.04	.025	.04	
Reach-1	2330	.04	.025	.04	
Reach-1	2300	.04	.025	.04	
Reach-1	2200	.04	.025	.04	
Reach-1	2100	.04	.025	.04	
Reach-1	2000.1	.025	.015	.025	
Reach-1	2000	.025	.015	.025	
Reach-1	1950	Bridge			
Reach-1	1900	.025	.015	.025	
Reach-1	1800	.04	.025	.04	
Reach-1	1750	.04	.025	.04	
Reach-1	1700	.04	.025	.04	
Reach-1	1650	.04	.025	.04	
Reach-1	1600	.04	.025	.04	
Reach-1	1500	.04	.025	.04	
Reach-1	1400	.04	.025	.04	
Reach-1	1300	.04	.025	.04	
Reach-1	1200	.04	.025	.04	
Reach-1	1100	.04	.025	.04	.04
Reach-1	1000	.04	.025	.04	
Reach-1	900	.04	.025	.04	
Reach-1	800	.04	.025	.04	
Reach-1	700	.04	.025	.04	
Reach-1	600	.04	.025	.04	
Reach-1	580	.025	.015	.025	
Reach-1	550	Bridge			
Reach-1	500	.025	.015	.025	
Reach-1	400	.03			
Reach-1	300	.03			
Reach-1	200	.03			

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	3800	580	566	553
Reach-1	3700	222.1	225	219.5
Reach-1	3660	42.6	42.6	42.6
Reach-1	3650	Bridge		
Reach-1	3640	143.1	143.1	143.1
Reach-1	3600	366.01	370	383
Reach-1	3500	392	394	393
Reach-1	3400	347	344	345
Reach-1	3300	49	51	53
Reach-1	3280	17.5	17.5	17.5
Reach-1	3275	33	33	33
Reach-1	3270	250	250	250
Reach-1	3200	400	400	400
Reach-1	3100	40	40	40
Reach-1	3080	127.2	127.2	127.2
Reach-1	3050	Bridge		
Reach-1	3020	150	150	150
Reach-1	3000	350	350	350
Reach-1	2900	290	290	290

Reach-1	2800	250	250	250
Reach-1	2700	381.4	381.4	381.4
Reach-1	2600	6.4	6.4	6.4
Reach-1	2590	226	210	201
Reach-1	2500	186.68	179.72	182.96
Reach-1	2400	57	71	87
Reach-1	2350	64	63	63
Reach-1	2330	235	240	222
Reach-1	2300	320.42	311.55	310.65
Reach-1	2200	383.01	328.57	273.85
Reach-1	2100	67.6	97.6	97.6
Reach-1	2000.1	1	1	1
Reach-1	2000	320.07	319.85	303.13
Reach-1	1950	Bridge		
Reach-1	1900	38.8	38.8	38.8
Reach-1	1800	173.79	170.93	148.02
Reach-1	1750	171.49	169.33	179.87
Reach-1	1700	163.66	161.13	154.63
Reach-1	1650	190.68	175.57	185.82
Reach-1	1600	157	142	133
Reach-1	1500	125	113	101
Reach-1	1400	122.02	161.58	190.42
Reach-1	1300	198.91	176.37	153.42
Reach-1	1200	111.55	110.23	110.23
Reach-1	1100	102.45	103.7	103.7
Reach-1	1000	116.93	118.27	121.55
Reach-1	900	102.08	103.62	108.33
Reach-1	800	134	133	133
Reach-1	700	109	119	125
Reach-1	600	65.6	65.6	65.6
Reach-1	580	102.1	102.1	102.1
Reach-1	550	Bridge		
Reach-1	500	40.6	40.6	40.6
Reach-1	400	132.08	134.41	158.2
Reach-1	300	364.63	352.07	359.83
Reach-1	200	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER-1

Reach	River Sta.	Contr.	Expan.
Reach-1	3800	.1	.3
Reach-1	3700	.1	.3
Reach-1	3660	.3	.5
Reach-1	3650	Bridge	
Reach-1	3640	.3	.5
Reach-1	3600	.1	.3
Reach-1	3500	.1	.3
Reach-1	3400	.1	.3
Reach-1	3300	.1	.3
Reach-1	3280	.1	.3
Reach-1	3275	.1	.3
Reach-1	3270	.1	.3
Reach-1	3200	.1	.3
Reach-1	3100	.1	.3
Reach-1	3080	.1	.3
Reach-1	3050	Bridge	
Reach-1	3020	.1	.3
Reach-1	3000	.1	.3
Reach-1	2900	.1	.3
Reach-1	2800	.1	.3
Reach-1	2700	.1	.3
Reach-1	2600	.1	.3
Reach-1	2590	.1	.3
Reach-1	2500	.1	.3
Reach-1	2400	.1	.3
Reach-1	2350	.1	.3
Reach-1	2330	.1	.3
Reach-1	2300	.1	.3
Reach-1	2200	.1	.3
Reach-1	2100	.1	.3
Reach-1	2000.1	.1	.1
Reach-1	2000	.3	.5
Reach-1	1950	Bridge	
Reach-1	1900	.3	.5
Reach-1	1800	.1	.3
Reach-1	1750	.1	.3
Reach-1	1700	.1	.3
Reach-1	1650	.1	.3
Reach-1	1600	.1	.3
Reach-1	1500	.1	.3
Reach-1	1400	.1	.3
Reach-1	1300	.1	.3
Reach-1	1200	.1	.3
Reach-1	1100	.1	.3
Reach-1	1000	.1	.3
Reach-1	900	.1	.3
Reach-1	800	.1	.3
Reach-1	700	.1	.3
Reach-1	600	.1	.3
Reach-1	580	.3	.5
Reach-1	550	Bridge	
Reach-1	500	.3	.5
Reach-1	400	.1	.3
Reach-1	300	.1	.3
Reach-1	200	.1	.3

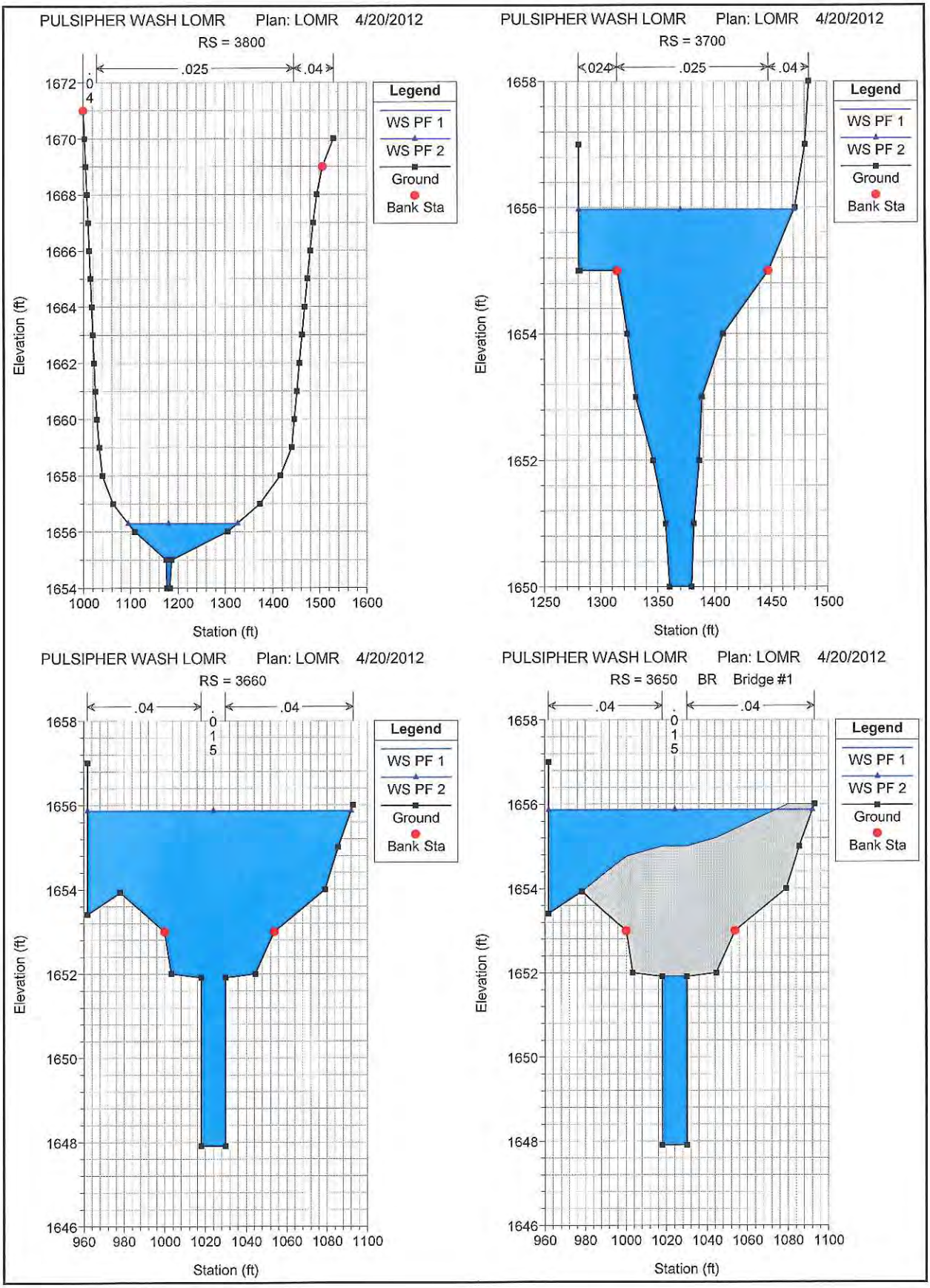
Profile Output Table - CHECKRAS

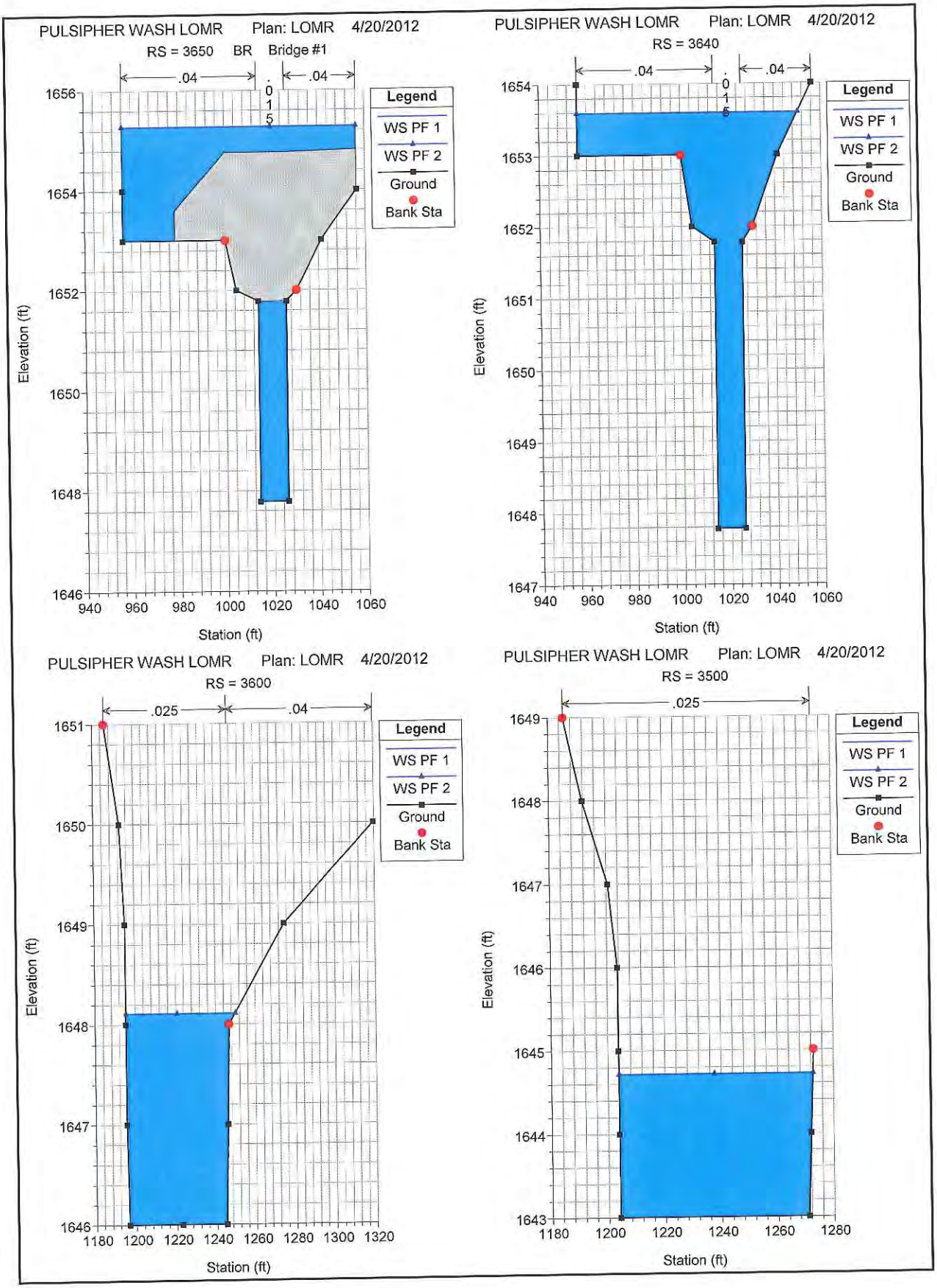
Reach	River Sta	Profile	Froude # Chl	Top Wdth Act	Conv. Total	Prof Delta WS	Left Sta Eff	Enc Sta L	Center Station	Enc Sta R	Rght Sta
Eff Min Ch El	Left Stagn	Right Stagn		(ft)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	
(ft)	(ft)	(ft)									
Reach-1	3800	PF 1	0.99	230.33	8738.2		1095.27		1253.25		
1325.60	1654.00										
Reach-1	3800	PF 2	0.99	230.33	8738.2	0.00	1095.27		1253.25		
1325.60	1654.00										
Reach-1	3700	PF 1	0.20	190.24	54487.9		1280.37		1381.31		
1470.61	1650.00										
Reach-1	3700	PF 2	0.20	190.24	54487.9	0.00	1280.37		1381.31		
1470.61	1650.00										
Reach-1	3660	PF 1	0.21	130.19	38449.6		961.80		1026.96		
1091.99	1647.91										
Reach-1	3660	PF 2	0.21	130.19	38449.6	0.00	961.80		1026.96		
1091.99	1647.91										

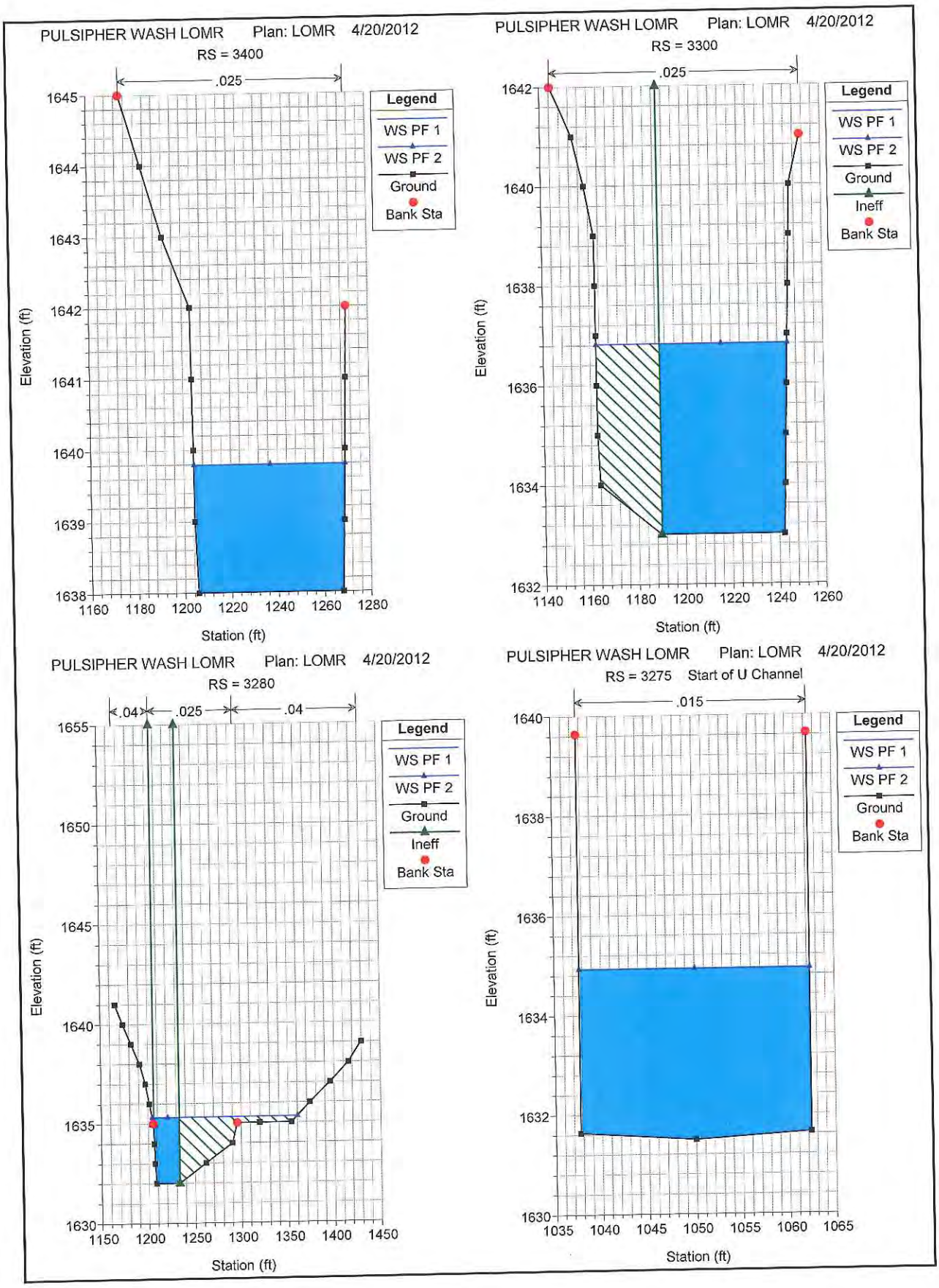
Reach-1	3650	BR U	PF 1	0.32	112.36			961.80		1026.96	
1074.16	1647.91										
Reach-1	3650	BR U	PF 2	0.32	112.36		0.00	961.80		1026.96	
1074.16	1647.91										
Reach-1	3650	BR D	PF 1	0.37	100.12			956.10		1015.16	
1056.22	1647.78										
Reach-1	3650	BR D	PF 2	0.37	100.12		0.00	956.10		1015.16	
1056.22	1647.78										
Reach-1	3640		PF 1	0.77	94.08	10746.1		956.10		1015.16	
1050.18	1647.78										
Reach-1	3640		PF 2	0.77	94.08	10746.1	0.00	956.10		1015.16	
1050.18	1647.78										
Reach-1	3600		PF 1	1.00	54.66	9929.1		1195.29		1216.27	
1249.95	1646.00										
Reach-1	3600		PF 2	1.00	54.66	9929.1	0.00	1195.29		1216.27	
1249.95	1646.00										
Reach-1	3500		PF 1	1.01	68.89	9652.1		1203.83		1229.21	
1272.72	1643.00										
Reach-1	3500		PF 2	1.01	68.89	9652.1	0.00	1203.83		1229.21	
1272.72	1643.00										
Reach-1	3400		PF 1	1.01	65.00	9739.3		1204.18		1222.27	
1269.18	1638.00										
Reach-1	3400		PF 2	1.01	65.00	9739.3	0.00	1204.18		1222.27	
1269.18	1638.00										
Reach-1	3300		PF 1	0.38	54.64	28624.3		1162.53		1197.65	
1244.32	1633.00										
Reach-1	3300		PF 2	0.38	54.64	28624.3	0.00	1162.53		1197.65	
1244.32	1633.00										
Reach-1	3280		PF 1	1.00	27.50	10675.8		1205.39		1250.56	
1232.89	1632.00										
Reach-1	3280		PF 2	1.00	27.50	10675.8	0.00	1205.39		1250.56	
1232.89	1632.00										
Reach-1	3275		PF 1	1.00	24.66	15777.2		1037.67		1050.00	
1062.33	1631.49										
Reach-1	3275		PF 2	1.00	24.66	15777.2	0.00	1037.67		1050.00	
1062.33	1631.49										
Reach-1	3270		PF 1	1.01	24.66	15753.8		1037.67		1050.00	
1062.33	1630.88										
Reach-1	3270		PF 2	1.01	24.66	15753.8	0.00	1037.67		1050.00	
1062.33	1630.88										
Reach-1	3200		PF 1	1.01	24.66	15774.5		1037.67		1050.00	
1062.33	1627.08										
Reach-1	3200		PF 2	1.01	24.66	15774.5	0.00	1037.67		1050.00	
1062.33	1627.08										
Reach-1	3100		PF 1	1.01	24.66	15758.0		1037.67		1050.00	
1062.33	1621.00										
Reach-1	3100		PF 2	1.01	24.66	15758.0	0.00	1037.67		1050.00	
1062.33	1621.00										
Reach-1	3080		PF 1	0.72	24.00	18801.6		1037.67		1050.00	
1062.33	1620.49										
Reach-1	3080		PF 2	0.72	24.00	18801.6	0.00	1037.67		1050.00	
1062.33	1620.49										
Reach-1	3050	BR U	PF 1	0.72	23.99	20208.1		1037.67		1050.00	
1062.33	1620.49										
Reach-1	3050	BR U	PF 2	0.72	23.99	20208.1	0.00	1037.67		1050.00	
1062.33	1620.49										
Reach-1	3050	BR D	PF 1	0.50	23.99	28272.9		1037.67		1050.00	
1062.33	1619.47										
Reach-1	3050	BR D	PF 2	0.50	23.99	28272.9	0.00	1037.67		1050.00	
1062.33	1619.47										
Reach-1	3020		PF 1	1.00	24.00	26001.2		1037.67		1050.00	
1062.33	1619.47										
Reach-1	3020		PF 2	1.00	24.00	26001.2	0.00	1037.67		1050.00	
1062.33	1619.47										
Reach-1	3000		PF 1	1.00	24.00	26000.5		1037.67		1050.00	
1062.33	1618.27										
Reach-1	3000		PF 2	1.00	24.00	26000.5	0.00	1037.67		1050.00	
1062.33	1618.27										
Reach-1	2900		PF 1	1.00	24.00	26001.2		1037.67		1050.00	
1062.33	1615.47										
Reach-1	2900		PF 2	1.00	24.00	26001.2	0.00	1037.67		1050.00	
1062.33	1615.47										
Reach-1	2800		PF 1	1.00	24.00	26000.5		1037.67		1050.00	
1062.33	1613.15										
Reach-1	2800		PF 2	1.00	24.00	26000.5	0.00	1037.67		1050.00	
1062.33	1613.15										
Reach-1	2700		PF 1	1.00	24.00	26000.5		1037.67		1050.00	
1062.33	1611.15										
Reach-1	2700		PF 2	1.00	24.00	26000.5	0.00	1037.67		1050.00	
1062.33	1611.15										
Reach-1	2600		PF 1	1.00	24.00	25967.4		1037.67		1050.00	
1062.33	1608.13										
Reach-1	2600		PF 2	1.00	24.00	25967.4	0.00	1037.67	1037.67	1050.00	1062.33
1062.33	1608.13										
Reach-1	2590		PF 1	1.00	69.47	20899.7		1033.92		1069.16	
1103.39	1608.00										

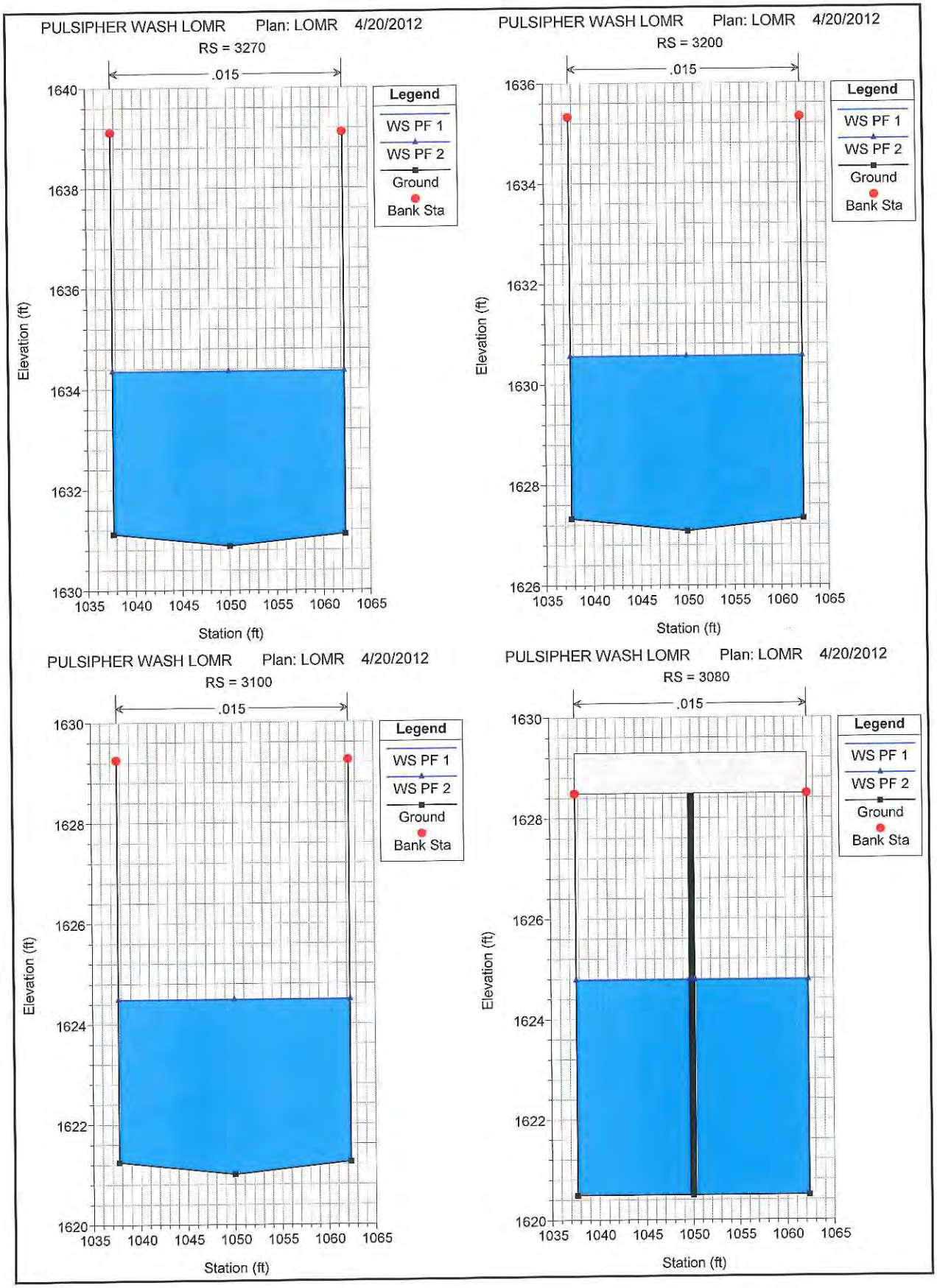
Reach-1	2590		PF 2	1.01	60.00	20464.2	0.03	1040.00	1040.00	1069.16	1100.00
1100.00	1608.00										
Reach-1	2500		PF 1	0.61	60.76	34602.3		1032.31		1071.18	
1093.07	1603.00										
Reach-1	2500		PF 2	0.61	60.76	34599.9	0.00	1032.31	1030.12	1071.18	1106.13
1093.07	1603.00										
Reach-1	2400		PF 1	1.00	48.09	21815.6		1300.53		1338.83	
1348.61	1602.00										
Reach-1	2400		PF 2	1.00	48.09	21818.5	0.00	1300.53	1293.09	1338.83	1384.56
1348.61	1602.00										
Reach-1	2350		PF 1	0.82	113.19	26195.3		1068.96		1175.32	
1182.15	1601.00										
Reach-1	2350		PF 2	0.72	103.18	29960.1	0.32	1080.00	1080.00	1175.32	1220.41
1183.18	1601.00										
Reach-1	2330		PF 1	0.52	214.90	38804.9		1083.17		1287.63	
1298.06	1601.00										
Reach-1	2330		PF 2	0.56	148.25	36008.0	0.06	1150.00	1150.00	1287.63	1330.73
1298.25	1601.00										
Reach-1	2300		PF 1	0.18	322.16	111542.0		1029.63		1327.34	
1351.79	1599.00										
Reach-1	2300		PF 2	0.24	188.31	84918.0	0.01	1163.50	1163.50	1327.34	1383.27
1351.81	1599.00										
Reach-1	2200		PF 1	0.05	570.34	430287.5		1010.99		1548.86	
1581.33	1597.00										
Reach-1	2200		PF 2	0.12	181.27	189388.8	-0.03	1400.00	1400.00	1548.86	1594.90
1581.27	1597.00										
Reach-1	2100		PF 1	0.08	234.08	375679.6		959.00		1141.11	
1193.08	1593.00										
Reach-1	2100		PF 2	0.09	182.51	362545.2	0.00	1010.56	1010.56	1141.11	1206.95
1193.07	1593.00										
Reach-1	2000.1		PF 1	0.35	100.45	80911.3		994.34		1050.29	
1094.79	1591.77										
Reach-1	2000.1		PF 2	0.35	100.45	80913.8	0.00	994.34	990.10	1050.29	1094.79
1094.79	1591.77										
Reach-1	2000		PF 1	0.42	12.00	50362.6		1044.29		1050.29	
1056.29	1591.77										
Reach-1	2000		PF 2	0.42	12.00	43327.0	0.00	1044.29	1044.29	1050.29	1056.29
1056.29	1591.77										
Reach-1	1950	BR U	PF 1	0.59				1044.29		1050.29	
1056.29	1591.77						0.00				
Reach-1	1950	BR U	PF 2	0.59				1044.29	1044.29	1050.29	1056.29
1056.29	1591.77										
Reach-1	1950	BR D	PF 1	0.48				1193.33		1199.33	
1205.33	1585.08						0.00				
Reach-1	1950	BR D	PF 2	0.48				1193.33	1193.33	1199.33	1205.33
1205.33	1585.08										
Reach-1	1900		PF 1	1.00	12.00	22249.0		1193.33		1199.33	
1205.33	1585.08										
Reach-1	1900		PF 2	0.90	12.00	24263.2	0.57	1193.33	1193.33	1199.33	1205.33
1205.33	1585.08										
Reach-1	1800		PF 1	0.85	104.11	21091.1		1051.22		1137.85	
1155.34	1590.00										
Reach-1	1800		PF 2	1.00	31.30	18176.1	0.39	1117.33	1117.33	1137.85	1148.63
1148.63	1590.00										
Reach-1	1750		PF 1	0.81	216.57	23537.2		1105.02		1318.81	
1321.59	1588.00										
Reach-1	1750		PF 2	0.99	40.09	19526.7	0.61	1278.17	1278.17	1318.81	1318.26
1318.26	1588.00										
Reach-1	1700		PF 1	0.72	255.42	22961.7		1221.91		1474.58	
1477.33	1587.00										
Reach-1	1700		PF 2	0.89	56.44	21898.8	0.97	1408.08	1408.08	1474.58	1464.52
1464.52	1587.00										
Reach-1	1650		PF 1	0.81	227.05	20068.4		1390.13		1598.78	
1617.18	1585.00										
Reach-1	1650		PF 2	0.99	42.78	19452.8	0.74	1557.78	1557.78	1598.78	1600.56
1600.56	1585.00										
Reach-1	1600		PF 1	1.00	107.28	12809.9		1449.06		1505.53	
1556.34	1584.00										
Reach-1	1600		PF 2	1.00	45.70	14093.3	0.85	1462.44	1462.44	1505.53	1508.14
1508.14	1584.00										
Reach-1	1500		PF 1	0.30	108.62	66483.7		1042.97		1096.95	
1151.59	1578.00										
Reach-1	1500		PF 2	0.29	105.59	67058.3	0.00	1046.00	1046.00	1096.95	1152.39
1151.59	1578.00										
Reach-1	1400		PF 1	1.00	27.06	16024.7		1313.55		1318.62	
1340.61	1576.00										
Reach-1	1400		PF 2	1.00	27.05	16003.4	0.00	1313.56	1311.27	1318.62	1345.71
1340.61	1576.00										
Reach-1	1300		PF 1	0.92	31.34	16375.0		1634.90		1650.87	
1666.23	1573.00										
Reach-1	1300		PF 2	0.72	32.59	20880.7	0.88	1634.75	1634.75	1650.87	1667.65
1667.34	1573.00										
Reach-1	1200		PF 1	0.63	59.57	21146.8		1625.88		1658.03	
1685.45	1572.00										
Reach-1	1200		PF 2	0.65	34.24	20665.4	0.44	1625.23	1624.95	1658.03	1659.47
1659.47	1572.00										

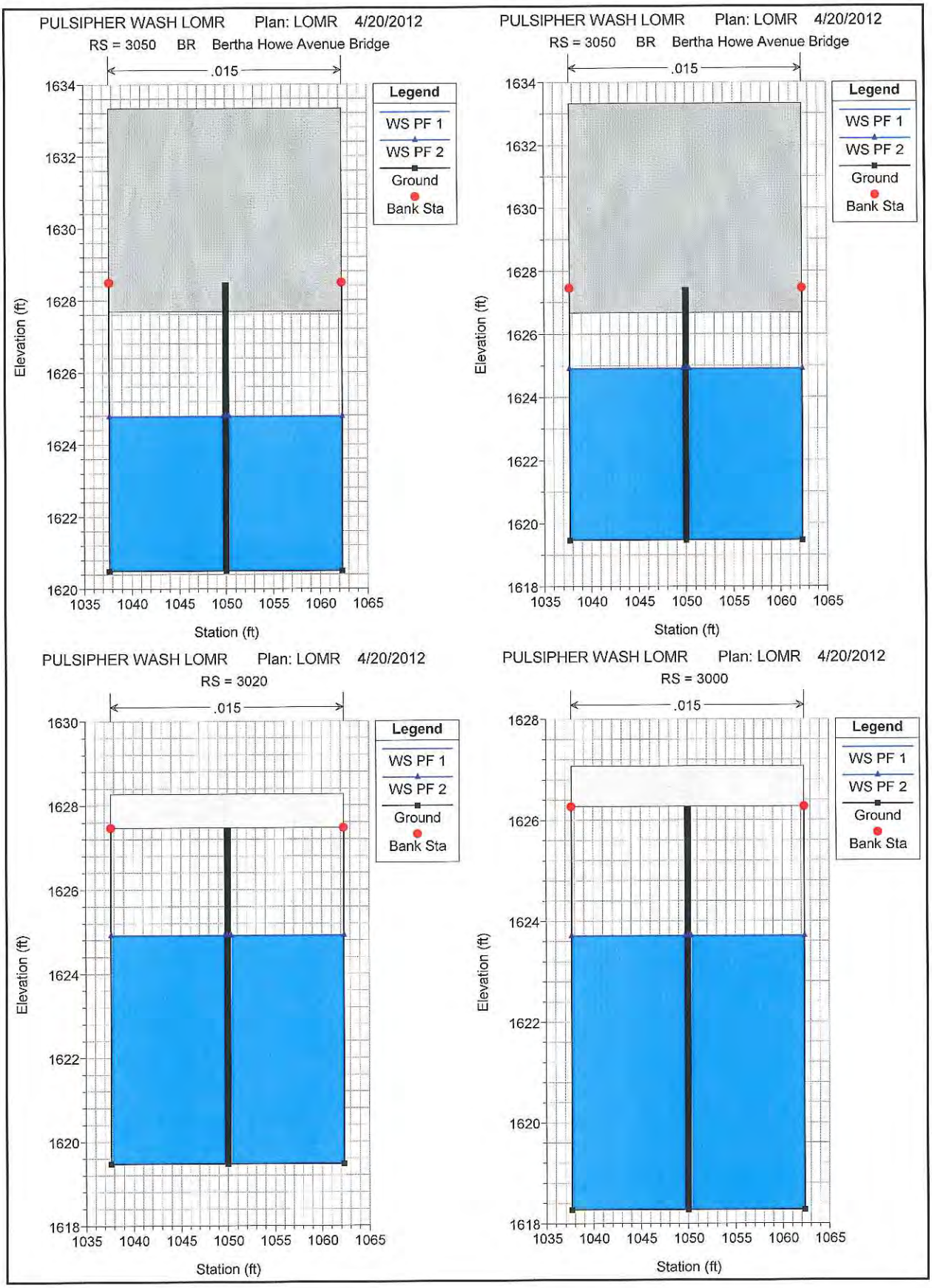
Reach-1	1100		PF 1	0.61	52.77	22513.5		1621.72		1648.48	
1674.49	1572.00										
Reach-1	1100		PF 2	0.70	34.21	19590.1	0.24	1621.32	1619.57	1648.48	1655.53
1655.53	1572.00										
Reach-1	1000		PF 1	0.72	57.06	17725.3		1620.67		1650.25	
1677.73	1572.00										
Reach-1	1000		PF 2	0.66	39.37	19186.7	0.47	1619.95	1619.06	1650.25	1659.32
1659.32	1572.00										
Reach-1	900		PF 1	0.78	51.45	16741.4		1617.66		1636.80	
1669.11	1570.00										
Reach-1	900		PF 2	0.76	34.46	17242.1	0.40	1616.98	1615.48	1636.80	1651.44
1651.44	1570.00										
Reach-1	800		PF 1	0.61	62.45	21980.8		1604.41		1635.31	
1666.86	1570.00										
Reach-1	800		PF 2	0.62	43.10	21559.2	0.46	1603.74	1601.95	1635.31	1646.84
1646.84	1570.00										
Reach-1	700		PF 1	0.53	72.47	25717.7		1597.53		1633.03	
1670.00	1570.00										
Reach-1	700		PF 2	0.72	43.76	19309.6	-0.10	1597.68	1594.24	1633.03	1641.44
1641.44	1570.00										
Reach-1	600		PF 1	0.51	103.48	29565.6		1582.09		1604.43	
1685.57	1569.00										
Reach-1	600		PF 2	0.60	45.39	24723.3	-0.12	1582.26	1581.21	1604.43	1627.65
1627.65	1569.00										
Reach-1	580		PF 1	0.35	37.34	77213.8		1000.00		1018.67	
1037.34	1568.41										
Reach-1	580		PF 2	0.34	37.34	78864.7	0.10	1000.00	995.00	1018.67	1042.34
1037.34	1568.41										
Reach-1	550	BR U	PF 1	0.64				1000.00		1018.67	
1037.34	1568.41										
Reach-1	550	BR U	PF 2	0.64			0.10	1000.00	995.00	1018.67	1042.34
1037.34	1568.41										
Reach-1	550	BR D	PF 1	0.60				1000.00		1018.67	
1037.34	1567.36										
Reach-1	550	BR D	PF 2	0.59			0.10	1000.00	1000.00	1018.67	1037.34
1037.34	1567.36										
Reach-1	500		PF 1	1.01	37.34	26469.2		1000.00		1018.67	
1037.34	1567.36										
Reach-1	500		PF 2	1.00	37.34	26545.9	0.01	1000.00	1000.00	1018.67	1037.34
1037.34	1567.36										
Reach-1	400		PF 1	1.01	59.03	13978.4		1483.16		1505.06	
1542.20	1564.00										
Reach-1	400		PF 2	1.00	25.38	13049.4	0.47	1501.15	1501.15	1505.06	1526.53
1526.53	1564.00										
Reach-1	300		PF 1	1.00	112.79	15373.4		1401.78		1436.65	
1514.57	1562.00										
Reach-1	300		PF 2	1.00	40.37	15562.9	0.91	1441.01	1441.01	1436.65	1481.38
1481.38	1562.00										
Reach-1	200		PF 1	1.01	153.34	14719.3		1453.40		1534.15	
1606.74	1557.00										
Reach-1	200		PF 2	1.00	55.83	15507.2	0.71	1535.63	1535.63	1534.15	1591.46
1591.46	1557.00										


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3800
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3700
.024
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3660
.04
.015
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3650 BR Bridge #1
.04
.015
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3650 BR Bridge #1
.04
.015
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3640
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3600
.025
.04
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3500
.025

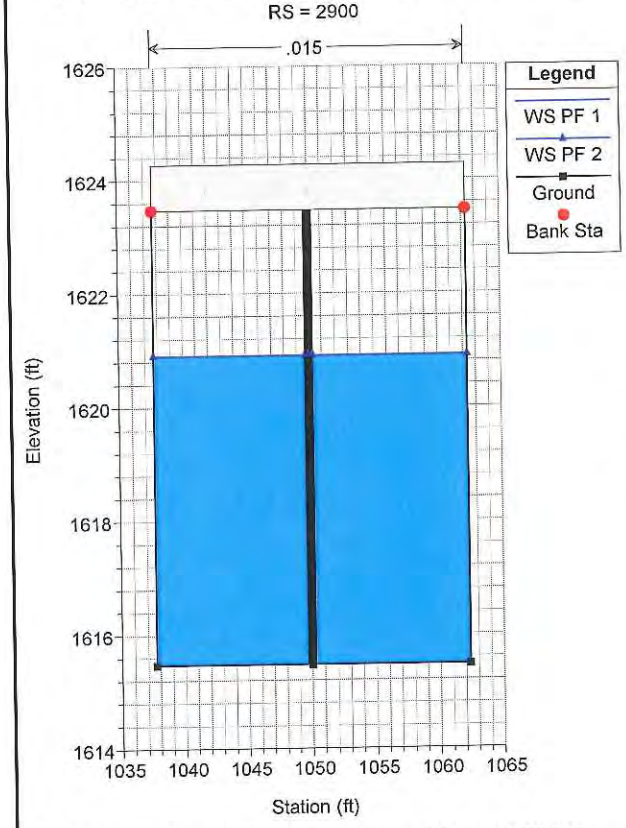

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3400
.025
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3300
.025
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3280
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3275 Start of U Channel
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3270
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3200
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3100
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3080
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3050 BR Bertha Howe Avenue Bridge
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3020
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 3000
.015
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

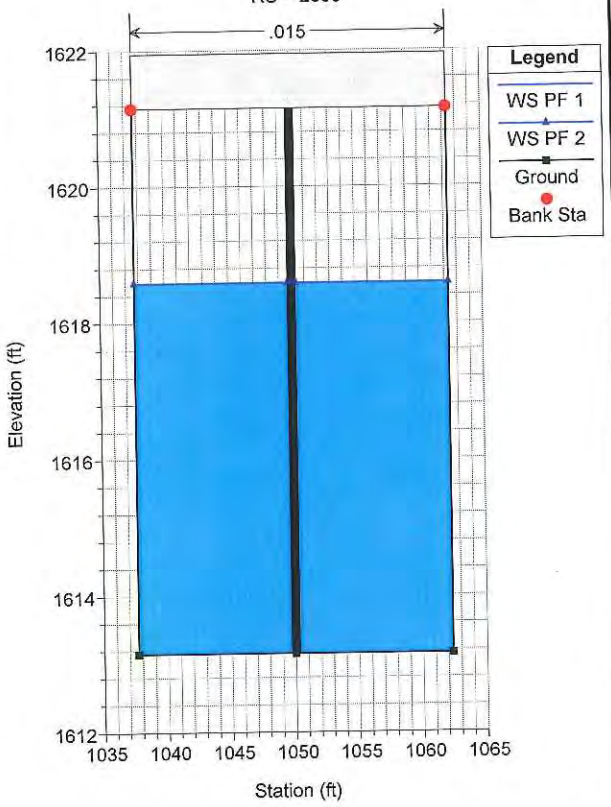
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012

RS = 2900



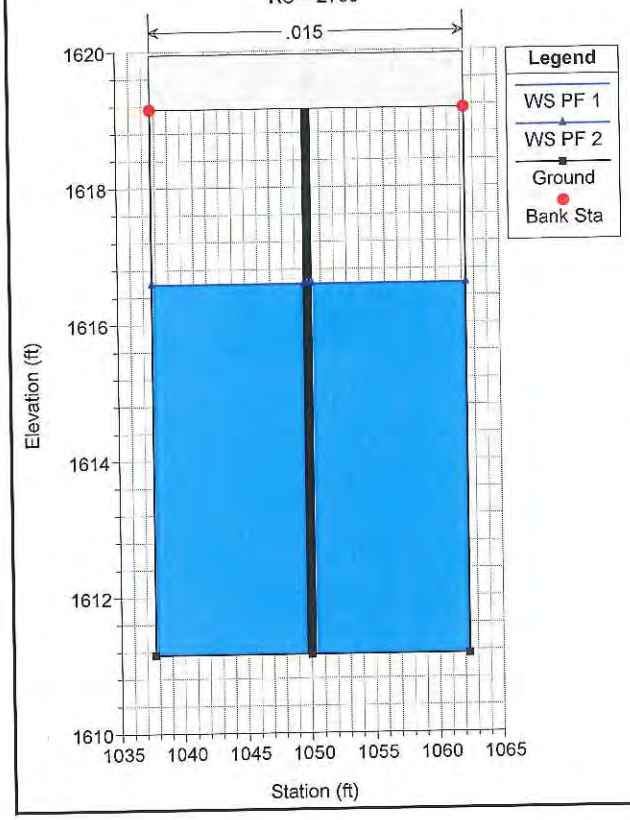
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012

RS = 2800



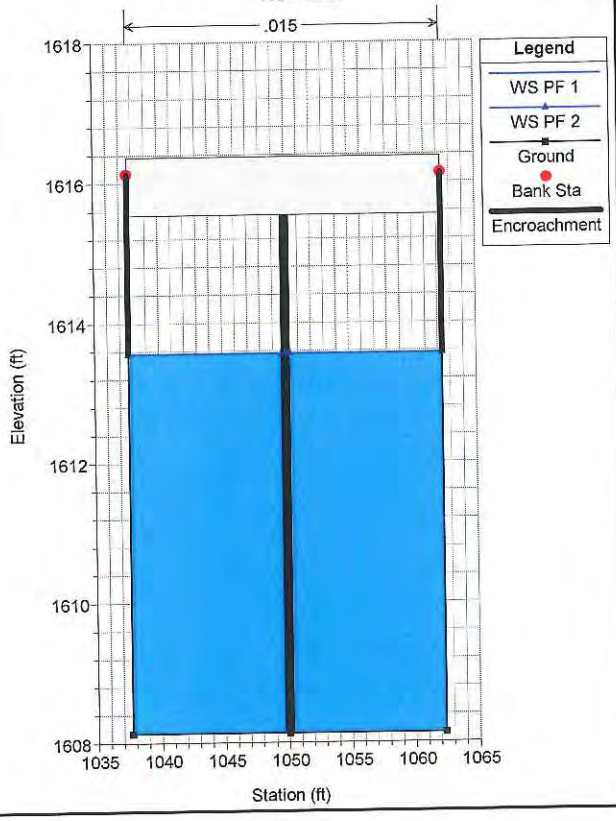
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012

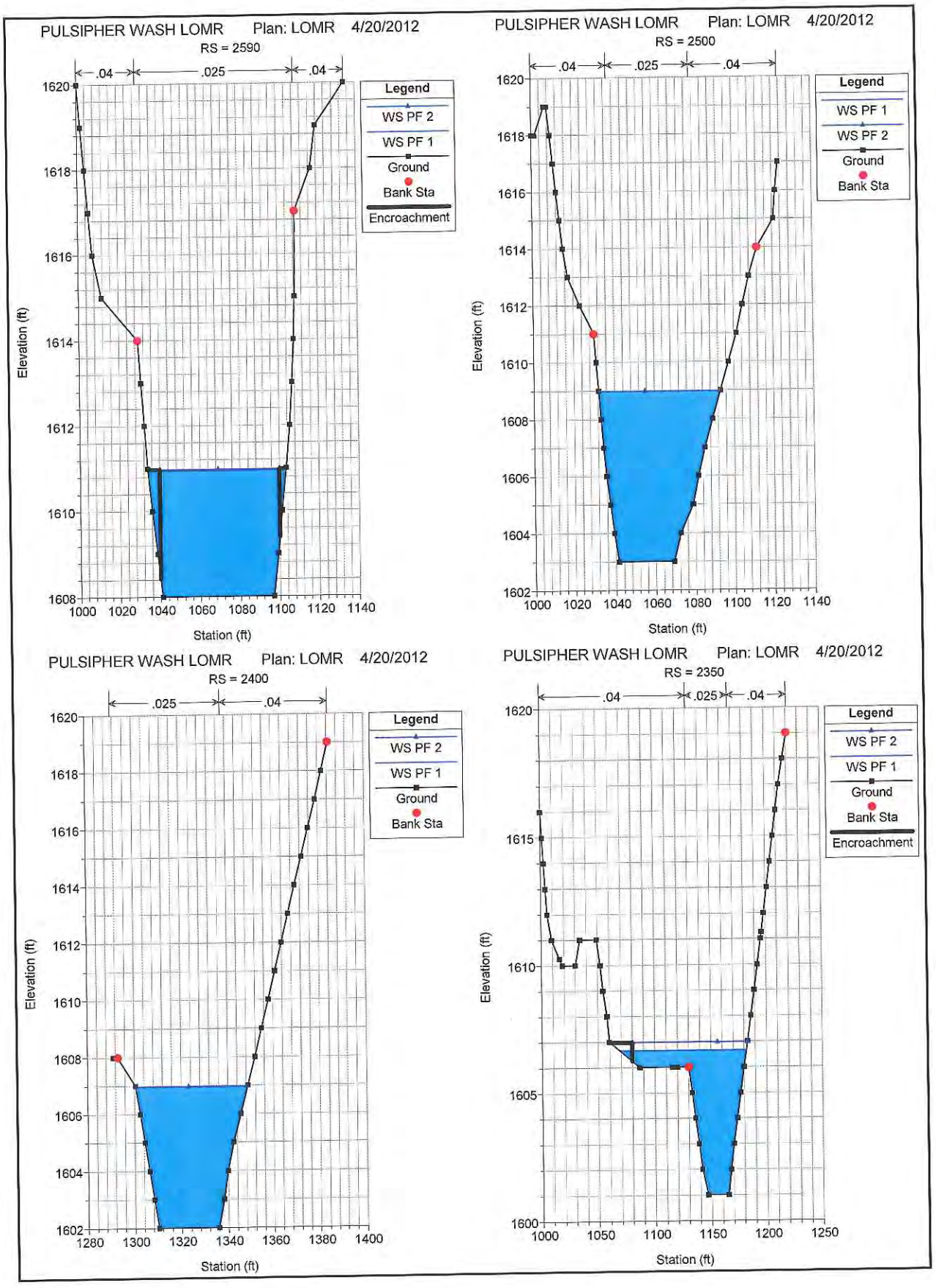
RS = 2700

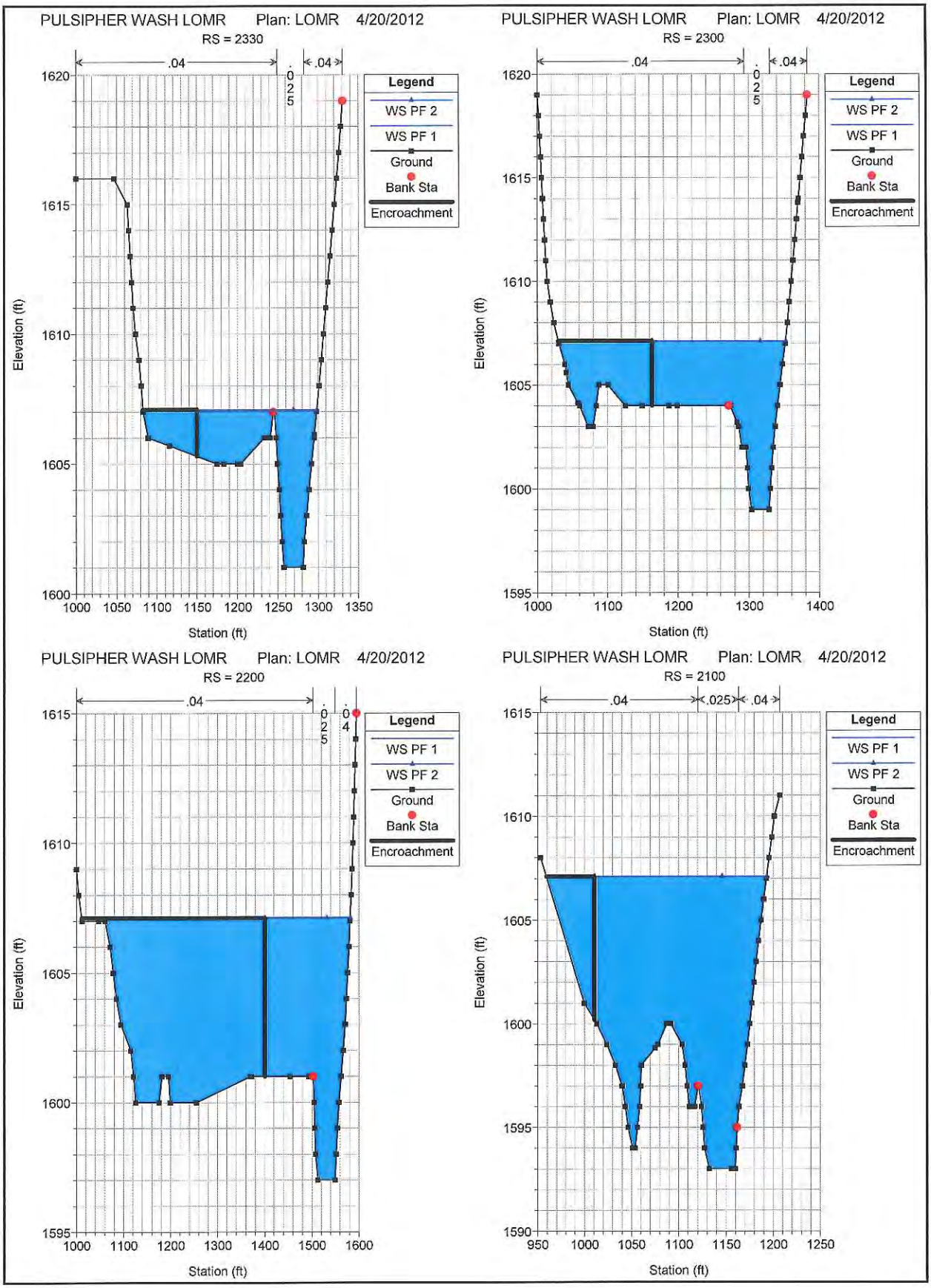


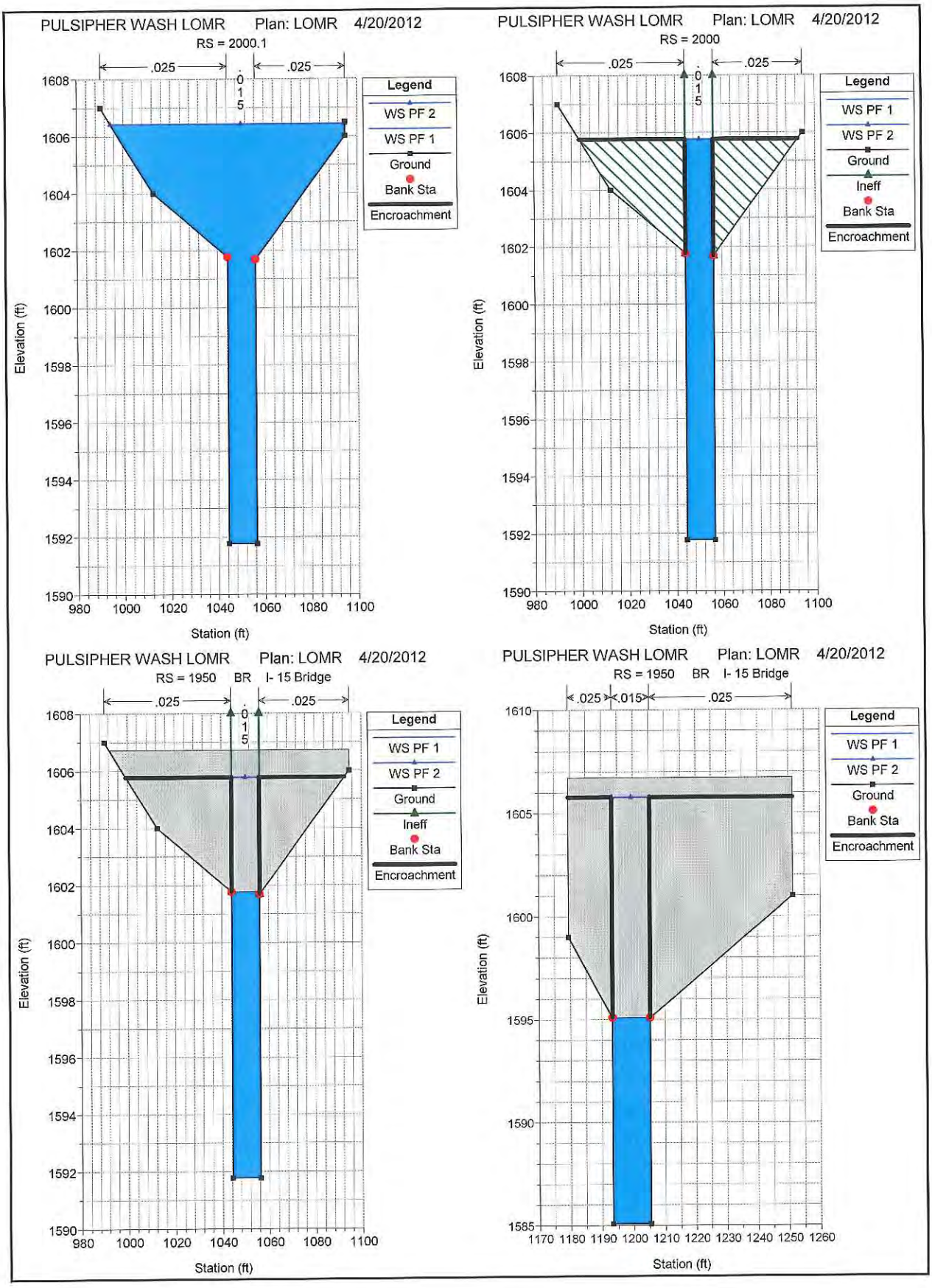
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012

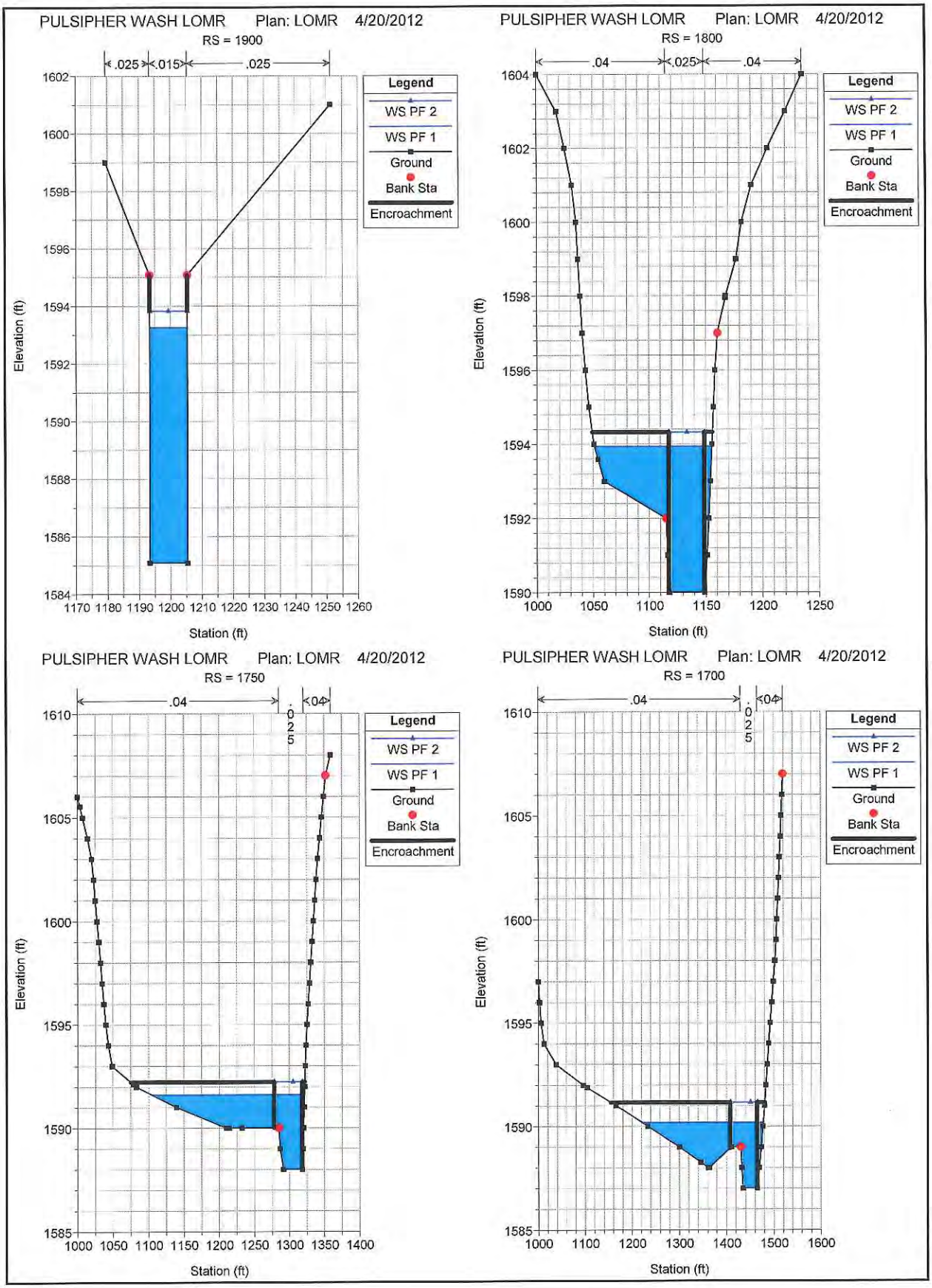
RS = 2600

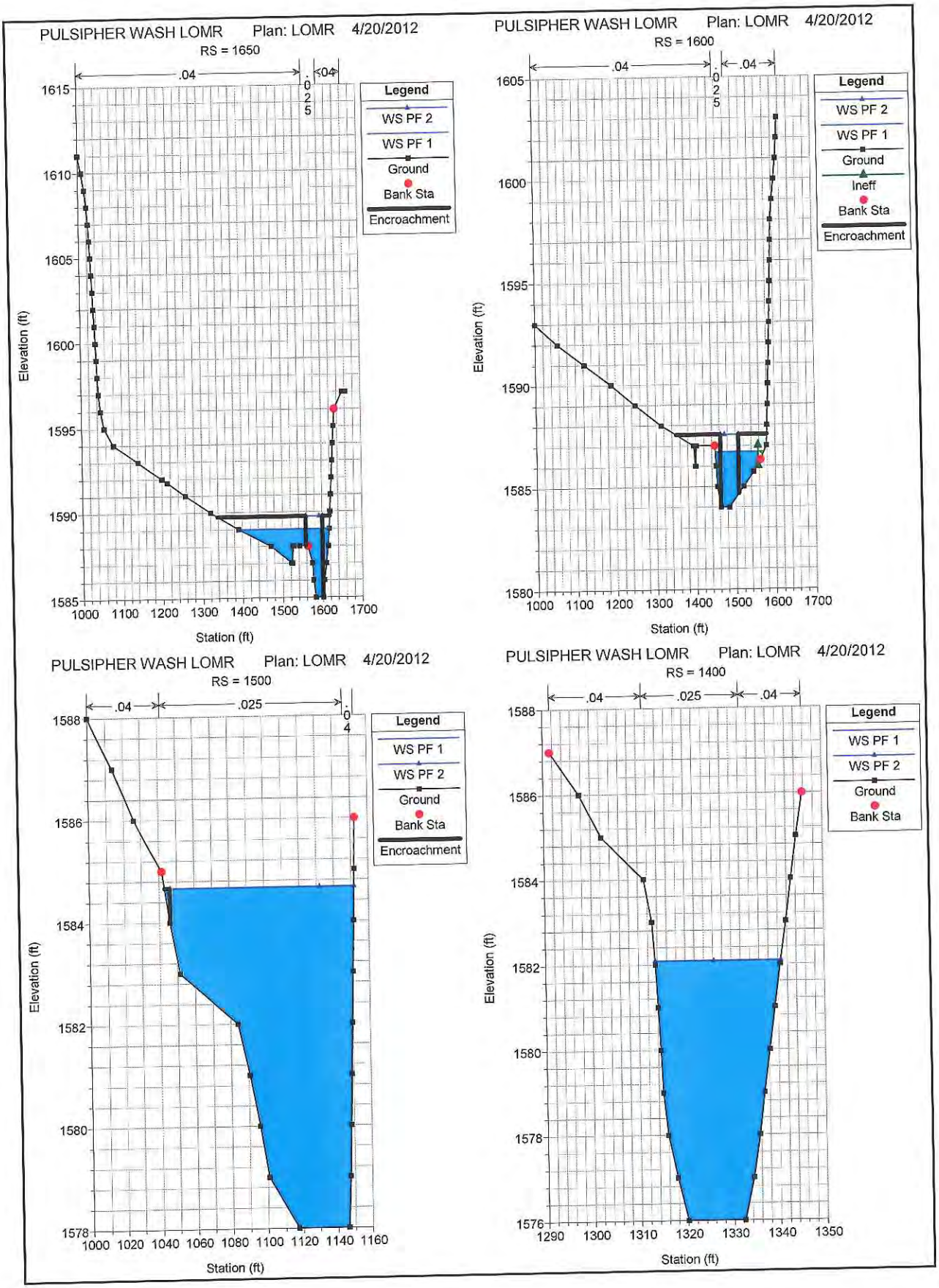


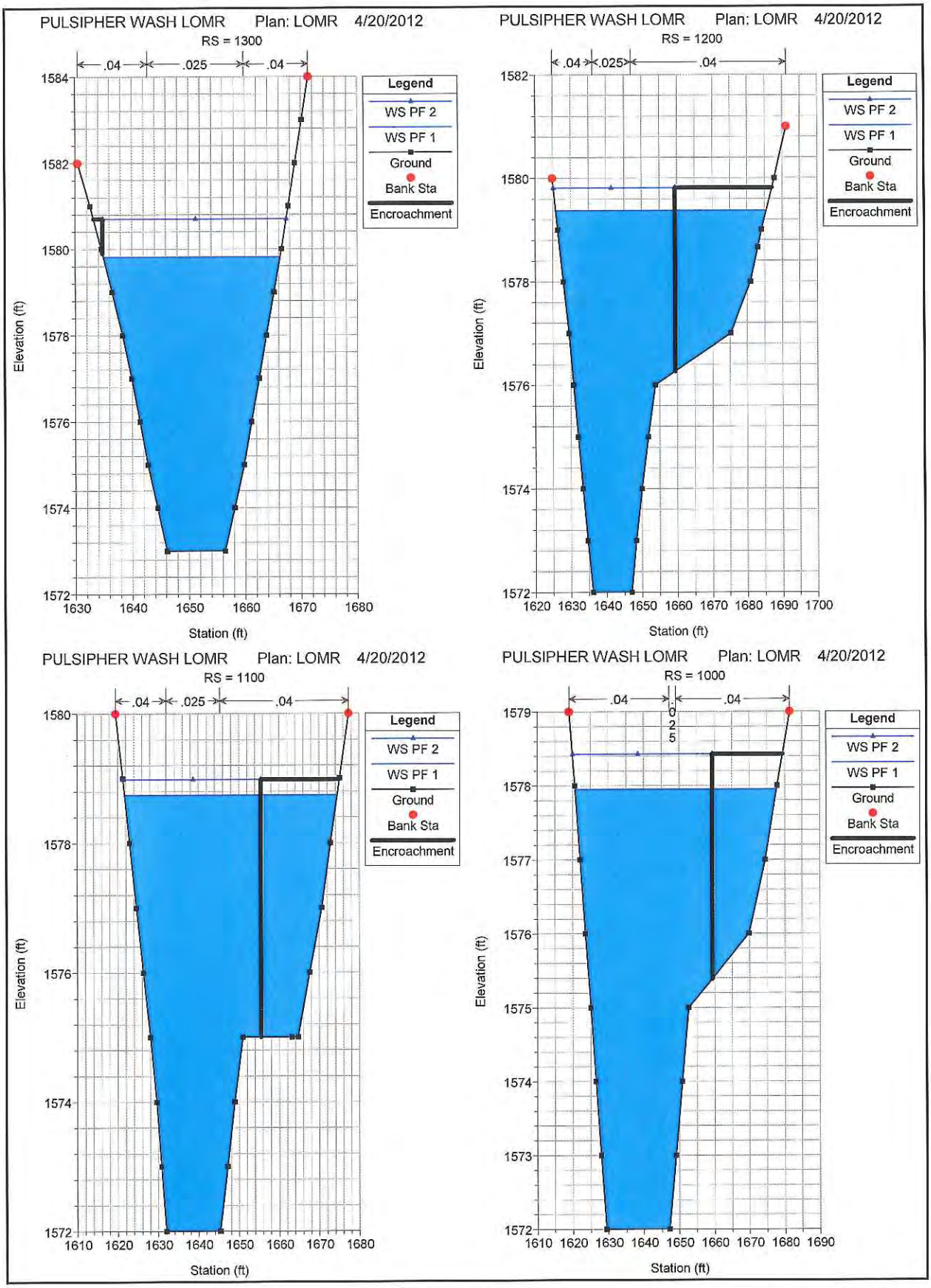

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2590
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2500
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2400
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2350
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

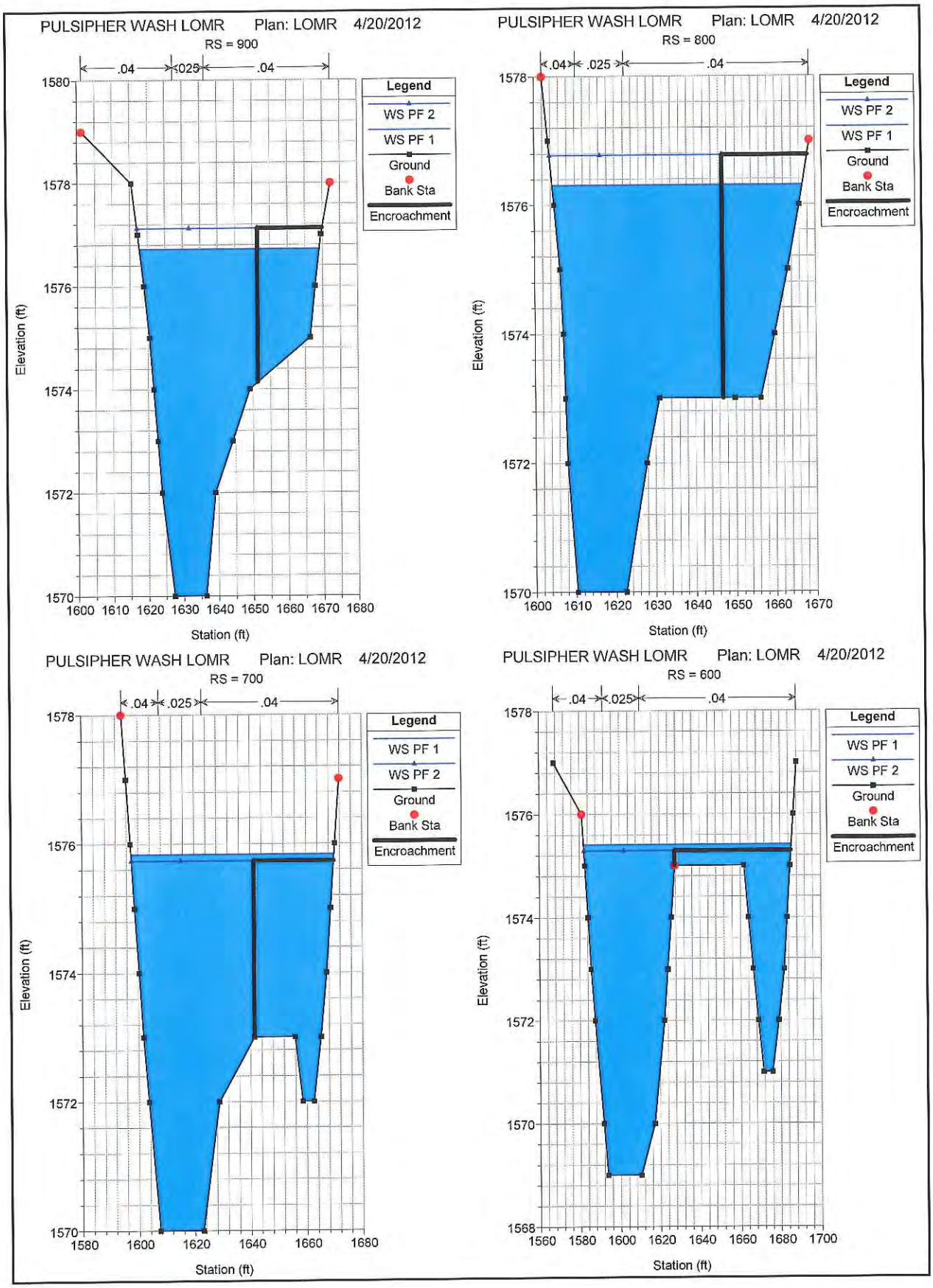

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2330
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2300
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2200
.04
.025
.04
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2100
.04
.025
.04

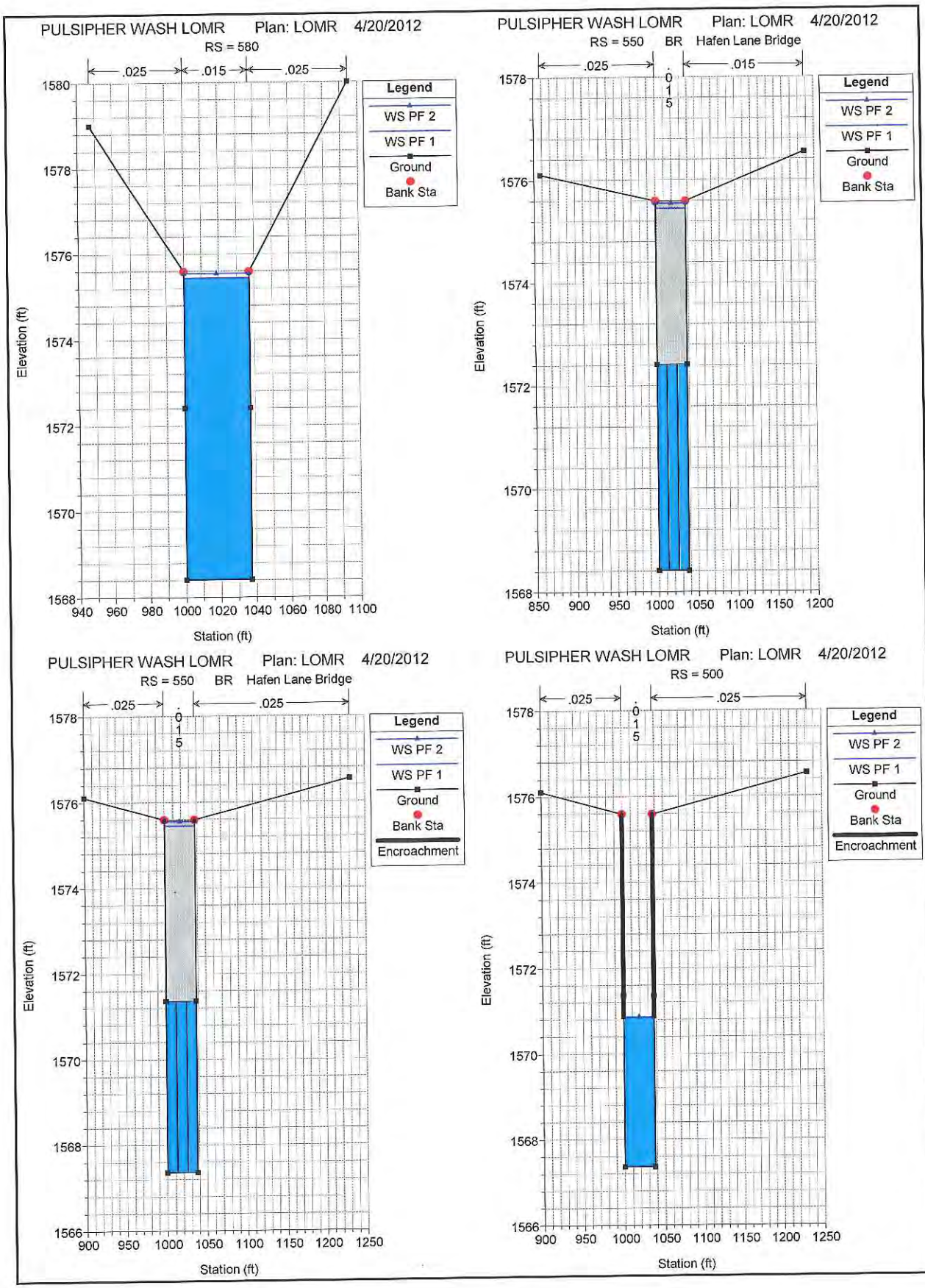

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2000.1
.025
.015
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 2000
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1950 BR I- 15 Bridge
Legend
WS PF 1
WS PF 2
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1950 BR I- 15 Bridge
.025
.015
.025
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

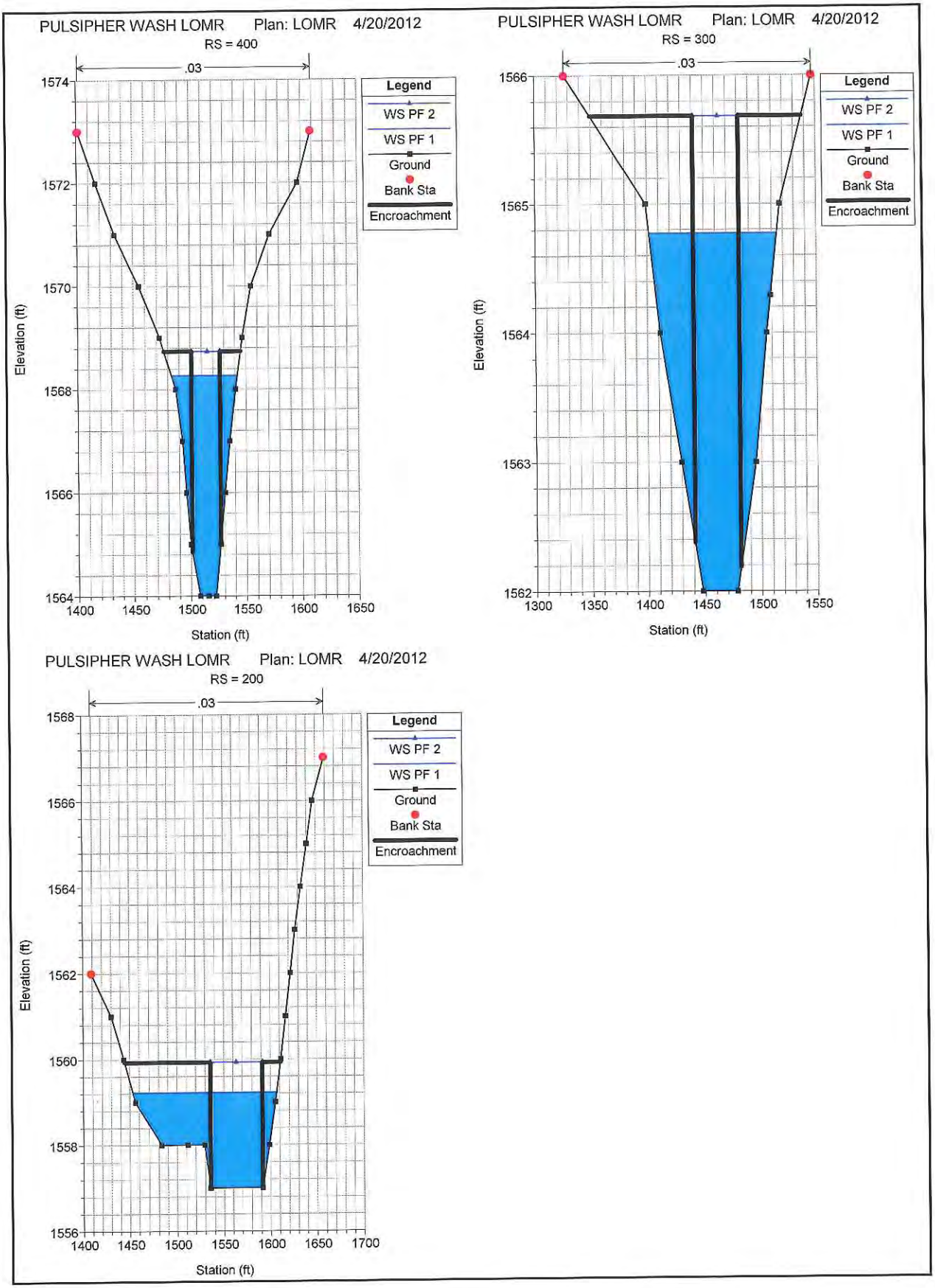

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1900
.025
.015
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1800
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1750
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1700
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1650
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1600
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1500
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1400
.04
.025
.04
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1300
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1200
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1100
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 1000
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 900
.04
.025
.04
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 800
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 700
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 600


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 580
.025
.015
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 550 BR Hafen Lane Bridge
.025
.015
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 550 BR Hafen Lane Bridge
.025
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 500
.025
.025
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)


PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 400
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 300
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
PULSIPHER WASH LOMR Plan: LOMR 4/20/2012
RS = 200
.03
Legend
WS PF 2
WS PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)

HEC-RAS Plan: LOMR River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Q Left	Q Right	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)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	3800	PF 1			867	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3800	PF 2			867	1654.0	1656.3	1656.3	1656.7	0.009844	4.9	176.1	230	0.99
Reach-1	3700	PF 1	31.66	4.02	867	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3700	PF 2	31.66	4.02	867	1650.0	1656.0		1656.0	0.000253	2.0	458.9	190	0.20
Reach-1	3660	PF 1	124.32	90.74	867	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3660	PF 2	124.32	90.74	867	1647.9	1655.9	1653.2	1656.0	0.000508	2.6	412.5	130	0.21
Reach-1	3650		Bridge											
Reach-1	3640	PF 1	55.44	35.67	867	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3640	PF 2	55.44	35.67	867	1647.8	1653.6	1653.6	1654.5	0.006509	7.9	139.3	94	0.77
Reach-1	3600	PF 1		0.08	867	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3600	PF 2		0.08	867	1646.0	1648.1	1648.1	1649.1	0.007625	8.2	106.4	55	1.00
Reach-1	3500	PF 1			867	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3500	PF 2			867	1643.0	1644.7	1644.7	1645.6	0.008069	7.4	116.7	69	1.01
Reach-1	3400	PF 1			867	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3400	PF 2			867	1638.0	1639.8	1639.8	1640.7	0.007925	7.6	114.5	65	1.01
Reach-1	3300	PF 1			867	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3300	PF 2			867	1633.0	1636.8	1635.0	1637.1	0.000917	4.2	205.0	82	0.38
Reach-1	3280	PF 1			867	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3280	PF 2			867	1632.0	1635.3	1635.3	1636.9	0.006595	10.1	86.2	156	1.00
Reach-1	3275	PF 1			867	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3275	PF 2			867	1631.5	1634.9	1634.9	1636.6	0.003020	10.4	83.0	25	1.00
Reach-1	3270	PF 1			867	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3270	PF 2			867	1630.9	1634.4	1634.4	1636.1	0.003029	10.5	82.8	25	1.01
Reach-1	3200	PF 1			867	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3200	PF 2			867	1627.1	1630.6	1630.6	1632.3	0.003021	10.5	82.9	25	1.01
Reach-1	3100	PF 1			867	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3100	PF 2			867	1621.0	1624.5	1624.5	1626.2	0.003027	10.5	82.8	25	1.01
Reach-1	3080	PF 1			867	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3080	PF 2			867	1620.5	1624.8	1623.9	1625.9	0.002126	8.4	103.0	24	0.72
Reach-1	3050		Bridge											
Reach-1	3020	PF 1			1723	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3020	PF 2			1723	1619.5	1624.9	1624.9	1627.6	0.004391	13.2	130.5	24	1.00
Reach-1	3000	PF 1			1723	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	3000	PF 2			1723	1618.3	1623.7	1623.7	1626.4	0.004391	13.2	130.5	24	1.00
Reach-1	2900	PF 1			1723	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2900	PF 2			1723	1615.5	1620.9	1620.9	1623.6	0.004391	13.2	130.5	24	1.00
Reach-1	2800	PF 1			1723	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2800	PF 2			1723	1613.2	1618.6	1618.6	1621.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	PF 1			1723	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2700	PF 2			1723	1611.2	1616.6	1616.6	1619.3	0.004391	13.2	130.5	24	1.00
Reach-1	2600	PF 1			1723	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2600	PF 2			1723	1608.1	1613.6	1613.6	1616.3	0.004403	13.2	130.4	24	1.00
Reach-1	2590	PF 1			1723	1608.0	1611.0	1611.0	1612.3	0.006797	9.3	185.1	69	1.00
Reach-1	2590	PF 2			1723	1608.0	1611.0	1611.0	1612.5	0.007089	9.8	176.2	60	1.01
Reach-1	2500	PF 1			1972	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2500	PF 2			1972	1603.0	1609.0		1609.8	0.003248	7.3	270.1	61	0.61
Reach-1	2400	PF 1			1972	1602.0	1607.0	1607.0	1608.8	0.008171	11.0	179.8	48	1.00
Reach-1	2400	PF 2			1972	1602.0	1607.0	1607.0	1608.8	0.008169	11.0	179.8	48	1.00
Reach-1	2350	PF 1	65.31		1972	1601.0	1606.7	1606.5	1607.9	0.005667	9.3	240.4	113	0.82
Reach-1	2350	PF 2	112.99		1972	1601.0	1607.0		1608.0	0.004332	8.3	270.8	103	0.72
Reach-1	2330	PF 1	618.50		1972	1601.0	1607.0		1607.4	0.002583	6.1	470.4	215	0.52
Reach-1	2330	PF 2	483.55		1972	1601.0	1607.1		1607.6	0.002999	6.6	392.4	148	0.56
Reach-1	2300	PF 1	936.40		1972	1599.0	1607.1		1607.2	0.000313	2.4	1138.7	322	0.18
Reach-1	2300	PF 2	609.49		1972	1599.0	1607.1		1607.2	0.000539	3.1	774.5	188	0.24
Reach-1	2200	PF 1	1445.62		1972	1597.0	1607.1		1607.1	0.000021	0.8	3344.2	570	0.05
Reach-1	2200	PF 2	781.71		1972	1597.0	1607.1		1607.2	0.000108	1.9	1251.9	181	0.12

HEC-RAS Plan: LOMR River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Left	Q Right	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)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	2100	PF 1	878.15	130.20	1972	1593.0	1607.1		1607.1	0.000028	1.7	1946.3	234	0.08
Reach-1	2100	PF 2	839.02	134.83	1972	1593.0	1607.1		1607.1	0.000030	1.8	1751.8	183	0.09
Reach-1	2000.1	PF 1	376.96	269.18	1972	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000.1	PF 2	376.97	269.19	1972	1591.8	1606.4		1607.1	0.000594	7.5	410.4	100	0.35
Reach-1	2000	PF 1			1498	1591.8	1605.8	1599.6	1607.0	0.000885	8.9	168.0	93	0.42
Reach-1	2000	PF 2			1498	1591.8	1605.8	1599.6	1607.0	0.001195	8.9	168.0	12	0.42
Reach-1	1950		Bridge											
Reach-1	1900	PF 1			1595	1585.1	1593.3	1593.3	1597.4	0.005139	16.2	98.2	12	1.00
Reach-1	1900	PF 2			1595	1585.1	1593.8	1593.2	1597.4	0.004321	15.2	105.1	12	0.90
Reach-1	1800	PF 1	281.61		1595	1590.0	1593.9	1593.9	1595.0	0.005719	9.1	228.1	104	0.85
Reach-1	1800	PF 2			1595	1590.0	1594.3	1594.3	1596.5	0.007701	11.8	135.5	31	1.00
Reach-1	1750	PF 1	582.81		1595	1588.0	1591.6	1591.6	1592.3	0.004592	8.4	330.5	217	0.81
Reach-1	1750	PF 2	66.63		1595	1588.0	1592.2	1592.2	1594.1	0.006672	11.3	150.2	40	0.99
Reach-1	1700	PF 1	753.19		1595	1587.0	1590.2		1590.6	0.004825	6.7	381.3	255	0.72
Reach-1	1700	PF 2	202.04		1595	1587.0	1591.2		1592.6	0.005305	10.1	185.9	56	0.89
Reach-1	1650	PF 1	450.32		1595	1585.0	1589.0	1589.0	1589.7	0.006317	7.7	310.1	227	0.81
Reach-1	1650	PF 2	33.89		1595	1585.0	1589.7	1589.7	1591.6	0.006723	10.9	152.2	43	0.99
Reach-1	1600	PF 1			1595	1584.0	1586.7	1586.7	1587.6	0.015504	7.8	203.9	123	1.00
Reach-1	1600	PF 2			1595	1584.0	1587.5	1587.5	1589.2	0.012808	10.4	153.7	46	1.00
Reach-1	1500	PF 1			1595	1578.0	1584.7		1584.9	0.000576	3.5	459.8	109	0.30
Reach-1	1500	PF 2			1595	1578.0	1584.7		1584.9	0.000566	3.5	458.4	106	0.29
Reach-1	1400	PF 1			1595	1576.0	1582.1	1582.1	1584.5	0.009907	12.4	128.8	27	1.00
Reach-1	1400	PF 2			1595	1576.0	1582.1	1582.1	1584.5	0.009933	12.4	128.7	27	1.00
Reach-1	1300	PF 1			1595	1573.0	1579.8	1579.5	1581.8	0.009488	11.2	142.6	31	0.92
Reach-1	1300	PF 2			1595	1573.0	1580.7		1582.1	0.005835	9.3	170.8	33	0.72
Reach-1	1200	PF 1			1595	1572.0	1579.4		1580.1	0.005689	7.0	228.2	60	0.63
Reach-1	1200	PF 2			1595	1572.0	1579.8		1581.0	0.005957	8.6	186.0	34	0.65
Reach-1	1100	PF 1			1595	1572.0	1578.7		1579.5	0.005019	7.2	222.6	53	0.61
Reach-1	1100	PF 2			1595	1572.0	1579.0		1580.2	0.006629	9.0	176.8	34	0.70
Reach-1	1000	PF 1			1595	1572.0	1578.0		1578.9	0.008097	7.7	206.6	57	0.72
Reach-1	1000	PF 2			1595	1572.0	1578.4		1579.5	0.006911	8.3	193.0	39	0.66
Reach-1	900	PF 1			1595	1570.0	1576.7		1577.8	0.009077	8.5	187.7	51	0.78
Reach-1	900	PF 2			1595	1570.0	1577.1		1578.5	0.008557	9.6	166.9	34	0.76
Reach-1	800	PF 1			1595	1570.0	1576.3		1577.0	0.005265	6.7	237.3	62	0.61
Reach-1	800	PF 2			1595	1570.0	1576.8		1577.7	0.005473	7.7	207.5	43	0.62
Reach-1	700	PF 1			1595	1570.0	1575.8		1576.4	0.003846	5.8	273.3	72	0.53
Reach-1	700	PF 2			1595	1570.0	1575.7		1576.9	0.006823	8.5	187.5	44	0.72
Reach-1	600	PF 1		203.88	1595	1569.0	1575.4		1576.0	0.002910	6.3	301.5	103	0.51
Reach-1	600	PF 2			1595	1569.0	1575.3		1576.2	0.004162	7.5	214.0	45	0.60
Reach-1	580	PF 1			1389	1568.4	1575.4	1571.9	1575.9	0.000323	5.3	262.7	37	0.35
Reach-1	580	PF 2			1389	1568.4	1575.5	1571.9	1576.0	0.000310	5.2	266.5	37	0.34
Reach-1	550		Bridge											
Reach-1	500	PF 1			1389	1567.4	1570.8	1570.8	1572.6	0.002753	10.7	130.2	37	1.01
Reach-1	500	PF 2			1389	1567.4	1570.9	1570.9	1572.6	0.002737	10.6	130.5	37	1.00
Reach-1	400	PF 1			1389	1564.0	1568.3	1568.3	1569.6	0.009870	9.1	151.8	59	1.01
Reach-1	400	PF 2			1389	1564.0	1568.7	1568.7	1571.0	0.011325	12.1	114.9	25	1.00
Reach-1	300	PF 1			1595	1562.0	1564.8	1564.8	1565.7	0.010764	7.7	207.2	113	1.00
Reach-1	300	PF 2			1595	1562.0	1565.7	1565.7	1567.5	0.010504	10.8	147.2	40	1.00
Reach-1	200	PF 1			1595	1557.0	1559.2	1559.2	1560.0	0.011742	7.0	228.2	153	1.01
Reach-1	200	PF 2			1595	1557.0	1559.9	1559.9	1561.4	0.010579	9.8	163.5	56	1.00

TABLE 2: PULSIPHER WASH ZONE AE BFE COMPARISON TABLE

River Station	Study Name	Effective BFE (1929 Datum)	Effectvie BFE (1988 Datum)	Current BFE (1988 Datum)	Difference	Note	Note
2300	LOMR	1605.4	1608.2	1607.1	-1.1		Datum Difference 2.84
2200	LOMR	1605.4	1608.2	1607.1	-1.1		Datum Difference 2.84
2100	FIS	1605.8	1608.1	1607.1	-1.0		Datum Difference 2.29
2000	FIS	1599.5	1601.8	1605.8	4.0	Difference in HEC-2 and HEC-RAS Bridge Modeling	Datum Difference 2.29
1900	FIS	1592.7	1595.0	1593.3	-1.7		Datum Difference 2.29
1800	FIS	1590.5	1592.8	1593.9	1.1	Section Different, Higher Invert of Wash	Datum Difference 2.29
1750	FIS	1589.2	1591.5	1591.6	0.1	Section Different, Higher Invert of Wash	Datum Difference 2.29
1650	FIS	1588.2	1590.5	1589.0	-1.5		Datum Difference 2.29
1700	FIS	1587.3	1589.6	1590.2	0.6		Datum Difference 2.29
1600	FIS	1585.7	1588.0	1586.7	-1.3		Datum Difference 2.29
1500	FIS	1585.5	1587.8	1584.7	-3.1		Datum Difference 2.29
1400	FIS	1584.2	1586.5	1582.1	-4.4		Datum Difference 2.29
1300	FIS	1579.5	1581.8	1579.8	-2.0		Datum Difference 2.29
1200	FIS	1578.5	1580.8	1579.4	-1.4		Datum Difference 2.29
1100	FIS	1578.1	1580.4	1578.7	-1.7		Datum Difference 2.29
1000	FIS	1577.0	1579.3	1578.0	-1.3		Datum Difference 2.29
900	FIS	1576.0	1578.3	1576.7	-1.6		Datum Difference 2.29
800	FIS	1575.4	1577.7	1576.3	-1.4		Datum Difference 2.29
700	FIS	1573.9	1576.2	1575.8	-0.4		Datum Difference 2.29
600	FIS	1568.7	1571.0	1575.4	4.4	Differnce in HEC-2 and HEC-RAS Bridge Modeling, Higher Q	Datum Difference 2.29
500	FIS	1567.1	1569.4	1570.8	1.4	Higher Q	Datum Difference 2.29
400	FIS	1563.2	1565.5	1568.3	2.8	Higher Q	Datum Difference 2.29
300	FIS	1560.6	1562.9	1564.8	1.9	Higher Q	Datum Difference 2.29
200	FIS	1555.7	1558.0	1559.2	1.2	Higher Q	Datum Difference 2.29

PULSIPHER WASH LOMR Plan: LOMR 4/20/2012

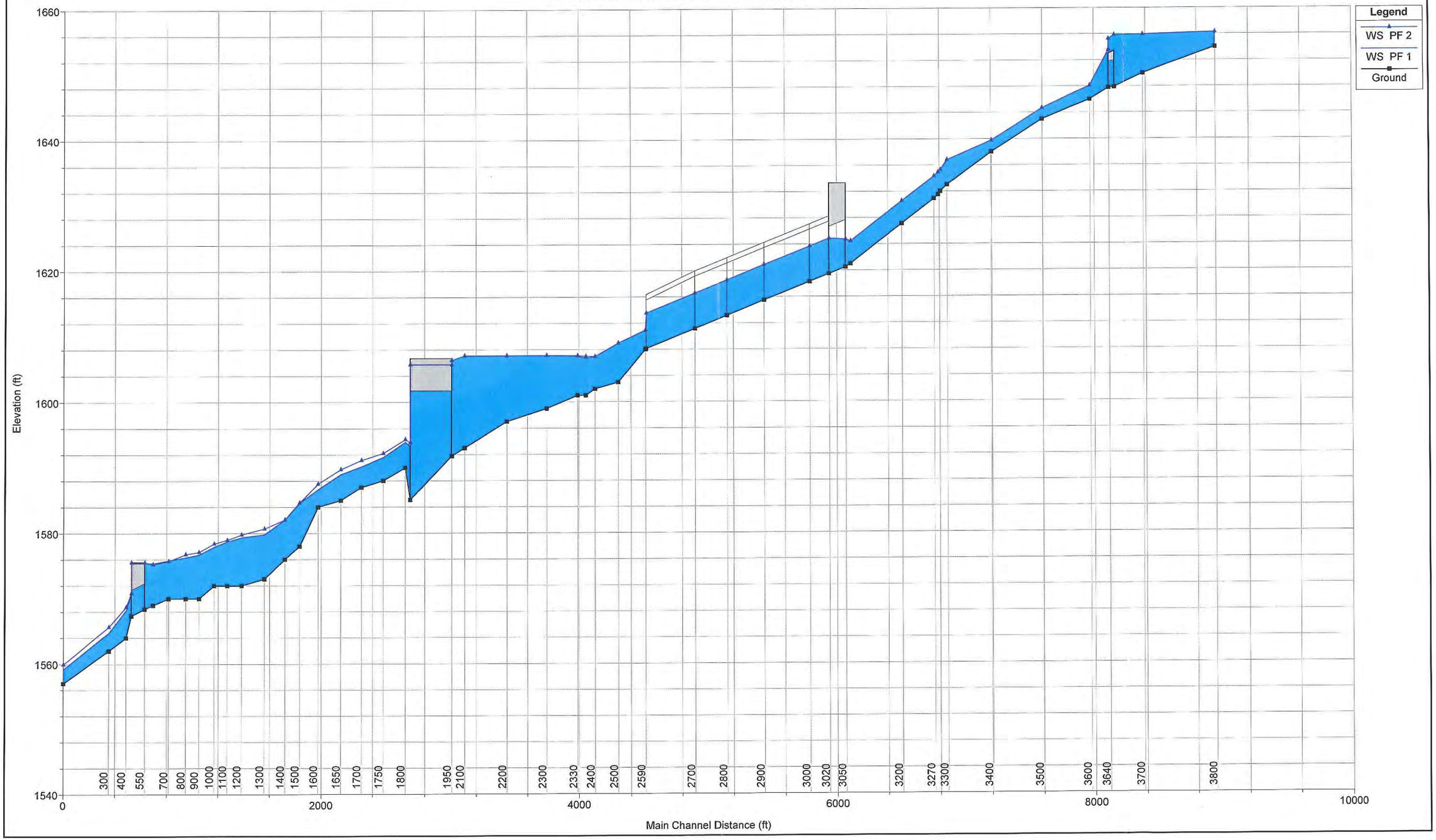


TABLE 4: PULSIPHER WASH HYDRAULIC MODELING SUMMARY
FOR BOTH FLOODPLAIN AND FLOODWAY ANALYSES, SUBCRITICAL RUN RESULTS USED FOR ALL SECTIONS.
LEGEND
DISTANCE = DISTANCE IN FEEET ABOVE THE VIRGIN RIVER TIE-IN
Q = 100-YEAR FLOW RATE, CFS.
WSE = WATER SURFACE ELEVATION, FT. FOR FLOODPLAIN MODEL, WSE IS SAME AS BASE FLOOD ELEVATION (BFE).
D = FLOW DEPTH, FT.
V = AVERAGE FLOW VELOCITY, FPS.
TW = TOP WIDTH OF WATER SURFACE, FT.
INCREASE = INCREASE IN DEPTH BETWEEN FLOODWAY AND FLOODPLAIN WATER SURFACE ELEVATIONS
N/A = FLOODWAY HAS NOT BEEN PROPOSED IN THESE SECTIONS.

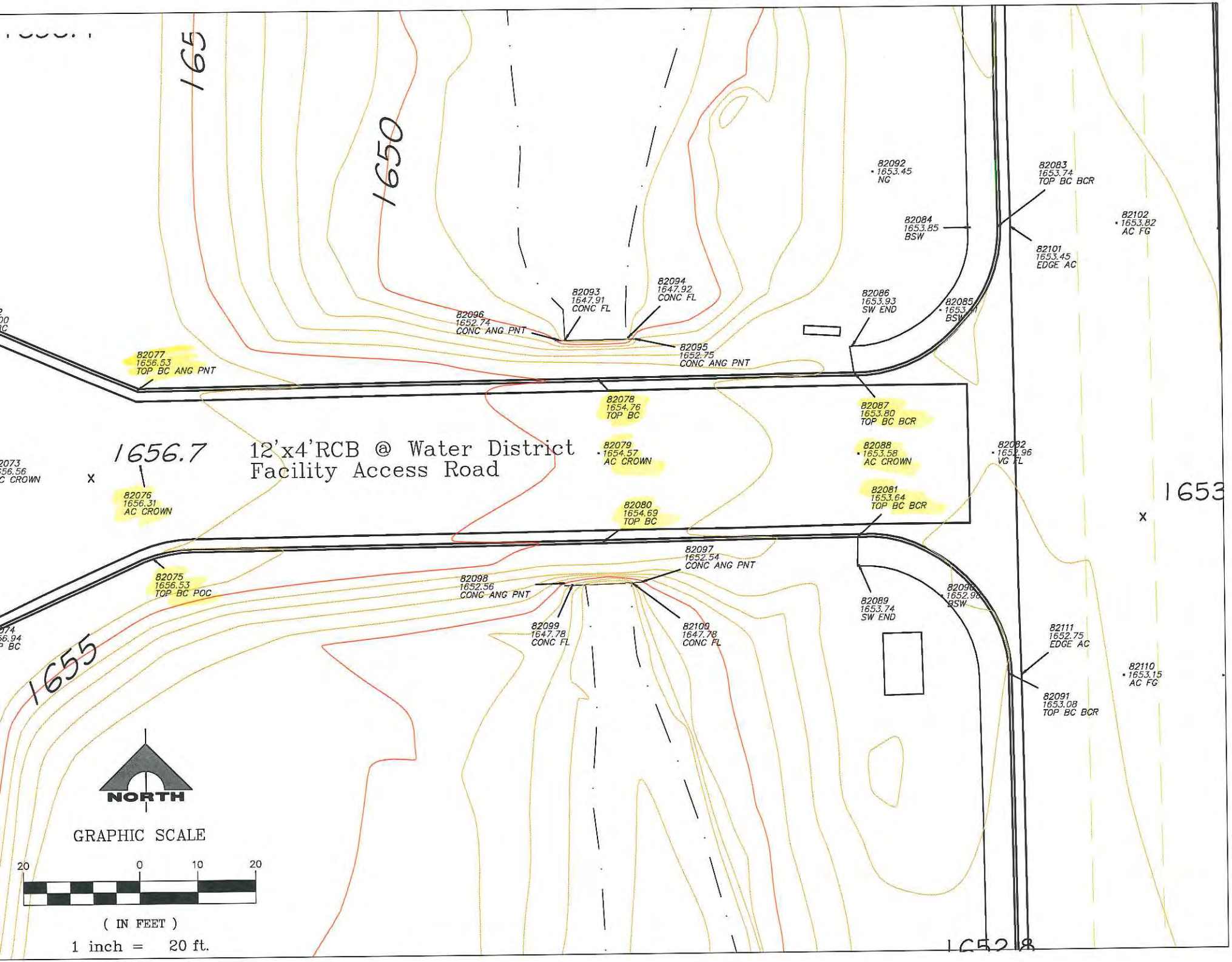
HEC-RAS	HEC-RAS		LOCATION/	FLOW REGIME		DISTANCE	FLOODPLAIN MODELING SUMMARY					FLOODWAY MODELING SUMMARY					INCREASE
MODEL XS	PROJECT	PLAN	DESCRIPTION	ACTUAL	USED		Q	WSE	D	V	TW	Q	WSE	D	V	TW	
3800	PULWASH	LOMR	Pulsipher Wash DB D/S	SUB	SUB	9095	867	1656.3	2.3	4.9	230	N/A	N/A	N/A	N/A	N/A	N/A
3700	PULWASH	LOMR		SUB	SUB	8529	867	1656	6	2	190	N/A	N/A	N/A	N/A	N/A	N/A
3660	PULWASH	LOMR	Access Road U/S	SUB	SUB	8304	867	1655.9	8	2.6	130	N/A	N/A	N/A	N/A	N/A	N/A
3640	PULWASH	LOMR	Access Road D/S	SUB	SUB	8261	867	1653.6	5.8	7.9	94	N/A	N/A	N/A	N/A	N/A	N/A
3600	PULWASH	LOMR		SUPER	SUB	8118	867	1648.1	2.1	8.2	55	N/A	N/A	N/A	N/A	N/A	N/A
3500	PULWASH	LOMR		SUPER	SUB	7748	867	1644.7	1.7	7.4	69	N/A	N/A	N/A	N/A	N/A	N/A
3400	PULWASH	LOMR		SUPER	SUB	7354	867	1639.8	1.8	7.6	65	N/A	N/A	N/A	N/A	N/A	N/A
3300	PULWASH	LOMR		SUB	SUB	7010	867	1636.8	3.8	4.2	82	N/A	N/A	N/A	N/A	N/A	N/A
3280	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6959	867	1635.3	3.3	10.1	156	N/A	N/A	N/A	N/A	N/A	N/A
3275	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6942	867	1634.9	3.4	10.4	25	N/A	N/A	N/A	N/A	N/A	N/A
3270	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6909	867	1634.4	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3200	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6659	867	1630.6	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3100	PULWASH	LOMR	Concrete Channel	SUPER	SUB	6259	867	1624.5	3.5	10.5	25	N/A	N/A	N/A	N/A	N/A	N/A
3080	PULWASH	LOMR	Bertha Howe U/S	SUPER	SUB	6219	867	1624.8	4.3	8.4	24	N/A	N/A	N/A	N/A	N/A	N/A
3020	PULWASH	LOMR	Bertha Howe D/S	SUB	SUB	6091	1723	1624.9	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
3000	PULWASH	LOMR	RCB	SUPER	SUB	5941	1723	1623.7	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2900	PULWASH	LOMR	RCB	SUPER	SUB	5591	1723	1620.9	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2800	PULWASH	LOMR	RCB	SUPER	SUB	5301	1723	1618.6	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2700	PULWASH	LOMR	RCB	SUPER	SUB	5051	1723	1616.6	5.4	13.2	24	N/A	N/A	N/A	N/A	N/A	N/A
2600	PULWASH	LOMR	RCB	SUPER	SUB	4670	1723	1613.6	5.5	13.2	24	1723	1613.6	5.5	13.2	24	0.0
2590	PULWASH	LOMR		SUPER	SUB	4664	1723	1611	3	9.3	69	1723	1611	3	9.8	60	0.0
2500	PULWASH	LOMR		SUB	SUB	4454	1972	1609	6	7.3	61	1972	1609	6	7.3	61	0.0
2400	PULWASH	LOMR		SUB	SUB	4274	1972	1607	5	11	48	1972	1607	5	11	48	0.0
2350	PULWASH	LOMR		SUPER	SUB	4203	1972	1606.7	5.7	9.3	113	1972	1607	6	8.3	103	0.3
2330	PULWASH	LOMR		SUB	SUB	4140	1972	1607	6	6.1	215	1972	1607.1	6.1	6.6	148	0.1
2300	PULWASH	LOMR		SUB	SUB	3900	1972	1607.1	8.1	2.4	322	1972	1607.1	8.1	3.1	188	0.0
2200	PULWASH	LOMR		SUB	SUB	3588	1972	1607.1	10.1	0.8	570	1972	1607.1	10.1	1.9	181	0.0
2100	PULWASH	LOMR		SUB	SUB	3260	1972	1607.1	14.1	1.7	234	1972	1607.1	14.1	1.8	183	0.0
2000.1	PULWASH	LOMR		SUB	SUB	3162	1972	1606.4	14.6	7.5	100	1972	1606.4	14.6	7.5	100	0.0
2000	PULWASH	LOMR	I-15 U/S	SUB	SUB	3161	1498	1605.8	14	8.9	93	1498	1605.8	14	8.9	12	0.0
1900	PULWASH	LOMR	I-15 D/S	SUB	SUB	2841	1595	1593.3	8.2	16.2	12	1595	1593.8	8.7	15.2	12	0.5
1800	PULWASH	LOMR		SUPER	SUB	2803	1595	1593.9	3.9	9.1	104	1595	1594.3	4.3	11.8	31	0.4
1750	PULWASH	LOMR		SUPER	SUB	2632	1595	1591.6	3.6	8.4	217	1595	1592.2	4.2	11.3	40	0.6
1700	PULWASH	LOMR		SUB	SUB	2462	1595	1590.2	3.2	6.7	255	1595	1591.2	4.2	10.1	56	1.0
1650	PULWASH	LOMR		SUB	SUB	2301	1595	1589	4	7.7	227	1595	1589.7	4.7	10.9	43	0.7
1600	PULWASH	LOMR		SUPER	SUB	2126	1595	1586.7	2.7	7.8	123	1595	1587.5	3.5	10.4	46	0.8
1500	PULWASH	LOMR		SUB	SUB	1984	1595	1584.7	6.7	3.5	109	1595	1584.7	6.7	3.5	106	0.0
1400	PULWASH	LOMR		SUB	SUB	1871	1595	1582.1	6.1	12.4	27	1595	1582.1	6.1	12.4	27	0.0
1300	PULWASH	LOMR		SUB	SUB	1709	1595	1579.8	6.8	11.2	31	1595	1580.7	7.7	9.3	33	0.9
1200	PULWASH	LOMR		SUB	SUB	1533	1595	1579.4	7.4	7	60	1595	1579.8	7.8	8.6	34	0.4
1100	PULWASH	LOMR		SUB	SUB	1422	1595	1578.7	6.7	7.2	53	1595	1579	7	9	34	0.3
1000	PULWASH	LOMR		SUB	SUB	1319	1595	1578	6	7.7	57	1595	1578.4	6.4	8.3	39	0.4
900	PULWASH	LOMR		SUB	SUB	1200	1595	1576.7	6.7	8.5	51	1595	1577.1	7.1	9.6	34	0.4
800	PULWASH	LOMR		SUB	SUB	1097	1595	1576.3	6.3	6.7	62	1595	1576.8	6.8	7.7	43	0.5

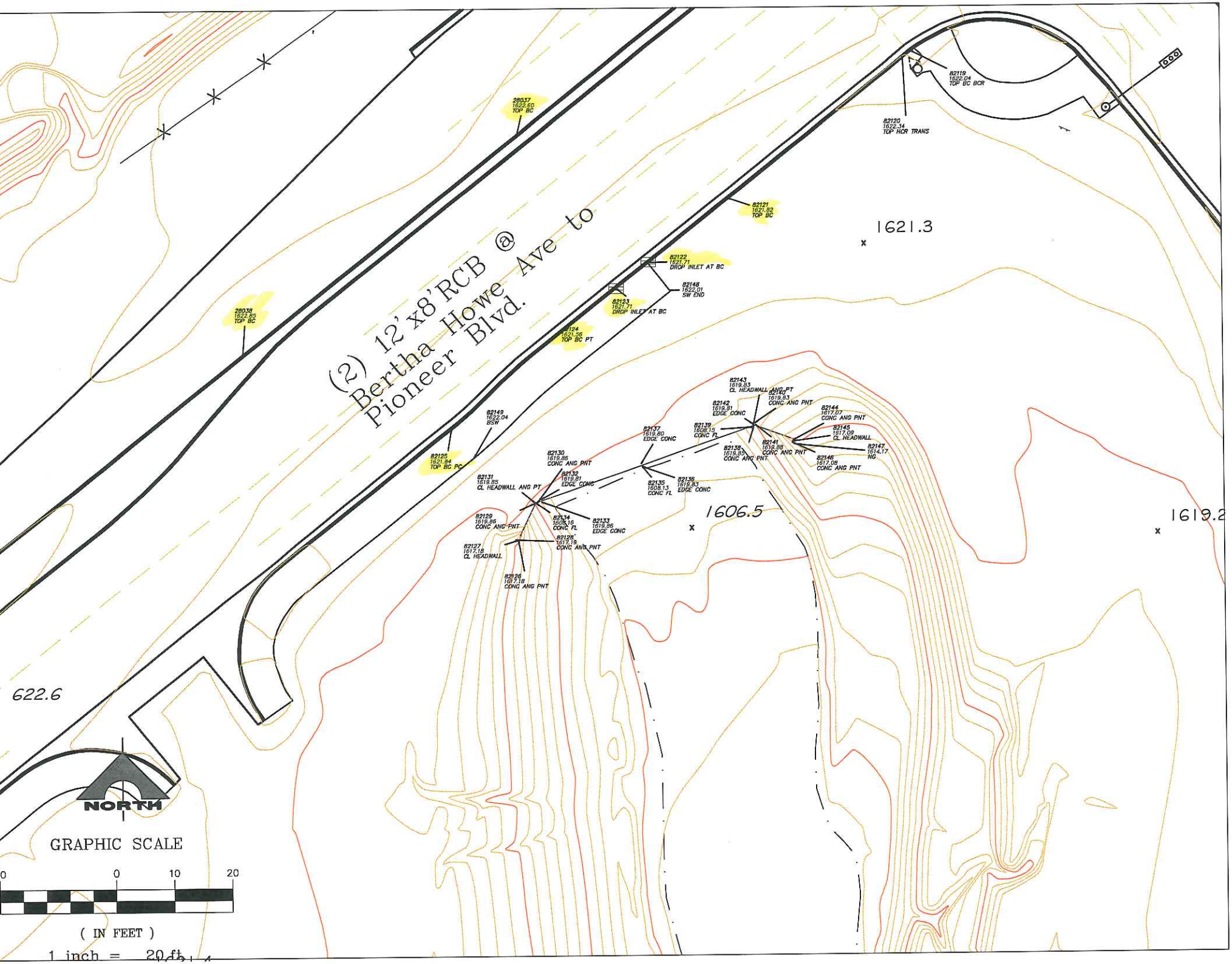
HEC-RAS	HEC-RAS		LOCATION/	FLOW REGIME		DISTANCE	FLOODPLAIN MODELING SUMMARY					FLOODWAY MODELING SUMMARY					INCREASE
MODEL XS	PROJECT	PLAN	DESCRIPTION	ACTUAL	USED		Q	WSE	D	V	TW	Q	WSE	D	V	TW	
700	PULWASH	LOMR		SUB	SUB	964	1595	1575.8	5.8	5.8	72	1595	1575.7	5.7	8.5	44	-0.1
600	PULWASH	LOMR		SUB	SUB	845	1595	1575.4	6.4	6.3	103	1595	1575.3	6.3	7.5	45	-0.1
580	PULWASH	LOMR	Hafen Ln U/S	SUB	SUB	779	1389	1575.4	7	5.3	37	1389	1575.5	7.1	5.2	37	0.1
500	PULWASH	LOMR	Hafen Ln D/S	SUPER	SUB	677	1389	1570.8	3.4	10.7	37	1389	1570.9	3.5	10.6	37	0.1
400	PULWASH	LOMR		SUPER	SUB	636	1389	1568.3	4.3	9.1	59	1389	1568.7	4.7	12.1	25	0.4
300	PULWASH	LOMR		SUPER	SUB	502	1595	1564.8	2.8	7.7	113	1595	1565.7	3.7	10.8	40	0.9
200	PULWASH	LOMR		SUB	SUB	150	1595	1559.2	2.2	7	153	1595	1559.9	2.9	9.8	56	0.7

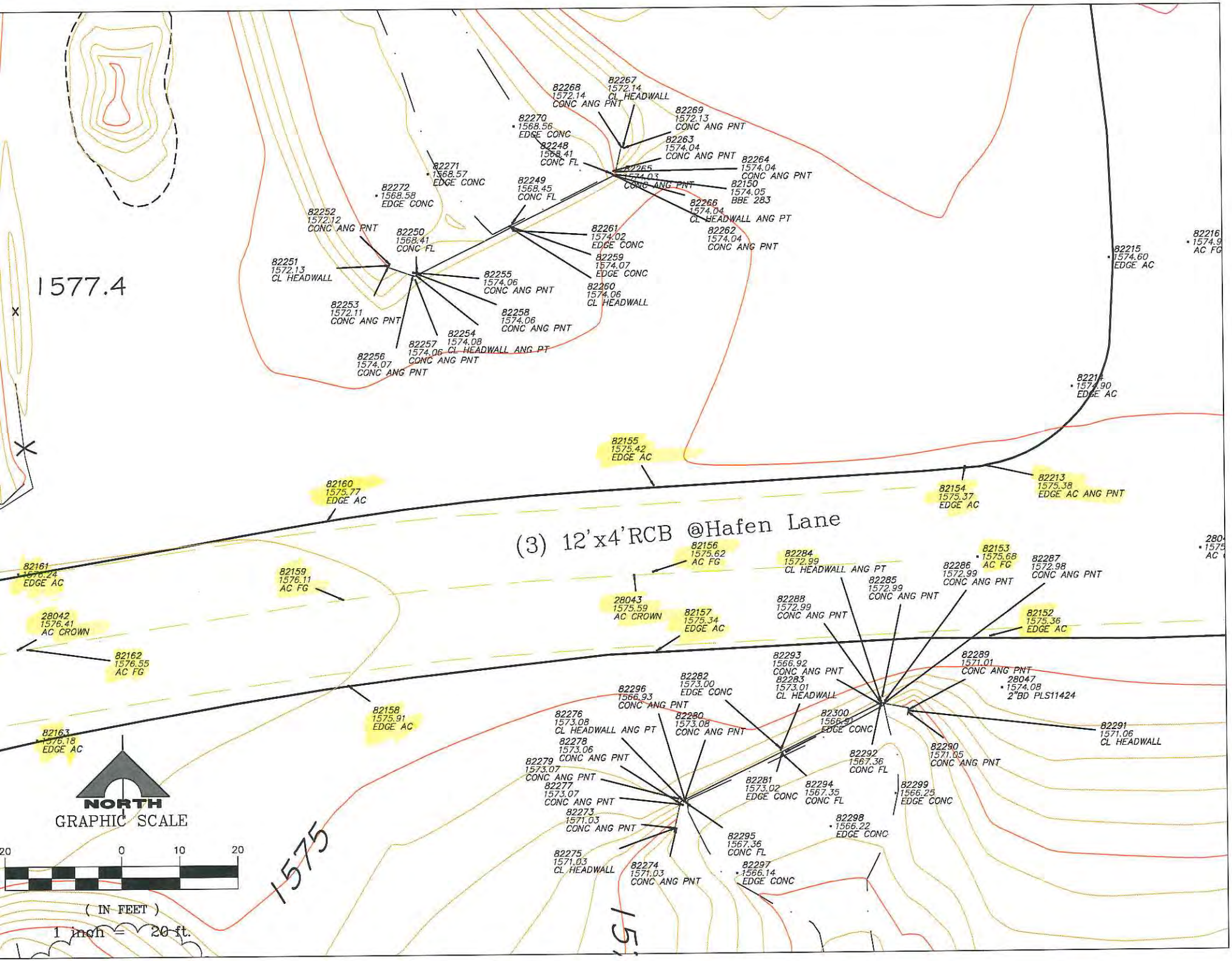
BACKUP FOR RESPONSE TO COMMENT #8

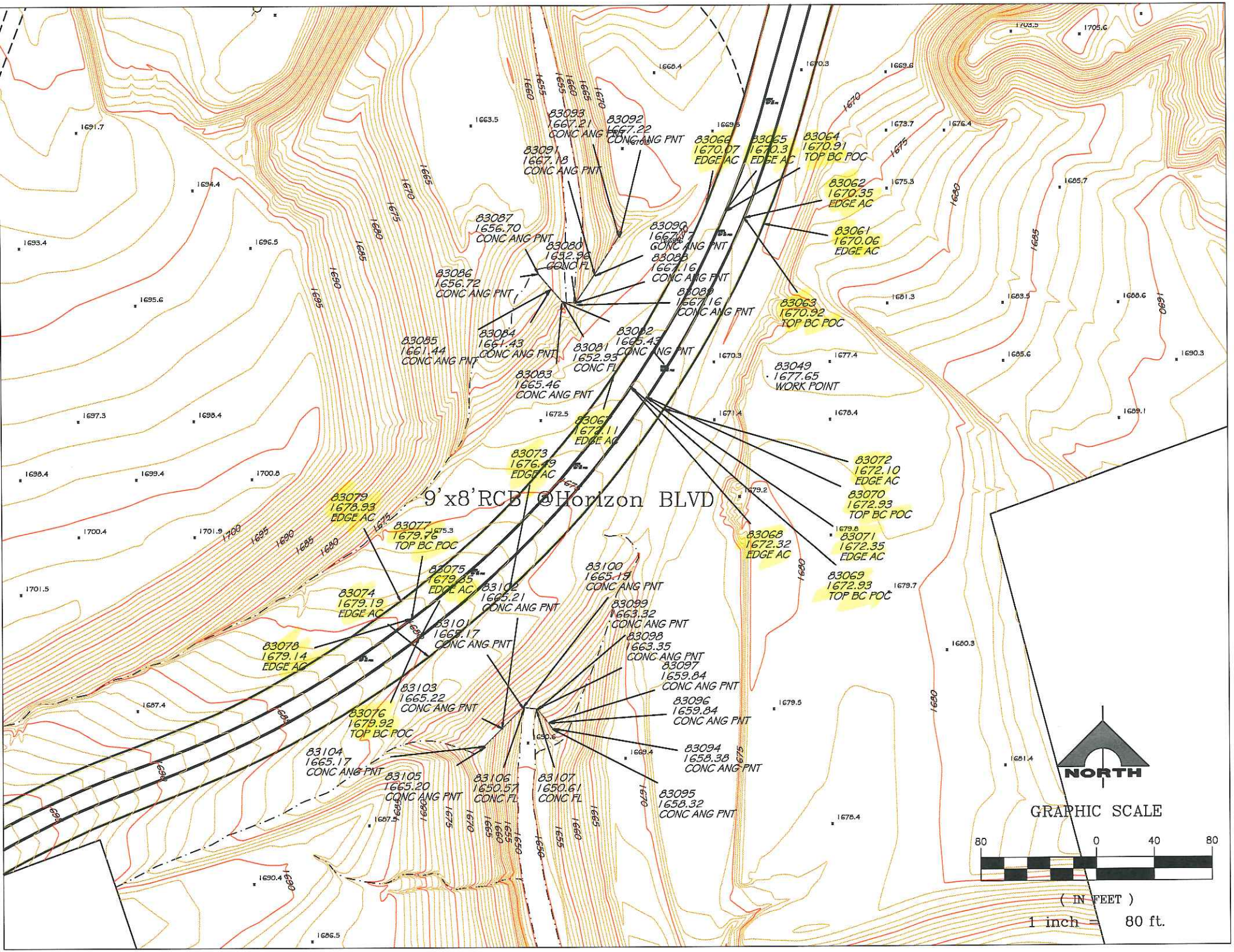
Survey Exhibits and Certification Letter

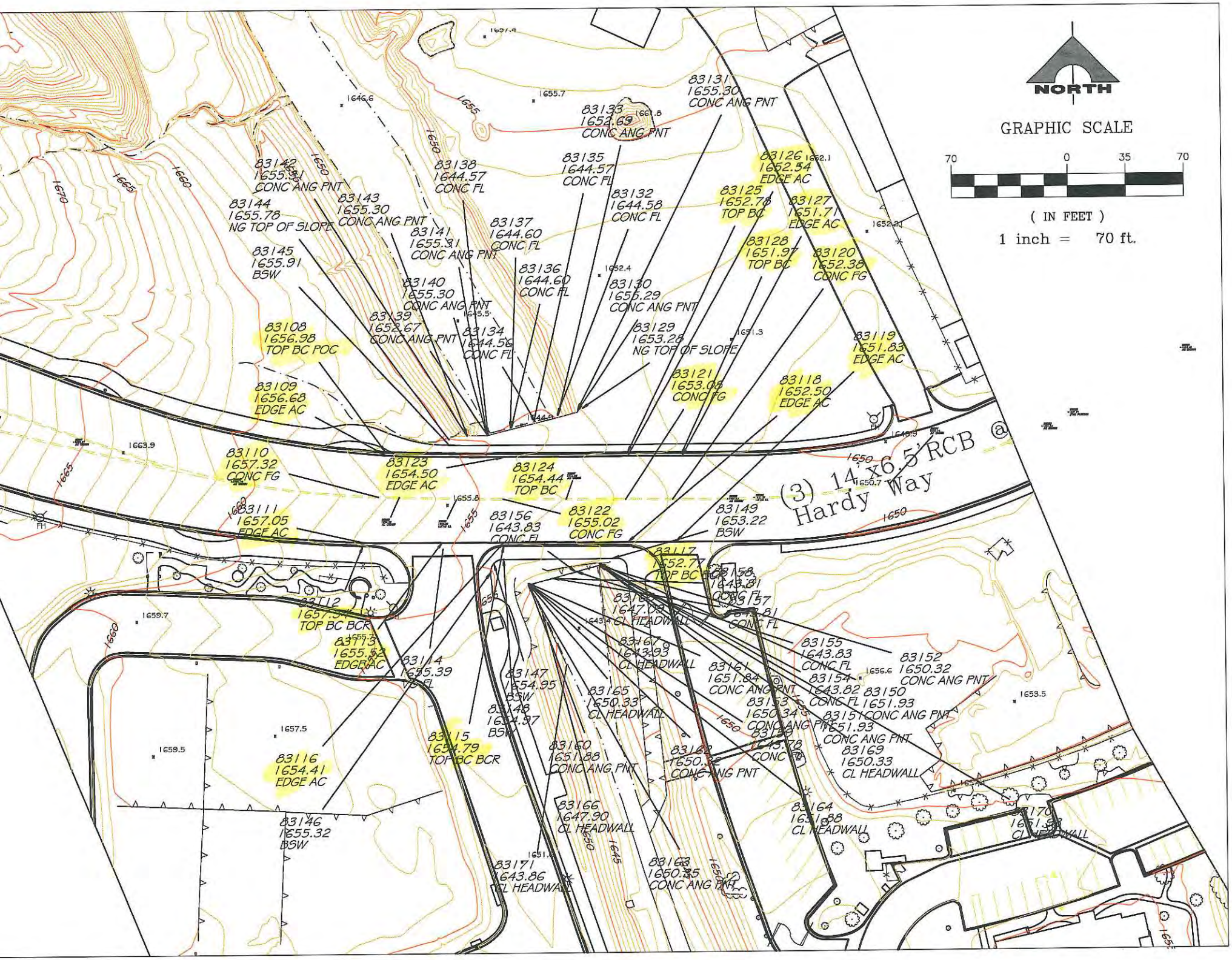
See attached CD for Digital Files


1650
1655
1656.7
12'x4'RCB @ Water District
Facility Access Road
82092
1653.45
NG
82083
1653.74
TOP BC BCR
82084
1653.85
BSW
82102
1653.82
AC FG
82101
1653.45
EDGE AC
82093
1647.91
CONC FL
82094
1647.92
CONC FL
82096
1652.74
CONC ANG PNT
82095
1652.75
CONC ANG PNT
82086
1653.93
SW END
82085
1653.71
BSW
82077
1656.53
TOP BC ANG PNT
82078
1654.76
TOP BC
82087
1653.80
TOP BC BCR
82079
1654.57
AC CROWN
82088
1653.58
AC CROWN
82082
1652.96
VG FL
82076
1656.31
AC CROWN
82080
1654.69
TOP BC
82081
1653.64
TOP BC BCR
82097
1652.54
CONC ANG PNT
82075
1656.53
TOP BC POC
82098
1652.56
CONC ANG PNT
82089
1653.74
SW END
82099
1647.78
CONC FL
82100
1647.78
CONC FL
82111
1652.75
EDGE AC
82110
1653.15
AC FG
82091
1653.08
TOP BC BCR
NORTH
GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.


(2) 12' x 8' RCB @
Bertha Howe Ave to
Pioneer Blvd.
28037
1622.50
TOP BC
28038
1622.65
TOP BC
82119
1622.04
TOP BC BCR
82120
1622.34
TOP HCR TRANS
82121
1621.82
TOP BC
82122
1621.71
DROP INLET AT BC
82123
1621.71
DROP INLET AT BC
82124
1621.56
TOP BC PT
82125
1621.84
TOP BC PC
82126
1617.19
CONC ANG PNT
82127
1617.18
CL HEADWALL
82128
1617.19
CONC ANG PNT
82129
1619.85
CONC ANG PNT
82130
1619.85
CONC ANG PNT
82131
1619.85
CL HEADWALL ANG PT
82132
1619.91
EDGE CONC
82133
1619.86
EDGE CONC
82134
1608.16
CONC FL
82135
1608.13
CONC FL
82136
1619.83
EDGE CONC
82137
1619.80
EDGE CONC
82138
1619.88
CONC ANG PNT
82139
1608.19
CONC FL
82140
1619.83
CONC ANG PNT
82141
1619.88
CONC ANG PNT
82142
1619.91
EDGE CONC
82143
1619.83
CL HEADWALL ANG PT
82144
1617.07
CONC ANG PNT
82145
1617.09
CL HEADWALL
82146
1617.08
CONC ANG PNT
82147
1614.17
NG
1621.3
1606.5
1619.2
622.6
NORTH
GRAPHIC SCALE
0
0
10
20
(IN FEET)
1 inch = 20 ft.


82268
1572.14
CONC ANG PNT
82267
1572.14
CL HEADWALL
82269
1572.13
CONC ANG PNT
82270
1568.56
EDGE CONC
82263
1574.04
CONC ANG PNT
82248
1568.41
CONC FL
82264
1574.04
CONC ANG PNT
82271
1568.57
EDGE CONC
82265
1574.03
CONC ANG PNT
82150
1574.05
BBE 283
82272
1568.58
EDGE CONC
82249
1568.45
CONC FL
82266
1574.04
CL HEADWALL ANG PT
82252
1572.12
CONC ANG PNT
82250
1568.41
CONC FL
82261
1574.02
EDGE CONC
82262
1574.04
CONC ANG PNT
82251
1572.13
CL HEADWALL
82259
1574.07
EDGE CONC
82255
1574.06
CONC ANG PNT
82260
1574.06
CL HEADWALL
82253
1572.11
CONC ANG PNT
82258
1574.06
CONC ANG PNT
82254
1574.08
CL HEADWALL ANG PT
82257
1574.06
CONC ANG PNT
82256
1574.07
CONC ANG PNT
1577.4
82215
1574.60
EDGE AC
82216
1574.9
AC FG
82214
1574.90
EDGE AC
82155
1575.42
EDGE AC
82213
1575.38
EDGE AC ANG PNT
82154
1575.37
EDGE AC
82160
1575.77
EDGE AC
(3) 12'x4'RCB @Hafen Lane
82156
1575.62
AC FG
82284
1572.99
CL HEADWALL ANG PT
82153
1575.68
AC FG
82287
1572.98
CONC ANG PNT
82286
1572.99
CONC ANG PNT
82285
1572.99
CONC ANG PNT
82161
1576.24
EDGE AC
82159
1576.11
AC FG
28043
1575.59
AC CROWN
82288
1572.99
CONC ANG PNT
82157
1575.34
EDGE AC
82152
1575.36
EDGE AC
28042
1576.41
AC CROWN
82162
1576.55
AC FG
82293
1566.92
CONC ANG PNT
82289
1571.01
CONC ANG PNT
82283
1573.01
CL HEADWALL
28047
1574.08
2"BD PLS11424
82282
1573.00
EDGE CONC
82296
1566.93
CONC ANG PNT
82158
1575.91
EDGE AC
82276
1573.08
CL HEADWALL ANG PT
82280
1573.08
CONC ANG PNT
82300
1566.91
EDGE CONC
82291
1571.06
CL HEADWALL
82278
1573.06
CONC ANG PNT
82292
1567.36
CONC FL
82290
1571.05
CONC ANG PNT
82279
1573.07
CONC ANG PNT
82281
1573.02
EDGE CONC
82294
1567.35
CONC FL
82299
1566.25
EDGE CONC
82277
1573.07
CONC ANG PNT
82273
1571.03
CONC ANG PNT
82298
1566.22
EDGE CONC
82163
1576.18
EDGE AC
82295
1567.36
CONC FL
82275
1571.03
CL HEADWALL
82274
1571.03
CONC ANG PNT
82297
1566.14
EDGE CONC
NORTH
GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.
1575
1575


9'x8' RCB @Horizon BLVD
83033 1667.21 CONC ANG PNT
83092 1667.22 CONC ANG PNT
83091 1667.18 CONC ANG PNT
83066 1670.07 EDGE AC
83065 1670.3 EDGE AC
83064 1670.91 TOP BC POC
83062 1670.35 EDGE AC
83061 1670.06 EDGE AC
83063 1670.92 TOP BC POC
83087 1656.70 CONC ANG PNT
83090 1667.17 CONC ANG PNT
83080 1652.96 CONC FL
83088 1667.16 CONC ANG PNT
83086 1656.72 CONC ANG PNT
83089 1667.16 CONC ANG PNT
83085 1661.44 CONC ANG PNT
83084 1661.43 CONC ANG PNT
83081 1652.93 CONC FL
83082 1665.43 CONC ANG PNT
83083 1665.46 CONC ANG PNT
83049 1677.65 WORK POINT
83067 1671.11 EDGE AC
83073 1676.49 EDGE AC
83072 1672.10 EDGE AC
83070 1672.93 TOP BC POC
83071 1672.35 EDGE AC
83068 1672.32 EDGE AC
83069 1672.93 TOP BC POC
83079 1678.93 EDGE AC
83077 1679.76 TOP BC POC
83075 1679.85 EDGE AC
83102 1665.21 CONC ANG PNT
83100 1665.19 CONC ANG PNT
83074 1679.19 EDGE AC
83099 1663.32 CONC ANG PNT
83101 1665.17 CONC ANG PNT
83098 1663.35 CONC ANG PNT
83078 1679.14 EDGE AC
83097 1659.84 CONC ANG PNT
83103 1665.22 CONC ANG PNT
83096 1659.84 CONC ANG PNT
83076 1679.92 TOP BC POC
83094 1658.38 CONC ANG PNT
83104 1665.17 CONC ANG PNT
83105 1665.20 CONC ANG PNT
83106 1650.57 CONC FL
83107 1650.61 CONC FL
83095 1658.32 CONC ANG PNT
NORTH
GRAPHIC SCALE
80 0 40 80
(IN FEET)
1 inch = 80 ft.


NORTH
GRAPHIC SCALE
70 0 35 70
(IN FEET)
1 inch = 70 ft.
(3) 14 x6.5' RCB @
Hardy Way
83108 1656.98 TOP BC POC
83109 1656.68 EDGE AC
83110 1657.32 CONC FG
83111 1657.05 EDGE AC
83112 1657.54 TOP BC BCR
83113 1655.52 EDGE AC
83114 1655.39 CONC FL
83115 1654.79 TOP BC BCR
83116 1654.41 EDGE AC
83117 1652.77 TOP BC HDR
83118 1652.50 EDGE AC
83119 1651.85 EDGE AC
83120 1652.38 CONC FG
83121 1653.08 CONC FG
83122 1655.02 CONC FG
83123 1654.50 EDGE AC
83124 1654.44 TOP BC
83125 1652.78 TOP BC
83126 1652.54 EDGE AC
83127 1651.71 EDGE AC
83128 1651.97 TOP BC
83129 1653.28 NG TOP OF SLOPE
83130 1656.29 CONC ANG PNT
83131 1655.30 CONC ANG PNT
83132 1644.58 CONC FL
83133 1652.69 CONC ANG PNT
83134 1644.56 CONC FL
83135 1644.57 CONC FL
83136 1644.60 CONC FL
83137 1644.60 CONC FL
83138 1644.57 CONC FL
83139 1652.67 CONC ANG PNT
83140 1655.30 CONC ANG PNT
83141 1655.31 CONC ANG PNT
83142 1655.31 CONC ANG PNT
83143 1655.30 CONC ANG PNT
83144 1655.78 NG TOP OF SLOPE
83145 1655.91 BSW
83146 1655.32 BSW
83147 1654.95 BSW
83148 1654.97 BSW
83149 1653.22 BSW
83150 1651.93 CONC ANG PNT
83151 CONC ANG PNT 1651.93
83152 1650.32 CONC ANG PNT
83153 1650.34 CONC ANG PNT
83154 1643.82 CONC FL
83155 1643.83 CONC FL
83156 1643.83 CONC FL
83157 CONC FL
83158 CONC FL
83159 1643.78 CONC FL
83160 1651.88 CONC ANG PNT
83161 1651.84 CONC ANG PNT
83162 1650.32 CONC ANG PNT
83163 1650.35 CONC ANG PNT
83164 1651.88 CL HEADWALL
83165 1650.33 CL HEADWALL
83166 1647.90 CL HEADWALL
83167 1643.93 CL HEADWALL
83168 1647.08 CL HEADWALL
83169 1650.33 CL HEADWALL
83170 1651.88 CL HEADWALL
83171 1643.86 CL HEADWALL
FH

ABBOTT AND PULSIPHER WASHES LOMR CERTIFICATION

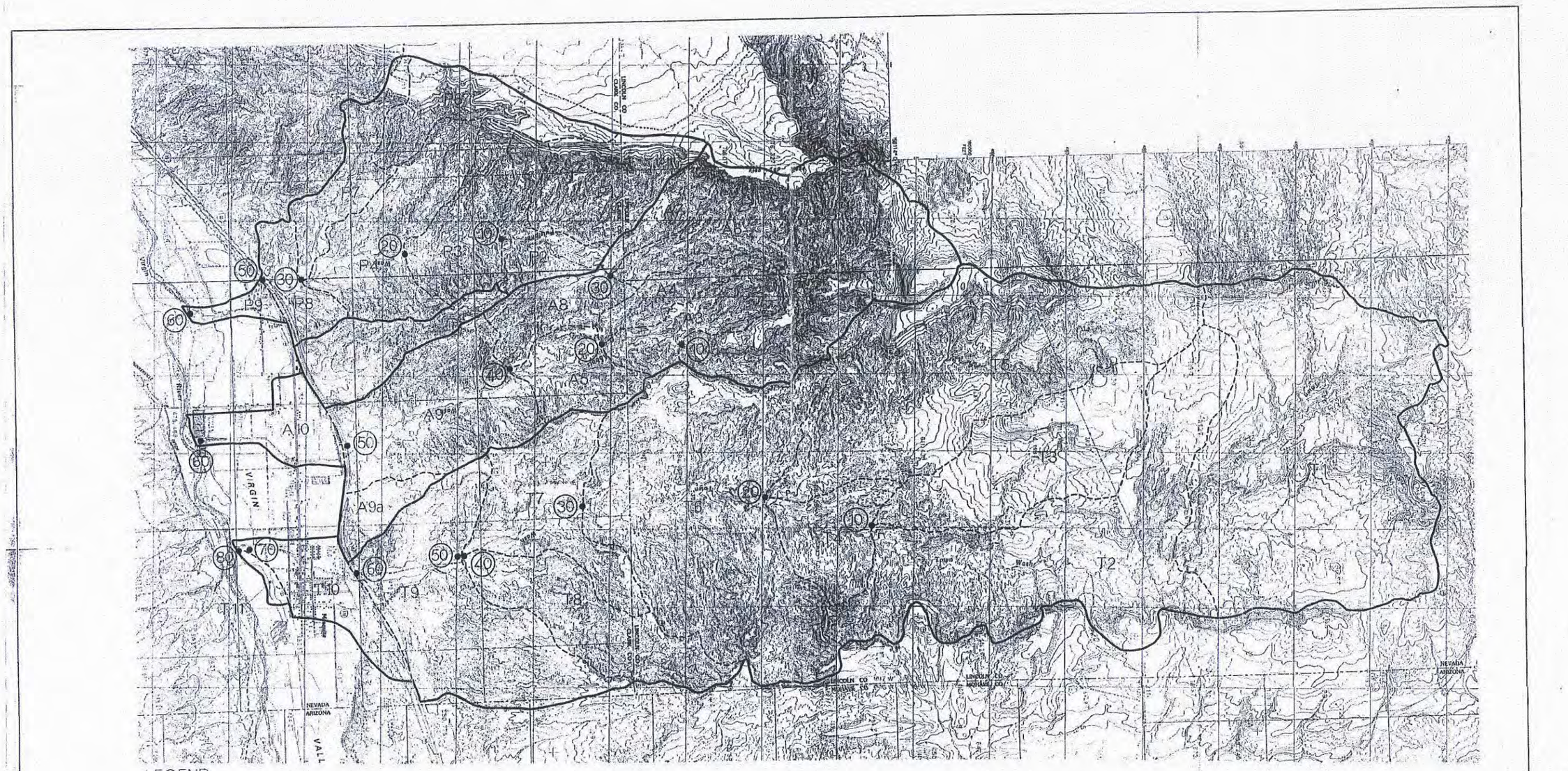
This is to certify that all work accomplished in the conduct of this LOMR was done in accordance with the Statement of Work and General Provisions of Contract 550.048, and all amendments thereto, together with all such modifications, either written or oral, as the Regional PO and/or the Contracting Officer or their representatives have directed, such as modifications affecting this contract, and that all such work has been accomplished in accordance with sound and accepted engineering practices within the contract provisions for respective phases of work. Topographic data on base maps, work maps, cross section maps, and exhibits is certified to represent existing conditions and to be accurate to the best of my knowledge as per Volume 2, Section 2.1.5 Guidelines and Specifications for Flood Hazard Mapping Partners, FEMA, April 2003.

Jerry E. Pruitt, PE – Senior Vice President
G. C. WALLACE, INC.

APPENDIX LAYOUT FOR RESPONSE TO FEMA COMMENTS ON THE LOMR FOR ABBOTT WASH

1. BACKUP FOR RESPONSE TO COMMENT #1

Figure 3 from 1995 City of Mesquite Flood Control Master Plan Update
Figure 5 from 2001 City of Mesquite Flood Control Master Plan Update



LEGEND

- MAJOR WATERSHED BOUNDARY
- SUBWATERSHED BOUNDARY
- T1 SUBWATERSHED NUMBER
- (10). CONCENTRATION POINT AND NUMBER

N

0 2000 4000 6000 FEET

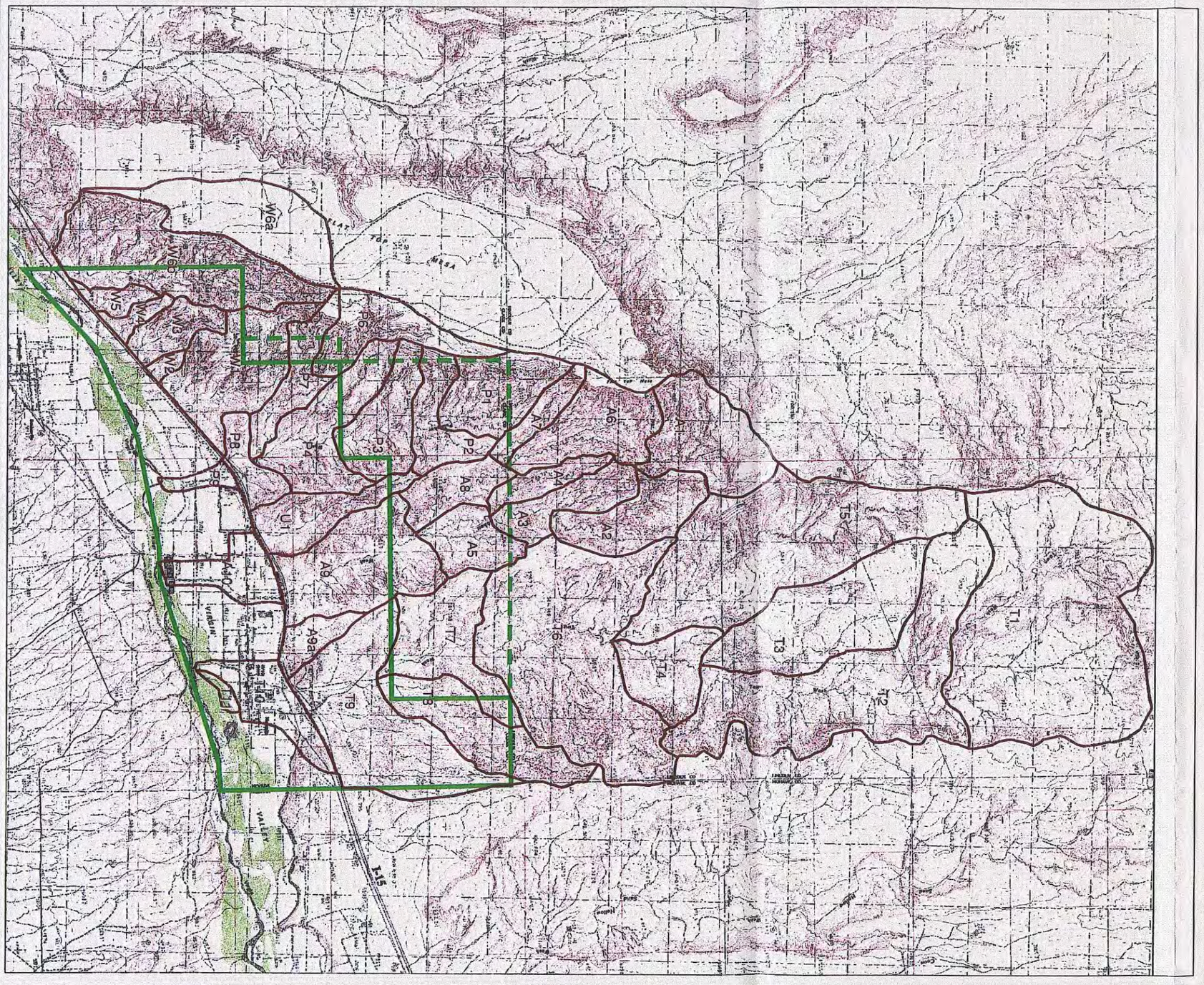
FIGURE D-2
EXISTING CONDITION
HYDROLOGIC MAP

CITY OF MESQUITE
FLOOD CONTROL MASTER PLAN UPDATE
CLARK COUNTY REGIONAL FLOOD
CONTROL DISTRICT, NEVADA

SWW39645.A1

CH2MHILL

FIGURE 3



CLARK COUNTY
REGIONAL FLOOD CONTROL DISTRICT

City of Mesquite MPU 2001 Drainage Basins

Watershed Boundaries

Mesquite City Limits

Future Mesquite City Limits

Figure 5

0 1/2 Mile 1 Mile 2 Miles

N
W E
S

September 07, 2001

Scale: 1 inch = 1 mile

PENTACORE
Geographic Information Systems
6763 West Charleston Blvd.
Las Vegas, Nevada 89146

For Reference only. Pentacore assumes no liability for the accuracy of the data delineated hereon.

D.N.G.

2. BACKUP FOR RESPONSE TO COMMENT #3

Excerpts from Abbott Wash at Mesquite Vistas LOMR: Hydraulic Summary Table and Cross Section Location Plan Exhibit

ABBOTT WASH AT MESQUITE VISTAS
LETTER OF MAP REVISION

452.017

November 2002

Prepared for:

Mesquite Vistas
P.O. Box 267
Mesquite NV, 89024
Phone: (702) 346-7901
Fax: (702) 346-7911

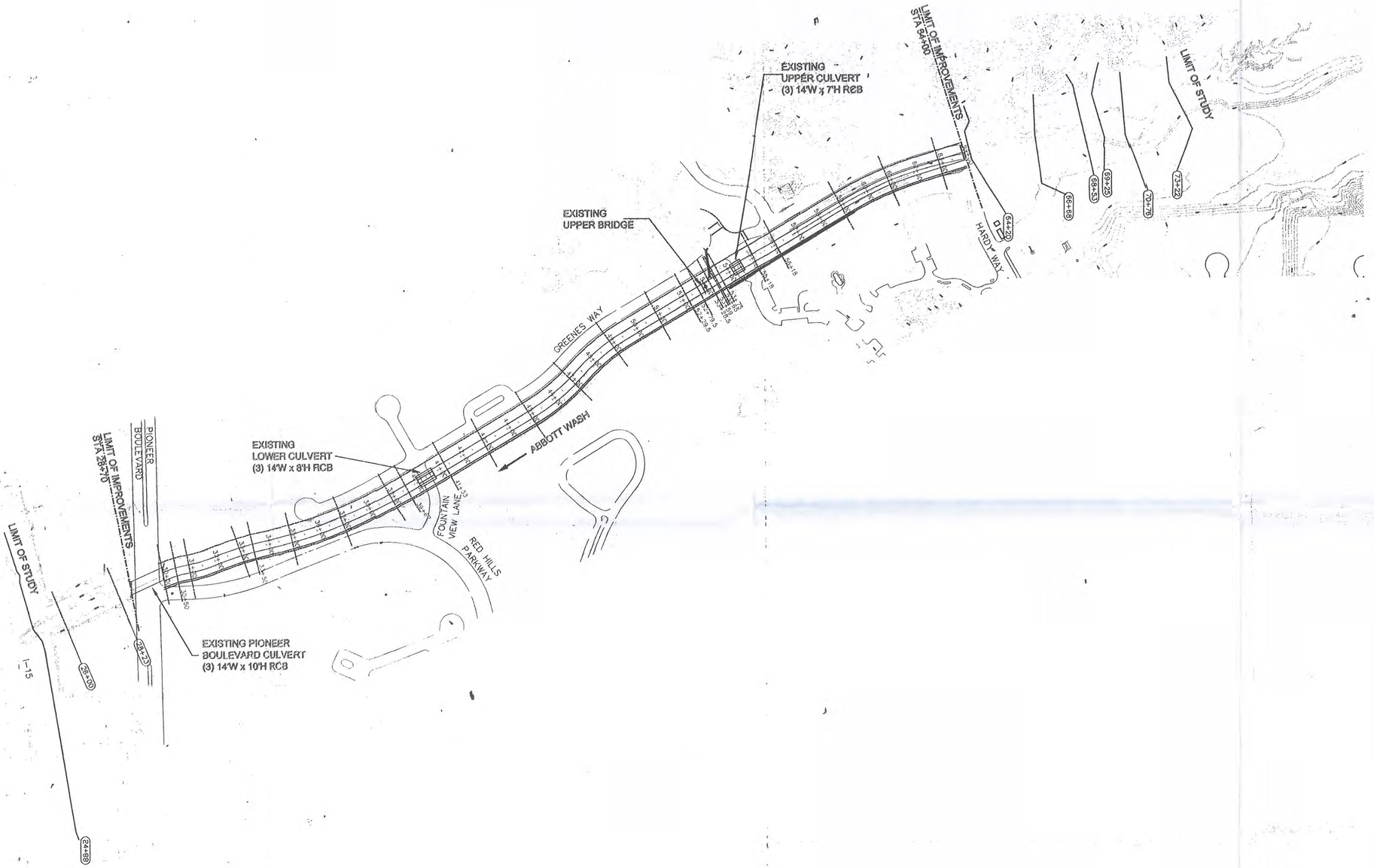
Developed Condition HEC-RAS
Subcritical Flow Analysis

Profile Output Table - Summary

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Max Chl Dpth (ft)	Mann Wtd Total
Mesquite Vistas	7322	3156.00	1646.00	1651.73	1651.23	1653.01	0.004047	9.08	347.53	90.61	0.82	5.73	0.025
Mesquite Vistas	7076	3156.00	1645.50	1651.65	1649.57	1652.11	0.001238	5.47	594.44	176.89	0.46	6.15	0.025
Mesquite Vistas	6925	3156.00	1645.00	1651.46	1649.29	1651.94	0.001064	5.56	638.09	301.18	0.44	6.46	0.025
Mesquite Vistas	6853	3156.00	1644.50	1650.59	1649.45	1651.76	0.002878	8.65	364.88	78.58	0.71	6.09	0.025
Mesquite Vistas	6668	3156.00	1644.00	1648.72	1648.71	1650.76	0.005913	11.46	275.34	66.44	0.99	4.72	0.025
Mesquite Vistas	6420	3156.00	1641.30	1648.71	1648.24	1649.42	0.001639	7.51	674.27	299.98	0.55	7.41	0.028
Mesquite Vistas	6400	3156.00	1641.00	1647.14	1647.14	1649.22	0.005988	11.56	272.91	65.91	1.00	6.14	0.025
Mesquite Vistas	6300	3156.00	1639.90	1645.37	1646.04	1648.29	0.009521	13.71	230.19	61.55	1.25	5.47	0.025
Mesquite Vistas	6100	3156.00	1637.64	1642.97	1643.78	1646.13	0.010604	14.26	221.29	60.60	1.32	5.33	0.025
Mesquite Vistas	5900	3156.00	1635.38	1640.69	1641.52	1643.88	0.010751	14.33	220.18	60.48	1.32	5.31	0.025
Mesquite Vistas	5618	3156.00	1632.39	1636.88	1638.33	1641.41	0.006267	17.09	184.68	56.09	1.66	4.49	0.015
Mesquite Vistas	5518	3156.00	1631.05	1635.29	1636.99	1640.56	0.007758	18.42	171.29	54.58	1.83	4.24	0.015
Mesquite Vistas	5468	3156.00	1630.48	1634.45	1636.09	1640.03	0.010600	18.95	166.50	41.97	1.68	3.97	0.015
Mesquite Vistas	5447	Bridge											
Mesquite Vistas	5425	3156.00	1630.03	1633.99	1635.64	1639.59	0.010650	18.98	166.26	41.97	1.68	3.96	0.015
Mesquite Vistas	5375	3156.00	1629.46	1633.60	1635.40	1639.24	0.008557	19.07	165.49	53.92	1.92	4.14	0.015
Mesquite Vistas	5365	3156.00	1629.32	1633.47	1635.26	1639.08	0.008487	19.01	165.98	53.97	1.91	4.15	0.015
Mesquite Vistas	5359	3156.00	1629.29	1633.42	1635.23	1639.11	0.008652	19.14	164.85	53.84	1.93	4.13	0.015
Mesquite Vistas	5328.5	3156.00	1629.13	1633.86	1635.39	1638.73	0.005936	17.71	178.25	48.42	1.63	4.73	0.015
Mesquite Vistas	5311.5	3156.00	1629.04	1633.79	1635.19	1638.67	0.005664	17.72	178.10	45.40	1.58	4.75	0.015
Mesquite Vistas	5304	Bridge											
Mesquite Vistas	5296.5	3156.00	1628.96	1633.70	1635.12	1638.59	0.005687	17.74	177.87	45.40	1.58	4.74	0.015
Mesquite Vistas	5279.5	3156.00	1628.87	1633.64	1635.13	1638.40	0.005738	17.50	180.35	48.60	1.60	4.77	0.015
Mesquite Vistas	5229.5	3156.00	1628.60	1632.90	1634.54	1637.98	0.007367	18.09	174.44	54.94	1.79	4.30	0.015
Mesquite Vistas	5100	3156.00	1627.91	1633.47	1634.05	1636.26	0.008957	13.41	235.39	62.10	1.21	5.56	0.025
Mesquite Vistas	4900	3156.00	1626.84	1633.18	1632.97	1635.07	0.005278	11.04	285.89	67.18	0.94	6.34	0.025
Mesquite Vistas	4700	3156.00	1625.77	1632.11	1631.91	1634.00	0.005288	11.05	285.69	67.16	0.94	6.34	0.025
Mesquite Vistas	4500	3156.00	1624.71	1631.19	1630.84	1632.96	0.004815	10.67	295.75	68.13	0.90	6.48	0.025
Mesquite Vistas	4300	3156.00	1623.64	1629.78	1629.78	1631.86	0.005988	11.56	272.91	65.91	1.00	6.14	0.025
Mesquite Vistas	4133	3156.00	1622.63	1629.71	1628.57	1630.96	0.001041	8.99	350.98	72.25	0.72	7.08	0.015
Mesquite Vistas	4083	3156.00	1622.33	1627.94	1627.94	1630.73	0.004025	13.41	235.42	41.98	1.00	5.61	0.015
Mesquite Vistas	4050	Bridge											
Mesquite Vistas	4017	3156.00	1621.95	1627.56	1627.56	1630.35	0.004025	13.41	235.42	41.98	1.00	5.61	0.015
Mesquite Vistas	3967	3156.00	1621.65	1626.65	1627.59	1630.01	0.004108	14.71	214.48	59.31	1.36	5.00	0.015
Mesquite Vistas	3900	3156.00	1621.23	1626.97	1627.36	1629.51	0.007880	12.79	246.71	63.27	1.14	5.74	0.025
Mesquite Vistas	3700	3156.00	1619.33	1624.77	1625.46	1627.75	0.009793	13.85	227.83	61.30	1.27	5.44	0.025
Mesquite Vistas	3500	3156.00	1617.43	1624.36	1623.57	1625.81	0.003668	9.65	327.02	71.06	0.79	6.93	0.025
Mesquite Vistas	3350	3156.00	1616.00	1624.36	1622.19	1625.22	0.001763	7.44	424.28	77.59	0.56	8.36	0.025
Mesquite Vistas	3300	3156.00	1615.22	1624.41	1621.48	1625.09	0.001247	6.63	476.26	79.31	0.48	9.19	0.025
Mesquite Vistas	3100	3156.00	1613.05	1624.50	1619.22	1624.81	0.000448	4.47	706.60	97.13	0.29	11.45	0.026
Mesquite Vistas	3050	3156.00	1612.52	1624.51	1618.53	1624.78	0.000116	4.24	745.22	91.16	0.26	11.99	0.015
Mesquite Vistas	3000	3156.00	1611.95	1624.22	1617.56	1624.75	0.000480	5.85	539.95	62.00	0.35	12.27	0.015
Mesquite Vistas	2935	Bridge											
Mesquite Vistas	2870	3156.00	1610.83	1623.99	1616.43	1624.40	0.000374	5.14	614.12	79.34	0.33	13.16	0.015
Mesquite Vistas	2823	3156.00	1610.00	1624.15	1615.80	1624.30	0.000311	3.18	992.05	110.96	0.19	14.15	0.034
Mesquite Vistas	2600	3156.00	1608.00	1624.13	1614.29	1624.25	0.000109	2.77	1141.05	114.78	0.15	16.13	0.025
Mesquite Vistas	2488	3156.00	1606.00	1624.20	1615.42	1624.21	0.000011	0.94	6521.44	992.93	0.05	18.20	0.036

Profile Output Table - Bridge Only

Reach	River Sta	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min Top Rd (ft)	Q Weir (cfs)	Delta EG (ft)
Mesquite Vistas	5447	1640.03	1637.48	293.37	1634.45	3156.00	1640.20		0.44
Mesquite Vistas	5304	1638.67	1636.30	292.11	1633.79	3156.00	1639.30		0.07
Mesquite Vistas	4050	1630.73	1630.33	335.76		3156.00	1632.28		0.38
Mesquite Vistas	2935	1624.75	1621.95	420.30		3156.00	1628.47		0.35



LEGEND

45+00 — LOCATION & ORIENTATION OF CROSS SECTIONS OUTSIDE OF LIMIT OF IMPROVEMENTS

45+00 — LOCATION & ORIENTATION OF CROSS SECTIONS WITHIN LIMIT OF IMPROVEMENTS

N

GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

ABBOTT WASH AT MESQUITE VISTAS LOMR

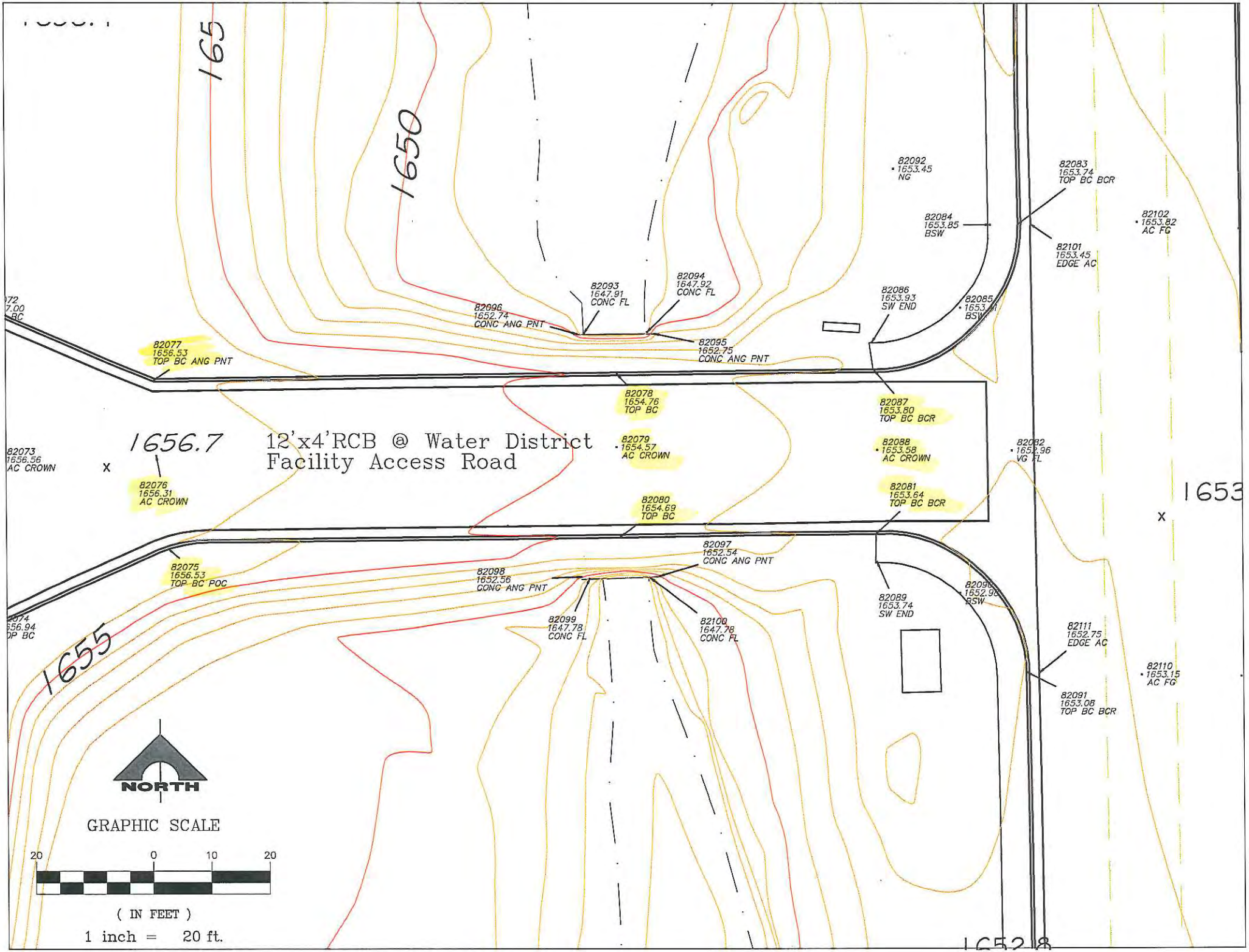
EXHIBIT

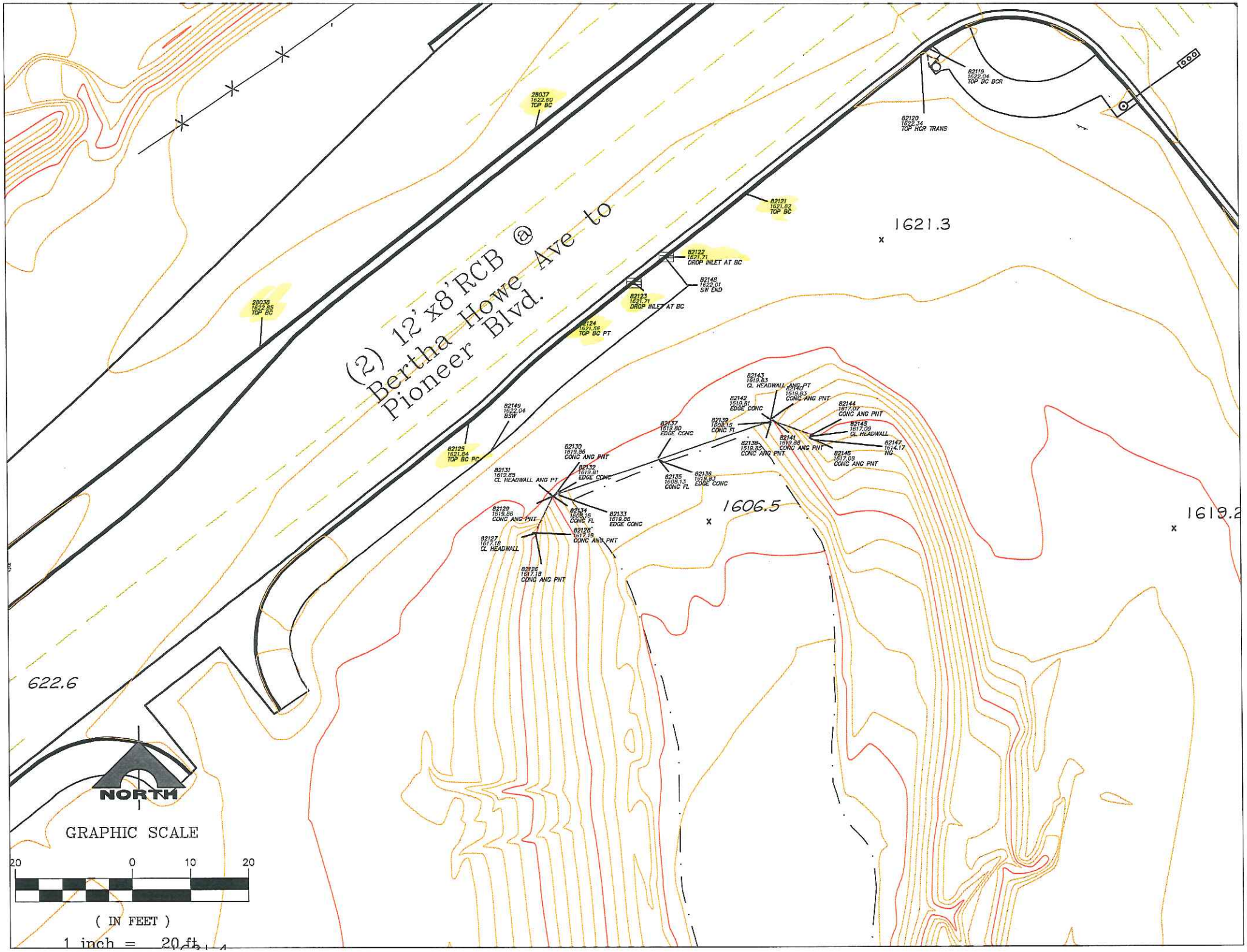
CROSS SECTION LOCATION PLAN

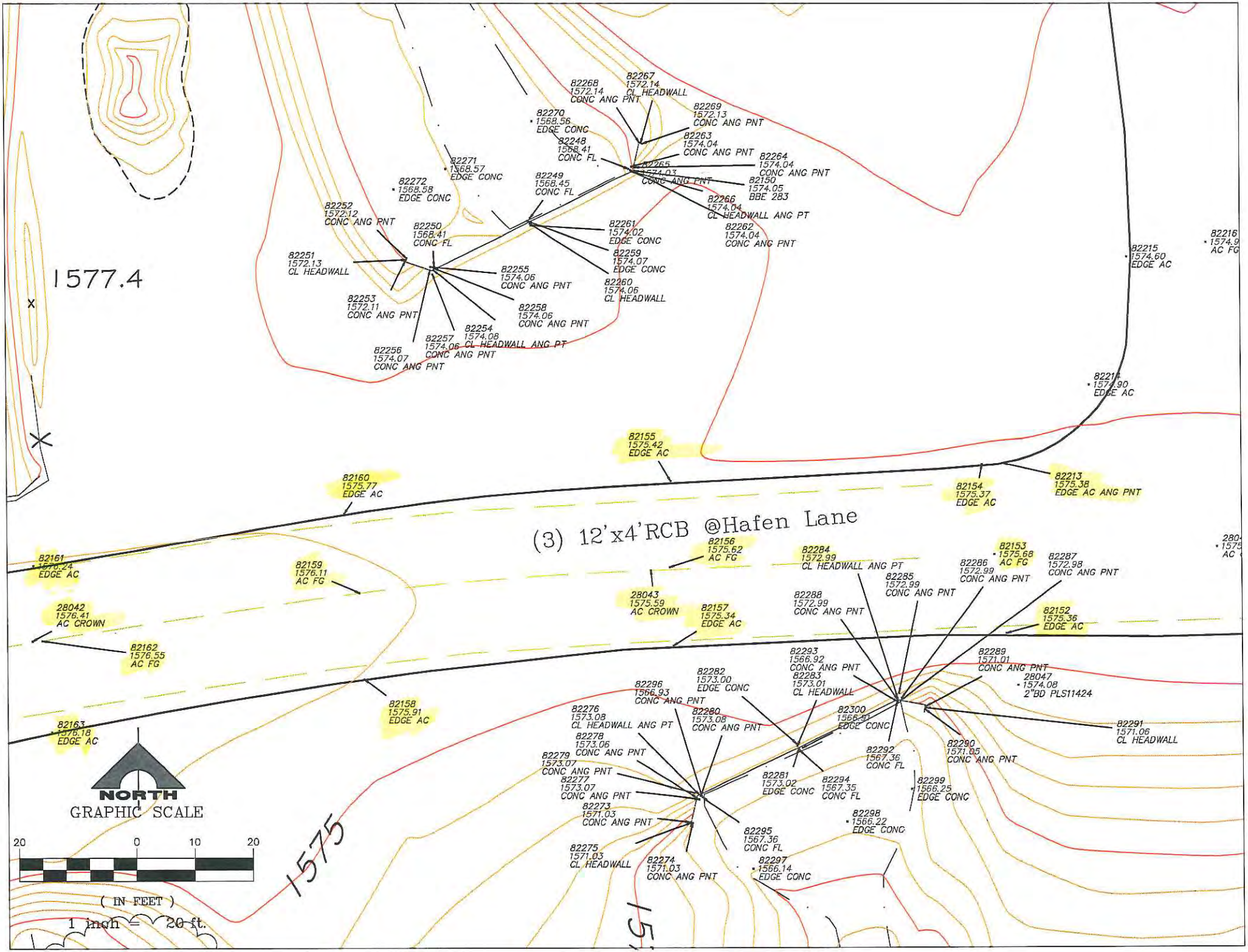
G.C. WALLACE, INC.
Engineers/Planners/Surveyors

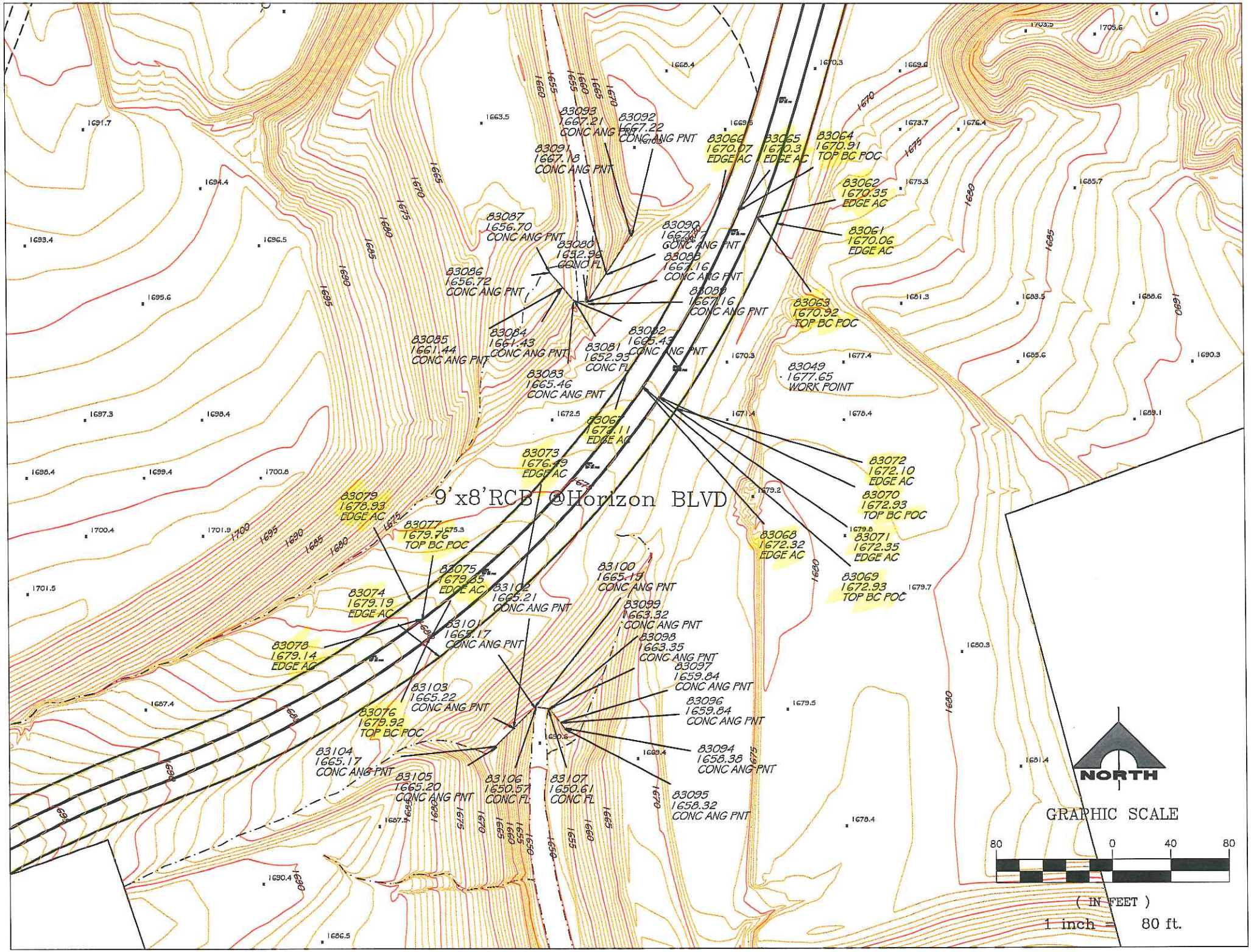
3. BACKUP FOR RESPONSE TO COMMENT #5

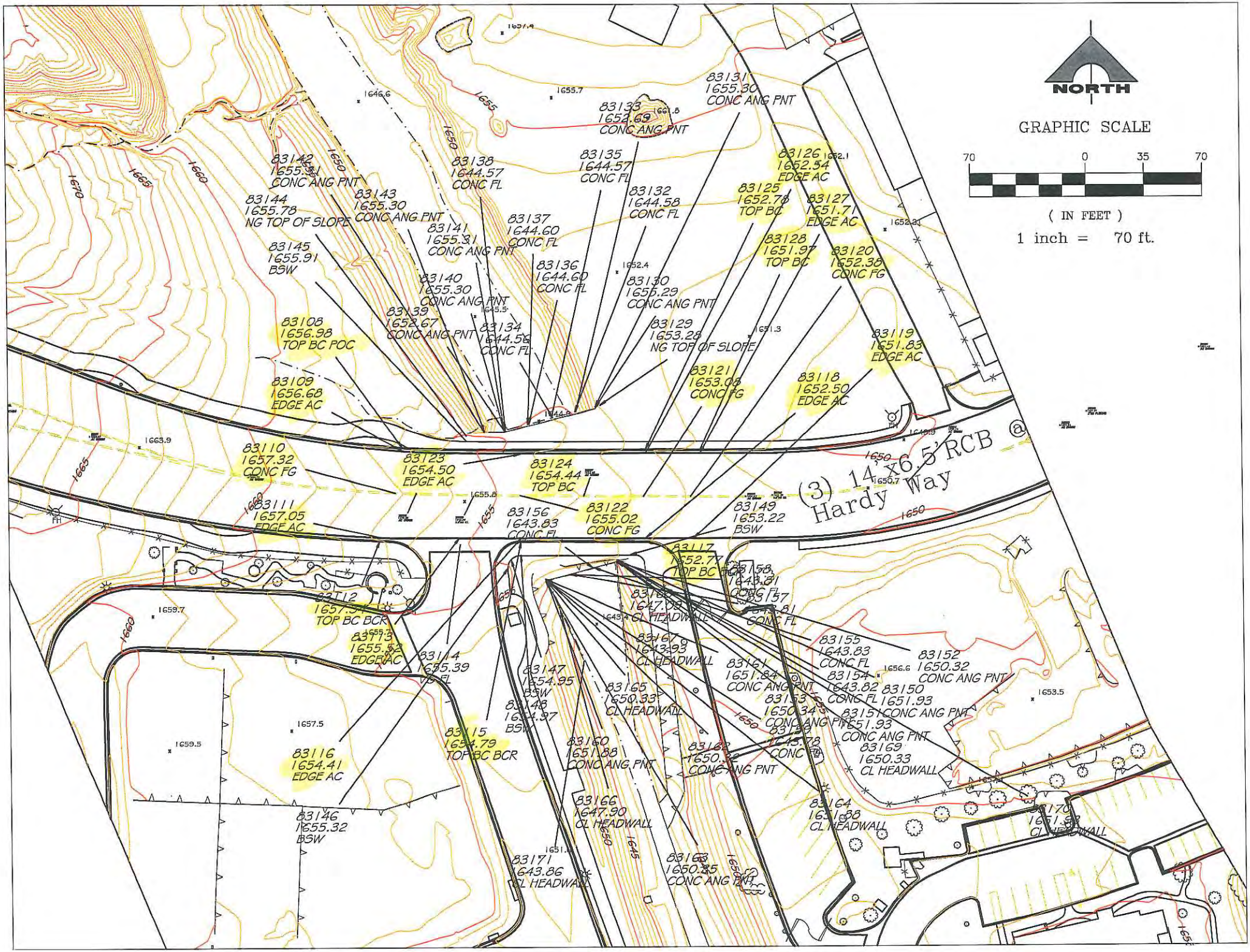
Survey Exhibits and Certification Letter


12'x4'RCB @ Water District Facility Access Road
1656.7
1650
1655
1653
82073 1656.56 AC CROWN
82074 1656.94 TOP BC
82075 1656.53 TOP BC POC
82076 1656.31 AC CROWN
82077 1656.53 TOP BC ANG PNT
82078 1654.76 TOP BC
82079 1654.57 AC CROWN
82080 1654.69 TOP BC
82081 1653.64 TOP BC BCR
82082 1652.96 VG FL
82083 1653.74 TOP BC BCR
82084 1653.85 BSW
82085 1653.M BSW
82086 1653.93 SW END
82087 1653.80 TOP BC BCR
82088 1653.58 AC CROWN
82089 1653.74 SW END
82090 1652.98 BSW
82091 1653.08 TOP BC BCR
82092 1653.45 NG
82093 1647.91 CONC FL
82094 1647.92 CONC FL
82095 1652.75 CONC ANG PNT
82096 1652.74 CONC ANG PNT
82097 1652.54 CONC ANG PNT
82098 1652.56 CONC ANG PNT
82099 1647.78 CONC FL
82100 1647.78 CONC FL
82101 1653.45 EDGE AC
82102 1653.82 AC FG
82110 1653.15 AC FG
82111 1652.75 EDGE AC
NORTH
GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.


(2) 12'x8'RCB @
Bertha Howe Ave to
Pioneer Blvd.
28037
1622.60
TOP BC
28038
1622.85
TOP BC
82119
1622.04
TOP BC BCR
82120
1622.34
TOP HCR TRANS
82121
1621.82
TOP BC
82122
1621.71
DROP INLET AT BC
82123
1621.71
DROP INLET AT BC
82124
1621.56
TOP BC PT
82125
1621.84
TOP BC PC
82126
1617.19
CONC ANG PNT
82127
1617.19
CL HEADWALL
82128
1617.19
CONC ANG PNT
82129
1619.86
CONC ANG PNT
82130
1619.86
CONC ANG PNT
82131
1619.85
CL HEADWALL ANG PT
82132
1619.91
EDGE CONC
82133
1619.86
EDGE CONC
82134
1608.16
CONC FL
82135
1608.13
CONC FL
82136
1618.83
EDGE CONC
82137
1619.80
EDGE CONC
82138
1618.85
CONC ANG PNT
82139
1608.15
CONC FL
82140
1613.81
EDGE CONC
82141
1619.86
CONC ANG PNT
82142
1613.81
EDGE CONC
82143
1619.83
CL HEADWALL ANG PT
82143a
1619.83
CONC ANG PNT
82144
1617.07
CONC ANG PNT
82145
1617.09
CL HEADWALL
82146
1617.09
CONC ANG PNT
82147
1614.17
NG
1621.3
1606.5
1619.2
622.6
NORTH
GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.


1577.4
82268 1572.14 CONC ANG PNT
82267 1572.14 CL HEADWALL
82269 1572.13 CONC ANG PNT
82270 1568.56 EDGE CONC
82248 1568.41 CONC FL
82263 1574.04 CONC ANG PNT
82264 1574.04 CONC ANG PNT
82265 1574.03 CONC ANG PNT
82150 1574.05 BBE 283
82266 1574.04 CL HEADWALL ANG PT
82262 1574.04 CONC ANG PNT
82271 1568.57 EDGE CONC
82272 1568.58 EDGE CONC
82249 1568.45 CONC FL
82252 1572.12 CONC ANG PNT
82250 1568.41 CONC FL
82261 1574.02 EDGE CONC
82259 1574.07 EDGE CONC
82260 1574.06 CL HEADWALL
82251 1572.13 CL HEADWALL
82255 1574.06 CONC ANG PNT
82258 1574.06 CONC ANG PNT
82253 1572.11 CONC ANG PNT
82254 1574.08 CL HEADWALL ANG PT
82257 1574.06 CONC ANG PNT
82256 1574.07 CONC ANG PNT
82215 1574.60 EDGE AC
82216 1574.9 AC FG
82217 1574.90 EDGE AC
82155 1575.42 EDGE AC
82160 1575.77 EDGE AC
82154 1575.37 EDGE AC
82213 1575.38 EDGE AC ANG PNT
(3) 12'x4'RCB @Hafen Lane
82161 1576.24 EDGE AC
82159 1576.11 AC FG
82156 1575.62 AC FG
28043 1575.59 AC CROWN
82157 1575.34 EDGE AC
82284 1572.99 CL HEADWALL ANG PT
82153 1575.68 AC FG
82286 1572.99 CONC ANG PNT
82287 1572.98 CONC ANG PNT
82285 1572.99 CONC ANG PNT
82288 1572.99 CONC ANG PNT
82152 1575.36 EDGE AC
28042 1576.41 AC CROWN
82162 1576.55 AC FG
82293 1566.92 CONC ANG PNT
82289 1571.01 CONC ANG PNT
28047 1574.08 2"BD PLS11424
82283 1573.01 CL HEADWALL
82282 1573.00 EDGE CONC
82296 1566.93 CONC ANG PNT
82300 1566.91 EDGE CONC
82158 1575.91 EDGE AC
82276 1573.08 CL HEADWALL ANG PT
82280 1573.08 CONC ANG PNT
82291 1571.06 CL HEADWALL
82163 1576.18 EDGE AC
82278 1573.06 CONC ANG PNT
82279 1573.07 CONC ANG PNT
82277 1573.07 CONC ANG PNT
82292 1567.36 CONC FL
82290 1571.05 CONC ANG PNT
82281 1573.02 EDGE CONC
82294 1567.35 CONC FL
82299 1566.25 EDGE CONC
82273 1571.03 CONC ANG PNT
82298 1566.22 EDGE CONC
82295 1567.36 CONC FL
82275 1571.03 CL HEADWALL
82274 1571.03 CONC ANG PNT
82297 1566.14 EDGE CONC
NORTH
GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.
1575


9'x8'RCB @Horizon BLVD
83093 1667.21 CONC ANG PNT
83092 1667.22 CONC ANG PNT
83091 1667.18 CONC ANG PNT
83066 1670.07 EDGE AC
83065 1670.3 EDGE AC
83064 1670.91 TOP BC POC
83062 1670.35 EDGE AC
83061 1670.06 EDGE AC
83063 1670.92 TOP BC POC
83087 1656.70 CONC ANG PNT
83090 1667.17 CONC ANG PNT
83080 1652.99 CONC FL
83088 1667.16 CONC ANG PNT
83089 1667.16 CONC ANG PNT
83086 1656.72 CONC ANG PNT
83085 1661.44 CONC ANG PNT
83084 1661.43 CONC ANG PNT
83082 1665.43 CONC ANG PNT
83081 1652.93 CONC FL
83083 1665.46 CONC ANG PNT
83049 1677.65 WORK POINT
83067 1672.11 EDGE AC
83073 1676.49 EDGE AC
83072 1672.10 EDGE AC
83070 1672.93 TOP BC POC
83071 1672.35 EDGE AC
83068 1672.32 EDGE AC
83069 1672.93 TOP BC POC
83079 1678.93 EDGE AC
83077 1679.76 TOP BC POC
83075 1679.85 EDGE AC
83074 1679.19 EDGE AC
83078 1679.14 EDGE AC
83102 1665.21 CONC ANG PNT
83100 1665.19 CONC ANG PNT
83099 1663.32 CONC ANG PNT
83098 1663.35 CONC ANG PNT
83097 1659.84 CONC ANG PNT
83096 1659.84 CONC ANG PNT
83101 1665.17 CONC ANG PNT
83103 1665.22 CONC ANG PNT
83076 1679.92 TOP BC POC
83104 1665.17 CONC ANG PNT
83105 1665.20 CONC ANG PNT
83106 1650.57 CONC FL
83107 1650.61 CONC FL
83094 1658.38 CONC ANG PNT
83095 1658.32 CONC ANG PNT
NORTH
GRAPHIC SCALE
80 0 40 80
(IN FEET)
1 inch = 80 ft.


NORTH
GRAPHIC SCALE
70 0 35 70
(IN FEET)
1 inch = 70 ft.
(3) 14'x6.5' RCB @
Hardy Way
83108 1656.98 TOP BC POC
83109 1656.68 EDGE AC
83110 1657.32 CONC FG
83111 1657.05 EDGE AC
83112 1657.34 TOP BC BCR
83113 1655.52 EDGE AC
83114 1655.39 VB FL
83115 1654.79 TOP BC BCR
83116 1654.41 EDGE AC
83117 1652.77 TOP BC
83118 1652.50 EDGE AC
83119 1651.83 EDGE AC
83120 1652.38 CONC FG
83121 1653.08 CONC FG
83122 1655.02 CONC FG
83123 1654.50 EDGE AC
83124 1654.44 TOP BC
83125 1652.78 TOP BC
83126 1652.54 EDGE AC
83127 1651.7 EDGE AC
83128 1651.97 TOP BC
83129 1653.28 NG TOP OF SLOPE
83130 1656.29 CONC ANG PNT
83131 1655.30 CONC ANG PNT
83132 1644.58 CONC FL
83133 1654.69 CONC ANG PNT
83134 1644.56 CONC FL
83135 1644.57 CONC FL
83136 1644.60 CONC FL
83137 1644.60 CONC FL
83138 1644.57 CONC FL
83139 1652.67 CONC ANG PNT
83140 1655.30 CONC ANG PNT
83141 1655.31 CONC ANG PNT
83142 1655.31 CONC ANG PNT
83143 1655.30 CONC ANG PNT
83144 1655.78 NG TOP OF SLOPE
83145 1655.91 BSW
83146 1655.32 BSW
83147 1654.95 BSW
83148 1654.97 BSW
83149 1653.22 BSW
83150 1651.93 CONC ANG PNT
83151 CONC ANG PNT
83152 1650.32 CONC ANG PNT
83153 1650.34 CONC ANG PNT
83154 1643.82 CONC FL
83155 1643.83 CONC FL
83156 1643.83 CONC FL
83157 1643.81 CONC FL
83158 1643.81 CONC FL
83159 1643.78 CONC FL
83160 1651.88 CONC ANG PNT
83161 1651.84 CONC ANG PNT
83162 1650.32 CONC ANG PNT
83163 1650.35 CONC ANG PNT
83164 1651.88 CL HEADWALL
83165 1650.33 CL HEADWALL
83166 1647.90 CL HEADWALL
83167 1643.93 CL HEADWALL
83168 1647.98 CL HEADWALL
83169 1650.33 CL HEADWALL
83170 1651.93 CL HEADWALL
83171 1643.86 CL HEADWALL

ABBOTT AND PULSIPHER WASHES LOMR CERTIFICATION

This is to certify that all work accomplished in the conduct of this LOMR was done in accordance with the Statement of Work and General Provisions of Contract 550.048, and all amendments thereto, together with all such modifications, either written or oral, as the Regional PO and/or the Contracting Officer or their representatives have directed, such as modifications affecting this contract, and that all such work has been accomplished in accordance with sound and accepted engineering practices within the contract provisions for respective phases of work. Topographic data on base maps, work maps, cross section maps, and exhibits is certified to represent existing conditions and to be accurate to the best of my knowledge as per Volume 2, Section 2.1.5 Guidelines and Specifications for Flood Hazard Mapping Partners, FEMA, April 2003.

Jerry E. Pruitt, PE – Senior Vice President
G. C. WALLACE, INC.