SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Jason K. Davis
P.O. Box 249
West Union, WV 26456

9590 9402 2859 7069 5449 71

2. Article Number *(Transfer from service label)*

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Crystal Kinsey ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* Crystal Kinsey

C. Date of Delivery 6-21-17

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

USPS TRACKING #

9590 9402 2859 7069 5449 71

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

United States Postal Service

• Sender: Please print your name, address, and ZIP+4® in this box•

George Eidel
Doddridge County Office of Emergency Management
105 Court Street Ste 3
West Union WV. 26456

#17-470

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Ronald Yerkey
37 McMullan Farm Rd
West Union, WV 26456

9590 9402 2859 7069 5449 88

2. Article Number *(Transfer from service label)*

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Ronald A. Yerkey ☐ Agent ☐ Addressee

B. Received by *(Printed Name)*

C. Date of Delivery 6-26-17

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
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- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
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- ☐ Signature Confirmation Restricted Delivery

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

United States Postal Service

• Sender: Please print your name, address, and ZIP+4® in this box•

George Eidel
Doddridge County Office of Emergency Management
105 Court Street Ste 3
West Union WV. 26456

#17-470

7015 3430 0001 1569 7644

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

Certified Mail Fee $3.35
Extra Services & Fees (check box, add fee as appropriate)
☑ Return Receipt (hardcopy) $2.75
☐ Return Receipt (electronic) $
☐ Certified Mail Restricted Delivery $
☐ Adult Signature Required $
☐ Adult Signature Restricted Delivery $
Postage $.49
Total Postage and Fees $6.59

Postmark Here
JUN 20 2017
WEST UNION, WV
USPS 26456-9998

Sent To Jason K. Davis #17-470
Street and Apt. No., or PO Box No. P.O. Box 249
City, State, ZIP+4® West UNION, WV 26456

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 3430 0001 1569 7668

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

Certified Mail Fee $3.35
Extra Services & Fees (check box, add fee as appropriate)
☑ Return Receipt (hardcopy) $2.75
☐ Return Receipt (electronic) $
☐ Certified Mail Restricted Delivery $
☐ Adult Signature Required $
☐ Adult Signature Restricted Delivery $
Postage $.49
Total Postage and Fees $6.59

Postmark Here
JUN 20 2017
WEST UNION, WV
USPS 26456-9998

Sent To William + Deanna Davis (Surv) #17-470
Street and Apt. No., or PO Box No. 5891 Big Flint Rd
City, State, ZIP+4® West UNION, WV. 26456

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 3430 0001 1569 7675

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

Certified Mail Fee $3.35
Extra Services & Fees (check box, add fee as appropriate)
☑ Return Receipt (hardcopy) $2.75
☐ Return Receipt (electronic) $
☐ Certified Mail Restricted Delivery $
☐ Adult Signature Required $
☐ Adult Signature Restricted Delivery $
Postage $.49
Total Postage and Fees $6.59

Postmark Here
JUN 20 2017
WEST UNION, WV
USPS 26456-9998

Sent To Barbara YerKey #17-470
Street and Apt. No., or PO Box No. 5891 Big Flint Rd
City, State, ZIP+4® West UNION, WV 26456

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 3430 0001 1569 7651

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OFFICIAL USE

Certified Mail Fee $3.35
Extra Services & Fees (check box, add fee as appropriate)
☑ Return Receipt (hardcopy) $2.75
☐ Return Receipt (electronic) $
☐ Certified Mail Restricted Delivery $
☐ Adult Signature Required $
☐ Adult Signature Restricted Delivery $
Postage $.49
Total Postage and Fees $6.59

Postmark Here
JUN 20 2017
WEST UNION, WV
USPS 26456-9998

Sent To Ronald YerKey #17-470
Street and Apt. No., or PO Box No. 37 McMullan Farm Rd
City, State, ZIP+4® West UNION, WV. 26456

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

CERTIFIED MAIL

George Eidel
Doddridge County Office of Emergency Management
105 Court Street Ste 3
West Union WV. 26456

7015 3430 0001 1569 7675

HASLER
$006.59[0]
06/19/2017 ZIP 26456
012E14643162
US POSTAGE

1-21

NIXIE 250 DE 1700 0007/22/17
RETURN TO SENDER
UNCLAIMED
UNABLE TO FORWARD
BC: 26456201205 *1771-05807-22-37

Barbara Yerkey
5891 Big Flint Rd
West Union, WV 2

OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

SENDER: COMPLETE THIS SECTION

- **Complete items 1, 2, and 3.**
- **Print your name and address on the reverse so that we can return the card to you.**
- **Attach this card to the back of the mailpiece, or on the front if space permits.**

1. Article Addressed to:

Barbara Yerkey
5891 Big Flint Rd
West Union, WV 26456

9590 9402 2859 7069 5450 08

2. Article Number *(Transfer from service label)*

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
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- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
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- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form **3811**, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt

Doddridge County Office of
Emergency Management/Floodplain Management
108 Court Street Suite 1
Tel 304-873-1343
doddridgecountyfpm@gmail.com

Dear Sir or Ma'am,

You are receiving this letter because you have been identified as a land surface and/or mineral rights owner for property or adjacent property related to the proposed development/project identified by the following page.

No action is required of you. This letter is simply to inform you of the proposed development.

If you would like to comment on this proposed project, or would like additional information, you may contact the Doddridge County Floodplain Manager at the above address.

Respectfully yours,

George Eidel, CFM

Doddridge County Floodplain Manager

Doddridge County Floodplain Permits

(Week of July 3, 2017)

Please take notice that on the **15** day of **June, 2017, Antero Resources Inc.** filed an application for a Floodplain Permit **(#17-470)** to develop land located at or about **6141 Big Flint Rd, Coordinates 39.341920N, 80.694138W**. The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by **July 25, 2017** (20 calendar days after the announcement at the regularly scheduled Doddridge County Commission Meeting) delivered to the Clerk of the County Court at 108 Court Street Ste. 1, West Union, WV 26456. **This project is for an access road and bridge.**

CERTIFIED MAIL

George Eidel
Doddridge County Office of Emergency Management
105 Court Street Ste 3
West Union WV. 26456

7015 3430 0001 1569 7668

HASLER
$006.59⁰
06/19/2017 ZIP 26456
012E14643162
US POSTAGE

1.72

NIXIE 250 DE 1700 0007/22/17
RETURN TO SENDER
UNCLAIMED
UNABLE TO FORWARD
BC: 26456201205 *1771-05808-22-37

William and Deanna Davis
5891 Big Flint Rd
West Union, WV 26456

UNC

CERTIFIED MAIL

PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

William and Deanna Davis (Surv)
5891 Big Flint Rd
West Union, WV 26456

9590 9402 2859 7069 5449 95

2. Article Number *(Transfer from service label)*

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* | C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
YES, enter delivery address below: ☐ No

ice Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
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- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form **3811**, July 2015 PSN 7530-02-000-9053 Domestic Return Receipt

Doddridge County Office of
Emergency Management/Floodplain Management
108 Court Street Suite 1
Tel 304-873-1343
doddridgecountyfpm@gmail.com

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No action is required of you. This letter is simply to inform you of the proposed development.

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Respectfully yours,

George Eidel, CFM

Doddridge County Floodplain Manager

Doddridge County Floodplain Permits

(Week of July 3, 2017)

Please take notice that on the **15** day of **June, 2017**, **Antero Resources Inc.** filed an application for a Floodplain Permit **(#17-470)** to develop land located at or about **6141 Big Flint Rd, Coordinates 39.341920N, 80.694138W**. The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by **July 25, 2017** (20 calendar days after the announcement at the regularly scheduled Doddridge County Commission Meeting) delivered to the Clerk of the County Court at 108 Court Street Ste. 1, West Union, WV 26456. **This project is for an access road and bridge.**

Floodplain Development Permit

Doddridge County, WV Floodplain Management

This permit gives approval for the development/ project listed that impacts the FEMA-designated floodplain and/or floodway of Doddridge County, WV, pursuant to the rules and regulations established by all applicable Federal, State and local laws and ordinances, including the Doddridge County Floodplain Ordinance. This permit must be posted at the site of work as to be clearly visible, and must remain posted during entirety of development.

Permit #: 17-470

Date Approved: July 25, 2017 **Expires: July 25, 2018**

Issued to: Antero Resources Inc. **POC: Rachel Grzybek 304-842-4008**

Company Address: 535 White Oaks Blvd, Bridgeport, WV 26330

Project Address: 6141 Big Flint Rd

Firm: #54017C0130C **Lat/Long: 39.341920N, 80.694138W**

Purpose of development: Access road and bridge

Issued by: George C. Eidel, CFM, Doddridge County FPM (*or designee*)

George C. Eidel

Date: July 25, 2017

For additional information regarding this permit, please contact Doddridge County Floodplain Manager at 304.873.2631, or via email at doddridgecountyfpm@gmail.com
118 East Court Street; West Union, WV 26456

ANTERO MIDSTREAM LLC
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Jul-28-2017	107655	$1,215.00

INV #	INV DATE	DESCRIPTION	AMOUNT	DISCOUNTS	NET AMOUNT
MR6917	07/07/17	FLOODPLAIN PERMIT - VICTORIA ACCESS	1,215.00	0.00	1,215.00

AUG 1 17 2:16PM

TOTAL INVOICES PAID	1,215.00	0.00	1,215.00

DETACH AND RETAIN FOR TAX PURPOSES

THIS CHECK HAS A COLORED FACE ON WHITE STOCK AND AN ARTIFICIAL WATERMARK ON THE BACK

ANTERO MIDSTREAM LLC
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Wells Fargo
Denver, CO

800 - AP ACCT WELLS FARGO

Check No. **107655** 11-24 / 412

Void After 90 Days

CHECK NUMBER	DATE	PAY EXACTLY
107655	Jul-28-2017	$1,215.00

PAY EXACTLY $1,215dols00cts
One Thousand Two Hundred Fifteen Dollars and Zero Cents

TO THE ORDER OF
DODDRIDGE COUNTY COMMISSION
BETHA ROGERS, CLERK~118 EAST COURT STREET~ROOM 10
2
WEST UNION, WV 26456

⑈107655⑈ ⑆041203824⑆ 9657481710⑈

ANTERO MIDSTREAM LLC
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Jul-28-2017	107655	$1,215.00

INV #	INV DATE	DESCRIPTION	AMOUNT	DISCOUNTS	NET AMOUNT
MR6917	07/07/17	FLOODPLAIN PERMIT - VICTORIA ACCESS	1,215.00	0.00	1,215.00

Doddridge County, West Virginia

RECEIPT NO: 9435 DATE: 2017/08/02

FROM: ANTERO MIDSTREAM LLC **AMOUNT:** $ 1,215.00

ONE THOUSAND TWO HUNDRED FIFTEEN DOLLARS AND 00 CENTS

FOR: #17-470 VICTORIA ACCESS

00000107655 FP-BUILDING PERMITS 020-318 **TOTAL:** $1,215.00

MICHAEL HEADLEY
SHERIFF &TREASURER

MEC
CLERK

Customer Copy

TOTAL INVOICES PAID ====>	1,215.00	0.00	1,215.00

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County Flood Plain Application Fee Calculator (if in Flood Plain)	
Victoria Launcher AR & Bridge	
Estimated Construction Costs	$143,000.00
Amount over $100,000	$43,000.00
Drilling Oil and Gas Well Fee	$1,000.00
$5 per $1,000 over $100,000	$215.00
Amount Due with application	$1,215.00

FLOODPLAIN PERMIT #17-470

Antero Resources-Victoria Access Road and Bridge Project Big Flint

FIRM # 54017C0130C Coordinates 39.341920N. 80.694138W 6141 Big Flint Road

TASK	COMPLETE (DATE)	NOTES
CHECK RECEIVED	8-1-17	
US ARMY CORP. ENGINEERS (USACE)		
US FISH & WILDLIFE SERVICES (USFWS)	February 28, 2017	
WV DEPT. NATURAL RESOURCES (WVDNR)	March 15, 2017	
WV DEPT. ENVIROMENTAL PROTECTION (WVDEP)		
STATE HISTORIC & PRESERVATION OFFICE (SHPO)		
OFFICE of LAND & STREAM (OLS)		
DATE OF COMMISSION READING		
DATE AVAILABLE TO BE GRANTED	7/25/17	
PERMIT GRANTED		
COMPLETE		

7015 3430 0001 1569 7675

7015 3430 0001 1569 7651

7015 3430 0001 1569 7668

7015 3430 0001 1569 7644

Doddridge County Floodplain Permits

(Week of July 3, 2017)

Please take notice that on the **15** day of **June, 2017**, **Antero Resources Inc.** filed an application for a Floodplain Permit **(#17-470)** to develop land located at or about **6141 Big Flint Rd, Coordinates 39.341920N, 80.694138W**. The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by **July 25, 2017** (20 calendar days after the announcement at the regularly scheduled Doddridge County Commission Meeting) delivered to the Clerk of the County Court at 108 Court Street Ste. 1, West Union, WV 26456. **This project is for an access road and bridge.**

Antero Midstream Partners LP
Antero Midstream, LLC
535 White Oaks Blvd
Bridgeport, WV 26330
Office 304.842.4100
Fax 304.842.4102

June 9, 2017

Doddridge County Commission
Attn: George Eidel, Doddridge County Floodplain Manager
118 East Court Street, Room 102
West Union, WV 26456

Mr. Eidel:

Antero Midstream LLC would like to submit a Doddridge County Floodplain permit application for our ***Victoria Access Road & Bridge*** project. This project is located in Doddridge County, where the repairs begin at coordinate 39.341920N, 80.694138W. Per the FIRM Map #54017C0130C this location is <u>in</u> the floodplain.

Attached you will find the following:

- Doddridge County Floodplain Permit Application
- Project Map
- WV Flood Tool Map
- FIRM Maps
- HEC-RAS Analysis

If you have any questions please feel free to contact me at (304) 842-4008.

Thank you in advance for your consideration.

Sincerely,

Rachel Grzybek
Environmental Specialist II
Antero Resources Corporation

Enclosures

Permit# 17-470

Project Name: Victoria Access Road + Bridge

Permittees Name: ANTero Resources INC.

Doddridge County, WV

Floodplain Development Permit Application

This document is to be used for projects that impact/potentially impact the FEMA---designated floodplain and/or floodway of Doddridge County, WV pursuant to the rules and regulations established by all applicable Federal, State and local laws and ordinances, including the Doddridge County Floodplain Ordinance.

SECTION 1: GENERAL PROVISIONS (APPLICANT TO READ AND SIGN)

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal requirements.
7. Applicant hereby gives consent to the Floodplain Administrator/Manager or his/her representative to make inspections to verify compliance.
8. I THE APPLICANT CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

APPLICANT'S SIGNATURE _____

DATE 6/9/17

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Applicant Information:

Please provide all pertinent data.

Applicant Information		
Responsible Company Name: Antero Midstream, LLC.		
Corporate Mailing Address: 1615 Wynkoop Street		
City: Denver	**State: CO**	**Zip: 80202**
Corporate Point of Contact (POC):		
Corporate POC Title:		
Corporate POC Primary Phone:		
Corporate POC Primary Email:		
Corporate FEIN:	**Corporate DUNS:**	
Corporate Website: www.anteroresources.com		
Local Mailing Address: 535 White Oaks Boulevard		
City: Bridgeport	**State: WV**	**Zip: 26330**
Local Project Manager (PM):		
Local PM Primary Phone:		
Local PM Secondary Phone:		
Local PM Primary Email:		
Person Filing Application: Rachel Grzybek		
Applicant Title: Environmental Specialist II		
Applicant Primary Phone: (304) 842-4008		
Applicant Secondary Phone: (304) 641-2396		
Applicant Primary Email: rgrzybek@anteroresources.com		

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Project Narrative:

Describe in detail the proposed development including project name/title, type of development, estimated start and completion timeline, and its potential impact on the floodplain. Use additional copies of this page as needed.

Project Narrative:
The Victoria Launcher Access Road project is located off Doddridge County Route 3.
The proposed project involves the improvement of an access road and the installation of a new
bridge. A portion of the work will be performed within the Flint Run Zone A Flood Hazard Area,
as shown on the Flood Insurance Rate Map for Doddridge County, Map #54017C0130C with a
map revised date of October 4, 2011. A hydraulic study was performed to determine the
potential for adverse effects caused by the construction of the bridge and the impacts to the water
levels and floodplain of Flint Run. Existing and proposed conditions analyses were performed.
The proposed bridge was modeled using a span of 50', a width of 14', and a bridge deck height of
3'. The results of the hydraulic study indicate that the construction will increase the 100-year
water surface elevation of Flint Run by 0.94 feet.

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Proposed Development:

Please check all elements of the proposed project that apply.

DESCRIPTION OF WORK (CHECK ALL APPLICABLE BOXES)

A. STRUCTURAL DEVELOPMENT

	ACTIVITY		STRUCTURAL TYPE
[]	New Structure	[]	Residential (1 – 4 Family)
[]	Addition	[]	Residential (more than 4 Family)
[]	Alteration	[]	Non-residential (floodproofing)
[]	Relocation	[]	Combined Use (res. & com.)
[]	Demolition	[]	Replacement
[]	Manufactured/Mobil Home		

B. OTHER DEVELOPLMENT ACTIVITIES:

[] Fill [] Mining [] Drilling [] Pipelining
[X] Grading
[X] Excavation (except for STRUCTURAL DEVELOPMENT checked above)
[] Watercourse Alteration (including dredging and channel modification)
[] Drainage Improvements (including culvert work)
[X] Road, Street, or Bridge Construction
[] Subdivision (including new expansion)
[] Individual Water or Sewer System
[] Other (please specify)

_____

_____

_____

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Development Site/Property Information:

Please provide physical description of the site/property, along with pertinent ownership (surface and mineral rights) data as applicable. Attach appropriate maps from the WV Flood Tool showing location of proposed development. Use additional copies of this page if development spans multiple property boundaries. Designate each property by number (i.e. Property 1 of 1, Property 2 of 7, etc.)

Property Designation: 1 of 2

Site/Property Information:		
Legal Description: BIG FLINT 74.5 AC		
Physical Address/911 Address: County Route 3, Center Point, WV		
Decimal Latitude/Longitude: 39.3416° N, 80.6934° W		
DMS Latitude/Longitude: 39° 20' 29.76" N, 80° 41' 36.24" W		
District: 3 - Grant	**Map: 9**	**Parcel: 9**
Land Book Description:		
Deed Book Reference: Book 275, Page 64		
Tax Map Reference: 09-03-0009-0009-0000		
Existing Buildings/Use of Property: Antero Midstream, LLC's Victoria Launcher AR and Bridge will be located on this property.		

Floodplain Location Data: ***(to be completed by Floodplain Manager or designee)***			
Community:	**Number:**	**Panel:**	**Suffix:**
Location (Lat/Long):		**Approximate Elevation:** **Estimated BFE:**	
Is the development in the floodway? ☐ **Yes** ☐ **No**		**Is the development in the floodplain?** ☐ **Yes** ☐ **No** **Zone:** _____	
Notes:			

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Development Site/Property Information:

Please provide physical description of the site/property, along with pertinent ownership (surface and mineral rights) data as applicable. Attach appropriate maps from the WV Flood Tool showing location of proposed development. Use additional copies of this page if development spans multiple property boundaries. Designate each property by number (i.e. Property 1 of 1, Property 2 of 7, etc.)

Property Designation: 2 of 2

Site/Property Information:		
Legal Description: BIG FLINT 34.5 AC		
Physical Address/911 Address: County Route 3, Center Point, WV		
Decimal Latitude/Longitude: 39.3365° N, 80.6950° W		
DMS Latitude/Longitude: 39° 20'11.40" N, 80° 41' 42.00" W		
District: 3 - Grant	**Map: 9**	**Parcel: 23**
Land Book Description:		
Deed Book Reference: Book 275, Page 64		
Tax Map Reference: 09-03-0009-00023-0000		
Existing Buildings/Use of Property: Antero Midstream, LLC's Victoria Launcher AR and Bridge will be located on this property.		

Floodplain Location Data: ***(to be completed by Floodplain Manager or designee)***			
Community:	**Number:**	**Panel:**	**Suffix:**
Location (Lat/Long):		**Approximate Elevation:** **Estimated BFE:**	
Is the development in the floodway? ☐ **Yes** ☐ **No**		**Is the development in the floodplain?** ☐ **Yes** ☐ **No** **Zone:** _____	
Notes:			

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Property Owner Data:

Please provide data on current site/property landowner(s), both surface and mineral rights (as applicable). Use additional copies of this page as needed. Designate each page in relation to each property listed above.

Property Designation: 1 of 2		

Property Owner Data:		
Name of Primary Owner (PO): Ronald Yerkey		
PO Address: 37 McMullan Farm Road		
City: West Union	**State: WV**	**Zip: 26456**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Surface Rights Owner Data:		
Name of Primary Owner (PO):		
PO Address:		
City:	**State:**	**Zip:**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Mineral Rights Owner Data: ***(As Applicable)***		
Name of Primary Owner (PO):		
PO Address:		
City:	**State:**	**Zip:**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Property Owner Data:

Please provide data on current site/property landowner(s), both surface and mineral rights (as applicable). Use additional copies of this page as needed. Designate each page in relation to each property listed above.

Property Designation: 2 of 2		

Property Owner Data:		
Name of Primary Owner (PO): Ronald Yerkey		
PO Address: 37 McMullan Farm Road		
City: West Union	**State: WV**	**Zip: 26456**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Surface Rights Owner Data:		
Name of Primary Owner (PO):		
PO Address:		
City:	**State:**	**Zip:**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Mineral Rights Owner Data: ***(As Applicable)***		
Name of Primary Owner (PO):		
PO Address:		
City:	**State:**	**Zip:**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Doddridge County Commercial/Industrial
Floodplain Development Permit Application

Contractor Data:

Please provide all pertinent data for contractors and sub---contractors that may be participating in this project. Use additional copies of this page as needed. Designate each page in relation to each property listed above.

Property Designation: ____ of ____

Contractor/Sub-Contractor (C/SC) Information:		
C/SC Company Name:		
C/SC WV License Number:		
C/SC FEIN:	**C/SC DUNS:**	
Local C/SC Point of Contact (POC):		
Local C/SC POC Title:		
C/SC Mailing Address:		
City:	**State:**	**Zip-Code:**
Local C/SC Office Phone:		
Local C/SC POC Phone:		
Local C/SC POC E-Mail:		

Engineer Firm Information:		
Engineer Firm Name:		
Engineer WV License Number:		
Engineer Firm FEIN:	**Engineer Firm DUNS:**	
Engineer Firm Primary Point of Contact (POC):		
Engineer Firm Primary POC Title:		
Engineer Firm Mailing Address:		
City:	**State:**	**Zip-Code:**
Engineer Firm Office Phone:		
Engineer Firm Primary POC Phone:		
Engineer Firm Primary POC E-Mail:		

Adjacent and/or Affected Landowners Data

Please provide data for all adjacent and/or affected surface owners (both up and down stream) whose property may be impacted by proposed development as demonstrated by a floodplain study or survey. Use additional copies of this page as needed.

Adjacent Property Owner Data: Upstream		
Name of Primary Owner (PO): YERKEY BARBARA J		
Physical Address: R~~T 2 BOX 169~~ 5891 Big Flint Rd		
City: West Union	**State: WV**	**Zip: 26456**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Adjacent Property Owner Data: Upstream		
Name of Primary Owner (PO): DAVIS DEANNA & WILLIAM (SURV)		
Physical Address: 5891 Big Flint Rd		
City: West Union	**State: WV**	**Zip: 26456**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Adjacent Property Owner Data: Downstream		
Name of Primary Owner (PO): Ronald Yerkey		
Physical Address: 37 McMullan Farm Rd		
City: West Union	**State: WV**	**Zip: 26456**
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Adjacent Property Owner Data: Downstream		
Name of Primary Owner (PO): N/A Jason K. Davis		
Physical Address: P. O. Box 249		
City: West Union	**State:** WV	**Zip:** 26456
PO Primary Phone:		
PO Secondary Phone:		
PO Primary Email:		

Site Plan

A Site Plan is an accurate and detailed map of the proposed development for this project. It shows the size, shape, location and special features of the project property, and the size and location of any development planned to the property, especially as that development will impact the floodplain and/or floodway. Site plans show what currently exists on the project property, and any changes or improvements you are proposing to make. **A certified and licensed engineering firm should complete site plans.**

A SITE PLAN MUST CONTAIN THE FOLLOWING INFORMATION:

1. Legal description of the parcel, north arrow and scale
2. All property lines and their dimensions
3. Names of adjacent roads, location of driveways
4. Location of sloughs, tributaries, streams, rivers, wetlands, ponds, and lakes, with setbacks indicated, and including FEMA floodplain data based on most updated FIRM.
5. Location, size, shape of all buildings, existing and proposed, with elevation of lowest floor indicated.
6. Location and dimensions of existing or proposed on-site sewage systems.
7. Location of all propane tanks, fuel tanks or other liquid storage tanks whether above ground or below ground level.
8. Location and dimensions of any proposed pipeline placement(s) into floodplain/floodway.
9. Location and dimensions of any roadway development into floodplain/floodway. *(Includes initial development access roads)*
10. Location and dimensions of any bridge and/or culvert development into floodplain/floodway.
11. Location and dimensions of any storage yard or facility into the floodplain/floodway.
12. Location of any existing utilities and/or proposed utility placement and/or displacement.
13. Location, dimensions and depth of any existing or proposed fill on site.
14. A survey showing the **existing ground elevations** of at least location on the building site. **ELEVATION NOTE**: All vertical datum will reference either NGVD 29 or NAVD 88. Assumed datum will not be acceptable unless the property is located in an area where vertical datum has not been published. For those areas where vertical datum has not been established, a site plan with contours, elevations using assumed datum, high water marks and existing water levels of sloughs, rivers, lakes or streams and proposed lowest floor elevation.

Applicant

Please read print name, sign and date below:

- I certify that I am authorized to submit this application for the primary project developer.
- I certify that the information included in this application is to the best of my knowledge true and complete.
- I certify that all required Federal, State, and local permits required by law and/or ordinance for the above described development of this project have been properly attained, are current and valid, and must be presented with this application before a Doddridge County Floodplain Permit may be issued.
- I understand that if in the course of the development project additional permits become required that were not needed during the initial proposal, the primary developer must notify the Doddridge County Floodplain Manager within 48 hours of such need, and that a "Stop Work" order may be issued for all project work directly impacting the floodplain or floodway, until such time the required additional permits are acquired.
- I understand that once the floodplain permit is submitted, the application will be entered into official public record at the next regularly scheduled Doddridge County Commission meeting after the date of submittal.
- I understand that from the date of submittal of the fully completed permit application, the Doddridge County Floodplain Manager has ninety (90) days to make a determination to either grant or deny said permit application. During this approval period, the Doddridge County Floodplain Manager may, at his or her discretion, conduct a review and/or additional study of provided documentation by means of an independent engineering firm. All costs associated with said review and/or study must be reimbursed to the County before issuance of approved permit.
- I understand that during the approval period, the Doddridge County Floodplain Manager of designee may at his or her discretion conduct site visits and document conditions of proposed development pursuant to the permit application.
- I understand that once the Floodplain Permit is granted, the permit will be entered into official public record at the next scheduled Doddridge County Commission meeting after the date of issuance. Appeals to the permit may be made no later than twenty (20) days after said issuance. If a valid appeal is submitted, as determined by the Doddridge County Floodplain Manager, a "Stop Work" order will be issued for all project development directly involving the floodplain or floodway. A public hearing by the Doddridge County Appeals Board will be scheduled no less than ten (10) days after the next regularly scheduled Doddridge County Commission meeting.
- I understand that all decisions of the Doddridge County Appeals Board shall be final.
- **I understand issuance of a Floodplain Permit authorizes me to proceed with construction as proposed. A Certificate of Compliance is required upon substantial completion of the project.**
- In signing this application, the primary developer hereby grants the Doddridge County Floodplain Manager or designee the right to enter onto the above---described location to inspect the development work proposed, in progress, and/or completed.
- I understand that if I do not follow exactly the site---plan submitted and approved by this permit that a "Stop Work" order may be issued by the Wirt County Floodplain Manager and that I must stop all construction immediately until discrepancies of actual work vs. proposed work is resolved.

Applicant Signature:  Date: 6/9/17

Applicant Printed Name: Randy Kloberdanz

ALLSTAR ECOLOGY
Natural Resource Specialists

Doddridge County,
West Virginia

USGS 7.5' Quad: Smithburg

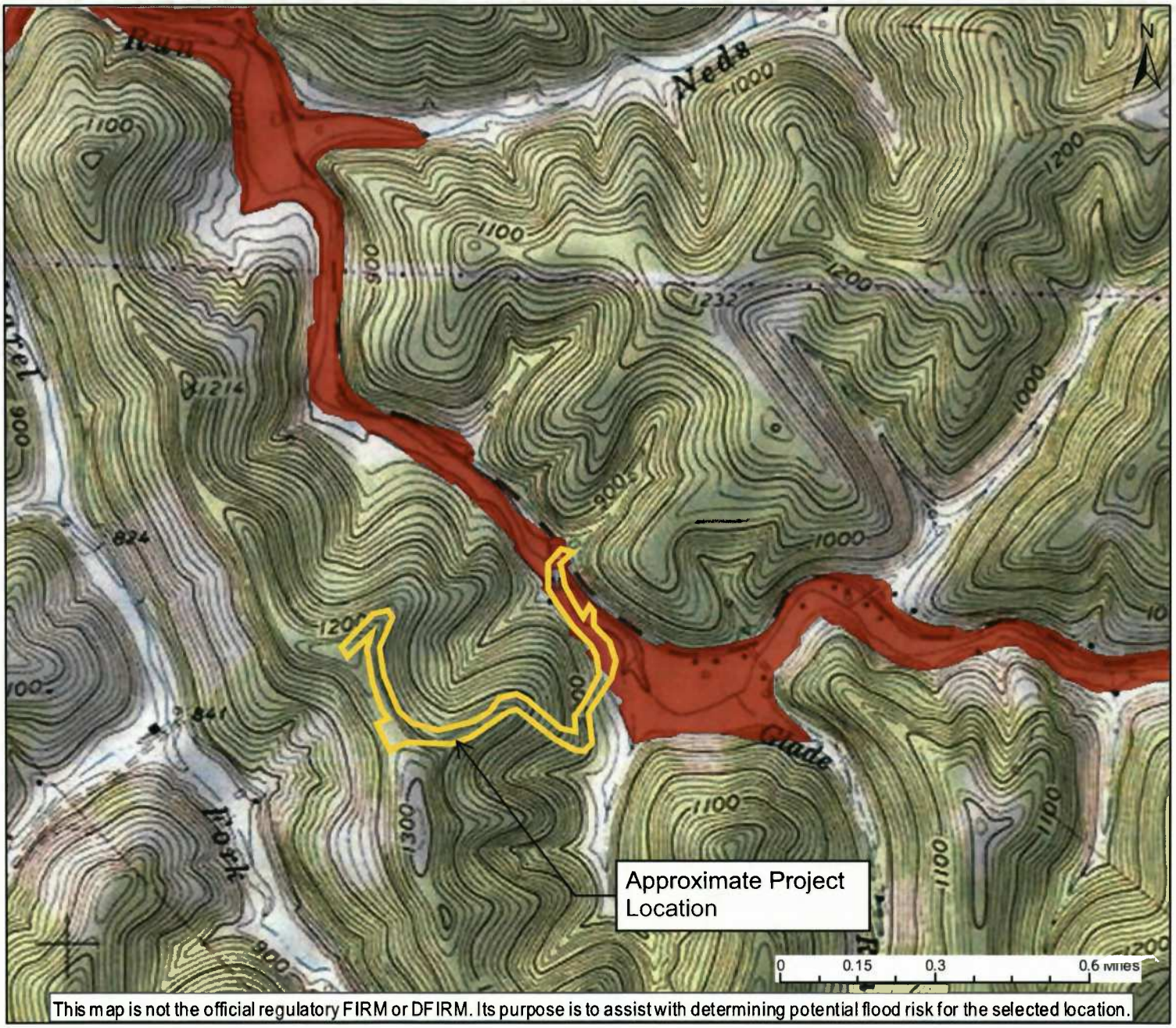
Antero Midstream LLC

Figure 1
Project Location Map
Victoria Launcher
Access Road and Bridge

Date: 2/23/2017

Version: 2

Victoria Launcher Access Road



User Notes:

Flood Hazard Zone

Flood Point of Interest

Disclaimer:

The online map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. To obtain more detailed information in areas where Base Flood Elevations have been determined, users are encouraged to consult the latest Flood Profile data contained in the official flood insurance study. These studies are available online at www.msc.fema.gov.

WV Flood Tool (http://www.MapWV.gov/flood) is supported by FEMA, WV NFIP Office, and WV GIS Technical Center.

Map created on March 22, 2017

Flood Hazard Area:

Flood Hazard Area: Location is WITHIN the FEMA 100-year floodplain.

FEMA Issued Flood Map:	54017C0130C
Watershed (HUC8):	Little Musringum-Middle Island (5
Elevation:	About 799 ft
Location (long, lat):	(80.694279 W,39.341439 N)
Location (UTM 17N):	(526346, 4354711)
Contacts:	Doddridge
CRS Information:	N/A
Parcel Number:	No Parcel

JOINS PANEL 0135

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0130C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 130 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0130	C

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
54017C0130C

MAP REVISED
OCTOBER 4, 2011

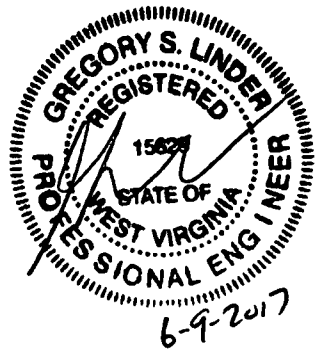
Federal Emergency Management Agency

HYDRAULIC STUDY

Victoria Launcher Access Road and Bridge
Doddridge County, West Virginia

Prepared For:

Antero Midstream, LLC
Bridgeport, West Virginia



June 2017

Civil & Environmental
Consultants, Inc.

TABLE OF CONTENTS

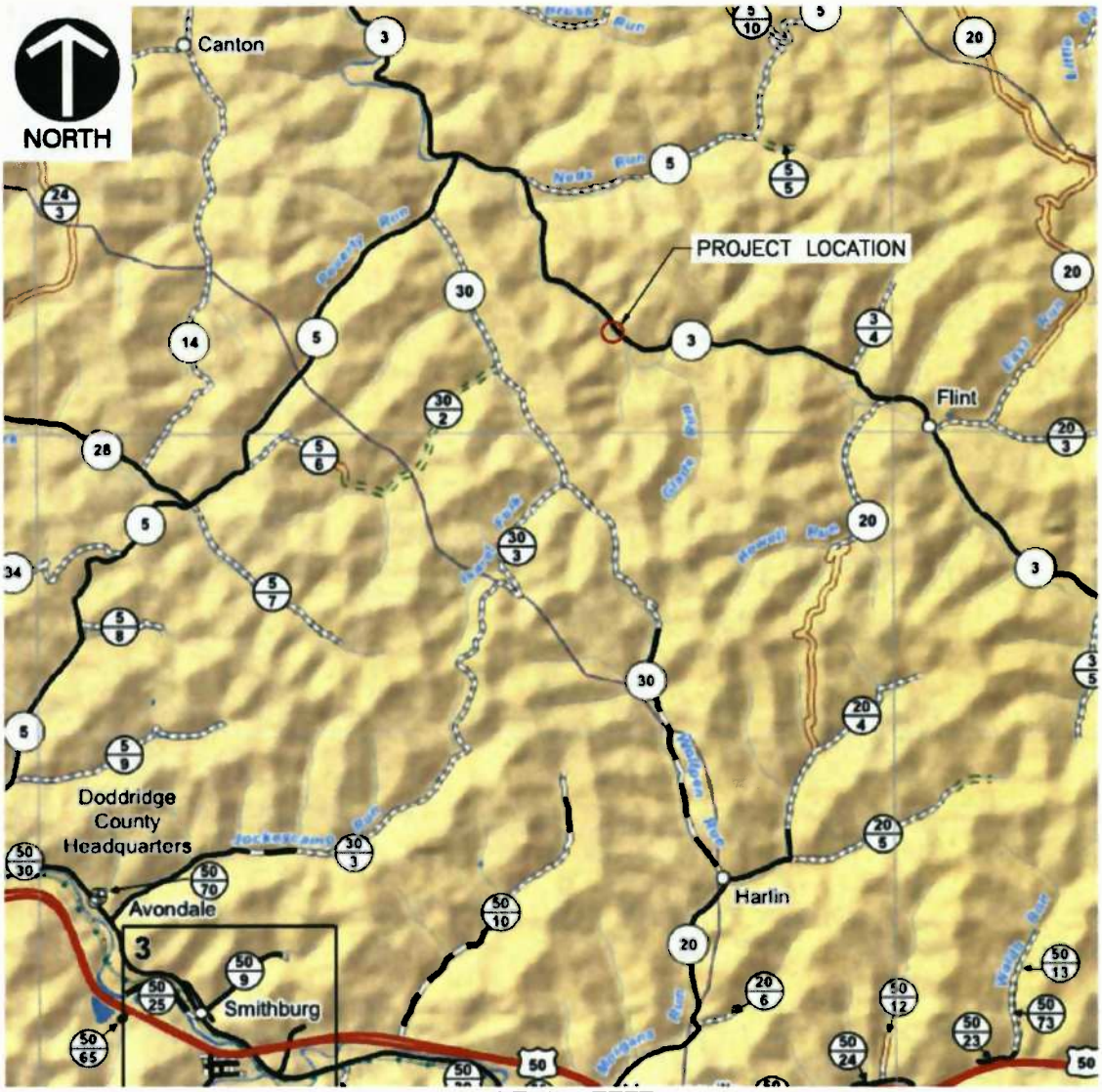
I. PROJECT DESCRIPTION

A. Narrative

The project site is located off of County Route 3 (Big Flint Road), approximately 4 miles northeast of Smithburg, WV. This hydraulic study is for the proposed Victoria Launcher Access Road and Bridge for Antero Midstream, LLC. The proposed project involves the construction of a bridge over Flint Run, which is a tributary of McElroy Creek in Doddridge County, WV. According to the Federal Emergency Management Agency (FEMA), the site is located within the Flint Run Zone A Flood Hazard Area as designated on the Doddridge County Flood Insurance Rate Map (FIRM) Panel 54017C0130C with a map revised date of October 4, 2011. The purpose of this hydraulic study is not to investigate the existence or severity of flood hazards in the study area. The purpose of this hydraulic study is to determine the potential for adverse effects caused by the construction of the bridge and the potential impacts to the water levels and floodplain of Flint Run.

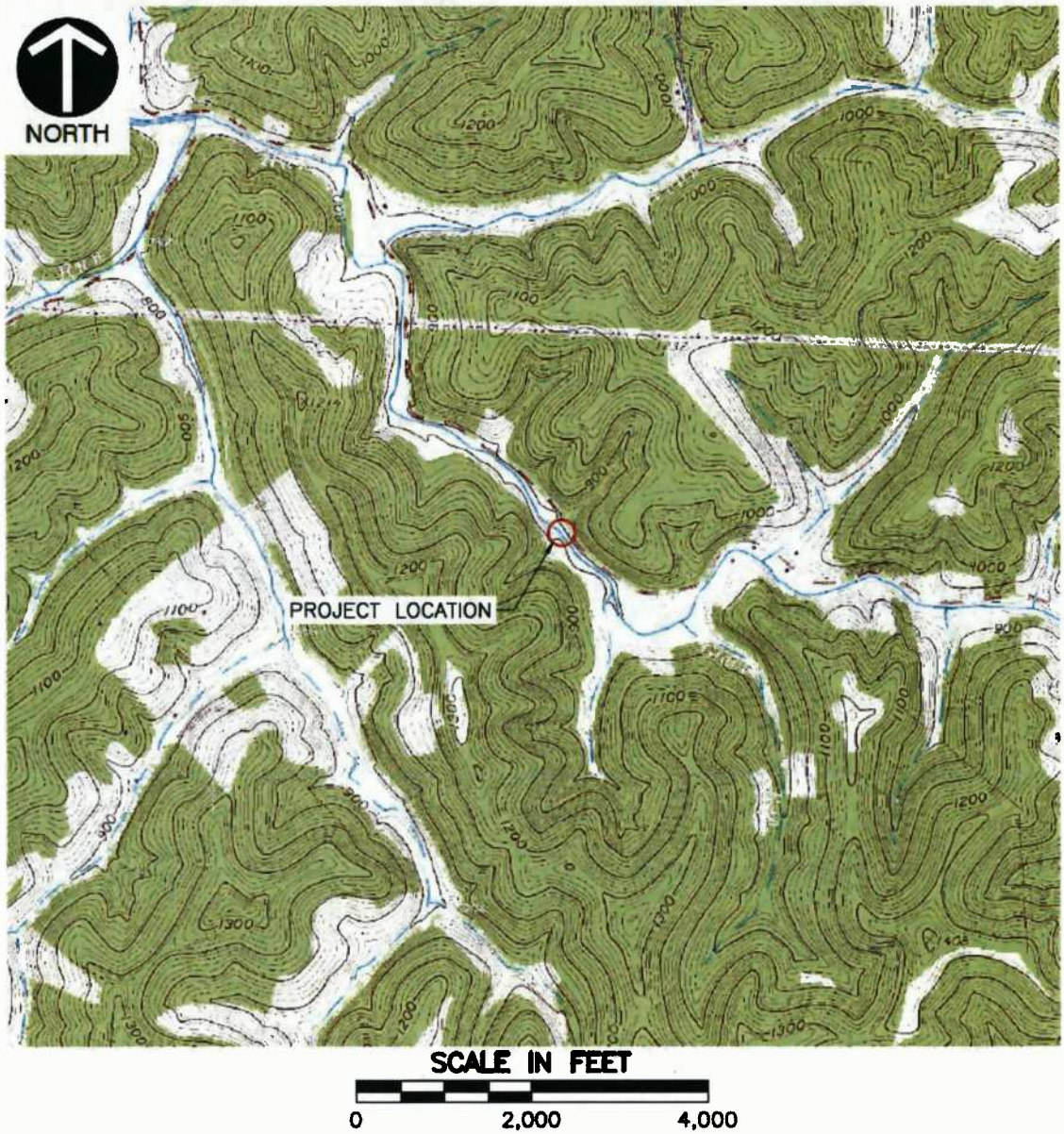
B. Location Maps

1. County Map



Scale: 1 Inch = 5,000 Feet

2. USGS Topographic Map



USGS $7^1/_2$ Minute Topographic Map – Smithburg Quadrangle
Scale: 1 Inch = 2000 Feet

C. Field Observations

1. High Water Marks

There are no established landmarks in the project vicinity to determine a historic high water mark for Flint Run.

2. Verification of Manning's "n" Values

Manning's roughness coefficients were determined based on aerial images of the site. From Table 3.1 of the HEC-RAS Hydraulic Reference Manual:

Main Channel:
Clean, winding, some pools and shoals: 'n' value 0.040

Floodplain:
Pasture, no brush, short grass: 'n' value 0.030
Pasture, no brush, high grass: 'n' value 0.035
Light brush and trees, in summer: 'n' value 0.060

The Manning's 'n' values assigned to the left overbank (LOB), channel, and right overbank (ROB) for each cross-section are shown in the following table.

Cross-Section	Friction (n/K)	LOB	Channel	ROB
2015.20	n	0.035	0.04	0.03
1821.84	n	0.035	0.04	0.03
1703.34	n	0.035	0.04	0.06
1530.05	n	0.035	0.04	0.06
1400.17	n	0.035	0.04	0.06
1322.31	n	0.035	0.04	0.06
1193.85	n	0.035	0.04	0.06
1104.54	n	0.035	0.04	0.06
983.32	n	0.035	0.04	0.06
919.83	n	0.035	0.04	0.06
887.16	n	0.035	0.04	0.06
851.42	n	0.035	0.04	0.06
797.37	n	0.035	0.04	0.035
750.66	n	0.035	0.04	0.035
698.14	n	0.035	0.04	0.035
604.67	n	0.035	0.04	0.035
541.57	n	0.06	0.04	0.035
441.52	n	0.06	0.04	0.035
329.21	n	0.06	0.04	0.035

D. Pictures

Example Bridge (Similar to Proposed Bridge)

Approximate Station 1400.17 (Looking Southwest)

Proposed Crossing

Approximate Station 441.52 (Looking West)

II. SUMMARY OF RESULTS

A. Analyses Performed:

Two analyses were performed in this study: an existing conditions analysis and a proposed conditions analysis. Cross-sections of Flint Run were field surveyed at specified locations within the study area to provide an accurate representation of the stream channel and floodplains. In the proposed conditions model, the proposed bridge was modeled using a span of 50 feet, a width of 14 feet, and a bridge deck height of 3 feet. The top of the bridge deck was set at an elevation of 800.75 feet. By comparing the results from the two analyses, the effects of the proposed bridge on the 100-year water levels of Flint Run were determined, as shown in the following table.

B. Water Surface Elevation Table, Including Existing and Proposed Analyses

100-Year Rainfall Event (2,653 cfs)			
Cross-Section	**Existing (ft)**	**Proposed (ft)**	**Difference (ft)**
2015.20	800.69	800.87	0.18
1821.84	799.88	800.21	0.33
1703.34	799.93	800.26	0.33
1530.05	799.41	799.91	0.50
1400.17	799.29	799.83	0.54
1322.31	799.18	799.76	0.58
1193.85	798.94	799.61	0.67
1104.54	798.95	799.62	0.67
983.32	798.51	799.34	0.83
919.83	798.44	799.31	0.87
887.16	798.25	799.19	0.94
851.42	797.82	798.48	0.66
Bridge			
797.37	797.39	797.28	-0.11
750.66	797.49	797.49	0.00
698.14	797.47	797.47	0.00
604.67	797.45	797.45	0.00
541.57	797.22	797.22	0.00
441.52	796.83	796.83	0.00
329.21	796.62	796.62	0.00

See Appendix D – HEC-RAS Profile Summary Tables.

C. Conclusions

The results of the hydraulic study indicate that the construction will increase the base flood elevation of Flint Run by 0.94 feet at hydraulic section 887.16. There are a number of structures adjacent to and upstream of hydraulic section 2015.20 that are located within the Flint Run Zone A Flood Hazard Area as designated on the Doddridge County Flood Insurance Rate Map (FIRM) Panel 54017C0130C with a map revised date of October 4, 2011 (See Appendix G). CEC performed a first floor and lowest adjacent grade survey for each of the structures. Based on the survey and hydraulic analysis all of the first floor elevations of the residences are situated well above the 100-year proposed water surface elevation of 800.87 feet. All of the outbuildings excluding Garage 1, Shed 1, and Shed 2 are situated above the 100-year proposed water surface elevation of 800.87 feet. Based on the hydraulic analysis Garage 1, Shed 1, and Shed 2 are expected to experience a 0.18 feet increase in the base flood elevation.

D. Signature Block, Consultant, or In-House Designers

1. Preparer

   Andrew P. Darnell, E.I.T. (West Virginia Engineer Intern No. 9156)

2. Reviewer

   Gregory S. Linder, P.E. (West Virginia Registered Professional Engineer No. 15629)

3. Date

   April 17, 2017

4. Engineer's Seal on Final Report

   Gregory S. Linder, P.E. (West Virginia Registered Professional Engineer No. 15629)

III. AVAILABLE DATA

A. Flood Insurance Study

The initial countywide Flood Insurance Study (FIS) for Doddridge County had an effective date of March 18, 1991. The final Consultation and Coordination Officer's meeting for the countywide revision to the FIS was held on April 29, 2010. The revised countywide FIS has an effective date of October 4, 2011. Flint Run was included among the areas studied by approximate methods, with no Base Flood Elevations (BFEs) or flood depths listed.

See Appendix B – FEMA FIRMette.

B. Existing Hydrologic Data

No detailed hydrologic evaluation has been performed within the boundaries of this project site.

C. Existing Hydraulic Model from FEMA, USACE, NRCS, others

There is no existing hydraulic model for this project site.

IV. HYDROLOGY

A. Design Discharge Based on USGS Regression Equation

Since no detailed hydrology has been performed within the boundaries of this project, the design discharge of the 2-year, 10-year, 25-year, and 100-year storms were calculated using the USGS regression equations for the Western Plateaus Region of West Virginia. The hydraulic analysis was performed for the 2-year, 10-year, 25-year, and 100-year discharges. The 100-year flood has been adopted by FEMA as the base flood for floodplain management purposes.

See Appendix C – Design Discharge Calculations.

Frequency	Discharge
2-year	700 cfs
10-year	1,474 cfs
25-year	1,924 cfs
100-year	2,653 cfs

B. Boundary Conditions

The boundary condition applicable to this hydraulic analysis is the Normal Depth slope at Cross-Section 329.21, which is approximately 0.0023 ft/ft.

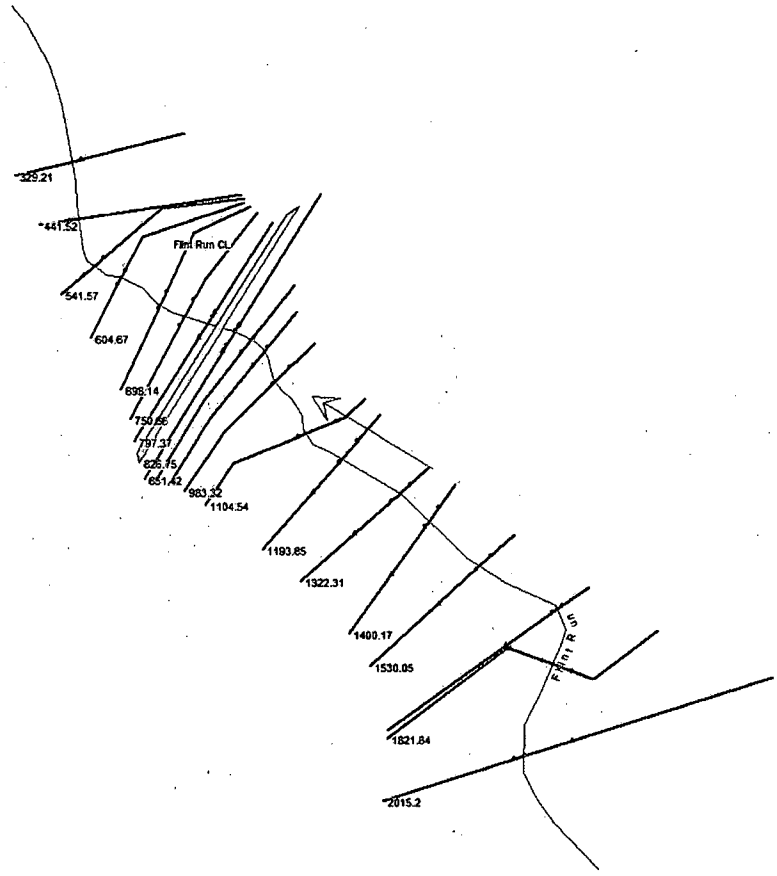
V. HYDRAULIC MODELING

A. Source of Model

HEC-RAS Version 5.0.3 was used to perform a hydraulic analysis to determine if adverse effects will be caused by the Victoria Launcher Access Road and Bridge relative to existing conditions, as well as the potential impacts to the water levels and floodplain of Flint Run.

HEC-RAS 5.0.3 is the most current version of the river analysis software available from the Hydraulic Engineering Center of the U.S. Army Corps of Engineers.

B. Site Map with Cross-Sections



C. Explanation of Data and Methods

1. Manning's Values

   Manning's roughness coefficients were determined based on aerial images of the project site. See Section I.C.2. for a detailed description of the Manning's values used.

2. Bridge Modeling Approach

   The Bridge Modeling Approach used was Energy (Standard Step).

3. Ineffective Flow Areas

   Ineffective flow areas were incorporated to account for areas in the cross-sectional geometry where ponded water will not be actively conveyed downstream.

4. Any Unusual Circumstances

There are no unusual circumstances specified in correlation with the hydraulic analysis of this project.

5. Table of HEC-RAS Plan Files

Filename	Description
171244 Existing Analysis	Existing Conditions Analysis
171244 Proposed Analysis	Proposed Conditions Analysis

See Appendix F - HEC-RAS Output Files

D. HEC-RAS Generated Tables

1. Profile Summary with Existing and Proposed Conditions

See Appendix D – HEC-RAS Profile Summary Tables

2. Detailed Output Tables

See Appendix F – HEC-RAS Output Files

APPENDIX A

Site Plan

ALLSTAR ECOLOGY
Natural Resource Specialists

Doddridge County, West Virginia

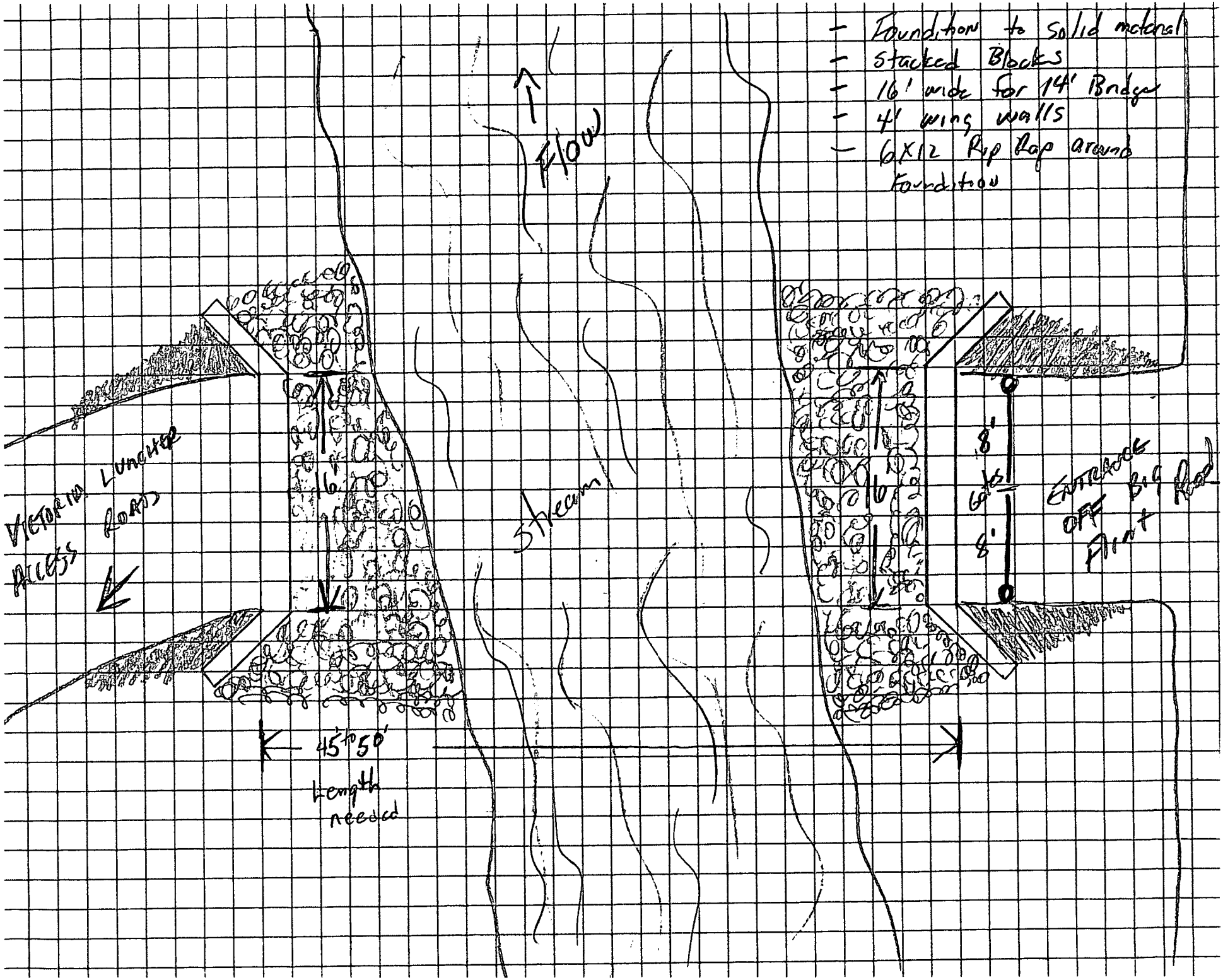
USGS 7.5' Quad: Smithburg

Antero Midstream LLC

Figure 1
Project Location Map
Victoria Launcher
Access Road and Bridge

Date: 2/23/2017

Version: 2


- Foundation to solid material
- Stacked Blocks
- 16' wide for 14' Bridge
- 4' wing walls
- 6x12 Rip Rap around foundation
Flow
Stream
Victoria Lumber Access Road
16'
45' to 50'
Length needed
8'
6'
8'
Entrance off Big Red Point

APPENDIX B

FEMA FIRMette

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0130C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 130 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0130	C

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
54017C0130C

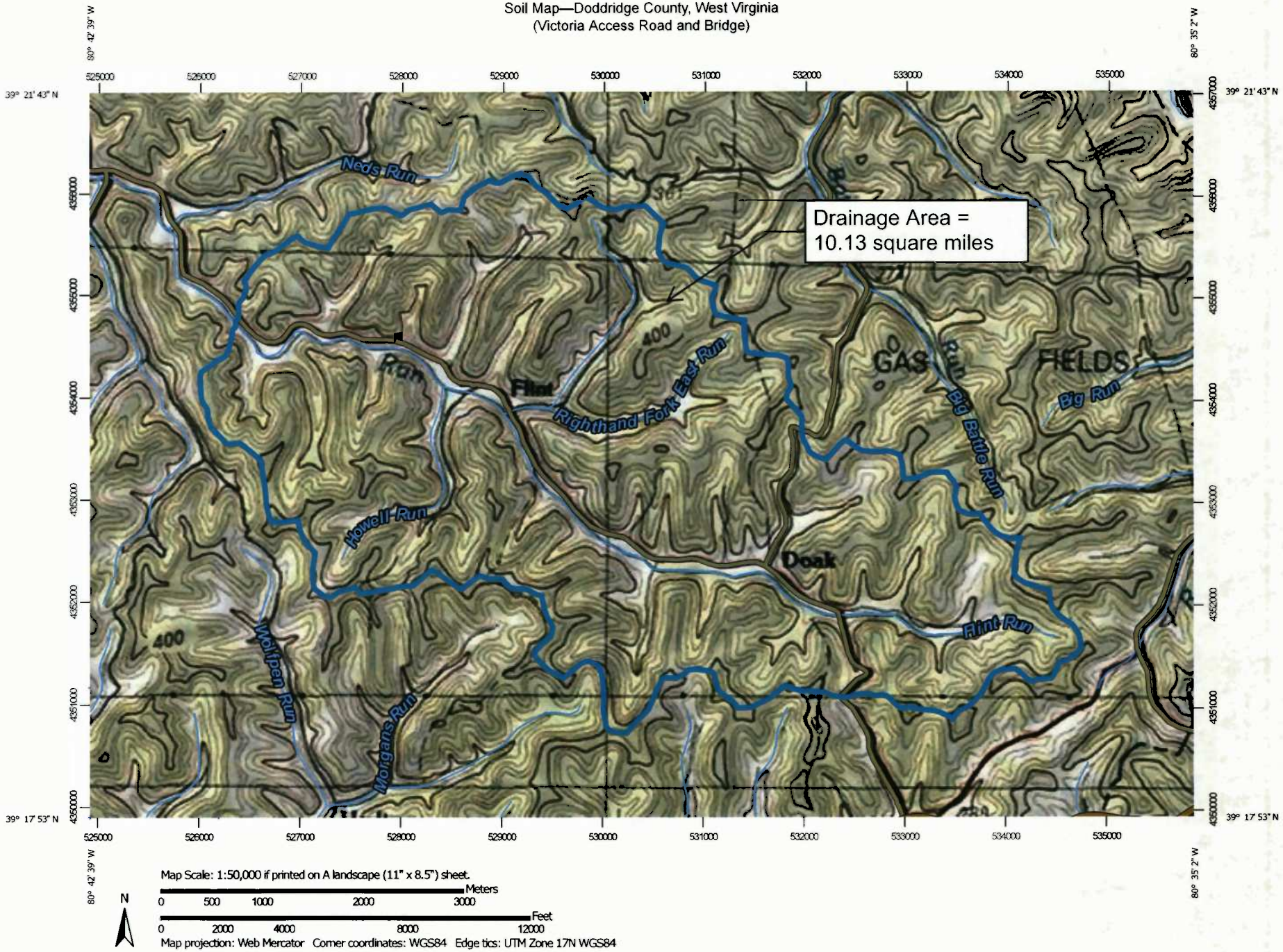
MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

APPENDIX C

Design Discharge Calculations

Soil Map—Doddridge County, West Virginia
(Victoria Access Road and Bridge)



Map Scale: 1:50,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Civil & Environmental Consultants, Inc.

PROJECT Antero - Victoria AR Bridge PROJECT NO. 171-244

PAGE 1 OF 1

PREPARED BY APD DATE 4/12/17 CHECKED BY _____ DATE _____

Drainage Area = 6,485 acres = 10.13 square miles

USGS Regression Equations - Western Plateaus Region

2-year: $Q(2) = 129 A^{0.730} = (129)(10.13)^{0.730} = 700$ cfs

10-year: $Q(10) = 292 A^{0.699} = (292)(10.13)^{0.699} = 1,474$ cfs

25-year: $Q(25) = 391 A^{0.688} = (391)(10.13)^{0.688} = 1,924$ cfs

100-year: $Q(100) = 557 A^{0.674} = (557)(10.13)^{0.674} = 2,653$ cfs

APPENDIX D

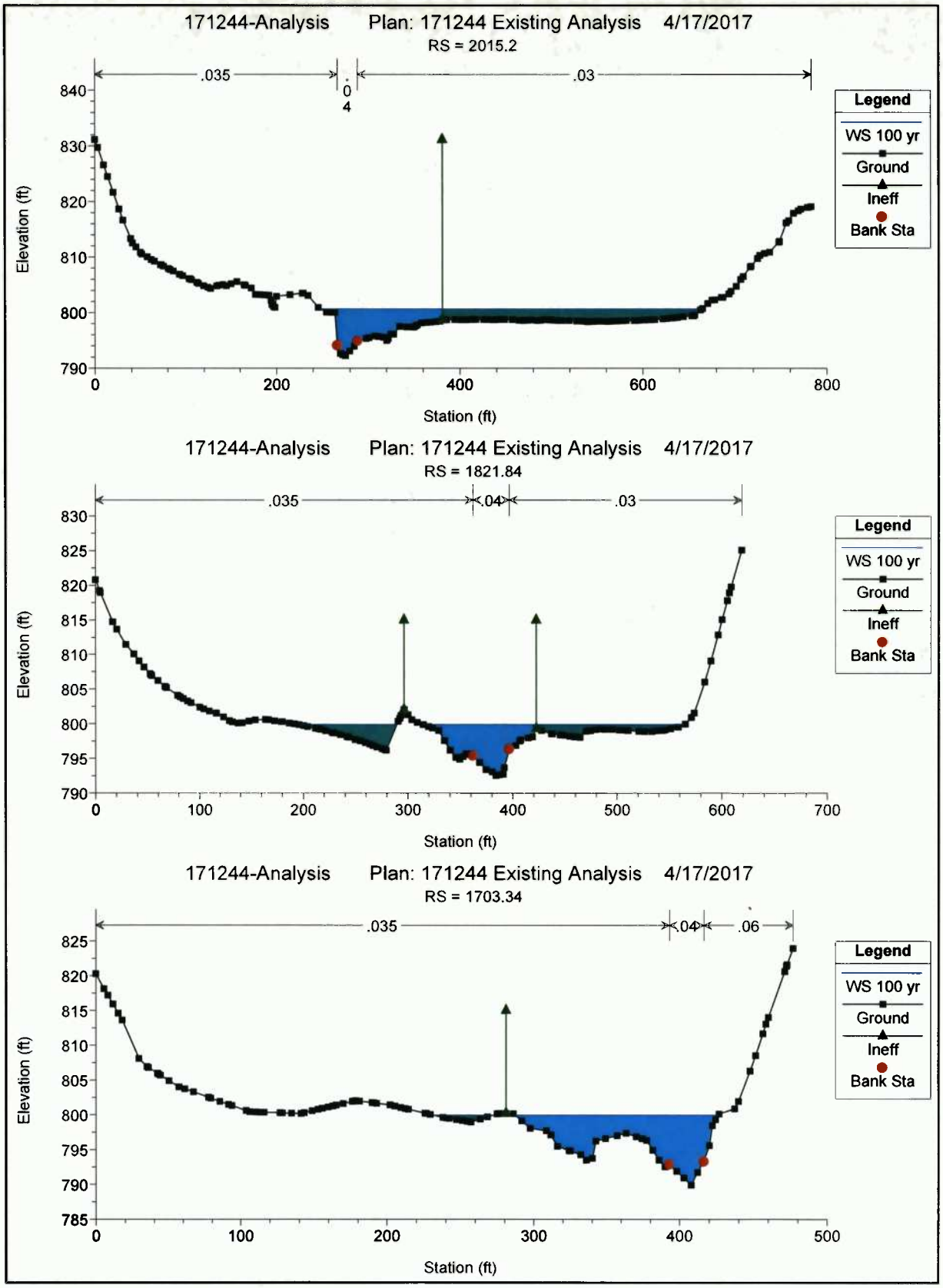
HEC-RAS Profile Summary Tables

HEC-RAS River: Flint Run Reach: Flint Run CL Profile: 100 yr

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Flint Run CL	2015.2	100 yr	Existing	2653.00	792.25	800.69		801.09	0.001548	5.50	541.90	416.41	0.35
Flint Run CL	2015.2	100 yr	Proposed	2653.00	792.25	800.87		801.23	0.001365	5.24	565.17	419.40	0.33
Flint Run CL	1821.84	100 yr	Existing	2653.00	792.53	799.88	798.65	800.63	0.004090	7.79	400.62	343.76	0.55
Flint Run CL	1821.84	100 yr	Proposed	2653.00	792.53	800.21	798.65	800.85	0.003231	7.17	438.15	378.41	0.50
Flint Run CL	1703.34	100 yr	Existing	2653.00	789.91	799.93	797.65	800.26	0.001378	5.56	626.76	178.76	0.34
Flint Run CL	1703.34	100 yr	Proposed	2653.00	789.91	800.26	797.65	800.54	0.001160	5.24	672.88	213.49	0.31
Flint Run CL	1530.05	100 yr	Existing	2653.00	790.23	799.41	798.24	799.93	0.002384	6.54	517.74	251.55	0.42
Flint Run CL	1530.05	100 yr	Proposed	2653.00	790.23	799.91	798.24	800.29	0.001653	5.69	589.84	257.18	0.36
Flint Run CL	1400.17	100 yr	Existing	2653.00	791.32	799.29	797.75	799.61	0.001756	5.16	614.77	261.42	0.35
Flint Run CL	1400.17	100 yr	Proposed	2653.00	791.32	799.83	797.75	800.07	0.001162	4.43	702.96	268.13	0.29
Flint Run CL	1322.31	100 yr	Existing	2653.00	791.24	799.18	797.24	799.47	0.001478	4.82	632.94	264.90	0.33
Flint Run CL	1322.31	100 yr	Proposed	2653.00	791.24	799.76	797.24	799.98	0.000992	4.18	722.52	276.00	0.27
Flint Run CL	1193.85	100 yr	Existing	2653.00	791.41	798.94	797.04	799.27	0.001662	5.06	614.34	250.68	0.35
Flint Run CL	1193.85	100 yr	Proposed	2653.00	791.41	799.61	797.04	799.85	0.001060	4.31	711.67	265.05	0.28
Flint Run CL	1104.54	100 yr	Existing	2653.00	790.77	798.95		799.12	0.000698	3.57	850.28	172.41	0.23
Flint Run CL	1104.54	100 yr	Proposed	2653.00	790.77	799.62		799.75	0.000482	3.15	967.34	178.55	0.20
Flint Run CL	983.32	100 yr	Existing	2653.00	790.66	798.51		798.96	0.002180	5.93	523.01	124.75	0.40
Flint Run CL	983.32	100 yr	Proposed	2653.00	790.66	799.34		799.65	0.001291	4.92	629.85	132.80	0.31
Flint Run CL	919.83	100 yr	Existing	2653.00	789.47	798.44		798.82	0.001751	5.53	589.30	145.93	0.36
Flint Run CL	919.83	100 yr	Proposed	2653.00	789.47	799.31		799.56	0.001010	4.53	720.00	154.45	0.28
Flint Run CL	887.16	100 yr	Existing	2653.00	789.31	798.25		798.74	0.002301	6.38	510.75	123.37	0.41
Flint Run CL	887.16	100 yr	Proposed	2653.00	789.31	799.19		799.52	0.001329	5.24	635.29	139.77	0.32
Flint Run CL	851.42	100 yr	Existing	2653.00	789.77	797.82		798.61	0.003588	8.01	445.18	131.10	0.53
Flint Run CL	851.42	100 yr	Proposed	2653.00	789.77	798.48	796.30	799.39	0.003146	7.96	366.58	145.54	0.50
Flint Run CL	797.37	100 yr	Existing	2653.00	790.86	797.39		798.36	0.005447	8.42	364.35	108.67	0.63
Flint Run CL	797.37	100 yr	Proposed	2653.00	790.86	797.28	796.52	798.68	0.007377	9.67	283.20	106.38	0.73
Flint Run CL	750.66	100 yr	Existing	2653.00	790.08	797.49		798.05	0.003088	6.44	473.95	131.04	0.47
Flint Run CL	750.66	100 yr	Proposed	2653.00	790.08	797.49		798.05	0.003088	6.44	473.95	131.04	0.47
Flint Run CL	698.14	100 yr	Existing	2653.00	788.85	797.47		797.86	0.002135	5.81	582.39	176.29	0.38
Flint Run CL	698.14	100 yr	Proposed	2653.00	788.85	797.47		797.86	0.002135	5.81	582.39	176.29	0.38
Flint Run CL	604.67	100 yr	Existing	2653.00	788.44	797.45		797.68	0.001045	4.41	746.04	186.51	0.28
Flint Run CL	604.67	100 yr	Proposed	2653.00	788.44	797.45		797.68	0.001045	4.41	746.04	186.51	0.28
Flint Run CL	541.57	100 yr	Existing	2653.00	788.27	797.22		797.58	0.001661	5.42	660.65	214.64	0.36
Flint Run CL	541.57	100 yr	Proposed	2653.00	788.27	797.22		797.58	0.001661	5.42	660.65	214.64	0.36
Flint Run CL	441.52	100 yr	Existing	2653.00	788.58	796.83		797.36	0.002870	6.57	525.13	182.12	0.46
Flint Run CL	441.52	100 yr	Proposed	2653.00	788.58	796.83		797.36	0.002870	6.57	525.13	182.12	0.46
Flint Run CL	329.21	100 yr	Existing	2653.00	788.31	796.62	795.23	797.03	0.002300	5.84	589.88	184.73	0.41
Flint Run CL	329.21	100 yr	Proposed	2653.00	788.31	796.62	795.23	797.03	0.002300	5.84	589.88	184.73	0.41

APPENDIX E

HEC-RAS Cross-Section Reports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Ineff
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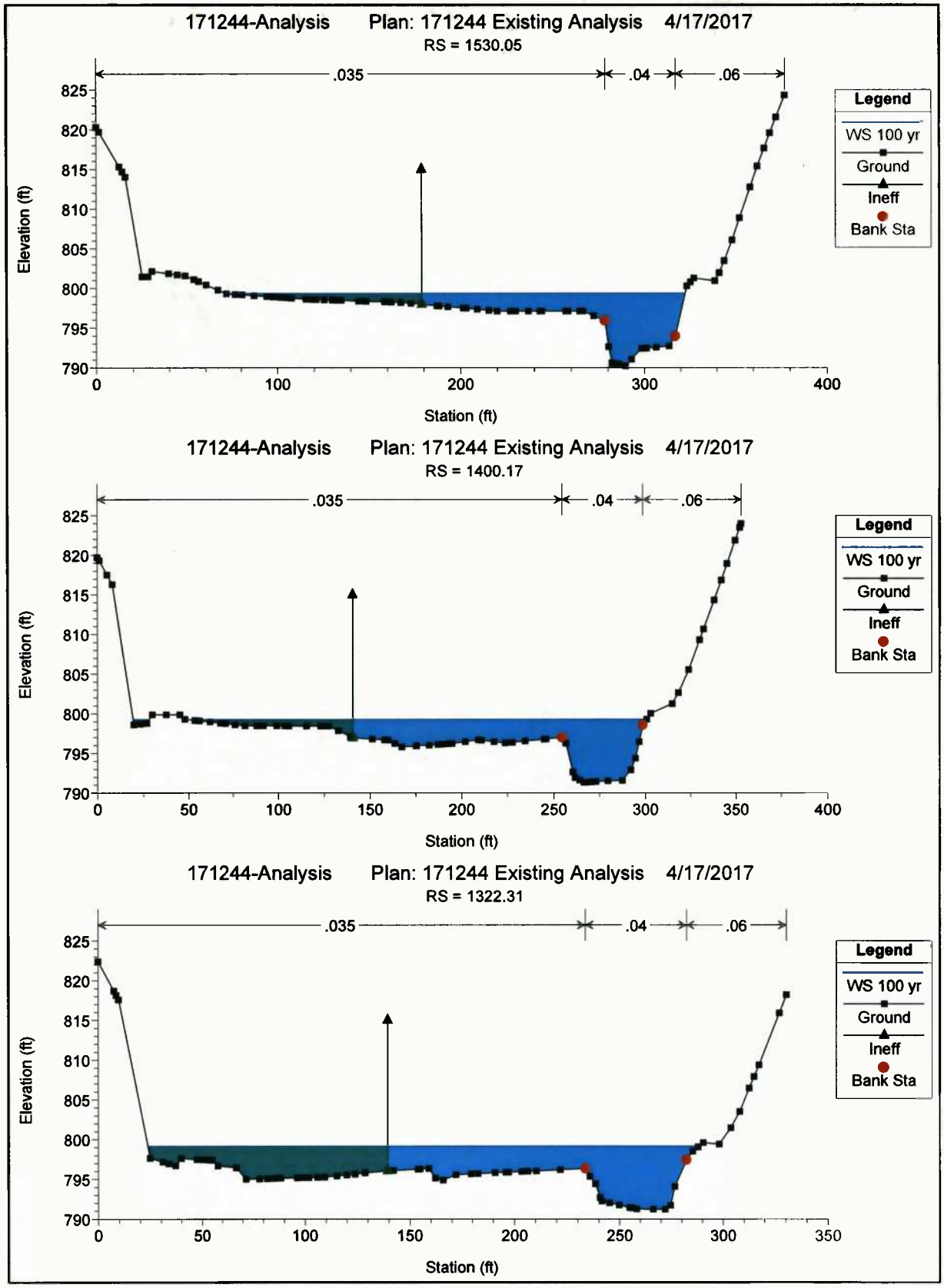
Station (ft)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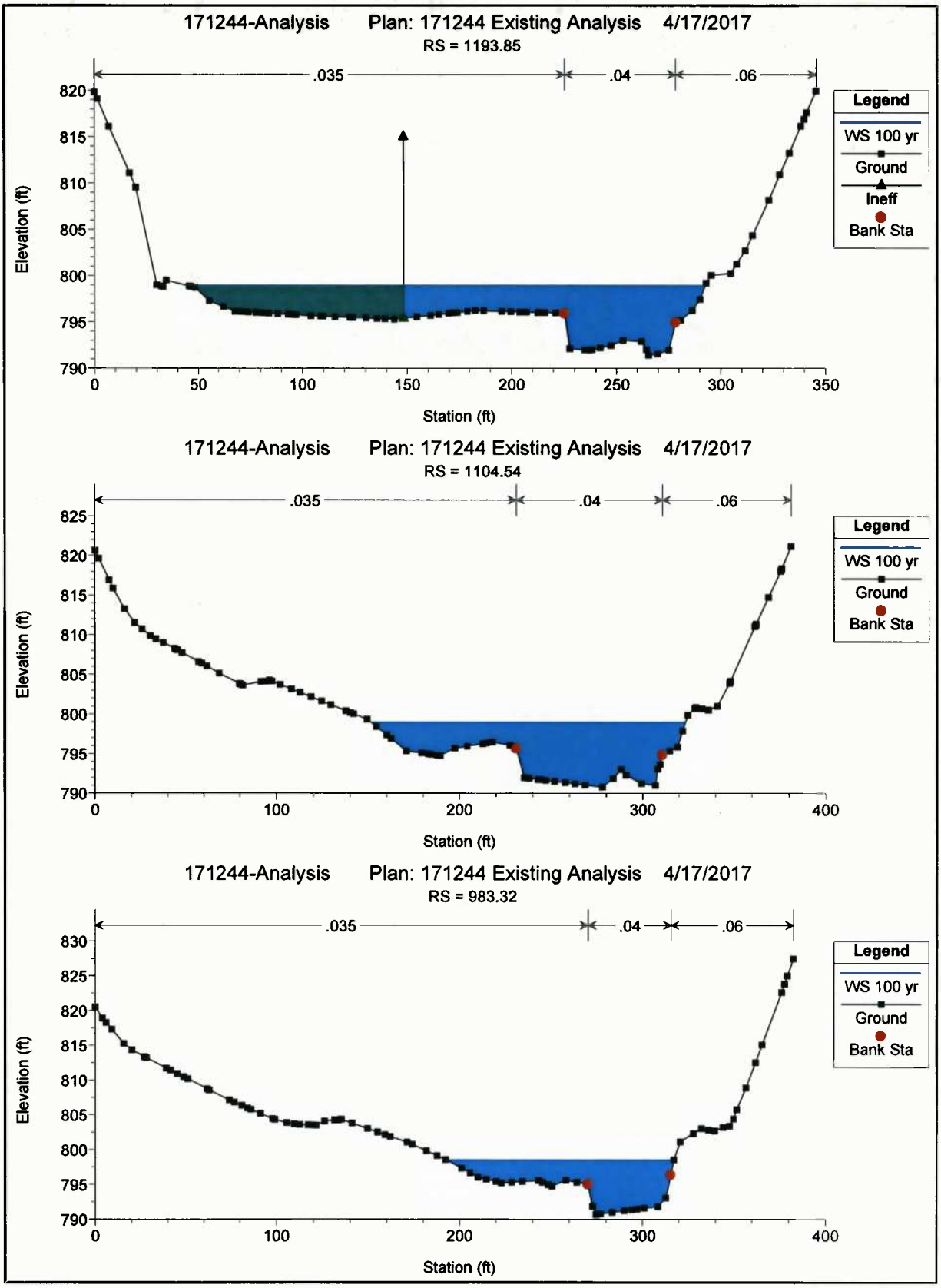
Station (ft)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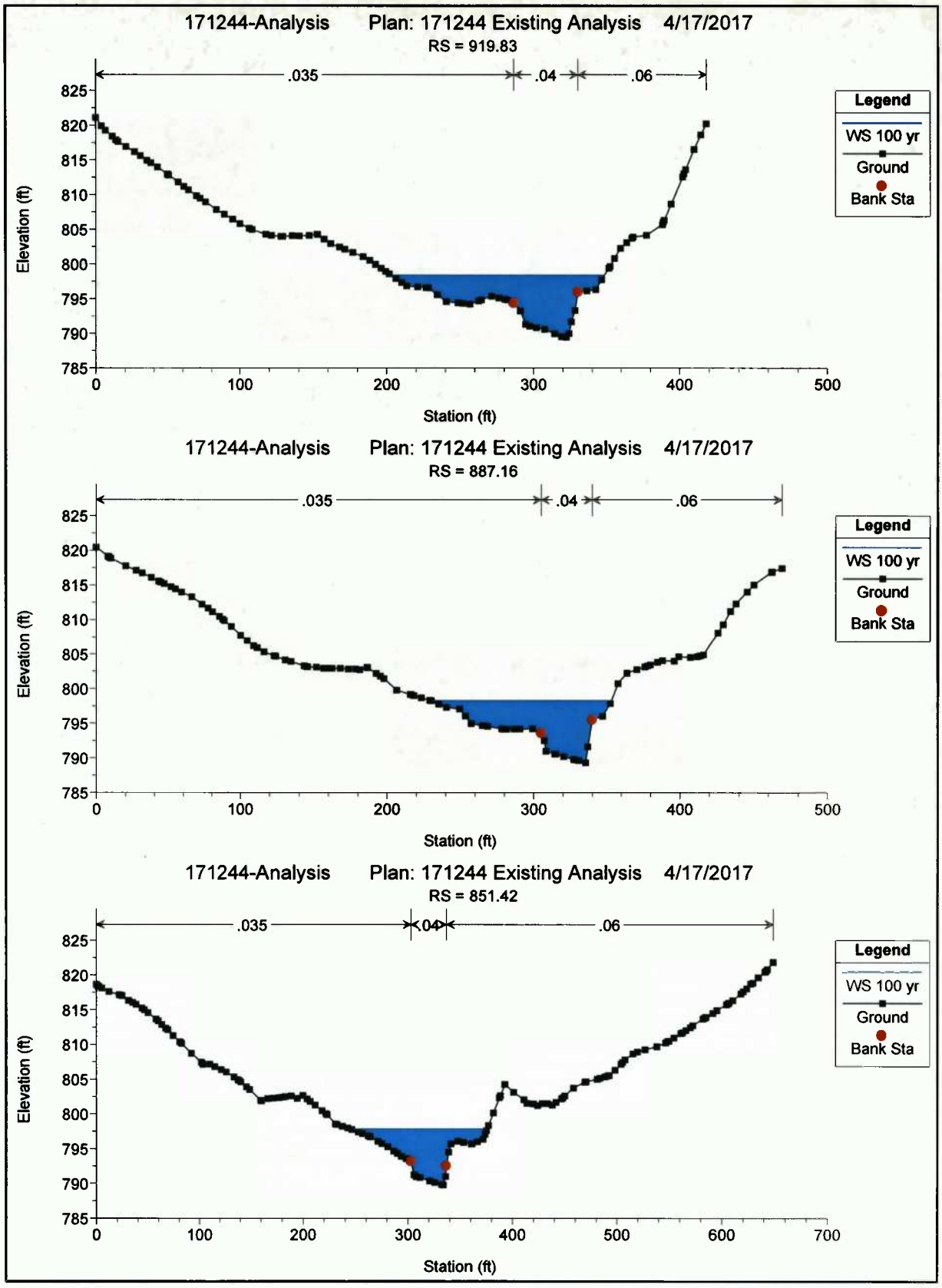
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Station (ft)
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Bank Sta
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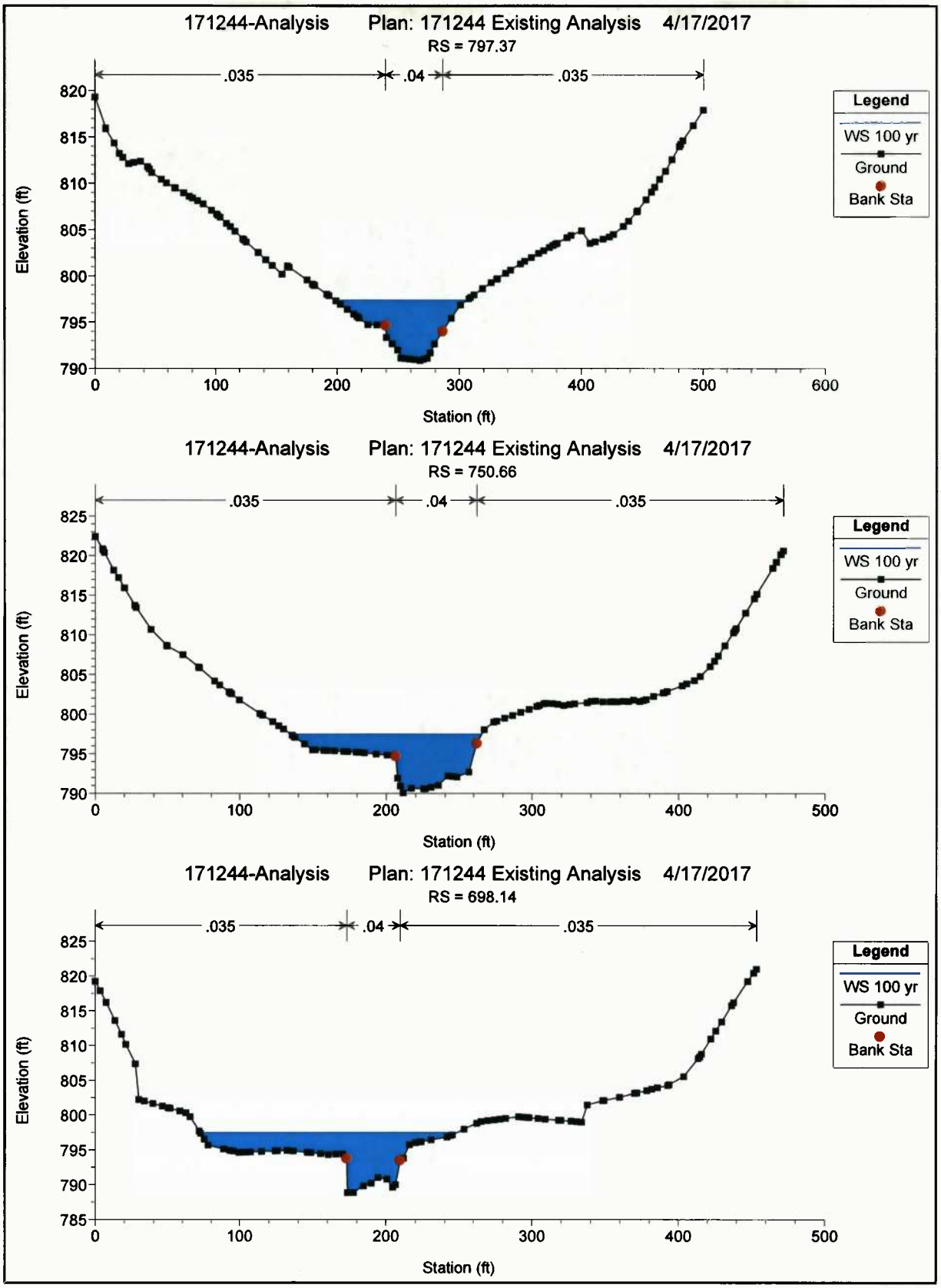
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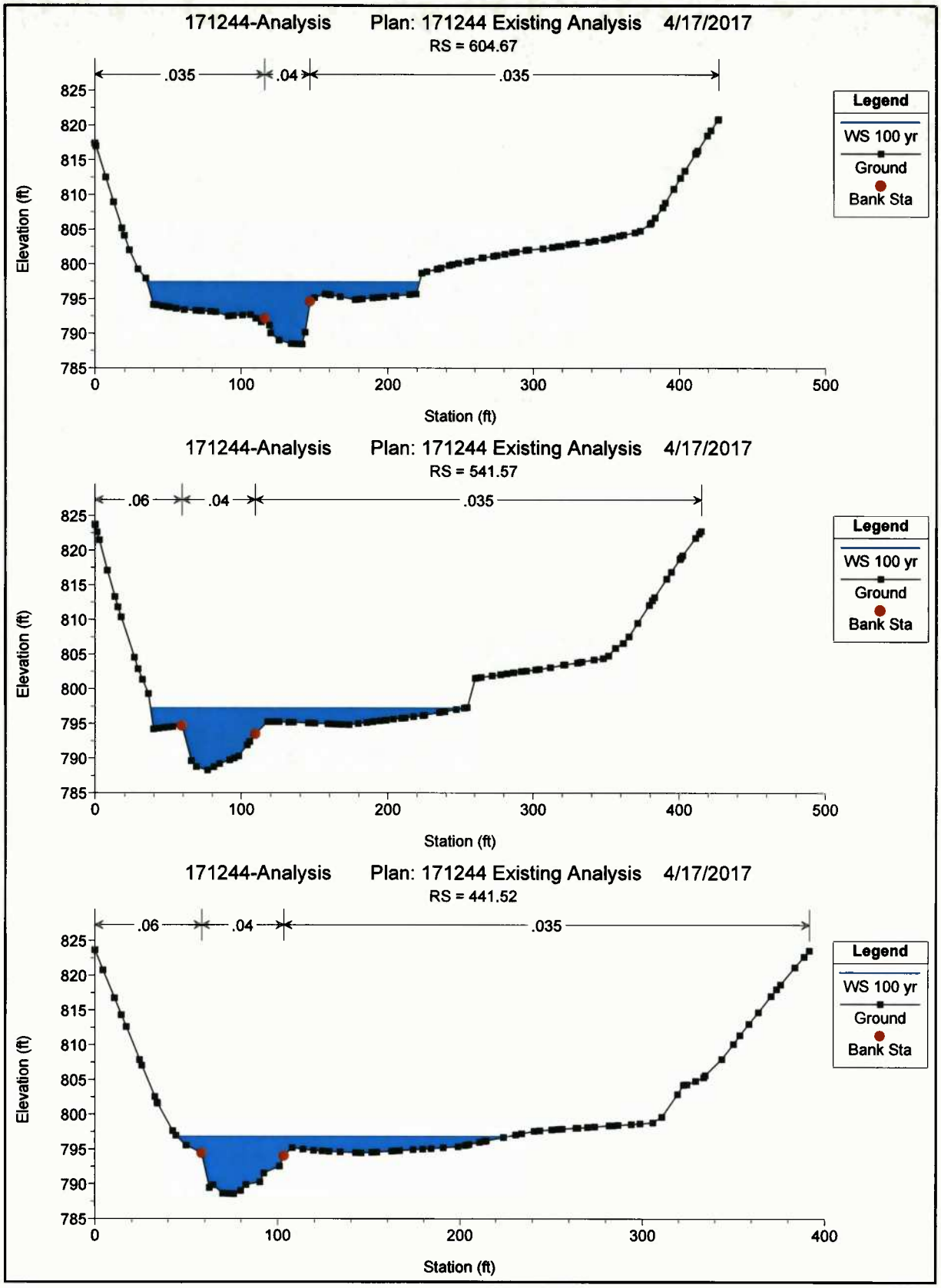
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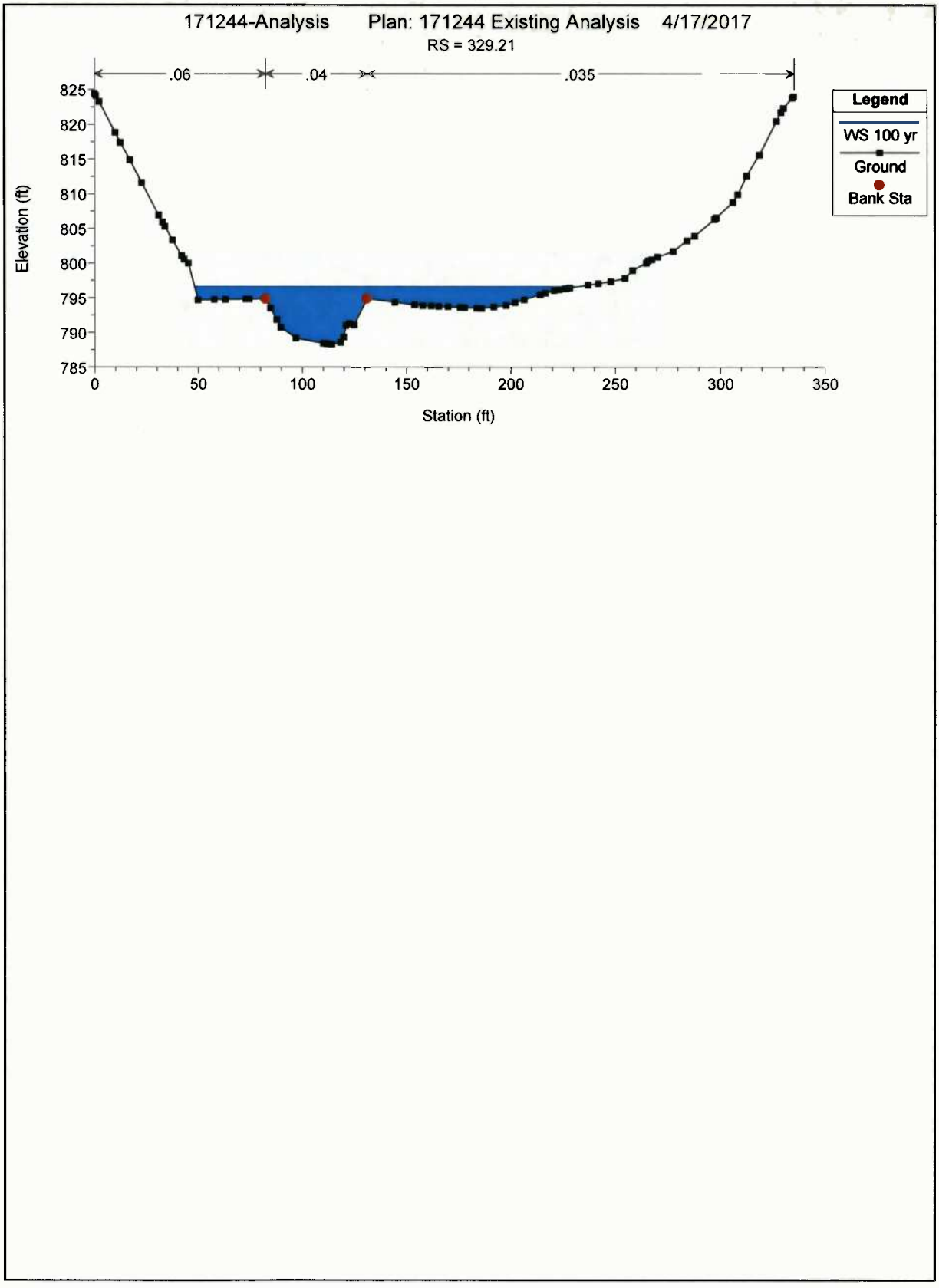
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4/17/2017
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Bank Sta
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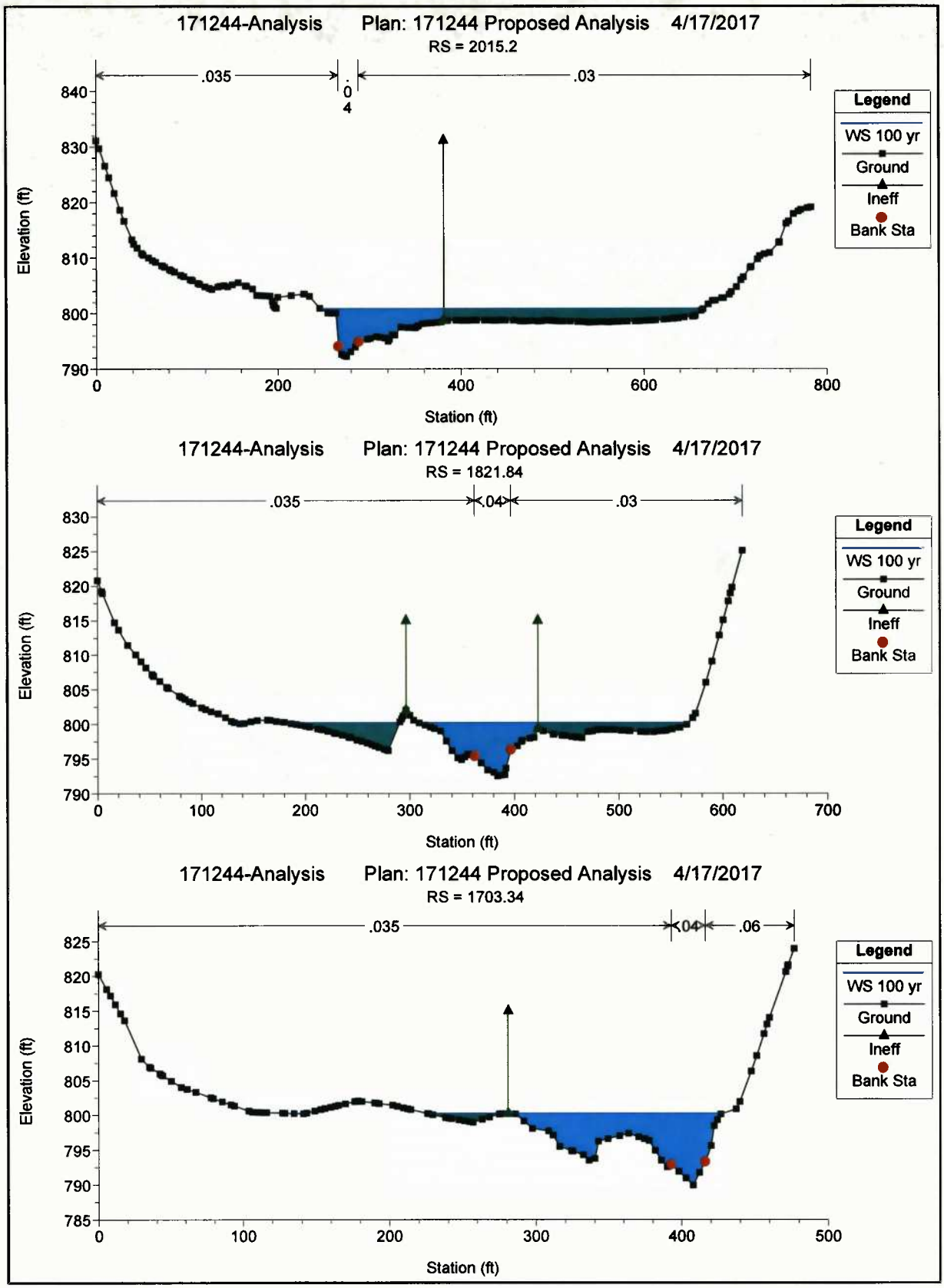
250
300
350
Station (ft)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Ineff
Bank Sta
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Station (ft)
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Legend
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Ground
Ineff
Bank Sta
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Station (ft)
171244-Analysis Plan: 171244 Proposed Analysis 4/17/2017
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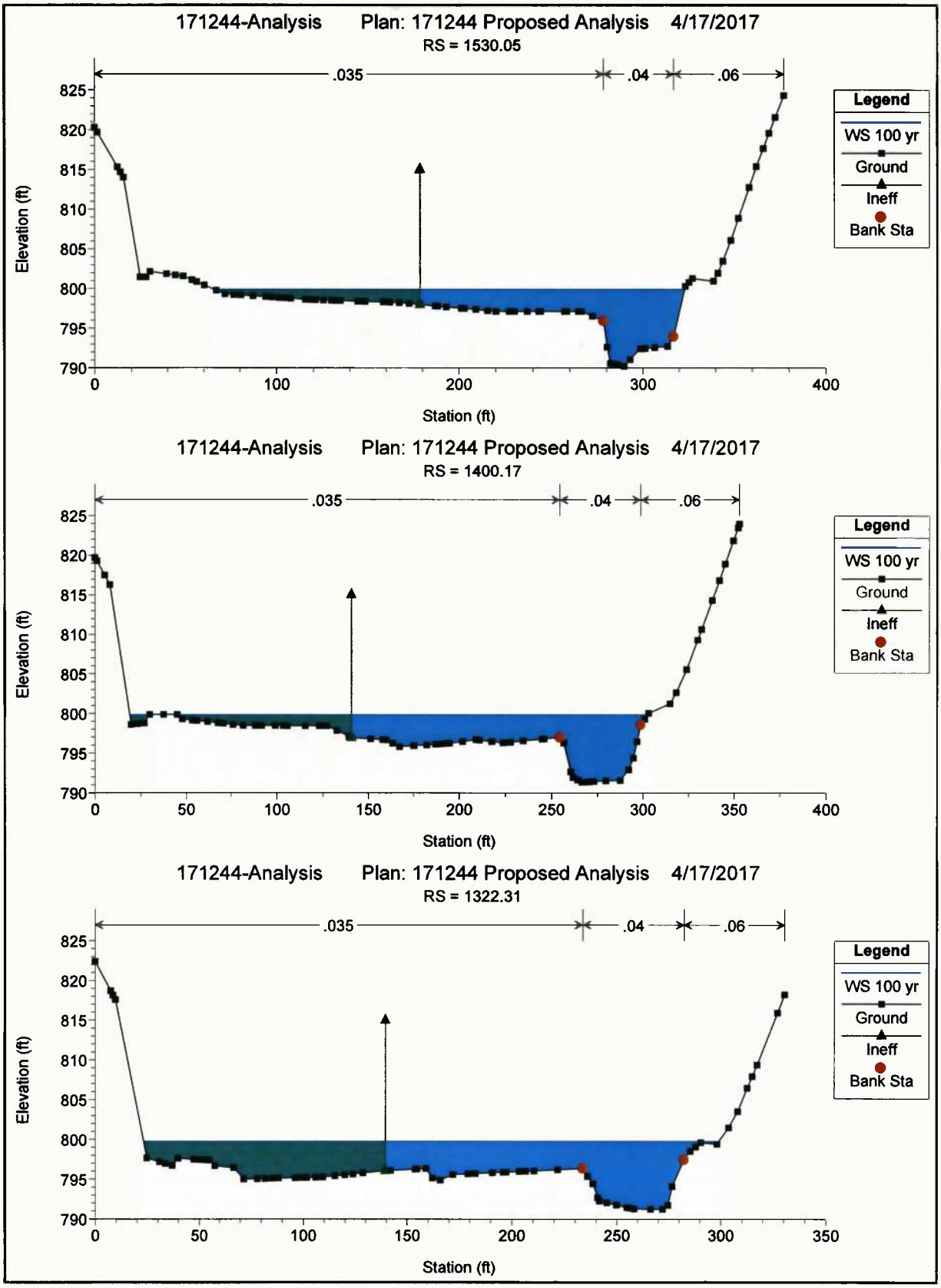
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Ground
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Station (ft)
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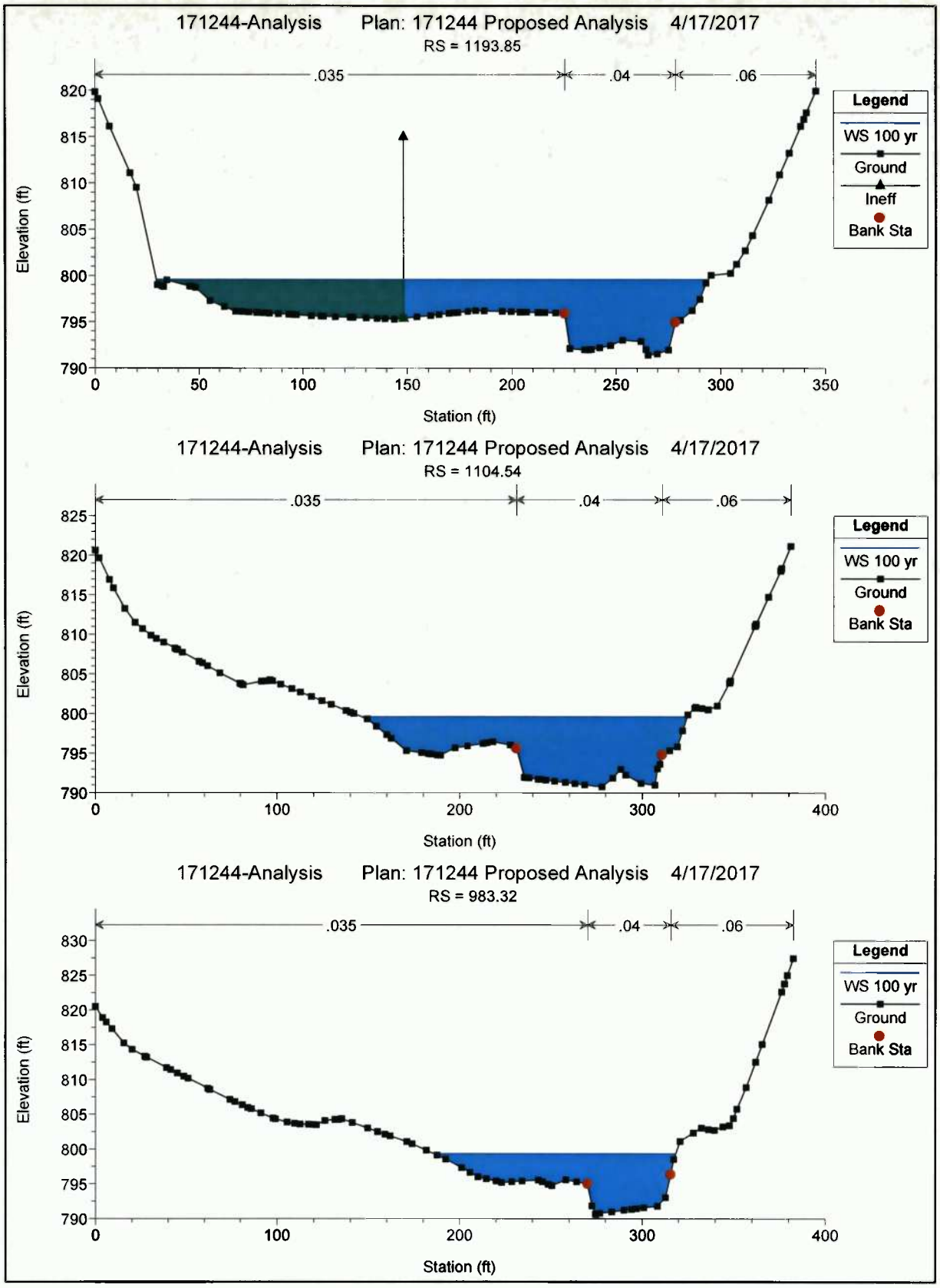
Station (ft)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Ground
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Elevation (ft)
Station (ft)
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Elevation (ft)
Station (ft)
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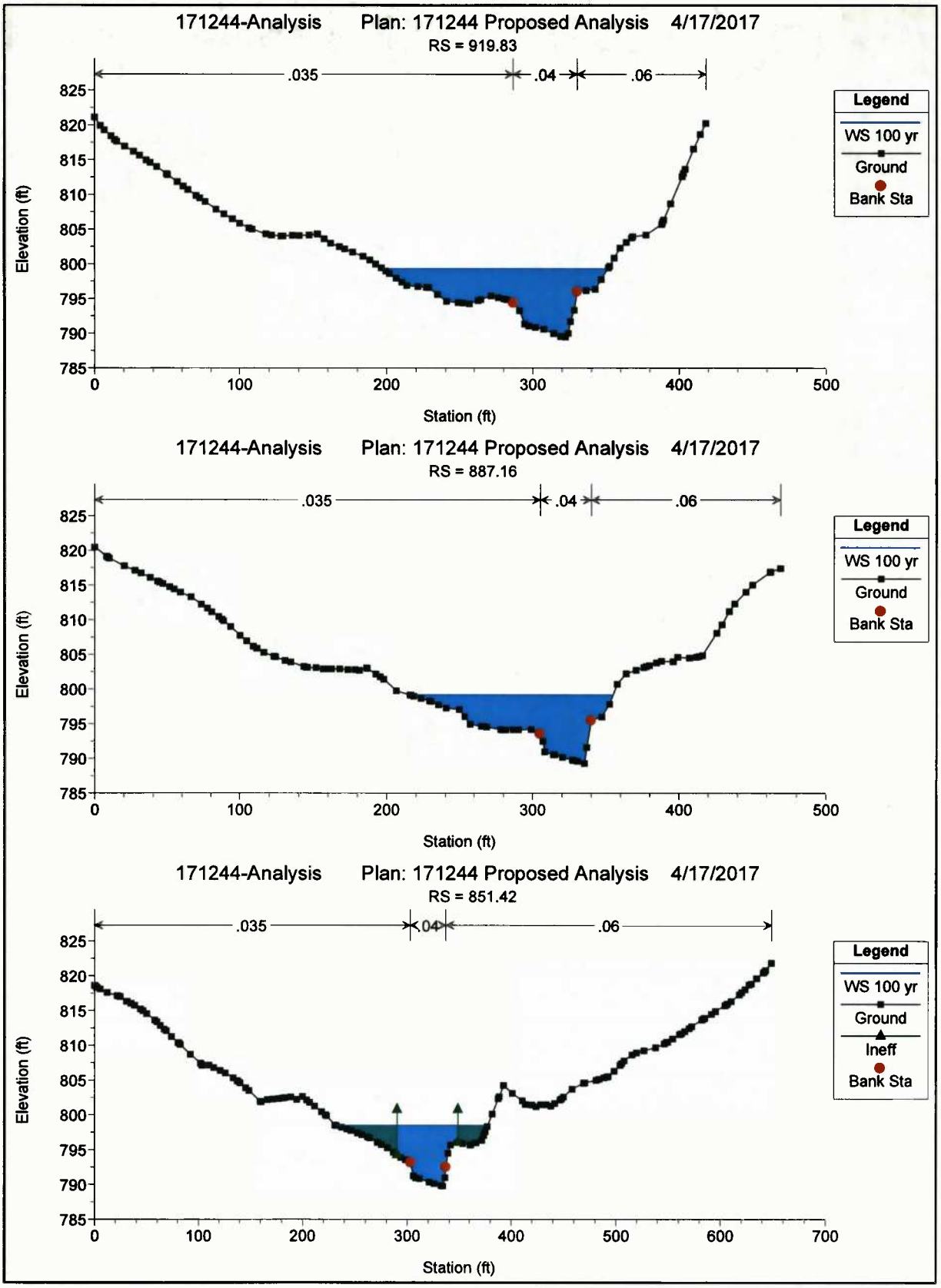
Station (ft)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Station (ft)
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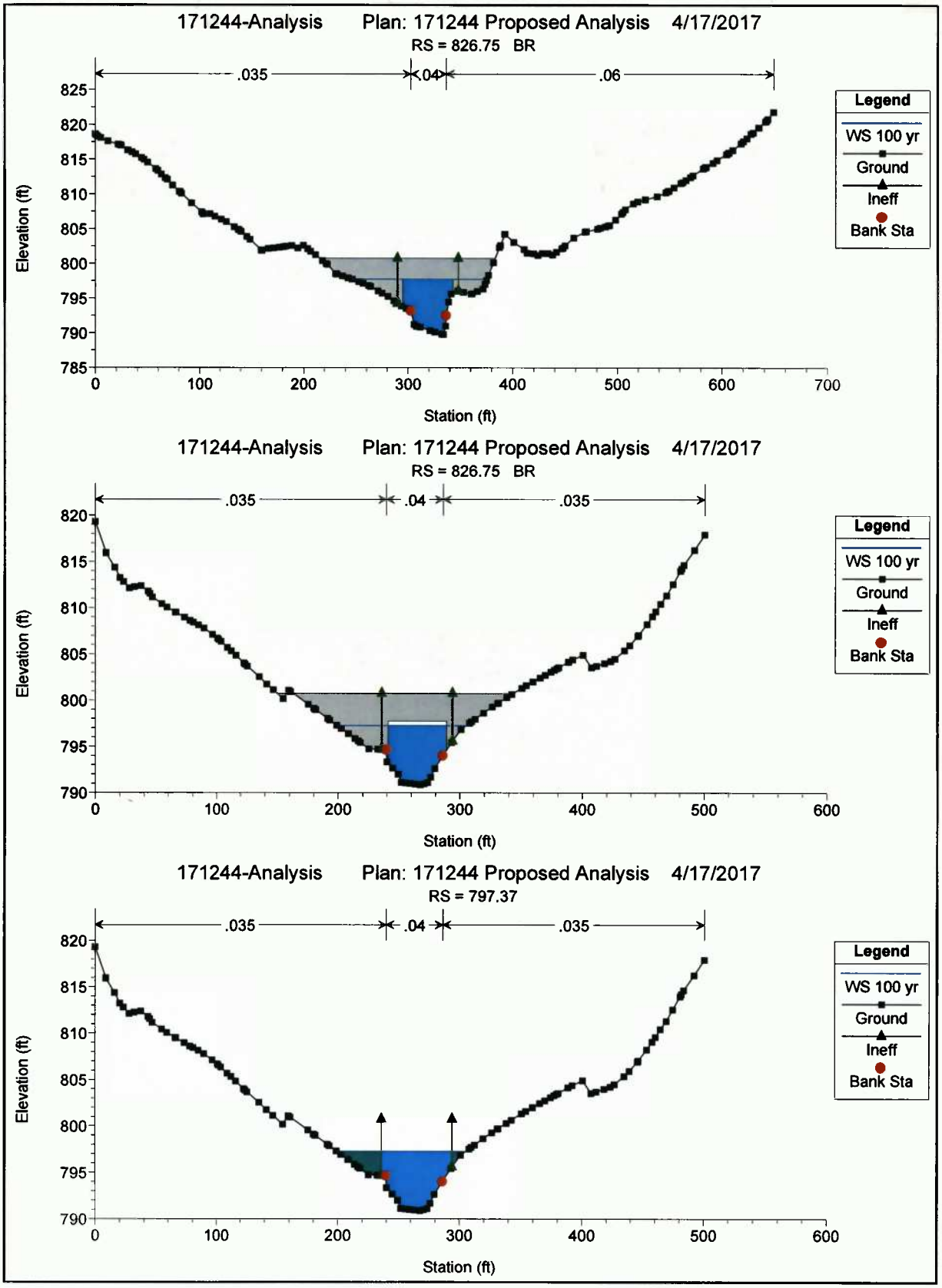
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Station (ft)
Legend
WS 100 yr
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Ineff
Bank Sta
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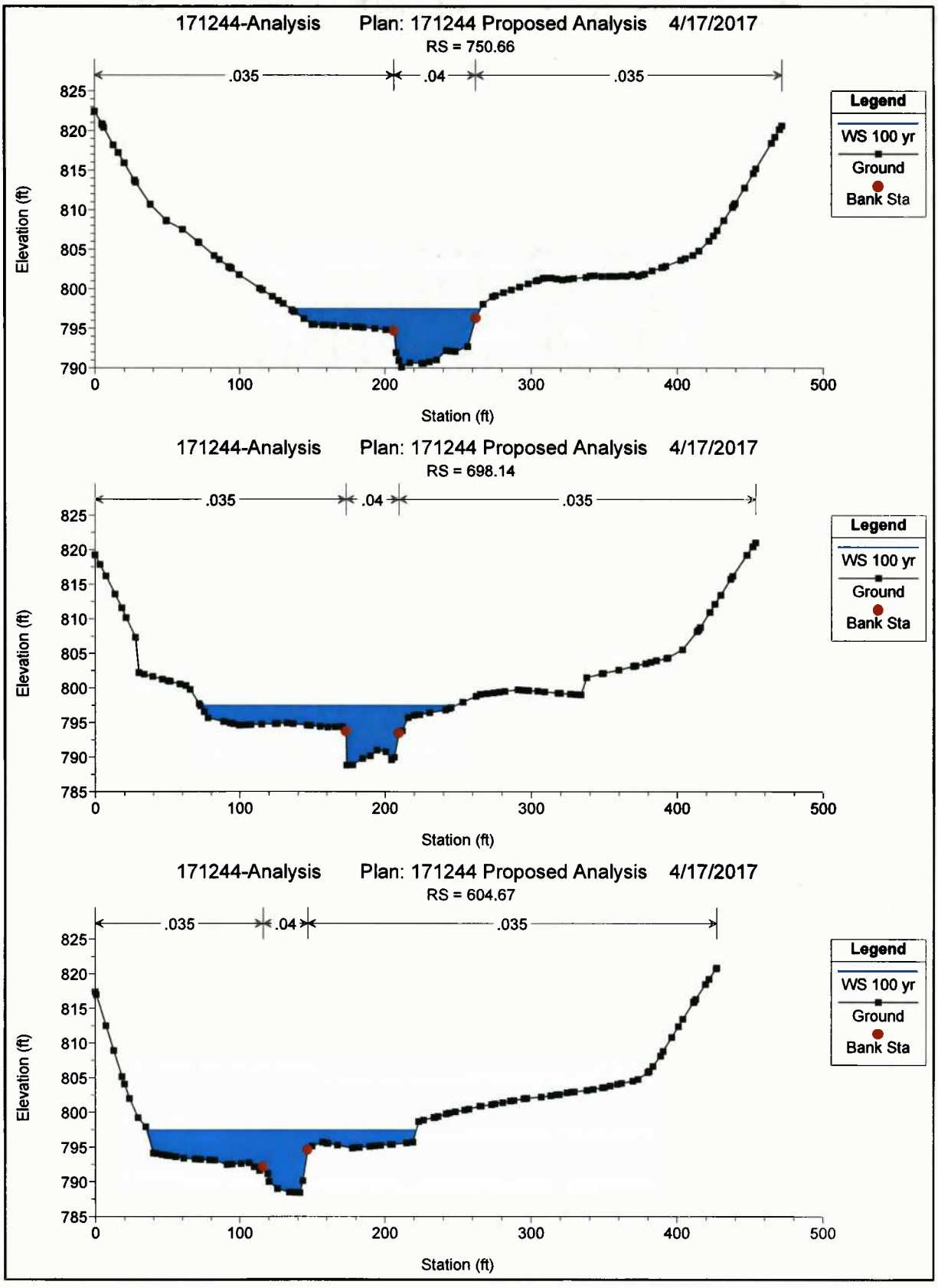
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Bank Sta
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Station (ft)
171244-Analysis Plan: 171244 Proposed Analysis 4/17/2017
RS = 604.67
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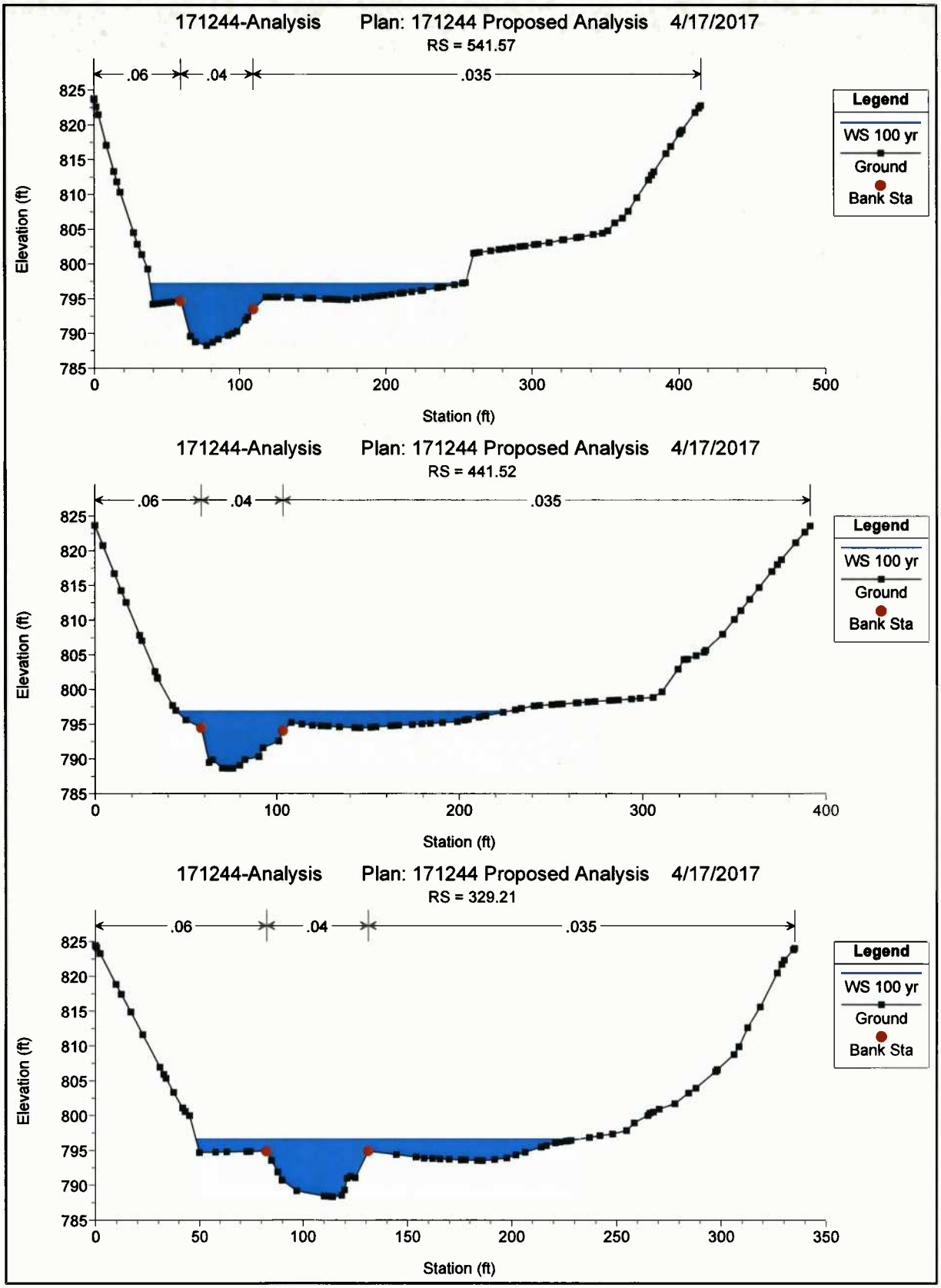
Elevation (ft)
Station (ft)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Station (ft)
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Legend
WS 100 yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
171244-Analysis Plan: 171244 Proposed Analysis 4/17/2017
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Legend
WS 100 yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX F

HEC-RAS Output Files

HEC-RAS HEC-RAS 5.0.3 September 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
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X     X  X        X           X  X     X    X        X
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Project File : 171244-Analysis.prj
Run Date and Time: 4/17/2017 2:09:33 PM

Project in English units

PLAN DATA

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Plan File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.p01

Geometry Title: 171244 Existing Geometry
Geometry File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.g01

Flow Title : 171244 Flow
Flow File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.f01

Plan Summary Information:

Number of:	Cross Sections	= 19	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	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: 171244 Flow

Flow File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.f01

Flow Data (cfs)

River	Reach	RS	2 yr	10 yr	25 yr	100 yr
Flint Run	Flint Run CL	2015.2	700	1474	1924	2653

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Flint Run	Flint Run CL	2 yr		Normal S = 0.0023
Flint Run	Flint Run CL	10 yr		Normal S = 0.0023
Flint Run	Flint Run CL	25 yr		Normal S = 0.0023
Flint Run	Flint Run CL	100 yr		Normal S = 0.0023

GEOMETRY DATA

Geometry Title: 171244 Existing Geometry
Geometry File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.g01

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 2015.2

INPUT
Description:
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
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26.40002	818.68	30.57001	816.68	39.02002	813.34	40.96997	812.55	44.73999	811.81
49.67999	810.86	51.37	810.56	57.45001	810.05	61.76001	809.58	65.21002	809.27
72.15997	808.64	72.96997	808.58	75.33002	808.39	80.72998	807.95	82.56	807.78
86.28998	807.47	92.96002	806.91	96.25	806.64	103.36	806.13	104.01	806.09
105.92	805.93	111.77	805.44	113.76	805.27	119.53	804.84	124.16	804.56
127.29	804.34	133.97	804.79	136.51	804.94	141.19	805.04	144.82	804.81
150.15	805.17	156.64	805.61	164.52	805.03	165.94	804.92	172.39	804.45
177.05	803.29	181.64	803.24	186.58	803.19	191.32	803.14	194.26	802.2
194.96	801.48	196.7	801.14	198.28	800.91	199.91	802.94	214.56	803.22
228.05	803.49	229.21	803.51	234.4	803.1	245.63	800.93	254.64	800.08
259.06	800.07	263.49	800.06	266.28	794.11	269.64	792.65	272.3	792.45
274.95	792.25	279.72	793.08	284.5	793.92	288.2	794.9	297.78	795.35
300.83	795.5	307.37	795.81	311.39	795.7	317.03	795.55	320.39	794.98
321.71	795.34	324.71	796.16	327.83	796.08	334.29	797.52	341.79	797.45
349.28	797.38	350.69	797.5	352.4	797.65	353.62	797.76	357.97	798.13

363.35	798.21	368.11	798.28	373.75	798.37	378.26	798.44	381.24	798.7
384.14	798.7	385.64	798.7	394.54	798.75	401.39	798.73	404.94	798.72
406.69	798.73	411.83	798.76	414.45	798.78	415.34	798.79	417.15	798.78
425.74	798.75	429.97	798.74	436.14	798.72	437.73	798.73	442.42	798.76
445.49	798.79	446.54	798.78	448.66	798.78	456.94	798.75	464.41	798.65
467.34	798.64	468.78	798.61	473.01	798.65	476.54	798.69	477.73	798.68
484.3	798.6	488.13	798.65	492.06	798.7	498.53	798.7	499.82	798.69
503.6	798.65	507.58	798.6	508.93	798.6	511.68	798.6	519.33	798.6
527.43	798.52	529.73	798.51	530.86	798.5	534.19	798.46	538.62	798.4
540.13	798.38	546.38	798.42	550.53	798.45	554.15	798.47	560.93	798.42
564.78	798.44	571.33	798.5	577.43	798.56	581.73	798.6	590.45	798.6
592.13	798.6	592.95	798.6	595.37	798.63	600.71	798.68	602.53	798.68
608.47	798.71	612.93	798.74	621.96	798.89	623.32	798.92	623.99	798.92
625.96	798.95	631.76	799.02	633.72	799.07	637.72	799.14	644.12	799.28
653.48	799.4	654.52	799.41	655.04	799.44	656.55	799.61	662.8	800.48
664.92	800.74	670.56	801.67	675.32	802.27	678.32	802.33	685.72	802.76
687.15	802.78	693.84	803.36	696.12	803.87	701.6	804.75	706.52	805.97
709.36	806.49	716.92	808.26	717.74	808.37	724.89	809.73	727.32	810.35
732.25	810.66	737.72	810.93	748.01	812.73	748.12	812.75	748.17	812.77
748.33	812.83	755.93	816.16	758.51	816.56	763.69	817.91	768.91	818.33
771.45	818.64	778.92	818.95	779.21	818.96	779.31	818.97	779.52	818.97
782.87	819.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	266.28	.04	288.2	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
266.28	288.2	242	193.36	136	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
381.24	782.87		F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1821.84

INPUT
Description:
Station Elevation Data num= 142

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.83	.909973	819.23	4.570007	818.99	16.42999	814.75	20.5	813.69
28.95001	811.43	36.44	810.02	41.47003	809.05	46.27002	808.15	52.38	807.19
53.28003	807.03	53.98999	806.93	59.91998	806.19	66.52002	805.35	67.31	805.28
68.31	805.18	79.03998	804.09	81.33002	803.88	84.25	803.61	88.34003	803.25
91.56	803.02	100.19	802.38	104.08	802.13	109.38	801.81	116.13	801.51
116.39	801.5	116.6	801.48	123.4	800.95	129.12	800.43	132.06	800.23
137.43	800.07	141.64	800.12	148	800.35	154.16	800.54	163.94	800.6
165.48	800.58	166.69	800.55	172.49	800.39	179.21	800.31	179.5	800.3
179.87	800.29	186.51	800.07	191.73	799.98	195.81	799.87	200.54	799.71
204.25	799.59	211.75	799.34	214.56	799.26	216.77	799.17	221.57	798.98
227.68	798.72	229.29	798.66	235.6	798.4	241.81	798.14	242.61	798.1
243.62	798.06	249.62	797.72	254.33	797.53	259.56	797.27	263.65	797.05
266.86	796.87	270.66	796.63	275.5	796.39	277.67	796.28	279.38	796.18
290.77	800.34	292.19	800.76	293.6	801.17	296.43	802.01	300.13	801.29
303.82	800.58	309	800.18	314.77	799.86	319.84	799.57	323.43	799.37
329.44	799.03	334.9	797.54	340.41	796.17	345.87	795.14	349.59	794.85
352.56	795.26	355.54	795.67	357.62	795.58	362.13	795.4	368.3	794.4
374.47	793.39	380.3	793.06	384.04	792.53	387.42	792.62	390.8	792.71
391.87	793.66	396.62	796.34	402.88	796.87	406.56	797.48	406.84	797.53
407.65	797.66	414.68	797.94	418.65	798.09	422.47	799.29	427.6	799.03

437.12	798.56	437.73	798.53	445.5	798.38	448.47	798.32	454.73	798.2
458.92	798.11	460.91	798.08	464.52	798.01	470.38	798.89	474.3	798.97
479.21	799.14	482.99	799.22	488.31	799.17	494.98	799.2	495.32	799.2
495.59	799.2	502.32	799.08	508.2	799.07	509.33	799.05	510.75	799.02
520.8	798.89	526.52	798.86	533.41	798.87	537.35	798.97	542.29	799.03
544.36	799.06	546.01	799.12	551.36	799.24	558.05	799.5	558.37	799.51
558.62	799.52	565.37	799.94	571.22	800.88	573.82	801.53	583.83	805.99
589.59	809.06	596.43	812.88	600.4	815.09	605.36	817.79	607.4	818.91
609.04	819.77	618.94	825.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	362.13	.04	396.62	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
362.13	396.62	90	118.5	162	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	296.43	815	F
422.47	618.94	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1703.34

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.35.639984	818.128.220001	817.2	11.69	815.9315.26001	814.61			
17.91998	813.6329.29999	808.0935.07001	806.9135.92999	806.7942.26001	805.96				
43.16998	805.8444.39999	805.6850.22998	804.9157.04999	804.0260.98999	803.73				
66.97	803.377.48999	802.5379.26999	802.485.54999	801.9491.54999	801.51				
93.95999	801.33	103.83	800.62	106.44	800.42	110.49	800.4	113.75	800.38
116.18	800.36	126.97	800.29	128.47	800.28	134.86	800.24	141.37	800.2
143.46	800.3	148.93	800.58	153.02	800.78	155.94	800.93	159.87	801.12
162.95	801.27	165.25	801.39	169.96	801.62	176.27	801.93	176.97	801.97
178.58	802.04	181.24	801.97	189.94	801.74	191.2	801.7	192.9	801.66
202.22	801.41	205.32	801.25	209.41	801.05	212.35	800.91	214.54	800.8
225.87	800.24	226.82	800.19	229.6	800.06	238.2	799.63	240.46	799.55
242.32	799.49	247.5	799.3	251.36	799.17	254.54	799.06	257.01	798.97
263.39	799.38	268.31	799.7	274.91	800.12	275.29	800.15	276.31	800.21
281.11	800.2	285.91	800.18	291.78	799.12	297.65	798.06	308.57	797.7
311.8	797.13	316.26	795.47	324.28	794.87	325	794.81	325.17	794.8
332.31	794.27	336.16	793.49	340.22	793.75	342.6	796.2	349.31	796.57
357.25	797.01	363.41	797.36	370.42	796.85	374.32	796.57	374.39	796.56
377.44	796.34	381.69	794.92	385.94	793.5	390.1	792.52	392.97	792.87
398.02	791.9	403.06	790.93	408.03	789.91	412.25	791.71	416.36	793.29
420.23	795.57	422.2	798.47	424.54	799.31	426.87	800.14	437.39	800.86
439.87	801.95	447.82	806.3	451.46	808.54	456.34	811.67	458.49	813.05
460.1	814.01	471.13	820.61	472.38	821.37	472.56	821.47	472.81	821.61
476.87	823.94								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	392.97	.04	416.36	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
392.97	416.36	173	173.29	174	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent

0	281.11	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1530.05

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.29	1.5	819.69	12.44	815.34	14.06	814.71	5.77002	814.02
24.91	801.48	26.5	801.47	28.09	801.46	30.29001	802.14	39.56	801.86
44.28	801.72	48.54001	801.59	53.29001	801.13	55.91	800.87	60.19	800.45
66.86002	799.81	71.85001	799.32	76.74002	799.24	80.44	799.19	87.13	799.09
94.05002	798.98	97.64001	798.92	101.41	798.87	104.6	798.82	107.65	798.77
115.69	798.65	118.53	798.61	121.25	798.59	125.5	798.55	129.95	798.52
132.46	798.5	134.85	798.48	144.23	798.41	146.39	798.39	148.46	798.37
158.5	798.3	162.06	798.27	167.32	798.21	172.81	798.1	178.75	797.98
187.09	797.81	188.22	797.79	193.03	797.69	201.37	797.52	202.16	797.5
202.91	797.49	209.12	797.36	215.64	797.23	220.04	797.14	227.26	797.14
229.95	797.13	230.05	797.13	236.91	797.13	243.24	797.13	243.88	797.13
244.12	797.13	257.25	797.13	257.81	797.13	258.39	797.13	264.77	797.12
266.43	797.12	272.37	796.53	278.3	795.94	280.42	792.63	282.17	790.59
284.51	790.48	285.87	790.41	289.58	790.23	292.89	791.04	298.46	792.4
299.58	792.42	301.2	792.46	306.54	792.58	313.62	792.73	316.94	793.98
323.43	800.28	325.35	800.79	327.26	801.3	338.85	800.94	341.37	801.95
344.02	803.47	348.34	806.09	352.45	808.89	358.29	812.77	362.27	815.39
366.05	817.66	369.23	819.59	372.57	821.57	377.26	824.33		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	278.3	.04	316.94	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
278.3	316.94	127	129.88	133	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	178.75	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1400.17

INPUT
Description:
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.73	9899902	819.32	5.230011	817.58	.130005	816.31	19.75	798.61
23.32999	798.69	26.91	798.77	29.94	799.86	37.54999	799.87	45.14999	799.87
47.94	799.35	3.29001	799.17	54.37	799.14	55.82999	799.1	61.88	798.95
67.75	798.81	70.72	798.74	76.03	798.61	81.66	798.47	88.19	798.46
90.23001	798.46	91.63	798.46	99.08	798.46	103.56	798.46	105.63	798.45
115.49	798.45	123.07	798.44	125.65	798.44	127.32	798.44	132.7	797.85
139.25	797.12	140.73	796.95	151.26	796.8	157.95	796.7	159.86	796.67
163.55	796.24	167.24	795.81	175.13	795.93	175.39	795.94	182.31	796.04
187.05	796.12	189.39	796.16	192.81	796.21	194.62	796.24	201.91	796.47
209.19	796.7	211	796.65	217.82	796.46	223.9	796.29	227.63	796.38
234.68	796.54	245.05	796.78	245.97	796.8	254.56	797	256.66	796.27
260.5	792.64	261.77	791.93	264.11	791.62	266.45	791.32	267.34	791.33

270.57	791.39	273.05	791.43	279.64	791.53	287.43	791.55	292.09	792.9
294.67	794.37	296.73	796.47	298.78	798.57	300.94	799.29	303.09	800.02
314.92	801.24	318.27	802.63	323.99	805.54	330.2	809.3	332.36	810.65
338.16	814.33	342.13	816.85	345.24	818.91	349.8	821.85	352.33	823.48
353.09	823.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	254.56	.04	298.78	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
254.56	298.78	81	77.86	74	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	140.73	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1322.31

INPUT
Description:
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822.41	7.420013	818.69	8.51001	818.15	9.660004	817.58	24.72	797.65
30.92001	797.18	33.73999	796.97	37.13	796.72	39.81	797.62	47.37	797.5
50.26999	797.46	52.91	797.42	54.94	797.39	57.72	796.68	66.89999	796.43
71.66	795.01	78.19	795.05	81.82001	795.07	85.15001	795.1	88.27	795.12
96.24001	795.17	99.08	795.19	101.74	795.2	106.05	795.23	109.38	795.25
115.25	795.41	120.01	795.55	123.86	795.65	128.7	795.79	139.51	796.07
140.87	796.09	142.14	796.11	153.92	796.26	154.79	796.28	159.05	796.33
162.2	795.13	165.95	794.9	172.02	795.58	179.22	795.67	182.53	795.71
182.64	795.71	190.9	795.81	195.99	795.87	196.56	795.88	197.18	795.89
203.52	795.97	206.33	796	210.48	796.05	221.72	796.19	233.66	796.34
235.91	795.37	238.48	794.43	240.74	792.69	241.66	792.27	245.25	792.04
249.88	791.76	254.87	791.45	256.22	791.37	258.26	791.25	266.25	791.24
272.02	791.24	274.59	791.71	276.6	794.09	282.28	797.44	285.4	798.53
287.92	799.06	290.44	799.59	298.19	799.41	303.78	801.48	308.05	803.5
312.62	806.45	315.02	807.93	317.26	809.38	327.05	815.93	330.44	818.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	233.66	.04	282.28	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
233.66	282.28	126	128.46	133	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	139.51	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1193.85

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.86	1.399994	819.16	6.889984	816.13	16.72	811.11	19.73999	809.53

29.78	799	32.06	798.86	32.94	798.83	4.51999	799.52	45.39999	798.88
46.26999	798.83	48.29999	798.72	55.32001	797.28	62.44	796.64	67.91	796.14
71.12	796.17	4.23999	796.06	77.95001	796.01	81.23001	795.97	83.98001	795.93
88.22	795.87	93.27	795.81	95.20999	795.78	96.83	795.76	103.99	795.66
108.6	795.62	109.7	795.61	115.44	795.55	122.55	795.49	123.92	795.47
130.17	795.41	135.41	795.36	139.24	795.33	143.74	795.28	148.29	795.39
154.57	795.54	161.12	795.7	165.11	795.79	169.86	795.91	172.08	795.96
173.95	796	179.06	796.13	182.84	796.22	186.85	796.19	195.4	796.13
199.71	796.1	204.05	796.07	207.08	796.05	212.57	796.01	214.07	796
215.86	795.99	221.06	795.96	225.26	795.93	227.83	792.11	235.01	791.99
237.05	791.95	238.25	792.01	242.22	792.2	247.39	792.44	253.16	793.01
262.05	792.9	264.38	792.01	265.45	791.41	269.84	791.54	275.28	791.96
278.52	794.98	280.84	795.18	286.48	796.22	290.23	797.44	293.03	799.2
295.56	800.05	304.9	800.25	307.73	801.25	311.88	802.69	315.37	804.34
323.05	808.17	328.22	810.92	332.85	813.26	338.36	816.14	339.84	816.91
341.08	817.61	345.56	819.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	225.26	.04	278.52	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
225.26	278.52	103	89.31	78	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	148.29	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1104.54

INPUT
Description:
Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.65	1.940002	819.65	7.679993	816.93	9.949982	815.87	16.16998	813.28
21.69998	811.52	25.72	810.72	30.39999	809.87	33.44998	809.48	37.50998	809.01
43.75	808.27	44.63	808.16	45.19998	808.09	47.91	807.76	56.94998	806.62
58.85999	806.46	1.78998	806.05	68.69998	805.16	79.82999	803.83	80.20999	803.78
80.44998	803.75	81.63	803.64	91.59998	804.09	93.95999	804.12	96.19	804.27
97.44998	804.15	102.02	803.72	108.13	803.16	112.73	802.73	118.79	802.16
124.46	801.63	129.46	801.17	137.73	800.4	140.12	800.18	141.89	800.01
149.17	799.33	154.26	798.4	160	797.34	162.45	796.89	170.83	795.35
179.1	795.08	182.8	794.96	184.29	794.91	187.77	794.79	189.31	794.74
197.39	795.67	204.31	795.93	212.93	796.25	214.97	796.33	218.26	796.45
227.73	796.07	231.1	795.64	235.5	791.96	236.86	791.92	238.01	791.89
242.92	791.75	244.38	791.71	247.1	791.63	251.89	791.5	257.8	791.33
263.11	791.18	268.49	791.03	278.01	790.77	283.87	791.87	288.28	792.98
291.01	792.28	299.35	791.2	307.09	791	308.43	793.04	309.81	793.63
310.92	794.83	315.06	795.33	319.21	795.84	322.09	797.86	324.97	799.88
328.83	800.7	329.35	800.81	332.55	800.69	336.09	800.51	341.04	800.99
347.69	803.86	348	803.99	348.31	804.15	361.61	811.02	361.93	811.18
362.24	811.34	368.89	814.73	375.53	818.02	375.85	818.18	376.17	818.35
381.24	821.15								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	231.1	.04	310.92	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
231.1	310.92	110	121.22	130	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 983.32

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.51	3.899994	818.92	5.910004	818.28	9	817.33	15.64999	815.25
20.14001	814.34	27.04001	813.33	27.39999	813.28	28.07999	813.19	39.14999	811.73
41.48999	811.42	45.07001	810.94	48.60001	810.46	50.89999	810.18	61.79999	808.74
62.64999	808.62	62.82999	808.66	3.11002	808.56	74.39999	807.13	77.06	806.8
81.14999	806.34	84.17999	805.98	86.16	805.78	91.29999	805.2	97.91	804.46
99.17999	804.35	105.53	803.89	109.66	803.71	112.64	803.6	117.22	803.56
119.76	803.53	121.41	803.51	126.13	804.09	131.57	804.26	133.53	804.24
135.03	804.38	135.34	804.35	141	803.81	149.45	803.02	154.94	802.52
159.02	802.16	161.89	801.9	171.08	801.07	173.89	800.74	181.69	799.82
187.49	799.13	192.3	798.56	201.03	797.33	205.79	796.66	210.25	796.03
214.83	795.73	220.11	795.39	223.13	795.19	228.69	795.29	234.44	795.39
243.25	795.55	245.41	795.31	248.58	794.96	250.58	794.73	258.16	795.6
264.16	795.31	270.17	795.02	272.72	791.84	274.67	790.66	277	790.75
283.46	790.97	290.15	791.21	294.19	791.34	297.13	791.44	301.14	791.57
308.47	791.81	312.85	793.04	315.69	796.38	317.38	798.51	320.88	801.11
328.19	802.32	332.47	803.03	336.37	802.81	339.56	802.71	344.2	803.21
347.8	803.4	349.87	804.42	351.86	805.75	356.83	808.87	361.98	812.55
365.55	815.06	376.15	822.65	377.72	823.8	379.24	825	382.47	827.44

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	270.17	.04	315.69	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
270.17	315.69	61	63.49	68	.1 .3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 919.83

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	821.13	3.800018	819.91	6.580017	819.28	11.32001	818.41	13.77002	817.89
15.20999	817.62	20.73001	816.93	26.63	816.19	30.79001	815.63	35.36002	814.95
38.04001	814.59	42.55002	813.98	49.45001	812.95	49.75	812.91	50.25	812.83
56.94	811.83	60.87	811.19	64.14001	810.68	69.72	809.82	72.28	809.47
75.92001	808.96	83.70001	807.85	89.17999	807.17	95.11002	806.45	100.11	805.85
106.52	805.17	108.65	804.99	117.94	804.31	121.7	804.13	128.11	804.01
128.89	803.99	129.35	803.99	135.84	804.09	140.64	804.05	147.4	804.13
152.9	804.31	153.18	804.27	157.66	803.61	162.07	802.96	168.08	802.45
171.56	802.14	177.05	801.67	184	801.07	188.45	800.56	192.48	799.97
196.33	799.4	199.45	798.94	201.89	798.59	206.41	797.92	210.38	797.34
213.69	796.85	221.14	796.72	227.08	796.61	228.6	796.58	234.69	795.59
240.78	794.61	248.77	794.43	252.06	794.35	256.76	794.25	262.77	794.7
264.58	794.84	271.59	795.37	276.48	795.13	280.38	794.94	282.2	794.85
286.69	794.44	291.17	793.26	294.73	791.34	297.48	791.07	302.03	790.85
307.65	790.58	314.4	789.97	319.19	789.54	322.37	789.47	324.23	790
325.82	791.69	328.25	793.32	330.36	796.03	336.47	796.17	342.58	796.32

346.77	797.74	351.67	799.41	352.43	799.67	355.55	800.82	359.55	802.3
363.95	803.11	367.38	803.74	368.35	803.92	377.55	804.18	388.28	805.71
389.01	806.04	389.59	806.33	394.3	808.69	402.09	812.57	403.04	813.04
404.26	813.63	410.06	816.54	414.59	818.62	418.35	820.23		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	286.69	.04	330.36	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
286.69	330.36	32	32.67	33	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 887.16

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.46	8.089996	819.14	8.589996	819.05	8.880005	818.99	10.03	818.87
20.32001	817.77	27.44998	817.14	31.75	816.73	37.95999	816.09	43.19	815.55
44.53	815.42	46.81	815.21	51.72	814.73	54.62	814.44	58.91	813.97
66.06	813.36	6.10001	813.29	66.16998	813.29	73.29001	812.24	77.48999	811.67
80.48001	811.12	85.53	810.45	87.66998	810.08	88.92999	809.87	93.82999	808.99
100.36	807.71	104.9	806.94	109.24	806.19	111.8	805.88	116.42	805.3
123.23	804.71	123.61	804.71	124.26	804.63	130.8	804.1	134.67	803.9
143.62	803.27	145.18	803.16	146.1	803.14	152.07	803.09	156.88	802.89
159.28	802.91	162.57	802.89	168.23	802.89	173.61	802.79	178.63	802.81
181.44	802.69	186.29	803.03	186.69	802.97	192.53	802.17	195.53	801.75
197.89	801.42	206.64	799.74	215.84	799.15	216.43	799.11	218.42	798.98
223.46	798.66	229.17	798.29	230.21	798.22	235.35	797.74	240.49	797.26
249.67	797.08	253.53	796.01	257.39	794.95	265.1	794.66	265.99	794.63
268.66	794.53	278.31	794.17	279.65	794.12	281.57	794.12	286.75	794.14
290.62	794.16	299.35	794.19	305.18	793.6	307.22	792.49	308.5	790.98
314.35	790.59	315.11	790.54	320.5	790.18	327.37	789.78	328.04	789.74
330.74	789.59	335.58	789.31	337.11	791.61	340.09	795.53	347.24	795.98
352.45	797.84	357.78	800.71	363.99	802.21	370.75	802.72	376.07	803.12
377.82	803.25	379.83	803.4	384.88	803.78	388.15	804.03	396.12	803.98
399.34	804.61	407.31	804.5	412.02	804.62	413.84	804.71	416.11	804.88
425.87	808.08	429.51	809.28	434.46	811.19	438.17	812.3	445.95	814.01
450.46	815.02	462.39	816.83	462.6	816.87	462.76	816.9	469.34	817.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	305.18	.04	340.09	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
305.18	340.09	33	35.74	38	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 851.42

INPUT
Description:
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	818.62	5.599976	818.52	2.289978	818.33	5.210022	818.09	12	817.6

21.84998	817.15	23.44	817.09	24.53998	816.99	31.03998	816.33	34.88	816.05
38.21997	815.75	43.87	815.23	46.32001	814.97	49.88	814.56	57.76001	813.65
59.78998	813.39	63.20001	812.84	66.96997	812.31	69.21002	812.09	74.15997	811.26
80.64996	810.35	81.34998	810.34	82.52997	810.19	2.08997	808.7	101.87	807.43
102.91	807.26	103.53	807.12	110.1	807.16	114.97	806.78	121.2	806.35
126.41	805.99	133.97	805.28	137.85	804.91	138.85	804.8	140.53	804.58
146.03	803.89	149.29	803.47	159.86	801.95	160.73	801.87	166.7	802.17
171.66	802.23	177.09	802.33	180.58	802.39	182.96	802.46	188.81	802.57
194.59	802.22	199.87	802.63	204.03	802.13	206.96	801.78	211.43	801.25
218.22	800.43	218.27	800.42	221.8	800	222.98	799.86	230.85	798.54
232.4	798.46	237.31	798.21	242.45	797.94	246.22	797.73	252.38	797.39
256.63	797.15	262.14	796.84	263.84	796.7	271.45	796.05	275.18	795.73
280.76	795.26	286.61	794.63	289.79	794.29	293.72	793.87	298.32	793.54
302.92	793.22	305.91	791.22	308.13	790.95	311.61	790.82	320.83	790.33
325.63	790.12	332.25	789.85	334.04	789.77	336.13	790.98	336.86	792.52
338.9	794.46	341.41	795.64	347.7	796.05	353.29	795.87	360.73	795.64
361.48	795.68	366.3	795.98	371.87	796.33	373.72	797.03	375.14	797.57
377.09	798.32	381.83	800.12	387.64	802.32	388.39	802.61	392.62	804.22
400.97	803.09	410.84	802.02	413.77	801.52	419.84	801.43	423.86	801.17
428.19	801.46	433.5	801.46	438.12	801.25	441.5	801.64	446.76	802.15
447.9	802.27	449.83	802.56	458.2	803.71	469.16	804.56	469.46	804.58
469.64	804.6	470.33	804.62	481.08	805	483.84	805.12	488.5	805.32
491.03	805.43	492.52	805.52	498.21	806.29	503.96	807.16	505.4	807.39
507.83	807.77	515.41	808.62	519.78	808.92	526.85	809.21	526.96	809.22
527.16	809.23	538.29	809.68	546.49	810.23	548.52	810.42	549.73	810.48
554.42	810.93	561.17	811.57	562.9	811.69	565.82	812.01	570.09	812.44
572.61	812.69	582.45	813.67	584.05	813.82	584.46	813.87	585.15	813.92
591.65	814.49	595.49	814.88	604.48	815.72	606.02	815.87	606.93	815.95
610.48	816.31	618.37	817.28	620.4	817.6	623.82	818.04	627.58	818.69
629.82	818.86	634.77	819.61	641.26	820.43	641.96	820.56	643.15	820.78
648.68	821.84								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	302.92	.04	336.86	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
302.92	336.86	53	54.05	56	.1 .3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 797.37

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.31	8.579987	815.97	8.690002	815.93	8.769989	815.91	5.89001	814.35
20.20999	813.23	23.06	812.81	27.76001	812.12	31.72	812.25	37.39001	812.38
43.23999	811.79	44.56	811.55	46.75	811.15	54.75	810.43	58.89999	810.05
65.73999	809.53	66.07001	809.56	6.26999	809.49	73.23001	808.96	77.78	808.61
80.39999	808.43	84.73001	808.14	89.29001	807.78	96.32999	807.1	100.81	806.69
101.91	806.56	103.72	806.35	109.08	805.68	112.32	805.33	116.24	804.83
122.71	804.01	123.84	803.87	125.58	803.67	135.35	802.53	141.7	801.74
146.87	801.12	154.83	800.16	159.29	801.07	160.83	800.93	175.44	799.55
179.91	799.12	180.99	799.02	181.65	798.96	191.58	798.02	193.23	797.86
198.97	797.29	202.55	796.94	208.34	796.37	213.55	795.86	216.16	795.61
217.85	795.44	225.11	794.73	232.35	794.7	239.6	794.66	240.17	793.33
244.81	792.66	249.45	791.99	251.95	791.11	255.37	791.06	258.78	791.01
263.14	790.94	267.5	790.86	270.41	790.97	273.32	791.08	275.81	791.67
279.46	792.62	286.3	794.02	293.14	795.41	300.85	796.85	307.93	797.52

309.65	797.69	312.48	797.95	319.46	798.62	326.39	799.27	330.99	799.66
331.18	799.68	331.49	799.7	338.34	800.28	342.5	800.63	350.47	801.3
354.03	801.58	359.47	801.99	365.53	802.43	369.47	802.72	374.18	803.07
377.04	803.28	379.19	803.44	380.5	803.53	388.55	804.13	388.71	804.14
392.04	804.38	400.5	804.89	407.56	803.53	411.7	803.69	418.07	803.99
423.21	804.21	426.55	804.47	434.73	805.37	438.81	805.93	445.54	806.94
445.98	806.99	446.24	807.04	453.14	808.22	457.76	809.07	460.31	809.59
464.53	810.44	469.27	811.32	474.65	812.56	480.79	813.97	481.82	814.21
483.52	814.62	492.3	816.25	500.5	817.92				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	239.6	.04	286.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
239.6	286.3	43	46.71	48	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 750.66

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822.42	4.98999	820.86	5.440002	820.76	6.330017	820.39	12.76001	818.18
16.06	817.23	20.07001	815.92	27.12	813.73	27.91	813.47	38.17999	810.7
48.98999	808.67	49.25	808.62	49.5	808.58	60.31	807.57	1.08002	805.94
71.38	805.89	71.69	805.85	82.44	804.19	85.91	803.69	92.66	802.81
93.51001	802.69	94.39001	802.57	99.72	801.78	113.99	800.08	115.8	799.87
122.6	799.06	126.64	798.53	129.78	798.13	135.8	797.34	137.07	797.18
137.73	797.09	144.37	796.23	149.98	795.5	151.73	795.49	157.41	795.43
159.89	795.41	164.75	795.36	170.97	795.3	173.69	795.27	179.51	795.22
181.03	795.19	182.05	795.17	185.24	795.12	193.13	794.97	200.63	794.84
206.4	794.73	207.87	791.92	209.71	790.94	211.46	790.08	217.12	790.66
225.43	790.58	226.45	790.57	230.58	790.78	235.51	791.03	242.11	792.2
245.15	792.13	248.18	792.07	256.69	792.7	262.22	796.32	267.27	798.04
273.76	799	275.78	799.13	281.3	799.5	286.62	799.85	292.36	800.24
298.13	800.63	303.44	800.99	305.05	801.1	308.21	801.32	309.26	801.39
313.92	801.37	317.4	801.27	321.58	801.11	325.64	801.22	329.03	801.32
337.46	801.45	340.18	801.64	343.38	801.66	348.27	801.56	353.07	801.58
354.93	801.59	358.19	801.56	362.09	801.64	365.54	801.59	369	801.8
373.25	801.59	375.71	801.74	377.6	801.86	382.73	802.26	389.39	802.68
390.03	802.72	392.16	802.87	402.45	803.6	405.53	803.82	410.81	804.23
414.88	804.78	421.67	806.02	424.85	806.7	427.3	807.36	431.87	808.64
437.81	810.29	438.89	810.57	439.73	810.81	446.16	812.77	452.15	814.59
453.95	815.16	464.58	818.42	466.98	819.19	470.09	820.15	471.66	820.62

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	206.4	.04	262.22	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
206.4	262.22	54	52.52	50	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 698.14

INPUT
Description:
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.24	3.279999	817.86	7.320007	816.21	3.54001	813.58	18.10001	811.6
20.98999	810.16	27.51001	807.34	29.94	802.21	33.64001	802	39.51999	801.66
46.14001	801.28	50.35001	801.04	50.76001	801.01	51.67999	800.96	58.25	800.58
62.33002	800.35	65.20999	799.78	71.53	797.72	72.51999	797.4	75.13	796.55
77.85001	795.67	88.76999	795.14	93.42001	794.92	95.48999	794.82	99.70001	794.62
103.05	794.65	104.31	794.66	107.57	794.69	115.08	794.76	124.45	794.85
125.41	794.86	125.84	794.86	132.42	794.92	136.66	794.83	146.41	794.63
146.51	794.62	148.73	794.58	155.31	794.44	160.6	794.32	165.74	794.37
170.59	794.41	173.19	793.77	173.75	788.85	177.76	788.86	184.59	789.81
189.99	790.2	194.47	790.99	200.65	790.79	204.53	789.64	206.42	789.97
209.56	793.49	211.78	793.78	216.01	795.71	219.97	796.02	222.68	796.12
223.83	796.16	230.81	796.42	241.65	796.81	244.07	797.04	245.32	797.16
253.42	797.94	262.44	798.8	265.19	799.06	269.78	799.19	274.52	799.31
278.13	799.41	281.99	799.51	291.08	799.76	294.13	799.7	297	799.65
298.28	799.63	304.45	799.52	309.03	799.43	318.32	799.27	319.34	799.25
319.79	799.24	326.78	799.12	330.54	799.05	333.83	798.99	333.87	798.99
337.81	801.49	348.34	802.06	348.8	802.08	348.96	802.09	349.28	802.11
359.79	802.58	370.1	803.14	370.78	803.18	371.46	803.22	378.35	803.53
381.76	803.73	385.7	803.96	392.75	804.28	393.65	804.36	403.74	805.54
413.63	808.15	414.72	808.4	415.84	808.75	422.44	810.97	425.71	812.11
429.79	813.42	436.7	815.74	438.02	816.16	447.68	819.23	451.83	820.43
453.69	821.02								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	173.19	.04	209.56	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
173.19	209.56	95	93.47	92	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 604.67

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	817.39	5.799866	816.99	7.279999	812.48	12.48001	808.92	18.20001	805.17
19.86002	804.1	23.31	802.01	29.13	799.23	34.51999	797.93	39.95999	794.13
41.94	794.06	45.98001	793.92	49.32001	793.85	0.92999	793.75	55.51001	793.59
60.87	793.46	8.73999	793.29	71.5	793.25	72.82001	793.23	78.88	793.14
82.64999	793.09	91.29999	792.48	93.64001	792.52	94.67001	792.53	101	792.62
106.38	792.7	110	792.15	113.62	791.61	116.09	792.13	119.25	791.17
120.21	790.03	125.91	788.98	134.06	788.49	137.77	788.46	141.47	788.44
143.56	790.12	146.93	794.6	150.02	795.14	157.13	795.67	159.78	795.57
160.34	795.54	160.87	795.52	167.42	795.26	177.7	794.85	179.4	794.89
182.17	794.94	182.38	794.95	189.56	795.09	193.02	795.15	196.95	795.23
203.96	795.37	204.34	795.37	205.14	795.39	214.89	795.58	219.4	795.67
223.28	798.67	226.75	798.87	233.73	799.25	234.46	799.28	236.52	799.43
242.17	799.78	244.18	799.9	248.4	800.08	254.63	800.34	257.59	800.47
265.08	800.88	265.9	800.91	273	801.12	275.53	801.23	280.71	801.4
285.98	801.64	288.42	801.73	295.28	801.98	296.13	802	296.43	802.01
297.06	802.02	306.88	802.22	313.28	802.4	317.33	802.52	319.25	802.58
324.66	802.81	327.78	802.92	329.5	802.96	338.23	803.19	342.38	803.3
348.68	803.54	350.09	803.6	354.04	803.8	359.13	804.05	361.94	804.19
369.58	804.51	373.21	804.77	380.03	805.78	380.92	805.92	383.42	806.64

388.63	808.13	390.48	808.8	396.34	810.81	400.93	812.39	404.05	813.43
411.38	815.88	411.75	815.99	412.8	816.32	419.46	818.47	421.83	819.23
426.82	820.74	427.22	820.86						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	116.09	.04	146.93	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
116.09	146.93	73	63.1	54	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 541.57

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823.75	.1399841	823.63	1.389984	822.62	2.789978	821.48	8.369995	817.09
13.37	813.3	15.34	811.82	17.53	810.33	26.59998	804.54	29.28	802.87
32.26999	801.36	36.25998	799.28	39.92999	794.19	43.28	794.28	47.03	794.38
50.19	794.46	53.03	794.53	59.34998	794.69	65.5	789.62	68.97998	788.78
76.88998	788.27	81.00998	788.73	85.12	789.19	92.04999	789.71	95.16	790
98.26999	790.29	103.97	791.89	105.69	792.37	109.68	793.49	117.87	795.23
121.86	795.24	125.85	795.25	132.46	795.19	135.46	795.16	145.68	795.08
147.81	795.06	150.18	795.04	158.9	794.96	161.75	794.94	164.91	794.91
168.71	794.88	173.34	794.84	179.73	795.01	185.44	795.15	189.72	795.26
194.48	795.38	198.29	795.48	198.69	795.49	203.68	795.62	209.24	795.76
210.66	795.8	211.93	795.83	217.63	795.98	224.03	796.15	224.66	796.18
225.22	796.2	235.58	796.59	238.45	796.7	239.06	796.72	247.09	797.02
252.54	797.23	253.51	797.27	254.87	797.32	260.52	801.54	262.29	801.6
264.63	801.67	272.23	801.9	278.03	802.07	282.16	802.2	286.78	802.34
292.1	802.5	295.53	802.57	302.03	802.77	304.29	802.84	311.97	803.09
321.01	803.46	321.9	803.5	330.55	803.77	331.84	803.83	333.53	803.88
341.77	804.23	348.06	804.42	351.71	804.79	356.49	805.89	361.64	806.59
365.57	807.56	371.58	809.51	379.46	812.08	381.51	812.75	383.08	813.23
391.45	815.88	394.69	816.88	400.59	818.7	401.38	818.94	402.43	819.25
411.32	821.75	413.91	822.4	415.24	822.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	9.34998	.04	109.68	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.34998	109.68	111	100.05	85	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 441.52

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823.68	4.279999	820.76	10.54001	816.74	14.26999	814.29	16.92001	812.58
24.25	807.83	25.45999	807.04	32.67001	802.54	34.01001	801.73	4.23001	801.57
42.56	797.66	44.22	796.96	49.76999	795.55	58.23999	794.45	62.45999	789.44
64.63	789.83	70.04001	788.62	73.01999	788.6	76	788.58	79.78	789.03

82.67001	789.87	90.25	790.28	92.5	791.55	101.1	792.53	103.41	794.02
108.07	795.18	113.8	794.98	119.53	794.79	124.12	794.72	128.03	794.67
134.08	794.58	142.58	794.47	145.53	794.43	151.37	794.52	154.07	794.57
162.24	794.71	164.07	794.74	166.63	794.78	174.06	794.9	179.35	794.99
184.05	795.07	190.66	795.18	198.89	795.32	202.83	795.53	204.19	795.6
205.16	795.66	210.91	795.97	213.71	796.12	214.18	796.14	214.84	796.18
224.16	796.68	230.79	797.04	234.14	797.22	241	797.59	243.98	797.65
250.7	797.77	253.97	797.84	256.29	797.88	263.95	798.02	264.84	798.04
270.1	798.14	273.94	798.21	281.93	798.36	283.92	798.4	286.72	798.45
293.91	798.58	298.73	798.67	305.84	798.81	310.69	799.63	319.5	802.88
322.65	804.24	323.78	804.29	324.58	804.31	329.36	804.8	333.76	805.32
334.65	805.61	343.75	807.98	350.22	810.12	353.73	811.37	358.66	813.01
363.72	814.7	370.67	817.03	373.7	818.02	375.86	818.7	383.68	821.17
388.7	822.7	391.53	823.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	58.23999	.04	103.41	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.23999	103.41	109	112.31	116	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 329.21

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	824.46	5100098	824.17	2.149994	823.26	9.809998	818.85	12.37	817.41
16.87	814.87	22.57999	811.61	30.95001	806.92	32.79001	805.89	33.82999	805.31
37.63	803.32	41.84	801.08	43	800.57	45.04001	799.98	49.88	794.68
57.87	794.72	63.42999	794.75	73.20999	794.81	73.63	794.81	73.87	794.81
74.73001	794.82	82.58	794.86	84.89	793.52	87.8	791.84	89.75999	790.7
97.02	789.18	110.08	788.43	111.83	788.37	113.83	788.31	113.97	788.31
118.29	788.54	119.77	789.32	120.88	790.98	122.63	791.27	124.81	791.06
131.14	794.88	144.54	794.37	154.06	794.01	157.95	793.86	161.99	793.81
165.57	793.76	169.99	793.7	175.76	793.62	177.99	793.59	183.83	793.51
185.97	793.48	186.09	793.48	191.93	793.69	197.88	793.89	202.06	794.29
206.44	794.7	214.14	795.43	216.64	795.66	220.86	796.06	223.22	796.17
226.06	796.3	226.84	796.34	228.22	796.4	237.08	796.82	242.11	797.05
248.13	797.33	254.91	797.8	258.55	798.91	265.06	799.99	266.07	800.32
267.66	800.48	270.45	800.89	277.87	801.67	284.54	803.22	288.09	803.9
297.42	806.31	298.11	806.49	298.3	806.55	306.12	808.73	308.51	809.87
312.72	812.59	318.72	815.57	326.81	820.45	328.93	821.72	330.14	822.31
334.53	823.81	335.06	823.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	82.58	.04	131.14	.035

Bank Sta: Left	Right	Coeff Contr.	Expan.
82.58	131.14	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Flint Run

Reach	River Sta.	n1	n2	n3
Flint Run CL	2015.2	.035	.04	.03
Flint Run CL	1821.84	.035	.04	.03
Flint Run CL	1703.34	.035	.04	.06
Flint Run CL	1530.05	.035	.04	.06
Flint Run CL	1400.17	.035	.04	.06
Flint Run CL	1322.31	.035	.04	.06
Flint Run CL	1193.85	.035	.04	.06
Flint Run CL	1104.54	.035	.04	.06
Flint Run CL	983.32	.035	.04	.06
Flint Run CL	919.83	.035	.04	.06
Flint Run CL	887.16	.035	.04	.06
Flint Run CL	851.42	.035	.04	.06
Flint Run CL	797.37	.035	.04	.035
Flint Run CL	750.66	.035	.04	.035
Flint Run CL	698.14	.035	.04	.035
Flint Run CL	604.67	.035	.04	.035
Flint Run CL	541.57	.06	.04	.035
Flint Run CL	441.52	.06	.04	.035
Flint Run CL	329.21	.06	.04	.035

SUMMARY OF REACH LENGTHS

River: Flint Run

Reach	River Sta.	Left	Channel	Right
Flint Run CL	2015.2	242	193.36	136
Flint Run CL	1821.84	90	118.5	162
Flint Run CL	1703.34	173	173.29	174
Flint Run CL	1530.05	127	129.88	133
Flint Run CL	1400.17	81	77.86	74
Flint Run CL	1322.31	126	128.46	133
Flint Run CL	1193.85	103	89.31	78
Flint Run CL	1104.54	110	121.22	130
Flint Run CL	983.32	61	63.49	68
Flint Run CL	919.83	32	32.67	33
Flint Run CL	887.16	33	35.74	38
Flint Run CL	851.42	53	54.05	56
Flint Run CL	797.37	43	46.71	48
Flint Run CL	750.66	54	52.52	50
Flint Run CL	698.14	95	93.47	92
Flint Run CL	604.67	73	63.1	54
Flint Run CL	541.57	111	100.05	85
Flint Run CL	441.52	109	112.31	116
Flint Run CL	329.21			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Flint Run

Reach	River Sta.	Contr.	Expan.
Flint Run CL	2015.2	.1	.3
Flint Run CL	1821.84	.1	.3
Flint Run CL	1703.34	.1	.3

Flint Run CL	1530.05	.1	.3
Flint Run CL	1400.17	.1	.3
Flint Run CL	1322.31	.1	.3
Flint Run CL	1193.85	.1	.3
Flint Run CL	1104.54	.1	.3
Flint Run CL	983.32	.1	.3
Flint Run CL	919.83	.1	.3
Flint Run CL	887.16	.1	.3
Flint Run CL	851.42	.1	.3
Flint Run CL	797.37	.1	.3
Flint Run CL	750.66	.1	.3
Flint Run CL	698.14	.1	.3
Flint Run CL	604.67	.1	.3
Flint Run CL	541.57	.1	.3
Flint Run CL	441.52	.1	.3
Flint Run CL	329.21	.1	.3

HEC-RAS HEC-RAS 5.0.3 September 2016
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: 171244-Analysis
Project File : 171244-Analysis.prj
Run Date and Time: 4/17/2017 2:06:51 PM

Project in English units

PLAN DATA

Plan Title: 171244 Proposed Analysis
Plan File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.p02

Geometry Title: 171244 Proposed Geometry
Geometry File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.g02

Flow Title : 171244 Flow
Flow File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.f01

Plan Summary Information:

Number of:	Cross Sections	= 19	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 1	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: 171244 Flow

Flow File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.f01

Flow Data (cfs)

River	Reach	RS	2 yr	10 yr	25 yr	100 yr
Flint Run	Flint Run CL	2015.2	700	1474	1924	2653

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Flint Run	Flint Run CL	2 yr		Normal S = 0.0023
Flint Run	Flint Run CL	10 yr		Normal S = 0.0023
Flint Run	Flint Run CL	25 yr		Normal S = 0.0023
Flint Run	Flint Run CL	100 yr		Normal S = 0.0023

GEOMETRY DATA

Geometry Title: 171244 Proposed Geometry
Geometry File : p:\2017\171-244\-Calculations\HEC-RAS\171244-Analysis.g02

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 2015.2

INPUT
Description:
Station Elevation Data num= 186

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	831.15	3.119995	829.72	9.77002	826.58	14.15002	824.52	20.16998	821.68
26.40002	818.68	30.57001	816.68	39.02002	813.34	40.96997	812.55	44.73999	811.81
49.67999	810.86	51.37	810.56	57.45001	810.05	61.76001	809.58	65.21002	809.27
72.15997	808.64	72.96997	808.58	75.33002	808.39	80.72998	807.95	82.56	807.78
86.28998	807.47	92.96002	806.91	96.25	806.64	103.36	806.13	104.01	806.09
105.92	805.93	111.77	805.44	113.76	805.27	119.53	804.84	124.16	804.56
127.29	804.34	133.97	804.79	136.51	804.94	141.19	805.04	144.82	804.81
150.15	805.17	156.64	805.61	164.52	805.03	165.94	804.92	172.39	804.45
177.05	803.29	181.64	803.24	186.58	803.19	191.32	803.14	194.26	802.2
194.96	801.48	196.7	801.14	198.28	800.91	199.91	802.94	214.56	803.22
228.05	803.49	229.21	803.51	234.4	803.1	245.63	800.93	254.64	800.08
259.06	800.07	263.49	800.06	266.28	794.11	269.64	792.65	272.3	792.45
274.95	792.25	279.72	793.08	284.5	793.92	288.2	794.9	297.78	795.35
300.83	795.5	307.37	795.81	311.39	795.7	317.03	795.55	320.39	794.98
321.71	795.34	324.71	796.16	327.83	796.08	334.29	797.52	341.79	797.45
349.28	797.38	350.69	797.5	352.4	797.65	353.62	797.76	357.97	798.13

363.35	798.21	368.11	798.28	373.75	798.37	378.26	798.44	381.24	798.7
384.14	798.7	385.64	798.7	394.54	798.75	401.39	798.73	404.94	798.72
406.69	798.73	411.83	798.76	414.45	798.78	415.34	798.79	417.15	798.78
425.74	798.75	429.97	798.74	436.14	798.72	437.73	798.73	442.42	798.76
445.49	798.79	446.54	798.78	448.66	798.78	456.94	798.75	464.41	798.65
467.34	798.64	468.78	798.61	473.01	798.65	476.54	798.69	477.73	798.68
484.3	798.6	488.13	798.65	492.06	798.7	498.53	798.7	499.82	798.69
503.6	798.65	507.58	798.6	508.93	798.6	511.68	798.6	519.33	798.6
527.43	798.52	529.73	798.51	530.86	798.5	534.19	798.46	538.62	798.4
540.13	798.38	546.38	798.42	550.53	798.45	554.15	798.47	560.93	798.42
564.78	798.44	571.33	798.5	577.43	798.56	581.73	798.6	590.45	798.6
592.13	798.6	592.95	798.6	595.37	798.63	600.71	798.68	602.53	798.68
608.47	798.71	612.93	798.74	621.96	798.89	623.32	798.92	623.99	798.92
625.96	798.95	631.76	799.02	633.72	799.07	637.72	799.14	644.12	799.28
653.48	799.4	654.52	799.41	655.04	799.44	656.55	799.61	662.8	800.48
664.92	800.74	670.56	801.67	675.32	802.27	678.32	802.33	685.72	802.76
687.15	802.78	693.84	803.36	696.12	803.87	701.6	804.75	706.52	805.97
709.36	806.49	716.92	808.26	717.74	808.37	724.89	809.73	727.32	810.35
732.25	810.66	737.72	810.93	748.01	812.73	748.12	812.75	748.17	812.77
748.33	812.83	755.93	816.16	758.51	816.56	763.69	817.91	768.91	818.33
771.45	818.64	778.92	818.95	779.21	818.96	779.31	818.97	779.52	818.97
782.87	819.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	266.28	.04	288.2	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
266.28	288.2	242 193.36	136	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
381.24	782.87		F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1821.84

INPUT
Description:
Station Elevation Data num= 142

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.83	909973	819.23	4.570007	818.99	16.42999	814.75	20.5	813.69
28.95001	811.43	36.44	810.02	41.47003	809.05	46.27002	808.15	52.38	807.19
53.28003	807.03	53.98999	806.93	59.91998	806.19	66.52002	805.35	67.31	805.28
68.31	805.18	79.03998	804.09	81.33002	803.88	84.25	803.61	88.34003	803.25
91.56	803.02	100.19	802.38	104.08	802.13	109.38	801.81	116.13	801.51
116.39	801.5	116.6	801.48	123.4	800.95	129.12	800.43	132.06	800.23
137.43	800.07	141.64	800.12	148	800.35	154.16	800.54	163.94	800.6
165.48	800.58	166.69	800.55	172.49	800.39	179.21	800.31	179.5	800.3
179.87	800.29	186.51	800.07	191.73	799.98	195.81	799.87	200.54	799.71
204.25	799.59	211.75	799.34	214.56	799.26	216.77	799.17	221.57	798.98
227.68	798.72	229.29	798.66	235.6	798.4	241.81	798.14	242.61	798.1
243.62	798.06	249.62	797.72	254.33	797.53	259.56	797.27	263.65	797.05
266.86	796.87	270.66	796.63	275.5	796.39	277.67	796.28	279.38	796.18
290.77	800.34	292.19	800.76	293.6	801.17	296.43	802.01	300.13	801.29
303.82	800.58	309	800.18	314.77	799.86	319.84	799.57	323.43	799.37
329.44	799.03	334.9	797.54	340.41	796.17	345.87	795.14	349.59	794.85
352.56	795.26	355.54	795.67	357.62	795.58	362.13	795.4	368.3	794.4
374.47	793.39	380.3	793.06	384.04	792.53	387.42	792.62	390.8	792.71
391.87	793.66	396.62	796.34	402.88	796.87	406.56	797.48	406.84	797.53
407.65	797.66	414.68	797.94	418.65	798.09	422.47	799.29	427.6	799.03

437.12	798.56	437.73	798.53	445.5	798.38	448.47	798.32	454.73	798.2
458.92	798.11	460.91	798.08	464.52	798.01	470.38	798.89	474.3	798.97
479.21	799.14	482.99	799.22	488.31	799.17	494.98	799.2	495.32	799.2
495.59	799.2	502.32	799.08	508.2	799.07	509.33	799.05	510.75	799.02
520.8	798.89	526.52	798.86	533.41	798.87	537.35	798.97	542.29	799.03
544.36	799.06	546.01	799.12	551.36	799.24	558.05	799.5	558.37	799.51
558.62	799.52	565.37	799.94	571.22	800.88	573.82	801.53	583.83	805.99
589.59	809.06	596.43	812.88	600.4	815.09	605.36	817.79	607.4	818.91
609.04	819.77	618.94	825.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	362.13	.04	396.62	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
362.13	396.62	90	118.5	162		.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	296.43	815	F
422.47	618.94	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1703.34

INPUT
Description:
Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.35	639984	818.12	8.220001	817.2	11.69	815.93	15.26001	814.61
17.91998	813.63	29.29999	808.09	35.07001	806.91	35.92999	806.79	42.26001	805.96
43.16998	805.84	44.39999	805.68	50.22998	804.91	57.04999	804.02	60.98999	803.73
66.97	803.37	7.48999	802.53	79.26999	802.48	5.54999	801.94	91.54999	801.51
93.95999	801.33	103.83	800.62	106.44	800.42	110.49	800.4	113.75	800.38
116.18	800.36	126.97	800.29	128.47	800.28	134.86	800.24	141.37	800.2
143.46	800.3	148.93	800.58	153.02	800.78	155.94	800.93	159.87	801.12
162.95	801.27	165.25	801.39	169.96	801.62	176.27	801.93	176.97	801.97
178.58	802.04	181.24	801.97	189.94	801.74	191.2	801.7	192.9	801.66
202.22	801.41	205.32	801.25	209.41	801.05	212.35	800.91	214.54	800.8
225.87	800.24	226.82	800.19	229.6	800.06	238.2	799.63	240.46	799.55
242.32	799.49	247.5	799.3	251.36	799.17	254.54	799.06	257.01	798.97
263.39	799.38	268.31	799.7	274.91	800.12	275.29	800.15	276.31	800.21
281.11	800.2	285.91	800.18	291.78	799.12	297.65	798.06	308.57	797.7
311.8	797.13	316.26	795.47	324.28	794.87	325	794.81	325.17	794.8
332.31	794.27	336.16	793.49	340.22	793.75	342.6	796.2	349.31	796.57
357.25	797.01	363.41	797.36	370.42	796.85	374.32	796.57	374.39	796.56
377.44	796.34	381.69	794.92	385.94	793.5	390.1	792.52	392.97	792.87
398.02	791.9	403.06	790.93	408.03	789.91	412.25	791.71	416.36	793.29
420.23	795.57	422.2	798.47	424.54	799.31	426.87	800.14	437.39	800.86
439.87	801.95	447.82	806.3	451.46	808.54	456.34	811.67	458.49	813.05
460.1	814.01	471.13	820.61	472.38	821.37	472.56	821.47	472.81	821.61
476.87	823.94								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	392.97	.04	416.36	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
392.97	416.36	173	173.29	174		.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent

0	281.11	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1530.05

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.29	1.5	819.69	12.44	815.34	14.06	814.71	5.77002	814.02
24.91	801.48	26.5	801.47	28.09	801.46	30.29001	802.14	39.56	801.86
44.28	801.72	48.54001	801.59	53.29001	801.13	55.91	800.87	60.19	800.45
66.86002	799.81	71.85001	799.32	76.74002	799.24	80.44	799.19	87.13	799.09
94.05002	798.98	97.64001	798.92	101.41	798.87	104.6	798.82	107.65	798.77
115.69	798.65	118.53	798.61	121.25	798.59	125.5	798.55	129.95	798.52
132.46	798.5	134.85	798.48	144.23	798.41	146.39	798.39	148.46	798.37
158.5	798.3	162.06	798.27	167.32	798.21	172.81	798.1	178.75	797.98
187.09	797.81	188.22	797.79	193.03	797.69	201.37	797.52	202.16	797.5
202.91	797.49	209.12	797.36	215.64	797.23	220.04	797.14	227.26	797.14
229.95	797.13	230.05	797.13	236.91	797.13	243.24	797.13	243.88	797.13
244.12	797.13	257.25	797.13	257.81	797.13	258.39	797.13	264.77	797.12
266.43	797.12	272.37	796.53	278.3	795.94	280.42	792.63	282.17	790.59
284.51	790.48	285.87	790.41	289.58	790.23	292.89	791.04	298.46	792.4
299.58	792.42	301.2	792.46	306.54	792.58	313.62	792.73	316.94	793.98
323.43	800.28	325.35	800.79	327.26	801.3	338.85	800.94	341.37	801.95
344.02	803.47	348.34	806.09	352.45	808.89	358.29	812.77	362.27	815.39
366.05	817.66	369.23	819.59	372.57	821.57	377.26	824.33		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	278.3	.04	316.94	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
278.3	316.94	127	129.88	133	.1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	178.75	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1400.17

INPUT
Description:
Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.73	9899902	819.32	5.230011	817.58	.130005	816.31	19.75	798.61
23.32999	798.69	26.91	798.77	29.94	799.86	37.54999	799.87	45.14999	799.87
47.94	799.35	3.29001	799.17	54.37	799.14	55.82999	799.1	61.88	798.95
67.75	798.81	70.72	798.74	76.03	798.61	81.66	798.47	88.19	798.46
90.23001	798.46	91.63	798.46	99.08	798.46	103.56	798.46	105.63	798.45
115.49	798.45	123.07	798.44	125.65	798.44	127.32	798.44	132.7	797.85
139.25	797.12	140.73	796.95	151.26	796.8	157.95	796.7	159.86	796.67
163.55	796.24	167.24	795.81	175.13	795.93	175.39	795.94	182.31	796.04
187.05	796.12	189.39	796.16	192.81	796.21	194.62	796.24	201.91	796.47
209.19	796.7	211	796.65	217.82	796.46	223.9	796.29	227.63	796.38
234.68	796.54	245.05	796.78	245.97	796.8	254.56	797	256.66	796.27
260.5	792.64	261.77	791.93	264.11	791.62	266.45	791.32	267.34	791.33

270.57	791.39	273.05	791.43	279.64	791.53	287.43	791.55	292.09	792.9
294.67	794.37	296.73	796.47	298.78	798.57	300.94	799.29	303.09	800.02
314.92	801.24	318.27	802.63	323.99	805.54	330.2	809.3	332.36	810.65
338.16	814.33	342.13	816.85	345.24	818.91	349.8	821.85	352.33	823.48
353.09	823.96								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	254.56	.04	298.78	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
254.56	298.78	81	77.86	74	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	140.73	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1322.31

INPUT
Description:
Station Elevation Data num= 75

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822.417.420013		818.69	8.51001	818.159.660004		817.58	24.72	797.65
30.92001	797.1833.73999		796.97	37.13	796.72	39.81	797.62	47.37	797.5
50.26999	797.46	52.91	797.42	54.94	797.39	57.72	796.6866.89999		796.43
71.66	795.01	78.19	795.058	1.82001	795.078	5.15001	795.1	88.27	795.12
96.24001	795.17	99.08	795.19	101.74	795.2	106.05	795.23	109.38	795.25
115.25	795.41	120.01	795.55	123.86	795.65	128.7	795.79	139.51	796.07
140.87	796.09	142.14	796.11	153.92	796.26	154.79	796.28	159.05	796.33
162.2	795.13	165.95	794.9	172.02	795.58	179.22	795.67	182.53	795.71
182.64	795.71	190.9	795.81	195.99	795.87	196.56	795.88	197.18	795.89
203.52	795.97	206.33	796	210.48	796.05	221.72	796.19	233.66	796.34
235.91	795.37	238.48	794.43	240.74	792.69	241.66	792.27	245.25	792.04
249.88	791.76	254.87	791.45	256.22	791.37	258.26	791.25	266.25	791.24
272.02	791.24	274.59	791.71	276.6	794.09	282.28	797.44	285.4	798.53
287.92	799.06	290.44	799.59	298.19	799.41	303.78	801.48	308.05	803.5
312.62	806.45	315.02	807.93	317.26	809.38	327.05	815.93	330.44	818.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	233.66	.04	282.28	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
233.66	282.28	126	128.46	133	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	139.51	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1193.85

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.861.399994		819.16	.889984	816.13	16.72	811.111	9.73999	809.53

29.78	799	32.06	798.86	32.94	798.83	4.51999	799.52	45.39999	798.88
46.26999	798.83	48.29999	798.72	55.32001	797.28	62.44	796.64	67.91	796.14
71.12	796.17	4.23999	796.06	77.95001	796.01	81.23001	795.97	83.98001	795.93
88.22	795.87	93.27	795.81	95.20999	795.78	96.83	795.76	103.99	795.66
108.6	795.62	109.7	795.61	115.44	795.55	122.55	795.49	123.92	795.47
130.17	795.41	135.41	795.36	139.24	795.33	143.74	795.28	148.29	795.39
154.57	795.54	161.12	795.7	165.11	795.79	169.86	795.91	172.08	795.96
173.95	796	179.06	796.13	182.84	796.22	186.85	796.19	195.4	796.13
199.71	796.1	204.05	796.07	207.08	796.05	212.57	796.01	214.07	796
215.86	795.99	221.06	795.96	225.26	795.93	227.83	792.11	235.01	791.99
237.05	791.95	238.25	792.01	242.22	792.2	247.39	792.44	253.16	793.01
262.05	792.9	264.38	792.01	265.45	791.41	269.84	791.54	275.28	791.96
278.52	794.98	280.84	795.18	286.48	796.22	290.23	797.44	293.03	799.2
295.56	800.05	304.9	800.25	307.73	801.25	311.88	802.69	315.37	804.34
323.05	808.17	328.22	810.92	332.85	813.26	338.36	816.14	339.84	816.91
341.08	817.61	345.56	819.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	225.26	.04	278.52	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
225.26	278.52	103	89.31	78	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	148.29	815	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 1104.54

INPUT
Description:
Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.65	1.940002	819.65	7.679993	816.93	9.949982	815.87	16.16998	813.28
21.69998	811.52	25.72	810.72	30.39999	809.87	33.44998	809.48	37.50998	809.01
43.75	808.27	44.63	808.16	45.19998	808.09	47.91	807.76	56.94998	806.62
58.85999	806.46	1.78998	806.05	68.69998	805.16	79.82999	803.83	80.20999	803.78
80.44998	803.75	81.63	803.64	91.59998	804.09	93.95999	804.12	96.19	804.27
97.44998	804.15	102.02	803.72	108.13	803.16	112.73	802.73	118.79	802.16
124.46	801.63	129.46	801.17	137.73	800.4	140.12	800.18	141.89	800.01
149.17	799.33	154.26	798.4	160	797.34	162.45	796.89	170.83	795.35
179.1	795.08	182.8	794.96	184.29	794.91	187.77	794.79	189.31	794.74
197.39	795.67	204.31	795.93	212.93	796.25	214.97	796.33	218.26	796.45
227.73	796.07	231.1	795.64	235.5	791.96	236.86	791.92	238.01	791.89
242.92	791.75	244.38	791.71	247.1	791.63	251.89	791.5	257.8	791.33
263.11	791.18	268.49	791.03	278.01	790.77	283.87	791.87	288.28	792.98
291.01	792.28	299.35	791.2	307.09	791	308.43	793.04	309.81	793.63
310.92	794.83	315.06	795.33	319.21	795.84	322.09	797.86	324.97	799.88
328.83	800.7	329.35	800.81	332.55	800.69	336.09	800.51	341.04	800.99
347.69	803.86	348	803.99	348.31	804.15	361.61	811.02	361.93	811.18
362.24	811.34	368.89	814.73	375.53	818.02	375.85	818.18	376.17	818.35
381.24	821.15								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	231.1	.04	310.92	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
231.1	310.92	110	121.22	130	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 983.32

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.51	3.899994	818.92	5.910004	818.28	9	817.33	15.64999	815.25
20.14001	814.34	27.04001	813.33	27.39999	813.28	28.07999	813.19	39.14999	811.73
41.48999	811.42	45.07001	810.94	48.60001	810.46	50.89999	810.18	61.79999	808.74
62.64999	808.62	62.82999	808.66	3.11002	808.56	74.39999	807.13	77.06	806.8
81.14999	806.34	84.17999	805.98	86.16	805.78	91.29999	805.2	97.91	804.46
99.17999	804.35	105.53	803.89	109.66	803.71	112.64	803.6	117.22	803.56
119.76	803.53	121.41	803.51	126.13	804.09	131.57	804.26	133.53	804.24
135.03	804.38	135.34	804.35	141	803.81	149.45	803.02	154.94	802.52
159.02	802.16	161.89	801.9	171.08	801.07	173.89	800.74	181.69	799.82
187.49	799.13	192.3	798.56	201.03	797.33	205.79	796.66	210.25	796.03
214.83	795.73	220.11	795.39	223.13	795.19	228.69	795.29	234.44	795.39
243.25	795.55	245.41	795.31	248.58	794.96	250.58	794.73	258.16	795.6
264.16	795.31	270.17	795.02	272.72	791.84	274.67	790.66	277	790.75
283.46	790.97	290.15	791.21	294.19	791.34	297.13	791.44	301.14	791.57
308.47	791.81	312.85	793.04	315.69	796.38	317.38	798.51	320.88	801.11
328.19	802.32	332.47	803.03	336.37	802.81	339.56	802.71	344.2	803.21
347.8	803.4	349.87	804.42	351.86	805.75	356.83	808.87	361.98	812.55
365.55	815.06	376.15	822.65	377.72	823.8	379.24	825	382.47	827.44

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	270.17	.04	315.69	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
270.17	315.69	61	63.49	68	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 919.83

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	821.1	3.800018	819.91	6.580017	819.28	11.32001	818.41	13.77002	817.89
15.20999	817.62	20.73001	816.93	26.63	816.19	30.79001	815.63	35.36002	814.95
38.04001	814.59	42.55002	813.98	49.45001	812.95	49.75	812.91	50.25	812.83
56.94	811.83	60.87	811.19	64.14001	810.68	69.72	809.82	72.28	809.47
75.92001	808.96	83.70001	807.85	89.17999	807.17	95.11002	806.45	100.11	805.85
106.52	805.17	108.65	804.99	117.94	804.31	121.7	804.13	128.11	804.01
128.89	803.99	129.35	803.99	135.84	804.09	140.64	804.05	147.4	804.13
152.9	804.31	153.18	804.27	157.66	803.61	162.07	802.96	168.08	802.45
171.56	802.14	177.05	801.67	184	801.07	188.45	800.56	192.48	799.97
196.33	799.4	199.45	798.94	201.89	798.59	206.41	797.92	210.38	797.34
213.69	796.85	221.14	796.72	227.08	796.61	228.6	796.58	234.69	795.59
240.78	794.61	248.77	794.43	252.06	794.35	256.76	794.25	262.77	794.7
264.58	794.84	271.59	795.37	276.48	795.13	280.38	794.94	282.2	794.85
286.69	794.44	291.17	793.26	294.73	791.34	297.48	791.07	302.03	790.85
307.65	790.58	314.4	789.97	319.19	789.54	322.37	789.47	324.23	790
325.82	791.69	328.25	793.32	330.36	796.03	336.47	796.17	342.58	796.32

346.77	797.74	351.67	799.41	352.43	799.67	355.55	800.82	359.55	802.3
363.95	803.11	367.38	803.74	368.35	803.92	377.55	804.18	388.28	805.71
389.01	806.04	389.59	806.33	394.3	808.69	402.09	812.57	403.04	813.04
404.26	813.63	410.06	816.54	414.59	818.62	418.35	820.23		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	286.69	.04	330.36	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
286.69	330.36	32	32.67	33	.1 .3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 887.16

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	820.468.089996		819.148.589996		819.058.880005		818.99	10.03	818.87
20.32001	817.7727.44998		817.14	31.75	816.7337.95999		816.09	43.19	815.55
44.53	815.42	46.81	815.21	51.72	814.73	54.62	814.44	58.91	813.97
66.06	813.366.10001		813.2966.16998		813.2973.29001		812.2477.48999		811.67
80.48001	811.12	85.53	810.4587.66998		810.0888.92999		809.8793.82999		808.99
100.36	807.71	104.9	806.94	109.24	806.19	111.8	805.88	116.42	805.3
123.23	804.71	123.61	804.71	124.26	804.63	130.8	804.1	134.67	803.9
143.62	803.27	145.18	803.16	146.1	803.14	152.07	803.09	156.88	802.89
159.28	802.91	162.57	802.89	168.23	802.89	173.61	802.79	178.63	802.81
181.44	802.69	186.29	803.03	186.69	802.97	192.53	802.17	195.53	801.75
197.89	801.42	206.64	799.74	215.84	799.15	216.43	799.11	218.42	798.98
223.46	798.66	229.17	798.29	230.21	798.22	235.35	797.74	240.49	797.26
249.67	797.08	253.53	796.01	257.39	794.95	265.1	794.66	265.99	794.63
268.66	794.53	278.31	794.17	279.65	794.12	281.57	794.12	286.75	794.14
290.62	794.16	299.35	794.19	305.18	793.6	307.22	792.49	308.5	790.98
314.35	790.59	315.11	790.54	320.5	790.18	327.37	789.78	328.04	789.74
330.74	789.59	335.58	789.31	337.11	791.61	340.09	795.53	347.24	795.98
352.45	797.84	357.78	800.71	363.99	802.21	370.75	802.72	376.07	803.12
377.82	803.25	379.83	803.4	384.88	803.78	388.15	804.03	396.12	803.98
399.34	804.61	407.31	804.5	412.02	804.62	413.84	804.71	416.11	804.88
425.87	808.08	429.51	809.28	434.46	811.19	438.17	812.3	445.95	814.01
450.46	815.02	462.39	816.83	462.6	816.87	462.76	816.9	469.34	817.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	305.18	.04	340.09	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
305.18	340.09	33	35.74	38	.1 .3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 851.42

INPUT
Description:
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	818.62.5599976		818.522.289978		818.335.210022		818.09	12	817.6

21.84998	817.15	23.44	817.09	24.53998	816.99	31.03998	816.33	34.88	816.05
38.21997	815.75	43.87	815.23	46.32001	814.97	49.88	814.56	57.76001	813.65
59.78998	813.39	63.20001	812.84	66.96997	812.31	69.21002	812.09	74.15997	811.26
80.64996	810.35	81.34998	810.34	82.52997	810.19	2.08997	808.7	101.87	807.43
102.91	807.26	103.53	807.12	110.1	807.16	114.97	806.78	121.2	806.35
126.41	805.99	133.97	805.28	137.85	804.91	138.85	804.8	140.53	804.58
146.03	803.89	149.29	803.47	159.86	801.95	160.73	801.87	166.7	802.17
171.66	802.23	177.09	802.33	180.58	802.39	182.96	802.46	188.81	802.57
194.59	802.22	199.87	802.63	204.03	802.13	206.96	801.78	211.43	801.25
218.22	800.43	218.27	800.42	221.8	800	222.98	799.86	230.85	798.54
232.4	798.46	237.31	798.21	242.45	797.94	246.22	797.73	252.38	797.39
256.63	797.15	262.14	796.84	263.84	796.7	271.45	796.05	275.18	795.73
280.76	795.26	286.61	794.63	289.79	794.29	293.72	793.87	298.32	793.54
302.92	793.22	305.91	791.22	308.13	790.95	311.61	790.82	320.83	790.33
325.63	790.12	332.25	789.85	334.04	789.77	336.13	790.98	336.86	792.52
338.9	794.46	341.41	795.64	347.7	796.05	353.29	795.87	360.73	795.64
361.48	795.68	366.3	795.98	371.87	796.33	373.72	797.03	375.14	797.57
377.09	798.32	381.83	800.12	387.64	802.32	388.39	802.61	392.62	804.22
400.97	803.09	410.84	802.02	413.77	801.52	419.84	801.43	423.86	801.17
428.19	801.46	433.5	801.46	438.12	801.25	441.5	801.64	446.76	802.15
447.9	802.27	449.83	802.56	458.2	803.71	469.16	804.56	469.46	804.58
469.64	804.6	470.33	804.62	481.08	805	483.84	805.12	488.5	805.32
491.03	805.43	492.52	805.52	498.21	806.29	503.96	807.16	505.4	807.39
507.83	807.77	515.41	808.62	519.78	808.92	526.85	809.21	526.96	809.22
527.16	809.23	538.29	809.68	546.49	810.23	548.52	810.42	549.73	810.48
554.42	810.93	561.17	811.57	562.9	811.69	565.82	812.01	570.09	812.44
572.61	812.69	582.45	813.67	584.05	813.82	584.46	813.87	585.15	813.92
591.65	814.49	595.49	814.88	604.48	815.72	606.02	815.87	606.93	815.95
610.48	816.31	618.37	817.28	620.4	817.6	623.82	818.04	627.58	818.69
629.82	818.86	634.77	819.61	641.26	820.43	641.96	820.56	643.15	820.78
648.68	821.84								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	302.92	.04	336.86	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
302.92	336.86	53	54.05	56	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	290.01	800.75	F
348.37	648.68	800.75	F

BRIDGE

RIVER: Flint Run
REACH: Flint Run CL RS: 826.75

INPUT
Description:
Distance from Upstream XS = 24.67
Deck/Roadway Width = 14
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	800.75	790	295.01	800.75	790	295.01	800.75	797.75
343.37	800.75	797.75	343.37	800.75	790	400	800.75	790

Upstream Bridge Cross Section Data
Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	818.62.5599976		818.522.289978		818.335.210022		818.09	12	817.6
21.84998	817.15	23.44	817.0924.53998		816.9931.03998		816.33	34.88	816.05
38.21997	815.75	43.87	815.2346.32001		814.97	49.88	814.5657.76001		813.65
59.78998	813.3963.20001		812.8466.96997		812.3169.21002		812.0974.15997		811.26
80.64996	810.3581.34998		810.3482.52997		810.192.08997		808.7	101.87	807.43
102.91	807.26	103.53	807.12	110.1	807.16	114.97	806.78	121.2	806.35
126.41	805.99	133.97	805.28	137.85	804.91	138.85	804.8	140.53	804.58
146.03	803.89	149.29	803.47	159.86	801.95	160.73	801.87	166.7	802.17
171.66	802.23	177.09	802.33	180.58	802.39	182.96	802.46	188.81	802.57
194.59	802.22	199.87	802.63	204.03	802.13	206.96	801.78	211.43	801.25
218.22	800.43	218.27	800.42	221.8	800	222.98	799.86	230.85	798.54
232.4	798.46	237.31	798.21	242.45	797.94	246.22	797.73	252.38	797.39
256.63	797.15	262.14	796.84	263.84	796.7	271.45	796.05	275.18	795.73
280.76	795.26	286.61	794.63	289.79	794.29	293.72	793.87	298.32	793.54
302.92	793.22	305.91	791.22	308.13	790.95	311.61	790.82	320.83	790.33
325.63	790.12	332.25	789.85	334.04	789.77	336.13	790.98	336.86	792.52
338.9	794.46	341.41	795.64	347.7	796.05	353.29	795.87	360.73	795.64
361.48	795.68	366.3	795.98	371.87	796.33	373.72	797.03	375.14	797.57
377.09	798.32	381.83	800.12	387.64	802.32	388.39	802.61	392.62	804.22
400.97	803.09	410.84	802.02	413.77	801.52	419.84	801.43	423.86	801.17
428.19	801.46	433.5	801.46	438.12	801.25	441.5	801.64	446.76	802.15
447.9	802.27	449.83	802.56	458.2	803.71	469.16	804.56	469.46	804.58
469.64	804.6	470.33	804.62	481.08	805	483.84	805.12	488.5	805.32
491.03	805.43	492.52	805.52	498.21	806.29	503.96	807.16	505.4	807.39
507.83	807.77	515.41	808.62	519.78	808.92	526.85	809.21	526.96	809.22
527.16	809.23	538.29	809.68	546.49	810.23	548.52	810.42	549.73	810.48
554.42	810.93	561.17	811.57	562.9	811.69	565.82	812.01	570.09	812.44
572.61	812.69	582.45	813.67	584.05	813.82	584.46	813.87	585.15	813.92
591.65	814.49	595.49	814.88	604.48	815.72	606.02	815.87	606.93	815.95
610.48	816.31	618.37	817.28	620.4	817.6	623.82	818.04	627.58	818.69
629.82	818.86	634.77	819.61	641.26	820.43	641.96	820.56	643.15	820.78
648.68	821.84								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	302.92	.04	336.86	.06

Bank Sta: Left Right Coeff Contr. Expan.

302.92	336.86	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	290.01	800.75	F
348.37	648.68	800.75	F

Downstream Deck/Roadway Coordinates

num= 6

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	800.75	790	240.92	800.75	790	240.92	800.75	797.75
289.14	800.75	797.75	289.14	800.75	790	500	800.75	790

Downstream Bridge Cross Section Data

Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.318.579987		815.978.690002		815.938.769989		815.915.89001		814.35
20.20999	813.23	23.06	812.8127.76001		812.12	31.72	812.2537.39001		812.38
43.23999	811.79	44.56	811.55	46.75	811.15	54.75	810.4358.89999		810.05
65.73999	809.5366.07001		809.566.26999		809.4973.23001		808.96	77.78	808.61
80.39999	808.4384.73001		808.1489.29001		807.7896.32999		807.1	100.81	806.69
101.91	806.56	103.72	806.35	109.08	805.68	112.32	805.33	116.24	804.83
122.71	804.01	123.84	803.87	125.58	803.67	135.35	802.53	141.7	801.74
146.87	801.12	154.83	800.16	159.29	801.07	160.83	800.93	175.44	799.55
179.91	799.12	180.99	799.02	181.65	798.96	191.58	798.02	193.23	797.86
198.97	797.29	202.55	796.94	208.34	796.37	213.55	795.86	216.16	795.61

217.85	795.44	225.11	794.73	232.35	794.7	239.6	794.66	240.17	793.33
244.81	792.66	249.45	791.99	251.95	791.11	255.37	791.06	258.78	791.01
263.14	790.94	267.5	790.86	270.41	790.97	273.32	791.08	275.81	791.67
279.46	792.62	286.3	794.02	293.14	795.41	300.85	796.85	307.93	797.52
309.65	797.69	312.48	797.95	319.46	798.62	326.39	799.27	330.99	799.66
331.18	799.68	331.49	799.7	338.34	800.28	342.5	800.63	350.47	801.3
354.03	801.58	359.47	801.99	365.53	802.43	369.47	802.72	374.18	803.07
377.04	803.28	379.19	803.44	380.5	803.53	388.55	804.13	388.71	804.14
392.04	804.38	400.5	804.89	407.56	803.53	411.7	803.69	418.07	803.99
423.21	804.21	426.55	804.47	434.73	805.37	438.81	805.93	445.54	806.94
445.98	806.99	446.24	807.04	453.14	808.22	457.76	809.07	460.31	809.59
464.53	810.44	469.27	811.32	474.65	812.56	480.79	813.97	481.82	814.21
483.52	814.62	492.3	816.25	500.5	817.92				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	239.6	.04	286.3	.035

Bank Sta: Left Right Coeff Contr. Expan.
239.6 286.3 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	235.92	800.75	F
294.14	500.5	800.75	F

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
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

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 797.37

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.318.579987		815.978.690002		815.938.769989		815.915.89001		814.35
20.20999	813.23	23.06	812.8127.76001		812.12	31.72	812.2537.39001		812.38
43.23999	811.79	44.56	811.55	46.75	811.15	54.75	810.4358.89999		810.05
65.73999	809.5366.07001		809.566.26999		809.4973.23001		808.96	77.78	808.61

80.39999	808.43	84.73001	808.14	89.29001	807.78	96.32999	807.1	100.81	806.69
101.91	806.56	103.72	806.35	109.08	805.68	112.32	805.33	116.24	804.83
122.71	804.01	123.84	803.87	125.58	803.67	135.35	802.53	141.7	801.74
146.87	801.12	154.83	800.16	159.29	801.07	160.83	800.93	175.44	799.55
179.91	799.12	180.99	799.02	181.65	798.96	191.58	798.02	193.23	797.86
198.97	797.29	202.55	796.94	208.34	796.37	213.55	795.86	216.16	795.61
217.85	795.44	225.11	794.73	232.35	794.7	239.6	794.66	240.17	793.33
244.81	792.66	249.45	791.99	251.95	791.11	255.37	791.06	258.78	791.01
263.14	790.94	267.5	790.86	270.41	790.97	273.32	791.08	275.81	791.67
279.46	792.62	286.3	794.02	293.14	795.41	300.85	796.85	307.93	797.52
309.65	797.69	312.48	797.95	319.46	798.62	326.39	799.27	330.99	799.66
331.18	799.68	331.49	799.7	338.34	800.28	342.5	800.63	350.47	801.3
354.03	801.58	359.47	801.99	365.53	802.43	369.47	802.72	374.18	803.07
377.04	803.28	379.19	803.44	380.5	803.53	388.55	804.13	388.71	804.14
392.04	804.38	400.5	804.89	407.56	803.53	411.7	803.69	418.07	803.99
423.21	804.21	426.55	804.47	434.73	805.37	438.81	805.93	445.54	806.94
445.98	806.99	446.24	807.04	453.14	808.22	457.76	809.07	460.31	809.59
464.53	810.44	469.27	811.32	474.65	812.56	480.79	813.97	481.82	814.21
483.52	814.62	492.3	816.25	500.5	817.92				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	239.6	.04	286.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
239.6	286.3	43	46.71	48	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	235.92	800.75	F
294.14	500.5	800.75	F

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 750.66

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822.42	4.98999	820.86	5.440002	820.76	6.330017	820.39	12.76001	818.18
16.06	817.23	20.07001	815.92	27.12	813.73	27.91	813.47	38.17999	810.7
48.98999	808.67	49.25	808.62	49.5	808.58	60.31	807.57	1.08002	805.94
71.38	805.89	71.69	805.85	82.44	804.19	85.91	803.69	92.66	802.81
93.51001	802.69	94.39001	802.57	99.72	801.78	113.99	800.08	115.8	799.87
122.6	799.06	126.64	798.53	129.78	798.13	135.8	797.34	137.07	797.18
137.73	797.09	144.37	796.23	149.98	795.5	151.73	795.49	157.41	795.43
159.89	795.41	164.75	795.36	170.97	795.3	173.69	795.27	179.51	795.22
181.03	795.19	182.05	795.17	185.24	795.12	193.13	794.97	200.63	794.84
206.4	794.73	207.87	791.92	209.71	790.94	211.46	790.08	217.12	790.66
225.43	790.58	226.45	790.57	230.58	790.78	235.51	791.03	242.11	792.2
245.15	792.13	248.18	792.07	256.69	792.7	262.22	796.32	267.27	798.04
273.76	799	275.78	799.13	281.3	799.5	286.62	799.85	292.36	800.24
298.13	800.63	303.44	800.99	305.05	801.1	308.21	801.32	309.26	801.39
313.92	801.37	317.4	801.27	321.58	801.11	325.64	801.22	329.03	801.32
337.46	801.45	340.18	801.64	343.38	801.66	348.27	801.56	353.07	801.58
354.93	801.59	358.19	801.56	362.09	801.64	365.54	801.59	369	801.8
373.25	801.59	375.71	801.74	377.6	801.86	382.73	802.26	389.39	802.68
390.03	802.72	392.16	802.87	402.45	803.6	405.53	803.82	410.81	804.23
414.88	804.78	421.67	806.02	424.85	806.7	427.3	807.36	431.87	808.64
437.81	810.29	438.89	810.57	439.73	810.81	446.16	812.77	452.15	814.59
453.95	815.16	464.58	818.42	466.98	819.19	470.09	820.15	471.66	820.62

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	206.4	.04	262.22	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
206.4	262.22	54	52.52	50	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 698.14

INPUT
Description:
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	819.24	3.279999	817.867	.320007	816.21	3.54001	813.58	18.10001	811.6
20.98999	810.16	27.51001	807.34	29.94	802.21	33.64001	802	39.51999	801.66
46.14001	801.28	50.35001	801.04	50.76001	801.01	51.67999	800.96	58.25	800.58
62.33002	800.35	65.20999	799.78	71.53	797.72	72.51999	797.4	75.13	796.55
77.85001	795.67	88.76999	795.14	93.42001	794.92	95.48999	794.82	99.70001	794.62
103.05	794.65	104.31	794.66	107.57	794.69	115.08	794.76	124.45	794.85
125.41	794.86	125.84	794.86	132.42	794.92	136.66	794.83	146.41	794.63
146.51	794.62	148.73	794.58	155.31	794.44	160.6	794.32	165.74	794.37
170.59	794.41	173.19	793.77	173.75	788.85	177.76	788.86	184.59	789.81
189.99	790.2	194.47	790.99	200.65	790.79	204.53	789.64	206.42	789.97
209.56	793.49	211.78	793.78	216.01	795.71	219.97	796.02	222.68	796.12
223.83	796.16	230.81	796.42	241.65	796.81	244.07	797.04	245.32	797.16
253.42	797.94	262.44	798.8	265.19	799.06	269.78	799.19	274.52	799.31
278.13	799.41	281.99	799.51	291.08	799.76	294.13	799.7	297	799.65
298.28	799.63	304.45	799.52	309.03	799.43	318.32	799.27	319.34	799.25
319.79	799.24	326.78	799.12	330.54	799.05	333.83	798.99	333.87	798.99
337.81	801.49	348.34	802.06	348.8	802.08	348.96	802.09	349.28	802.11
359.79	802.58	370.1	803.14	370.78	803.18	371.46	803.22	378.35	803.53
381.76	803.73	385.7	803.96	392.75	804.28	393.65	804.36	403.74	805.54
413.63	808.15	414.72	808.4	415.84	808.75	422.44	810.97	425.71	812.11
429.79	813.42	436.7	815.74	438.02	816.16	447.68	819.23	451.83	820.43
453.69	821.02								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	173.19	.04	209.56	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
173.19	209.56	95	93.47	92	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 604.67

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	817.39	.5799866	816.997	.279999	812.48	12.48001	808.92	18.20001	805.17
19.86002	804.1	23.31	802.01	29.13	799.23	34.51999	797.93	39.95999	794.13
41.94	794.06	45.98001	793.92	49.32001	793.85	0.92999	793.75	55.51001	793.59
60.87	793.46	8.73999	793.29	71.5	793.25	72.82001	793.23	78.88	793.14
82.64999	793.09	91.29999	792.48	93.64001	792.52	94.67001	792.53	101	792.62

106.38	792.7	110	792.15	113.62	791.61	116.09	792.13	119.25	791.17
120.21	790.03	125.91	788.98	134.06	788.49	137.77	788.46	141.47	788.44
143.56	790.12	146.93	794.6	150.02	795.14	157.13	795.67	159.78	795.57
160.34	795.54	160.87	795.52	167.42	795.26	177.7	794.85	179.4	794.89
182.17	794.94	182.38	794.95	189.56	795.09	193.02	795.15	196.95	795.23
203.96	795.37	204.34	795.37	205.14	795.39	214.89	795.58	219.4	795.67
223.28	798.67	226.75	798.87	233.73	799.25	234.46	799.28	236.52	799.43
242.17	799.78	244.18	799.9	248.4	800.08	254.63	800.34	257.59	800.47
265.08	800.88	265.9	800.91	273	801.12	275.53	801.23	280.71	801.4
285.98	801.64	288.42	801.73	295.28	801.98	296.13	802	296.43	802.01
297.06	802.02	306.88	802.22	313.28	802.4	317.33	802.52	319.25	802.58
324.66	802.81	327.78	802.92	329.5	802.96	338.23	803.19	342.38	803.3
348.68	803.54	350.09	803.6	354.04	803.8	359.13	804.05	361.94	804.19
369.58	804.51	373.21	804.77	380.03	805.78	380.92	805.92	383.42	806.64
388.63	808.13	390.48	808.8	396.34	810.81	400.93	812.39	404.05	813.43
411.38	815.88	411.75	815.99	412.8	816.32	419.46	818.47	421.83	819.23
426.82	820.74	427.22	820.86						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	116.09	.04	146.93	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
116.09	146.93	73	63.1	54	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 541.57

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823.75	.1399841	823.63	1.389984	822.62	2.789978	821.48	8.369995	817.09
13.37	813.3	15.34	811.82	17.53	810.33	26.59998	804.54	29.28	802.87
32.26999	801.36	36.25998	799.28	39.92999	794.19	43.28	794.28	47.03	794.38
50.19	794.46	53.03	794.53	59.34998	794.69	65.5	789.62	68.97998	788.78
76.88998	788.27	81.00998	788.73	85.12	789.19	92.04999	789.71	95.16	790
98.26999	790.29	103.97	791.89	105.69	792.37	109.68	793.49	117.87	795.23
121.86	795.24	125.85	795.25	132.46	795.19	135.46	795.16	145.68	795.08
147.81	795.06	150.18	795.04	158.9	794.96	161.75	794.94	164.91	794.91
168.71	794.88	173.34	794.84	179.73	795.01	185.44	795.15	189.72	795.26
194.48	795.38	198.29	795.48	198.69	795.49	203.68	795.62	209.24	795.76
210.66	795.8	211.93	795.83	217.63	795.98	224.03	796.15	224.66	796.18
225.22	796.2	235.58	796.59	238.45	796.7	239.06	796.72	247.09	797.02
252.54	797.23	253.51	797.27	254.87	797.32	260.52	801.54	262.29	801.6
264.63	801.67	272.23	801.9	278.03	802.07	282.16	802.2	286.78	802.34
292.1	802.5	295.53	802.57	302.03	802.77	304.29	802.84	311.97	803.09
321.01	803.46	321.9	803.5	330.55	803.77	331.84	803.83	333.53	803.88
341.77	804.23	348.06	804.42	351.71	804.79	356.49	805.89	361.64	806.59
365.57	807.56	371.58	809.51	379.46	812.08	381.51	812.75	383.08	813.23
391.45	815.88	394.69	816.88	400.59	818.7	401.38	818.94	402.43	819.25
411.32	821.75	413.91	822.4	415.24	822.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	9.34998	.04	109.68	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.34998	109.68	111	100.05	85	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 441.52

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823.68	4.279999	820.76	10.54001	816.74	14.26999	814.29	16.92001	812.58
24.25	807.83	25.45999	807.04	32.67001	802.54	34.01001	801.73	4.23001	801.57
42.56	797.66	44.22	796.96	49.76999	795.55	58.23999	794.45	62.45999	789.44
64.63	789.83	70.04001	788.62	73.01999	788.6	76	788.58	79.78	789.03
82.67001	789.87	90.25	790.28	92.5	791.55	101.1	792.53	103.41	794.02
108.07	795.18	113.8	794.98	119.53	794.79	124.12	794.72	128.03	794.67
134.08	794.58	142.58	794.47	145.53	794.43	151.37	794.52	154.07	794.57
162.24	794.71	164.07	794.74	166.63	794.78	174.06	794.9	179.35	794.99
184.05	795.07	190.66	795.18	198.89	795.32	202.83	795.53	204.19	795.6
205.16	795.66	210.91	795.97	213.71	796.12	214.18	796.14	214.84	796.18
224.16	796.68	230.79	797.04	234.14	797.22	241	797.59	243.98	797.65
250.7	797.77	253.97	797.84	256.29	797.88	263.95	798.02	264.84	798.04
270.1	798.14	273.94	798.21	281.93	798.36	283.92	798.4	286.72	798.45
293.91	798.58	298.73	798.67	305.84	798.81	310.69	799.63	319.5	802.88
322.65	804.24	323.78	804.29	324.58	804.31	329.36	804.8	333.76	805.32
334.65	805.61	343.75	807.98	350.22	810.12	353.73	811.37	358.66	813.01
363.72	814.7	370.67	817.03	373.7	818.02	375.86	818.7	383.68	821.17
388.7	822.7	391.53	823.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.065	8.23999	.04	103.41	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
58.23999	103.41	109	112.31	116	.1	.3

CROSS SECTION

RIVER: Flint Run
REACH: Flint Run CL RS: 329.21

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	824.4	6.5100098	824.17	2.149994	823.26	9.809998	818.85	12.37	817.41
16.87	814.87	22.57999	811.61	30.95001	806.92	32.79001	805.89	33.82999	805.31
37.63	803.32	41.84	801.08	43	800.57	45.04001	799.98	49.88	794.68
57.87	794.72	63.42999	794.75	73.20999	794.81	73.63	794.81	73.87	794.81
74.73001	794.82	82.58	794.86	84.89	793.52	87.8	791.84	89.75999	790.7
97.02	789.18	110.08	788.43	111.83	788.37	113.83	788.31	113.97	788.31
118.29	788.54	119.77	789.32	120.88	790.98	122.63	791.27	124.81	791.06
131.14	794.88	144.54	794.37	154.06	794.01	157.95	793.86	161.99	793.81
165.57	793.76	169.99	793.7	175.76	793.62	177.99	793.59	183.83	793.51
185.97	793.48	186.09	793.48	191.93	793.69	197.88	793.89	202.06	794.29
206.44	794.7	214.14	795.43	216.64	795.66	220.86	796.06	223.22	796.17
226.06	796.3	226.84	796.34	228.22	796.4	237.08	796.82	242.11	797.05
248.13	797.33	254.91	797.8	258.55	798.91	265.06	799.99	266.07	800.32
267.66	800.48	270.45	800.89	277.87	801.67	284.54	803.22	288.09	803.9
297.42	806.31	298.11	806.49	298.3	806.55	306.12	808.73	308.51	809.87
312.72	812.59	318.72	815.57	326.81	820.45	328.93	821.72	330.14	822.31
334.53	823.81	335.06	823.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	82.58	.04	131.14	.035

Bank Sta: Left	Right	Coeff Contr.	Expan.
82.58	131.14	.1	.3

SUMMARY OF MANNING'S N VALUES

River:Flint Run

Reach	River Sta.	n1	n2	n3
Flint Run CL	2015.2	.035	.04	.03
Flint Run CL	1821.84	.035	.04	.03
Flint Run CL	1703.34	.035	.04	.06
Flint Run CL	1530.05	.035	.04	.06
Flint Run CL	1400.17	.035	.04	.06
Flint Run CL	1322.31	.035	.04	.06
Flint Run CL	1193.85	.035	.04	.06
Flint Run CL	1104.54	.035	.04	.06
Flint Run CL	983.32	.035	.04	.06
Flint Run CL	919.83	.035	.04	.06
Flint Run CL	887.16	.035	.04	.06
Flint Run CL	851.42	.035	.04	.06
Flint Run CL	826.75	Bridge		
Flint Run CL	797.37	.035	.04	.035
Flint Run CL	750.66	.035	.04	.035
Flint Run CL	698.14	.035	.04	.035
Flint Run CL	604.67	.035	.04	.035
Flint Run CL	541.57	.06	.04	.035
Flint Run CL	441.52	.06	.04	.035
Flint Run CL	329.21	.06	.04	.035

SUMMARY OF REACH LENGTHS

River: Flint Run

Reach	River Sta.	Left	Channel	Right
Flint Run CL	2015.2	242	193.36	136
Flint Run CL	1821.84	90	118.5	162
Flint Run CL	1703.34	173	173.29	174
Flint Run CL	1530.05	127	129.88	133
Flint Run CL	1400.17	81	77.86	74
Flint Run CL	1322.31	126	128.46	133
Flint Run CL	1193.85	103	89.31	78
Flint Run CL	1104.54	110	121.22	130
Flint Run CL	983.32	61	63.49	68
Flint Run CL	919.83	32	32.67	33
Flint Run CL	887.16	33	35.74	38
Flint Run CL	851.42	53	54.05	56
Flint Run CL	826.75	Bridge		
Flint Run CL	797.37	43	46.71	48
Flint Run CL	750.66	54	52.52	50
Flint Run CL	698.14	95	93.47	92
Flint Run CL	604.67	73	63.1	54

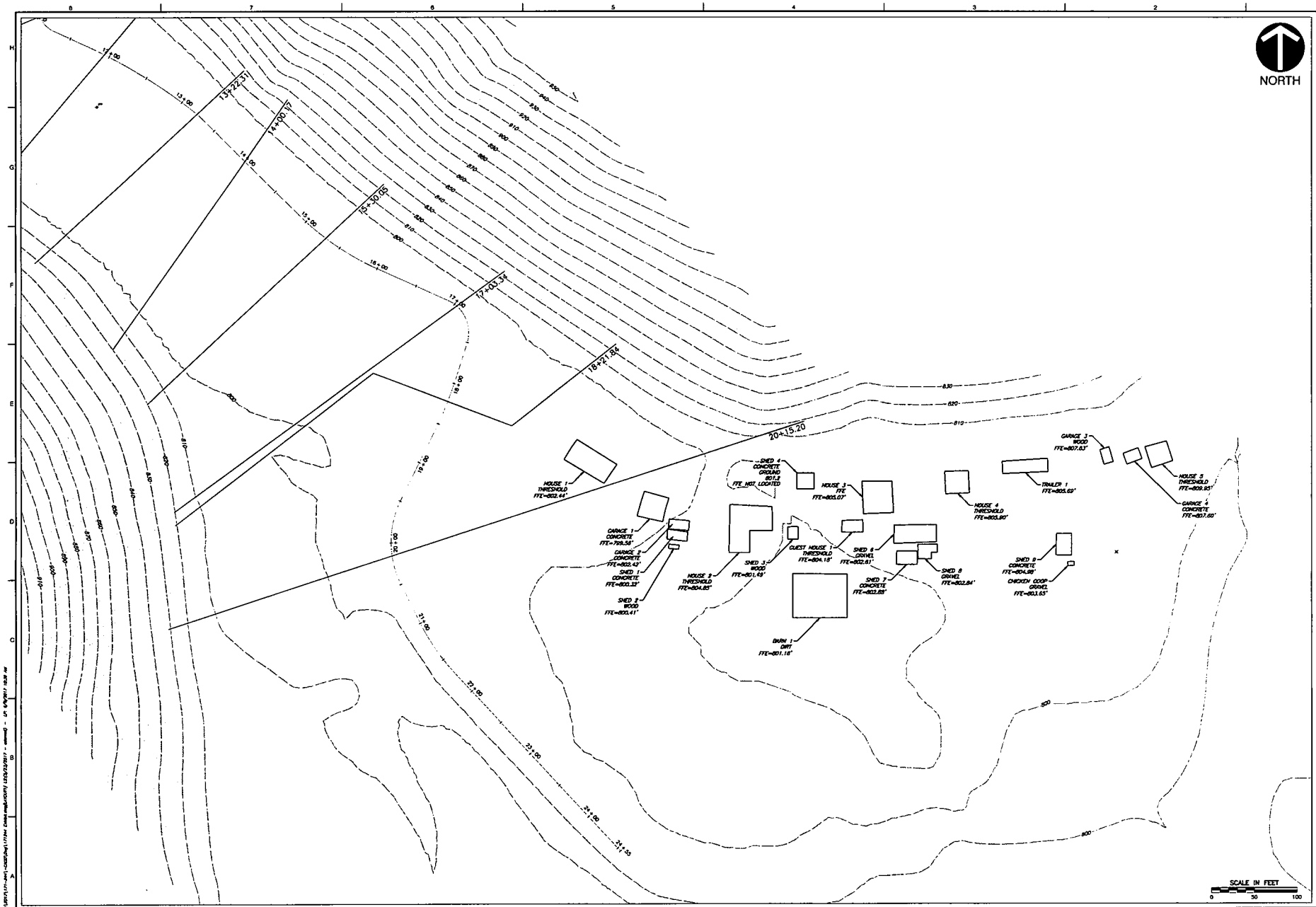
Flint Run CL	541.57	111	100.05	85
Flint Run CL	441.52	109	112.31	116
Flint Run CL	329.21			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Flint Run

Reach	River Sta.	Contr.	Expan.
Flint Run CL	2015.2	.1	.3
Flint Run CL	1821.84	.1	.3
Flint Run CL	1703.34	.1	.3
Flint Run CL	1530.05	.1	.3
Flint Run CL	1400.17	.1	.3
Flint Run CL	1322.31	.1	.3
Flint Run CL	1193.85	.1	.3
Flint Run CL	1104.54	.1	.3
Flint Run CL	983.32	.1	.3
Flint Run CL	919.83	.1	.3
Flint Run CL	887.16	.1	.3
Flint Run CL	851.42	.3	.5
Flint Run CL	826.75	Bridge	
Flint Run CL	797.37	.3	.5
Flint Run CL	750.66	.1	.3
Flint Run CL	698.14	.1	.3
Flint Run CL	604.67	.1	.3
Flint Run CL	541.57	.1	.3
Flint Run CL	441.52	.1	.3
Flint Run CL	329.21	.1	.3

APPENDIX G

Existing Structures Exhibit



REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
www.cecinc.com

ANTERO MIDSTREAM, LLC.
VICTORIA ACCESS ROAD AND BRIDGE
DODDRIDGE COUNTY, WV

EXISTING STRUCTURES EXHIBIT

DATE:	MAY 2017	DRAWN BY:	APD
DWG SCALE:	AS SHOWN	CHECKED BY:	GSL
PROJECT NO.			171-244
APPROVED BY:			GJF

DRAWING NO.: 1

SHEET 1 OF 1

WV Flood Map

or DFIRM. Its purpose is to assist with determining potential flood risk for the selected location.

Cross Section (XS) Lines

Base Flood Elevation (BFE) Lines

Floodway

Location of flood information

User Notes:

Flood Hazard Zone

Approximate Study (Zone A)

Detailed Study (AE, AH, AO)

High : 134.442

Low : -7.71759

Disclaimer:

The online map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. To obtain more detailed information in areas where Base Flood Elevations have been determined, users are encouraged to consult the latest Flood Profile data contained in the official flood insurance study. These studies are available online at www.msc.fema.gov.

WV Flood Tool (http://www.MapWV.gov/flood) is supported by FEMA, WV NFIP Office, and WV GIS Technical Center.

Map created on June 15, 2017

Flood Hazard Area:

Flood Hazard Area: Location is WITHIN the FEMA 100-year floodplain.

Flood Hazard Zone:	A (Advisory A)
Stream:	Flint Run
FEMA Issued Flood Map:	54017C0130C
Watershed (HUC8):	Little Musringum-Middle Island (503C
Advisory Flood Height:	About 799 ft
Water Depth:	About 6.6 ft (Source: HEC-RAS
Elevation:	About 792 ft
Location (long, lat):	(80.694249 W,39.341728 N)
Location (UTM 17N):	(526348, 4354743)
Contacts:	Doddridge
CRS Information:	N/A
Flood Profile:	N/A
HEC-RAS Model:	Flint Run
Parcel Number:	No Parcel

DIVISION OF NATURAL RESOURCES
324 Fourth Avenue, Room 200
South Charleston WV 25303-1228
TDD (304) 558-1439
TDD 1-800-354-6087
Fax (304) 558-6048
Telephone (304) 558-3225

Jim Justice
Governor

Stephen S. McDaniel
Director

March 15, 2017
Division of Natural Resources
RIGHT OF ENTRY

Re: LS-17-VI/09-622

Antero Midstream LLC
Wyatt Webster
c/o AllStar Ecology, LLC
Attention: Ernie Smith
1582 Meadowdale Road
Fairmont, WV 26554-

Dear Mr. Webster:

The Division of Natural Resources hereby grants to you for a period of ten (10) years from the date hereof, a Right of Entry for the purpose of a sixteen foot by fifty foot (16'x50') bridge and a timber mat bridge crossing (Victoria Launcher Access Road and Bridge) along Flint Run of McElroy Creek of Middle Island Creek of the Ohio River near Canton in Doddridge County, West Virginia.

This Right of Entry is subject to the following terms and conditions:

1. No in stream work during the fish-spawning season (April 1-June 30).

2. Work should be completed as quickly as possible during low flows in designated work areas only.

3. Any streambed disturbance should be restricted to the immediate area. In stream use of equipment should be kept to a minimum.

4. All shore areas disturbed by this operation must be reshaped, seeded and mulched immediately upon completion of work. The prompt establishment of vegetative cover will reduce future damage from high water levels.

5. Green concrete must not be put in the stream (highly toxic to aquatic life).

6. Guidance should be obtained from NRCS (formerly SCS) and a registered engineer for the design and construction. Must allow for passage of at least ten-year year flood flow.

7. Best management practices should be followed; measures such as hay

bales must be used to reduce downstream siltation.

8. Applicant is responsible for removing debris from in and around the installation periodically to prevent stream flow obstruction.

9. Durable head walls of logs, crossties, rock, or concrete shall be constructed at both the upstream and downstream ends of crossing to prevent erosion of fill material into the stream.

10. Bridge installation should not impede passage of recreational water craft. Water craft must be able to pass through or over the structure, whichever the applicant prefers.

11. The State's issuance of this Right-of-Entry does not provide for the applicant to work outside the requested boundaries nor does the State assume any liability for the applicant's/landowner's construction activities. By accepting this Right-of-Entry, the applicant/landowner assumes liability for any/all damages caused by this activity to both upstream and downstream landowners.

12. A 404 permit may be required from the U.S. Army Corps of Engineers. You may call them at 304-529-5710 or 412-395-7155.

Guidelines of Best Management Practices for Sediment and Erosion Control as outlined by the Section of Water Resources, Division of Environmental Protection must be followed. Copies of those guidelines are available from the Section of Water Resources, Telephone No. (304) 926-0440.

The issuance of this Right of Entry by the Division of Natural Resources does not preclude the necessity for you to obtain a permit from the U.S. Corps of Engineers District Office, Permit Section, or any other state or federal permits which may be required by law, nor does this Right of Entry negate the need to comply with the West Virginia Water Pollution Control Act and/or the State Environmental Quality Board's administrative regulations, applicant is also responsible for determining if the proposed activity is located within an identified flood plain and it is the applicant's responsibility for contacting the local governmental agency in charge of that program and obtaining a flood plain development permit for it. This Right of Entry does not grant any rights or privileges, or permission to enter upon or to cross the property of any other person, nor is permission granted to remove any material that lies upon the property of any other persons. Work should be completed in as brief a period as possible and within one year from the date of this letter. In the event you fail or refuse to comply with any of the terms or conditions herein, this Right of Entry will be canceled and considered null and void and the Division will reject further applications.

Your payment in the amount of $200.00 is now due and payable to the Division of Natural Resources covering the first year's annual fee of this agreement. You must notify the Division in writing with this installation has been removed. Your agreement will be effective upon receipt of your payment in full.

Sincerely,

Joe T. Scarberry, Supervisor
Office of Land and Streams

JTS:cb
pc: DNR Fish Biologist
Mr. Jeremy Bandy, Environmental Enforcement
DNR Conservation Officers

United States Department of the Interior

FISH AND WILDLIFE SERVICE

West Virginia Field Office
694 Beverly Pike
Elkins, West Virginia 26241

Contact Name: Ernest Smith

Email Address or Fax Number: ernie@allstarecology.com

FWS File # 2017-I-0382 **All future correspondence should clearly reference this FWS File #.**

Project Name & Location: Victoria Launcher Access Road and Bridge, Doddridge County, WV

Date of Letter Request: February 28, 2017

This is in response to your letter requesting threatened and endangered species information in regard to the proposed project listed above. These comments are provided pursuant to the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U. S. C. 1531 *et seq.*).

Two federally listed species could occur in the project area, the endangered Indiana bat (*Myotis sodalis*), and the threatened northern long-eared bat (NLEB) (*M. septentrionalis*).

The Indiana bat may use the project area for foraging and roosting between April 1 and November 15. Indiana bat summer foraging habitats are generally defined as riparian, bottomland, or upland forest, and old fields or pastures with scattered trees. Roosting/maternity habitat consists primarily of live or dead hardwood tree species which have exfoliating bark that provides space for bats to roost between the bark and the bole of the tree. Tree cavities, crevices, splits, or hollow portions of tree boles and limbs also provide roost sites. In West Virginia, the U.S. Fish and Wildlife Service (Service) considers all forested habitat containing trees greater than or equal to 5 inches in diameter at breast height (DBH) to be potentially suitable as summer roosting and foraging habitat for the Indiana bat. Similar to the Indiana bat, NLEB foraging habitat includes forested hillsides and ridges, and small ponds or streams. NLEB are typically associated with large tracts of mature, upland forests with more canopy cover than is preferred by Indiana bats. NLEB seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices, and this species is known to use a wider variety of roost types than the Indiana bat. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also occasionally been found roosting in structures like barns and sheds.

Indiana bats and NLEB use caves or mine portals for winter hibernation between November 15 and March 31. These species also use the hibernacula and the areas around them for fall-swarming and spring-staging activity (August 15 to November 14 and April 1 to May 14, respectively). Some males have been known to stay close to the hibernacula during the summer

and may use the hibernacula as a summer roosts. There may be other landscape features being used by NLEB during the winter that have yet to be documented.

The Service has reviewed the number of acres of potentially suitable foraging and roosting habitat on the West Virginia landscape available to each Indiana bat, versus the total acreage of forest. On that basis, we have determined that small projects, more than 10 miles from a known priority 1 or 2 Indiana bat hibernaculum, more than 5 miles from a known priority 3 or 4 Indiana bat hibernaculum, or more than 2.5 miles from any known maternity roost, or more than 5 miles from summer detection sites where no roosts were identified, that affect less than 17 acres of forested habitat, and will not affect any potential hibernacula, will have a very small chance of resulting in direct or indirect effects to the Indiana bat, and therefore these effects are considered discountable. **Please note that the Service may review and update this assessment at any time as new information becomes available.**

The Service does not anticipate that this project is likely to adversely affect the Indiana bat because your project: 1) will affect less than 17 acres of potential Indiana bat foraging or roosting habitat; 2) is not within any of the Indiana bat hibernacula or summer use buffers described above; and 3) will not affect any potential caves or mines that could be used as hibernacula for this species.

The NLEB may occur within the range of the proposed project, and may be affected by the proposed construction and operation of this project. Any take of NLEB occurring in conjunction with these activities that complies with the conservation measures (as outlined in the 4(d) rule), as necessary, is exempted from section 9 prohibitions by the 4(d) rule and does not require site specific incidental take authorization. Note that the 4(d) rule does not exempt take that may occur as a result of adverse effects to hibernacula and that no conservation measures are required as part of the 4(d) rule unless the proposed project: 1) involves tree removal within 0.25 miles of known NLEB hibernacula; or 2) cuts or destroys known, occupied maternity roost trees or any other trees within a 150-foot radius around known, occupied maternity tree during the pup season (June 1 to July 31). This proposed project is not located within any of these radii around known hibernacula or roost trees and will not affect any known NLEB hibernacula, therefore any take of NLEB associated with this project is exempted under the 4(d) rule and no conservation measures are required.

This letter provides technical assistance only and does not serve as a completed section 7 consultation document. If there is a federal nexus for the project (e.g., federal funding provided, federal permits required to construct), no tree clearing or any project construction activities on any portion of the parcel should occur until consultation under section 7 of the ESA, between the Service and the federal action agency, is completed. Section 7 consultation is not complete until the federal action agency submits a determination of effects to this office, the Service concurs with the federal action agency's determination, and the federal action agency agrees to limit tree clearing to under 17 acres as a mandatory condition for any permit decision rendered for this project. All measures must be implemented as proposed. If there is no federal nexus associated with this project, then no further coordination with this office is required.

Should project plans change or amendments be proposed that we have not considered in your proposed action, or if additional information on listed and proposed species becomes available, or if new species become listed or critical habitat is designated, this assessment may be reconsidered.

If you have any questions regarding these comments, please contact the biologist listed below at (304) 636-6586 or at the letterhead address.

Amanda Selmer — 3/14/2017

Biologist — Date

John E. Schmidt — 3/21/2017

John Schmidt, Field Supervisor — Date

Gmail George Eidel <doddridgecountyfpm@gmail.com>

Victoria Access Road and Bridge

5 messages

George Eidel <doddridgecountyfpm@gmail.com> Tue, Aug 1, 2017 at 2:41 PM
To: Rachel Grzybek <rgrzybek@anteroresources.com>

Rachel,

Good afternoon, we received the check for the Victoria Access Road and Bridge. The only thing we need now is a letter/permit from the Army Corp.

Thanks

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George C. Eidel, CFM, OEM Director/Floodplain Manager
Doddridge County Office of Emergency Management
105 Court Street Suite 3
West Union, WV 26456-2095
Work Phone:1-304-873-1343
Mobile Phone: 1-304-281-7407
Fax: 1-304-873-1840
doddridgecountyfpm@gmail.com
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Rachel Grzybek <rgrzybek@anteroresources.com> Tue, Aug 1, 2017 at 2:46 PM
To: George Eidel <doddridgecountyfpm@gmail.com>

Hi George,

No USACE required since there will be no temporary or permanent impacts done to streams/wetlands.

Let me know if you need anything else, or if you have any questions.

Thanks!

Rachel Grzybek

Phone: (304) 842-4008

Cell: (304) 641-2396

Fax: (304) 842-4102

rgrzybek@anteroresources.com

From: George Eidel [mailto:doddridgecountyfpm@gmail.com]
Sent: Tuesday, August 01, 2017 2:41 PM
To: Rachel Grzybek
Subject: Victoria Access Road and Bridge

[Quoted text hidden]

George Eidel <doddridgecountyfpm@gmail.com> Tue, Aug 1, 2017 at 2:50 PM
To: Rachel Grzybek <rgrzybek@anteroresources.com>

Did you have a letter from ACE on it.
[Quoted text hidden]

Rachel Grzybek <rgrzybek@anteroresources.com> Tue, Aug 1, 2017 at 3:45 PM
To: George Eidel <doddridgecountyfpm@gmail.com>

Nope nada.

Confirmation/approval was not required since the bridge will span the Ordinary High Water Mark of the stream.

Let me know if you have any other questions.

Thanks,

Rachel Grzybek

Phone: (304) 842-4008

Cell: (304) 641-2396

Fax: (304) 842-4102

rgrzybek@anteroresources.com

From: George Eidel [mailto:doddridgecountyfpm@gmail.com]
Sent: Tuesday, August 01, 2017 2:50 PM
To: Rachel Grzybek
Subject: Re: Victoria Access Road and Bridge

[Quoted text hidden]

George Eidel <doddridgecountyfpm@gmail.com> Tue, Aug 1, 2017 at 3:50 PM
To: Rachel Grzybek <rgrzybek@anteroresources.com>

Got it, will send the permits out tomorrow

Thanks
[Quoted text hidden]