

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: # 15-373

West Union

Date Approved: 10/07/2015



Expires: 10/07/2016

Issued to: EQT Gathering, LLC

POC: Matt Hoover

(724) 873-3009

**Company Address: 555 Southpointe Blvd. Suite 200
Canonsburg, PA 15317**

Project Address: Janus Compressor Station - Left Fork of Arnolds Creek

Firm:

Lat/Long: 39.259864, -80.794458

Purpose of development: Natural Gas Compressor Station

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

Date: 10/07/2015

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 RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Aug-26-2015	109364	\$500.00

INV #	INV DATE	DESCRIPTION	AMOUNT	DISCOUNTS	NET AMOUNT
KAD8182015SJ	08/18/15	SUSIE JANE BRIDGE FLOODPLAIN FEE	500.00	0.00	500.00

Permit # 15-374

TOTAL INVOICES PAID =====> 500.00 0.00 500.00

DETACH AND RETAIN FOR TAX PURPOSES

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



ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Wells Fargo
Denver, CO

Check No. 109364

11-24
412

400 - AP ACCT WELLS FARGO

PAY EXACTLY **9500dols00cts**
Five Hundred Dollars and Zero Cents

CHECK NUMBER	DATE	PAY EXACTLY
109364	Aug-26-2015	\$500.00

TO
THE
ORDER
OF

DODDRIDGE COUNTY COMMISSION
BETH A ROGERS, CLERK~118 EAST COURT STREET~ROOM 10
2
WEST UNION, WV 26456

[Handwritten Signature]

⑈ 109364⑈ ⑆ 041203824⑆ 9671451392⑈



Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Aug-26-2015	109364	\$500.00

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Permit # 15-374

TOTAL INVOICES PAID =====> 500.00 0.00 500.00

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County, West Virginia

RECEIPT NO: 5362 DATE: 2015/08/31
 FROM: ANTERO RESOURCES AMOUNT: \$ 500.00

FIVE HUNDRED DOLLARS AND 00 CENTS

FOR: #15-374 SUSIE JANE BRIDGE

00000109364 FP-BUILDING PERMITS 020-318 TOTAL: \$500.00

MICHAEL HEADLEY
 SHERIFF & TREASURER

MEC
 CLERK

139209

THE GATEWAY ENGINEERS, INC.

DATE	INVOICE NO.	COMMENT	AMOUNT	NET AMOUNT
08/14/2015	2015-08/14	Application Fee C-18422-0009		1,000.00
#15-373 EQT Gathering LLC. Janus Compressor Station				
DATE 08/14/15			TOTAL	1,000.00
VENDOR Doddridge County				

139209

THE GATEWAY ENGINEERS, INC.

400 HOLIDAY DRIVE, SUITE 300
PITTSBURGH, PA 15220-2727
(412) 921-4030

PNC Bank, N.A.
Pittsburgh, PA

8-9-430

One Thousand and no/100

DATE

AMOUNT

08/14/15

139209

\$1,000.00

PAY
TO THE
ORDER
OF

DODDRIDGE COUNTY
ATTN.: GEORGE EIDEL
118 EAST COURT STREET
WEST UNION WV 26456

VOID AFTER 90 DAYS

AUTHORIZED SIGNATURE

Security features. Details on back.

⑈ 139209 ⑈ ⑆043000096⑆ 1028945297⑈

DATE	INVOICE NO.	COMMENT	AMOUNT	NET AMOUNT
08/14/2015	2015-08/14	Application Fee C-18422-0009		1,000.00
#15-373 EQT Gathering LLC. Janus Compressor Station				
DATE 08/14/15	VENDOR Doddridge County		TOTAL	1,000.00

Doddridge County, West Virginia

RECEIPT NO: 5301

DATE: 2015/08/18

FROM: GATEWAY ENGINEERS INC

AMOUNT: \$ 1,000.00

ONE THOUSAND DOLLARS AND 00 CENTS

FOR: #15-373 EQT GATHERING LLC JANUS COMPRESSOR OR STATION

00000139209 FP-BUILDING PERMITS

020-318 TOTAL: \$1,000.00

MICHAEL HEADLEY
SHERIFF & TREASURER

MEC
CLERK

Customer Copy



GATEWAY

On Call. On Time. On Target.

15-373

THE GATEWAY ENGINEERS, INC.

400 HOLIDAY DRIVE, SUITE 300
PITTSBURGH, PA 15220-2727
412.921.4030 PHONE
412.921.9960 FAX

www.gatewayengineers.com

LETTER OF TRANSMITTAL

August 14, 2015
C-18422-0009

Doddridge County Commission
118 East Court Street
West Union, WV 26456

Attn: George C. Eidel, OEM/Floodplain Manager

RE: Janus Compressor Station
Floodplain Development Permit Application

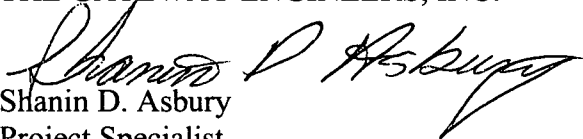
Dear Mr. Eidel:

Enclosed you will find the following items we are sending via Fed Ex.

COPIES	DESCRIPTION
1	Floodplain Development Permit Application
1	Floodplain Development Permit Drawing set
1	Project Narrative
1	Hydrology and Hydraulics Report
1	Check for application fee, \$1000.00

These are being provided for your use and records.

Sincerely,
THE GATEWAY ENGINEERS, INC.


Shanin D. Asbury
Project Specialist

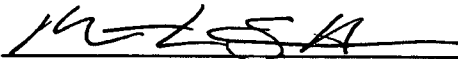
G:\Projects\18000\18422 EQT\0009 Janus CS\File Xfer\Sent\2015-08-14 Floodplain Dev App submitted\2015-8-14 Transmittal to Doddridge Co.doc

DODDRIDGE COUNTY
FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

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

8-14-15

SECTION 2: PROPOSED DEVELOPMENT (TO BE COMPLETED BY APPLICANT).

IF THE APPLICANT IS NOT A NATURAL PERSON, THE NAME, ADDRESS, AND TELEPHONE NUMBER OF A NATURAL PERSON WHO SHALL BE APPOINTED BY THE APPLICANT TO RECEIVE NOTICE PURSUANT TO ANY PROVISION OF THE CURRENT DODDRIDGE COUNTY FLOODPLAIN ORDINANCE.

APPLICANT'S NAME: EQT Gathering, LLC., Attn: Matt Hoover

ADDRESS: 555 Southeppointe Blvd., Suite 200, Canonsburg, PA 15317

TELEPHONE NUMBER: (724) 873-3009

CONTRACTOR NAME: TBD

ADDRESS: _____

TELEPHONE # _____

WV CONTRACTOR LICENCE # _____

ENGINEER'S NAME: The Gateway Engineers, Inc., Attn: Matthew E. Bagaley

ADDRESS: 400 Holiday Drive, Suite 300, Pittsburgh, PA 15220

TELEPHONE NUMBER: (412) 921-4030

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Gregory W. Price

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) 673 Harbor Avenue, Mays Landing, N.J. 08330

DISTRICT: Southwest District (Left Fork Arnolds Creek)

LAND BOOK DESCRIPTION: 39°15'35.51" N 80°47'40.05" W; 39.259864, -80.794458

DEED BOOK REFERENCE: 39°15'35.51" N 80°47'40.05" W; 39.259864, -80.794458

TAX MAP REFERENCE: 08-20-4

EXISTING BUILDINGS/USES OF PROPERTY: Existing use: residential, gas wells, field & pipelines, Proposed use: compressor station, gas wells, and pipelines station

NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Existing residential structure is vacant and will be demolished as part of the project.

ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Not Applicable

To avoid delay in processing the application, please provide enough information to easily identify the project location.

DESCRIPTION OF WORK (CHECK ALL APPLICABLE BOXES)

A. STRUCTURAL DEVELOPMENT

<u>ACTIVITY</u>	<u>STRUCTURAL TYPE</u>
<input type="checkbox"/> New Structure	<input type="checkbox"/> Residential (1 – 4 Family)
<input type="checkbox"/> Addition	<input type="checkbox"/> Residential (more than 4 Family)
<input type="checkbox"/> Alteration	<input type="checkbox"/> Non-residential (floodproofing)
<input type="checkbox"/> Relocation	<input type="checkbox"/> Combined Use (res. & com.)
<input type="checkbox"/> Demolition	<input type="checkbox"/> Replacement
<input type="checkbox"/> Manufactured/Mobil Home	

B. OTHER DEVELOPMENT ACTIVITIES:

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

C. STANDARD SITE PLAN OR SKETCH

1. SUBMIT ALL STANDARD SITE PLANS, IF ANY HAVE BEEN PREPARED (ENGINEERING PLANS MUST BE SIGNED AND SEALED).

2. IF STANDARD SITE PLANS HAVE NOT BEEN PREPARED:

SKETCH ON A SEPARATE 8 ½ X 11 INCH SHEET OF PAPER THE SHAPE AND LOCATION OF THE LOT. SHOW THE LOCATION OF THE INTENDED CONSTRUCTION OR LAND USE INDICATING BUILDING SETBACKS, SIZE & HEIGHT. IDENTIFY EXISTING BUILDINGS, STRUCTURES OR LAND USES ON THE PROPERTY.

3. SIGN AND DATE THE SKETCH.

**ACTUAL TOTAL CONSTRUCTION COSTS OF THE COMPLETE DEVELOPMENT/
PROPOSED CONSTRUCTION PROJECT WITHIN THE FLOODPLAIN**
\$ 100,000

D. ADJACENT AND/OR AFFECTED LANDOWNERS:

1. NAME AND ADDRESS OF ALL OWNERS OF SURFACE TRACTS ADJACENT TO THE AREA OF THE SURFACE TRACT (UP & DOWN STREAM) UPON WHICH THE PROPOSED ACTIVITY WILL OCCUR AND ALL OTHER SURFACE OWNERS UP & DOWN STREAM) WHO OWN PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY (IF ONE HAS BEEN COMPLETED.

NAME: Loren K & Larry N Smith
ADDRESS: Route 1, Box 54B
1093 Punkin Center Road
West Union, WV 26456

NAME: Michael Wilkinson, et al
ADDRESS: Route 1, Box 52
878 Punkin Center Road
West Union, WV 26456

1. NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON ANY ADJACENT PROPERTY AT THE TIME THE FLOODPLAIN PERMIT APPLICATION IS FILED AND THE NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN ANY HOME ON ANY PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY.

NAME: Loren K & Larry N Smith
ADDRESS: Route 1, Box 54B
1093 Punkin Center Road
West Union, WV 26456

NAME: Michael Wilkinson
ADDRESS: Route 1, Box 52
878 Punkin Center Road
West Union, WV 26456

E. CONFIRMATION FORM

THE APPLICANT ACKNOWLEDGES, AGREES, AND CONFIRMS THAT HE/IT WILL PAY WITHIN 30 DAYS OF RECEIPT OF INVOICE BY THE COUNTY FOR ALL EXPENSES RELATIVE TO THE PERMIT APPLICATION PROCESS GREATER THAN THE REQUIRED DEPOSIT FOR EXPENSES INCLUDING:

- (A) PERSONAL SERVICE OF PROCESS BY THE DODDRIDGE COUNTY SHERIFF AT THE RATES PERMITTED BY LAW FOR SUCH SERVICE.
- (B) SERVICE BY CERTIFIED MAIL RETURN RECEIPT REQUESTED.
- (C) PUBLICATION.
- (D) COURT REPORTING SERVICES AT ANY HEARINGS REQUESTED BY THE APPLICANT.

(E) CONSULTANTS AND/OR HEARING EXPERTS UTILIZED BY DODDRIDGE COUNTY FLOODPLAIN ADMINISTRATOR/MANAGER OR FLOODPLAIN APPEALS BOARD FOR REVIEW OF MATERIALS AND/OR TESTIMONY REGARDING THE EFFICACY OF GRANTING OR DENYING THE APPLICANT'S FLOODPLAIN PERMIT.

NAME (PRINT): Matt Hoover

SIGNATURE:  DATE: 8-14-15

After completing SECTION 2, APPLICANT should submit form and fees to Clerk of Doddridge County Court or his/her representative for review.

SECTION 3: FLOODPLAIN DETERMINATION (to be completed by Floodplain Administrator/Manager or his/her representative)

THE PROPOSED DEVELOPMENT:

THE PROPOSED DEVELOPMENT IS LOCATED ON:

FIRM Panel: _____

Dated: _____

Is **NOT** located in a Specific Flood Hazard Area (Notify applicant that the application review is complete and **NO FLOODPLAIN DEVELOPMENT PERMIT IS REQUIRED**).

Is located in Special Flood Hazard Area.

FIRM zone designation _____

100-Year flood elevation is _____ NGVD .

Stream name _____

Profile # _____

Unavailable

The proposed development is located in a floodway.

See section 4 for additional instructions.

SIGNED _____

DATE _____

**SECTION 4: ADDITIONAL INFORMATION REQUIRED FOR DEVELOPMENT IN
SPECIAL FLOOD HAZARD AREA (To be completed by Floodplain
Administrator/Manager or his/her representative)**

The applicant must submit the documents checked below before the application can be processed.

- A plan showing the location of all existing structures, water bodies, adjacent roads and proposed development.

- Development plans, drawn to scale, and specifications, including where applicable: details for anchoring structures, storage tanks, proposed elevation of lowest floor, (including basement or crawl space), types of water resistant materials used below the first floor, details of flood proofing of utilities located below the first floor and details of enclosures below the first floor. Also _____

- Subdivision or other development plans (If the subdivision or development exceeds 10 lots or 2 acres, whichever is the lesser, the applicant must provide 100-year flood elevations if they are not otherwise available).

- Plans showing the extent of watercourse relocation and/or landform alterations.

- Top of new fill elevation _____ Ft. NGVD.
For floodproofing structures applicant must attach certification from registered engineer or architect.

- Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood. A copy of all data and calculations supporting this finding must also be submitted.

- Manufactured homes located in a Flood Hazard Area must have a West Virginia Contractor's License and a Manufactured Home Installation License as required by the Federal Emergency Management Agency (FEMA).

- Other: _____

SECTION 5: PERMIT DETERMINATION (To be completed by Floodplain Administrator/Manager or his/her representative)

I have determined that the proposed activity (**type is or is not**) in conformance with provisions of the Floodplain Ordinance adopted by the County Commission of Doddridge County on May 21, 2013. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED _____ DATE _____

If the Floodplain Administrator/Manager found that the above was not in conformance with the provisions of the Doddridge County Floodplain Ordinance and/or denied that application, the applicant may appeal.

APPEALS: Appealed to the County Commission of Doddridge County? Yes No
Hearing Date: _____
County Commission Decision - Approved Yes No

CONDITIONS: _____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by APPLICANT before Certificate of Compliance is issued). NOT APPLICABLE

The following information must be provided for project structures. This section must be completed by a registered professional engineer or a licensed land surveyor (or attach a certification to this application).

COMPLETE 1 OR 2 BELOW:

- 1 Actual (As-Built) Elevation of the top of the lowest floor (including basement or crawl space is _____ FT. NGVD.
- 2 Actual (As Built) elevation of floodproofing is _____ FT. NGVD.

Note: Any work performed prior to submittal of the above information is at risk of the applicant.

SECTION 7: COMPLIANCE ACTION (To be completed by the Floodplain Administrator/Manager or his/her representative).

The Floodplain Administrator/Manager or his/her representative will complete this section as applicable based on inspection of the project to ensure compliance with the Doddridge County Floodplain Ordinance.

INSPECTIONS:

DATE: _____ **BY:** _____

DEFICIENCIES ? **Y/N**

COMMENTS _____

SECTION 8: CERTIFICATE OF COMPLIANCE (To be completed by Floodplain Administrator/Manager or his/her representative).

Certificate of Compliance issued: **DATE:** _____ **BY:** _____

**CERTIFICATE OF COMPLIANCE
FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREA
(OWNER MUST RETAIN)**

PERMIT NUMBER: _____

PERMIT DATE: _____

PURPOSE –

CONSTRUCTION LOCATION: _____

OWNER'S ADDRESS: _____

**THE FOLLOWING MUST BE COMPLETED BY THE FLOODPLAIN
ADMINISTRATOR/MANAGER OR HIS/HER AGENT.**

**COMPLIANCE IS HEREBY CERTIFIED WITH THE REQUIREMENT OF THE
FLOODPLAIN ORDINANCE ADOPTED BY THE COUNTY COMMISSION OF
DODDRIDGE COUNTY ON MAY 21, 2013.**

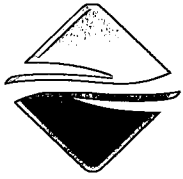
SIGNED _____ **DATE** _____

PROJECT NARRATIVE

The subject site is located in Doddridge County along Left Fork Run Road, southwest of West Union, WV. The project site consists of approximately 33.5 acres of existing wooded and meadow area. There is an existing house on site which will be demolished as part of the project. The site generally drains in two directions towards different watersheds; the west towards Right Fork Arnold Creek and the east towards Left Fork Arnold Creek. The project proponent, EQT Gathering, LLC. is proposing to construct a natural gas compressor station and access road. This includes the construction of a ford stream crossing and a permanent stream crossing near the access road entrance. The ford stream crossing will consist of a low water articulated concrete block crossing to minimize the impacts on the stream. The permanent crossing will consist of (3) 6' x 4' box culverts depressed a minimum of 6" below the existing streambed, and paved with 6" of reinforced concrete. They will span approximately 40 linear feet.

A Nationwide 39 Permit has been submitted to the USACE for review and approval. Concurrently, a National Pollution Discharge Elimination System permit application has been submitted to the WVDEP for review and approval. Both permits will be forwarded to the Doddridge County Floodplain Manager when approved.

A Hydrology and Hydraulics study was performed on the stream to determine the effects of the proposed work on the 100-year flood elevation. Based off of this study, the proposed stream crossing will increase the 100-year flood elevation of Arnold Creek by a maximum of 0.43 feet; this max increase occurs approximately 130' upstream of the proposed crossing within property to be owned by the applicant (EQT Gathering, LLC.). All flood level increases are contained to the properties controlled by the applicant. The increase is less than the 1.0 foot restriction that is listed in the Doddridge County Floodplain Ordinance and FEMA.



GATEWAY

On Call. On Time. On Target.

C-18422-0009

August 2015

Janus Compressor Station

Doddridge County
West Union, West Virginia

PREPARED FOR
EQT Gathering, L.L.C.
625 Liberty Avenue
Suite 1700
Pittsburgh, PA 15222



Where energy meets innovation.

SUBMITTED BY
Lindsay E. Appel, E.I.T.
The Gateway Engineers, Inc.
400 Holiday Drive
Suite 300
Pittsburgh, PA 15220
412.921.4030 PHONE
412.921.9960 FAX

www.gatewayengineers.com
lappel@gatewayengineers.com

REVIEWED BY
Matthew E. Bagaley, P.E.



A FULL-SERVICE CIVIL ENGINEERING FIRM

HYDROLOGY AND HYDRAULICS REPORT

H & H R E P P O R T

INDEX

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Site History and Conditions	1
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Hydraulic Analysis and Results	2
Conclusion	2

Appendices

1. Peak Flow Calculations
2. FEMA Flood Map
3. HEC-RAS Results (Existing Conditions)
4. HEC-RAS Results (Proposed Conditions)
5. 100-yr Floodway Results
6. Site Plan and Grading Plan

Site History and Conditions

The Janus Compressor Station project will consist of approximately 33.5 acres of existing wooded and meadow area. It will include the construction of a natural gas compressor station and access road, as well as a temporary (ford) and permanent box culvert stream crossing over Arnold Creek near the access road entrance. The site generally drains in two directions; the west towards Right Fork Arnold Creek and to the east towards Left Fork Arnold Creek. The crossing of Arnold Creek will cause a minor increase in the flood elevation for the 100-year study, and therefore must be studied.

The contributing drainage area at the crossing location is approximately 3,077 acres of mostly woods with some meadow. The soil types on site are Gilpin-Peabody, Gilpin-Upshur silt loams, Vandalia silt loams (Hydrologic Group C) and Sensabaugh silt loams (Hydrologic Group A). Web soil survey data can be found in Appendix 1.

The temporary ford stream crossing will consist of a low water articulated concrete block crossing to minimize the impacts on the stream. The permanent crossing will consist of (3) 6' x 4' box culverts depressed a minimum of 6" below the existing streambed, and paved with 6" of reinforced concrete. They will span approximately 40 linear feet.

A Nationwide 39 Permit has been submitted to the USACE for review and approval. Concurrently, a National Pollution Discharge Elimination System permit application has been submitted to the WVDEP for review and approval. Both the USACE and WVDEP permits will be forwarded to the Doddridge County Floodplain Manager when approved.

The project site can be found on FEMA Map Number 54017C and Panel Number 0120C, with an effective date of October 4, 2011. Since this is not a studied stream, there are no FEMA specified stations or cross sections. We have defined the stations, from upstream to downstream, 13.0 through 0.5.

The hydrologic and hydraulic analyses for the FIS report dated October 1979, were prepared by Michael Baker, Jr., Inc. for FIA under Contract No. H-4553. That work was completed in September 1978.

The purpose of this report is to summarize the analyses which were conducted for the site in both its existing conditions and the proposed conditions.

Hydrology

The flow rates provided in the Doddridge County FIS does not indicate flows for the stream at our crossing location. Therefore, peak flows have been calculated using the Hydraflow Hydrographs Extension program. Peak flows for the 2-, 10-, 50-, and 100-year storm events in Arnold Creek are as follows (see Appendix 1):

STATION	Flow Rate				
	2- yr	5-yr	10-yr	50-yr	100-yr
13.0	312.12 cfs	596.09 cfs	879.74 cfs	1,742.23 cfs	2,196.67 cfs

Hydraulic Analysis and Results

Arnold Creek was originally studied by FEMA in March of 1991. It is classified on the FIRM map as Zone A. Because no detailed hydraulic analyses were performed, there are no specified base flood elevations by FEMA. This report focuses on two analyses of the stream: an existing conditions analysis (to model the current conditions), and a proposed conditions analysis (to model the proposed stream crossing for the access road).

Cross sections were surveyed through Arnold Creek in the vicinity of the site. Data from these sections was then inserted into the HEC-RAS program in order to accurately model the stream in the vicinity of the site. A proposed ford crossing and a crossing with box culverts, as described above, will serve as the means of crossing Arnold Creek.

Conclusion

The proposed stream crossing will increase the 100-year flood elevation of Arnold Creek by a maximum of 0.43 feet; this max increase occurs approximately 130' upstream of the proposed crossing. All flood level increases are contained to the properties on which the work occurs. The increase is less than 1.0 foot restriction that is listed in the Doddridge County Floodplain Ordinance and FEMA; therefore, it is our professional opinion that no further action is required.

Please refer to Appendix 5 for the results of this analysis.


APPENDIX 1
PEAK FLOW CALCULATIONS



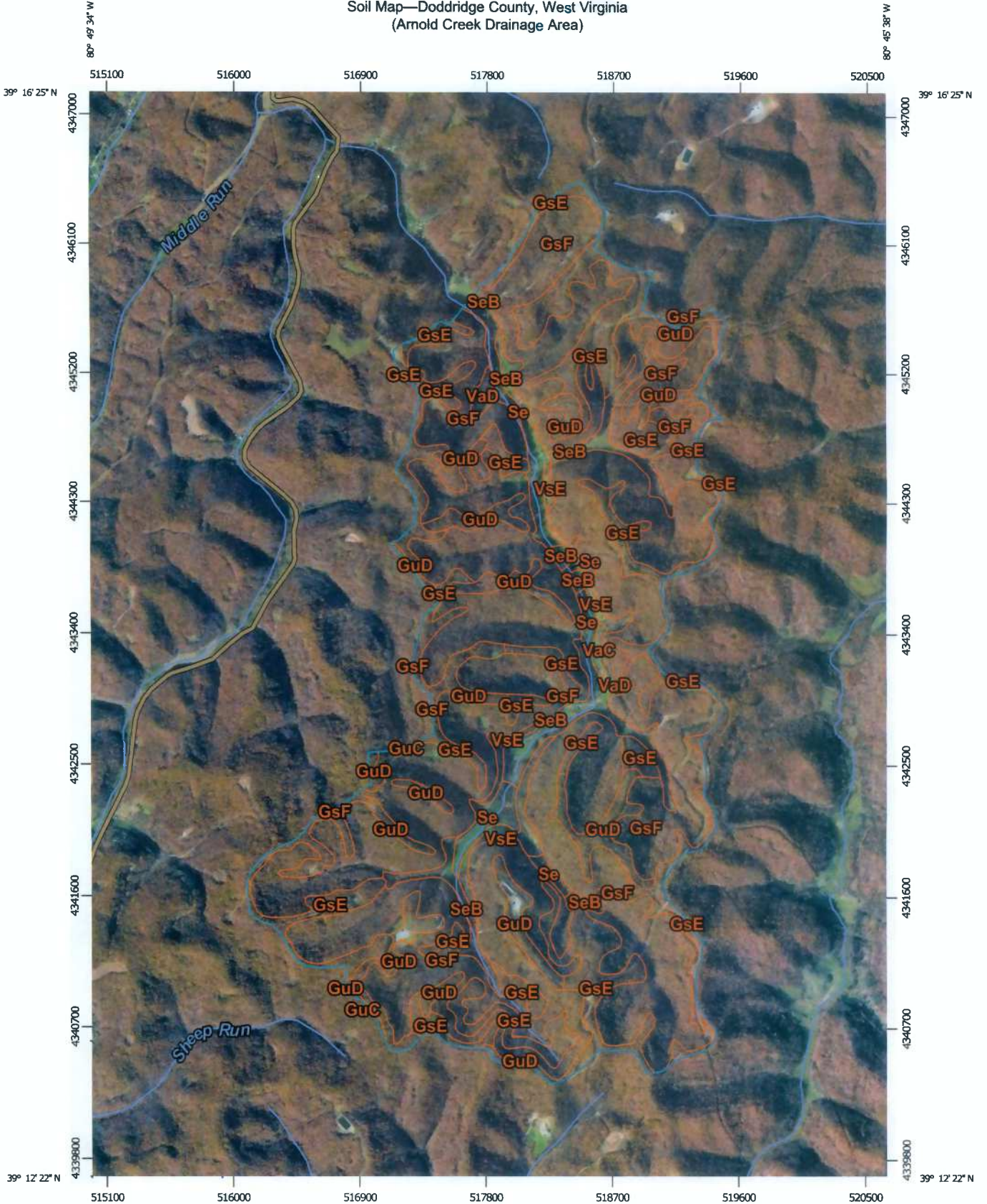
LOCATION MAP
 USGS WEST UNION AND OXFORD QUADS
 SCALE 1"=3,000'



NORTH

<p>DRAINAGE AREA MAP</p> <p>Project Number: E-18422-0009 Drawing Scale: 1" = 2000' Date Issued: JULY 2015 Index Number: _____ Drawn By: SAJ Checked By: MEB Project Manager: MEB</p> <p>USGS</p>	<p>JANUS COMPRESSOR STATION LEFT FORK RUN ROAD WEST UNION, WEST VIRGINIA</p> <p>PREPARED FOR: EQT GATHERING, LLC. 625 LIBERTY AVENUE, SUITE 1700 PITTSBURGH, PA 15222</p>	<table border="1"> <thead> <tr> <th>Date</th> <th>No</th> <th>REVISION RECORD</th> </tr> </thead> <tbody> <tr> <td>2015-07-09</td> <td>01</td> <td>PERMIT DRAWINGS</td> </tr> <tr> <td>-</td> <td>02</td> <td></td> </tr> <tr> <td>-</td> <td>03</td> <td></td> </tr> <tr> <td>-</td> <td>04</td> <td></td> </tr> <tr> <td>-</td> <td>05</td> <td></td> </tr> <tr> <td>-</td> <td>06</td> <td></td> </tr> <tr> <td>-</td> <td>07</td> <td></td> </tr> <tr> <td>-</td> <td>08</td> <td></td> </tr> </tbody> </table>	Date	No	REVISION RECORD	2015-07-09	01	PERMIT DRAWINGS	-	02		-	03		-	04		-	05		-	06		-	07		-	08		<div style="text-align: center;">  <p>GATEWAY[®]</p> <p>The Gateway Engineers, Inc. Full-Service Civil Engineering & Surveying Pittsburgh, PA</p> <p>gatewayengineers.com 855-634-9284</p> </div>
Date	No	REVISION RECORD																												
2015-07-09	01	PERMIT DRAWINGS																												
-	02																													
-	03																													
-	04																													
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-	07																													
-	08																													

Soil Map—Doddridge County, West Virginia
(Arnold Creek Drainage Area)



Map Scale: 1:36,500 if printed on A portrait (8.5" x 11") sheet.



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







































Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/11/2015
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Soil Map—Doddridge County, West Virginia
(Arnold Creek Drainage Area)

MAP LEGEND

Area of Interest (AOI)		 Spoil Area
	Area of Interest (AOI)	 Stony Spot
Soils		 Very Stony Spot
	Soil Map Unit Polygons	 Wet Spot
	Soil Map Unit Lines	 Other
	Soil Map Unit Points	 Special Line Features
Special Point Features		Water Features
	Blowout	 Streams and Canals
	Borrow Pit	Transportation
	Clay Spot	 Rails
	Closed Depression	 Interstate Highways
	Gravel Pit	 US Routes
	Gravelly Spot	 Major Roads
	Landfill	 Local Roads
	Lava Flow	Background
	Marsh or swamp	 Aerial Photography
	Mine or Quarry	
	Miscellaneous Water	
	Perennial Water	
	Rock Outcrop	
	Saline Spot	
	Sandy Spot	
	Severely Eroded Spot	
	Sinkhole	
	Slide or Slip	
	Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Doddridge County, West Virginia
Survey Area Data: Version 10, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

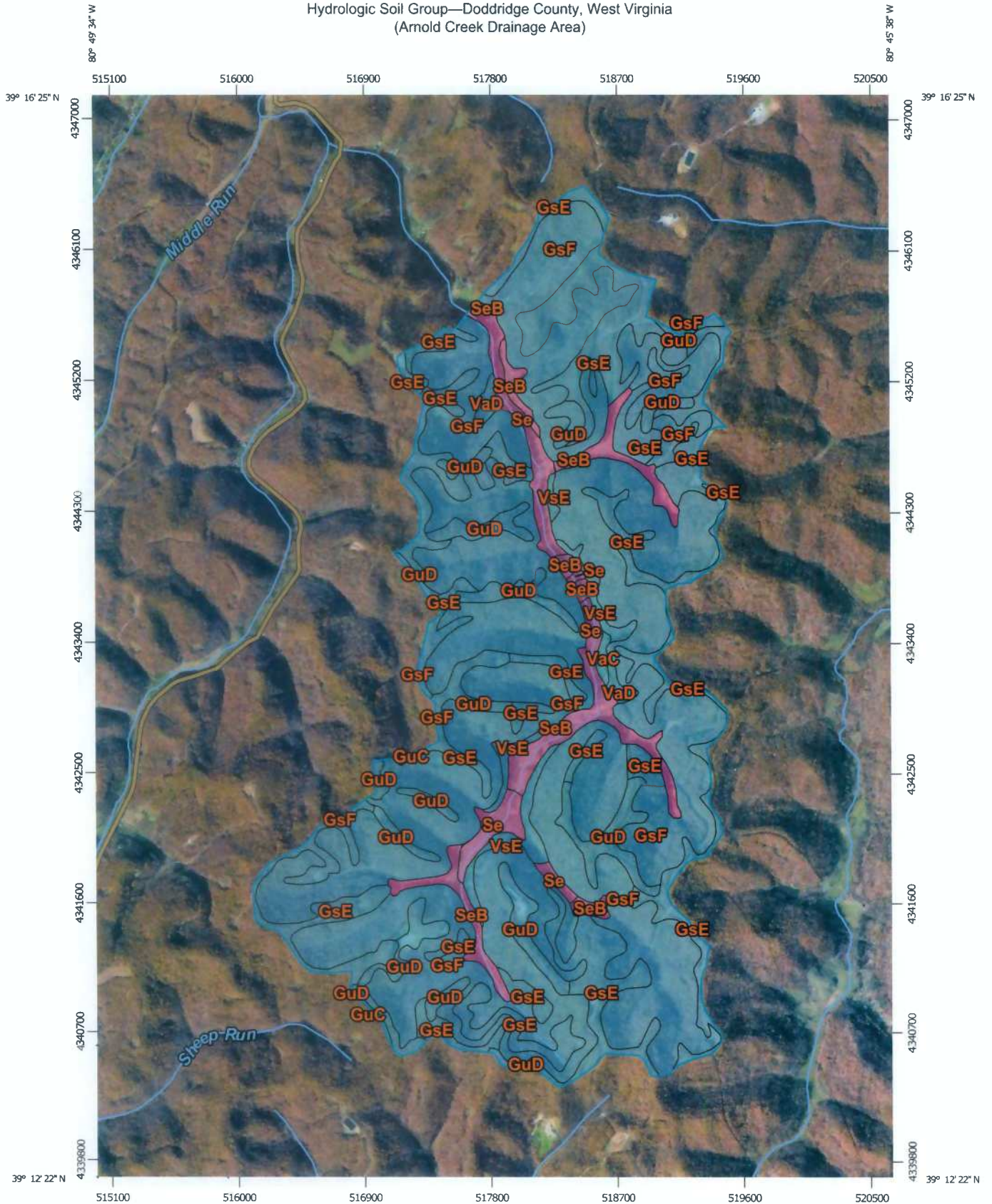
Date(s) aerial images were photographed: Oct 8, 2011—Oct 25, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Doddridge County, West Virginia (WV017)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GsE	Gilpin-Peabody complex, 15 to 35 percent slopes, very stony	642.7	20.9%
GsF	Gilpin-Peabody complex, 35 to 70 percent slopes, very stony	1,875.5	61.0%
GuC	Gilpin-Upshur silt loams, 8 to 15 percent slopes	9.9	0.3%
GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	242.1	7.9%
Se	Sensabaugh silt loam	88.1	2.9%
SeB	Sensabaugh silt loam, 3 to 8 percent slopes, rarely flooded	142.1	4.6%
VaC	Vandalia silt loam, 8 to 15 percent slopes	5.9	0.2%
VaD	Vandalia silt loam, 15 to 25 percent slopes	15.2	0.5%
VsE	Vandalia silt loam, 15 to 35 percent slopes, very stony	55.4	1.8%
Totals for Area of Interest		3,076.9	100.0%

Hydrologic Soil Group—Doddridge County, West Virginia
(Arnold Creek Drainage Area)



Map Scale: 1:36,500 if printed on A portrait (8.5" x 11") sheet.



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



































Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/11/2015
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Hydrologic Soil Group—Doddridge County, West Virginia
(Arnold Creek Drainage Area)

MAP LEGEND

Area of Interest (AOI)		 C	
 Area of Interest (AOI)		 C/D	
Soils		 D	
Soil Rating Polygons		 Not rated or not available	
 A		Water Features	
 A/D		 Streams and Canals	
 B		Transportation	
 B/D		 Rails	
 C		 Interstate Highways	
 C/D		 US Routes	
 D		 Major Roads	
 Not rated or not available		 Local Roads	
Soil Rating Lines		Background	
 A		 Aerial Photography	
 A/D			
 B			
 B/D			
 C			
 C/D			
 D			
 Not rated or not available			
Soil Rating Points			
 A			
 A/D			
 B			
 B/D			

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Doddridge County, West Virginia
Survey Area Data: Version 10, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 8, 2011—Oct 25, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Doddridge County, West Virginia (WV017)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GsE	Gilpin-Peabody complex, 15 to 35 percent slopes, very stony	C	642.7	20.9%
GsF	Gilpin-Peabody complex, 35 to 70 percent slopes, very stony	C	1,875.5	61.0%
GuC	Gilpin-Upshur silt loams, 8 to 15 percent slopes	C	9.9	0.3%
GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	C	242.1	7.9%
Se	Sensabaugh silt loam	A	88.1	2.9%
SeB	Sensabaugh silt loam, 3 to 8 percent slopes, rarely flooded	A	142.1	4.6%
VaC	Vandalia silt loam, 8 to 15 percent slopes	C	5.9	0.2%
VaD	Vandalia silt loam, 15 to 25 percent slopes	C	15.2	0.5%
VsE	Vandalia silt loam, 15 to 35 percent slopes, very stony	C	55.4	1.8%
Totals for Area of Interest			3,076.9	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Doddridge County, West Virginia

Map Unit: GsE—Gilpin-Peabody complex, 15 to 35 percent slopes, very stony

Component: Gilpin (50%)

The Gilpin component makes up 50 percent of the map unit. Slopes are 15 to 35 percent. This component is on hillslopes on hills. The parent material consists of very stony fine-loamy residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Peabody (35%)

The Peabody component makes up 35 percent of the map unit. Slopes are 15 to 35 percent. This component is on hillslopes on hills. The parent material consists of very stony clayey residuum weathered from interbedded sedimentary rock. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: GsF—Gilpin-Peabody complex, 35 to 70 percent slopes, very stony

Component: Gilpin (50%)

The Gilpin component makes up 50 percent of the map unit. Slopes are 35 to 70 percent. This component is on hillslopes on hills. The parent material consists of very stony fine-loamy residuum weathered from shale and siltstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Peabody (30%)

The Peabody component makes up 30 percent of the map unit. Slopes are 35 to 70 percent. This component is on hillslopes on hills. The parent material consists of very stony clayey residuum weathered from interbedded sedimentary rock. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Map Unit: GuC—Gilpin-Upshur silt loams, 8 to 15 percent slopes

Component: Gilpin (50%)

The Gilpin component makes up 50 percent of the map unit. Slopes are 8 to 15 percent. This component is on ridges on hills. The parent material consists of residuum weathered from sandstone and siltstone. Depth to a root restrictive layer, bedrock, paralithic, is 25 to 37 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Upshur (30%)

The Upshur component makes up 30 percent of the map unit. Slopes are 8 to 15 percent. This component is on ridges on hills. The parent material consists of residuum weathered from clayey shale. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 59 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: GuD—Gilpin-Upshur silt loams, 15 to 25 percent slopes

Component: Gilpin (50%)

The Gilpin component makes up 50 percent of the map unit. Slopes are 15 to 25 percent. This component is on hillslopes on hills. The parent material consists of residuum weathered from sandstone and siltstone. Depth to a root restrictive layer, bedrock, paralithic, is 25 to 37 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Upshur (30%)

The Upshur component makes up 30 percent of the map unit. Slopes are 15 to 25 percent. This component is on hillslopes on hills. The parent material consists of residuum weathered from clayey shale. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 59 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map Unit: Se—Sensabaugh silt loam

Component: Sensabaugh (75%)

The Sensabaugh component makes up 75 percent of the map unit. Slopes are 0 to 3 percent. This component is on flood plains on alluvial plains. The parent material consists of gravelly fine-loamy alluvium derived from interbedded sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Component: Melvin (3%)

Generated brief soil descriptions are created for major components. The Melvin soil is a minor component.

Map Unit: SeB—Sensabaugh silt loam, 3 to 8 percent slopes, rarely flooded

Component: Sensabaugh (80%)

The Sensabaugh component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on flood plains on alluvial plains. The parent material consists of gravelly fine-loamy alluvium derived from interbedded sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map Unit: VaC—Vandalia silt loam, 8 to 15 percent slopes

Component: Vandalia (80%)

The Vandalia component makes up 80 percent of the map unit. Slopes are 8 to 15 percent. This component is on hillslopes on hills. The parent material consists of colluvium derived from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 7 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map Unit: VaD—Vandalia silt loam, 15 to 25 percent slopes

Component: Vandalia (80%)

The Vandalia component makes up 80 percent of the map unit. Slopes are 15 to 25 percent. This component is on hillslopes on hills. The parent material consists of colluvium derived from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 7 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map Unit: VsE—Vandalia silt loam, 15 to 35 percent slopes, very stony**Component: Vandalia (80%)**

The Vandalia component makes up 80 percent of the map unit. Slopes are 15 to 35 percent. This component is on hillslopes on hills. The parent material consists of colluvium derived from sandstone and siltstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 7 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Data Source Information

Soil Survey Area: Doddridge County, West Virginia
Survey Area Data: Version 10, Sep 25, 2014

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	----	----	152.50	----	----	879.74	----	1742.23	2196.67	Arnold Creek DA

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	152.50	1	797	2,493,291	----	----	----	Arnold Creek DA
Janus CS Rates.gpw					Return Period: 2 Year		Thursday, 07 / 2 / 2015		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

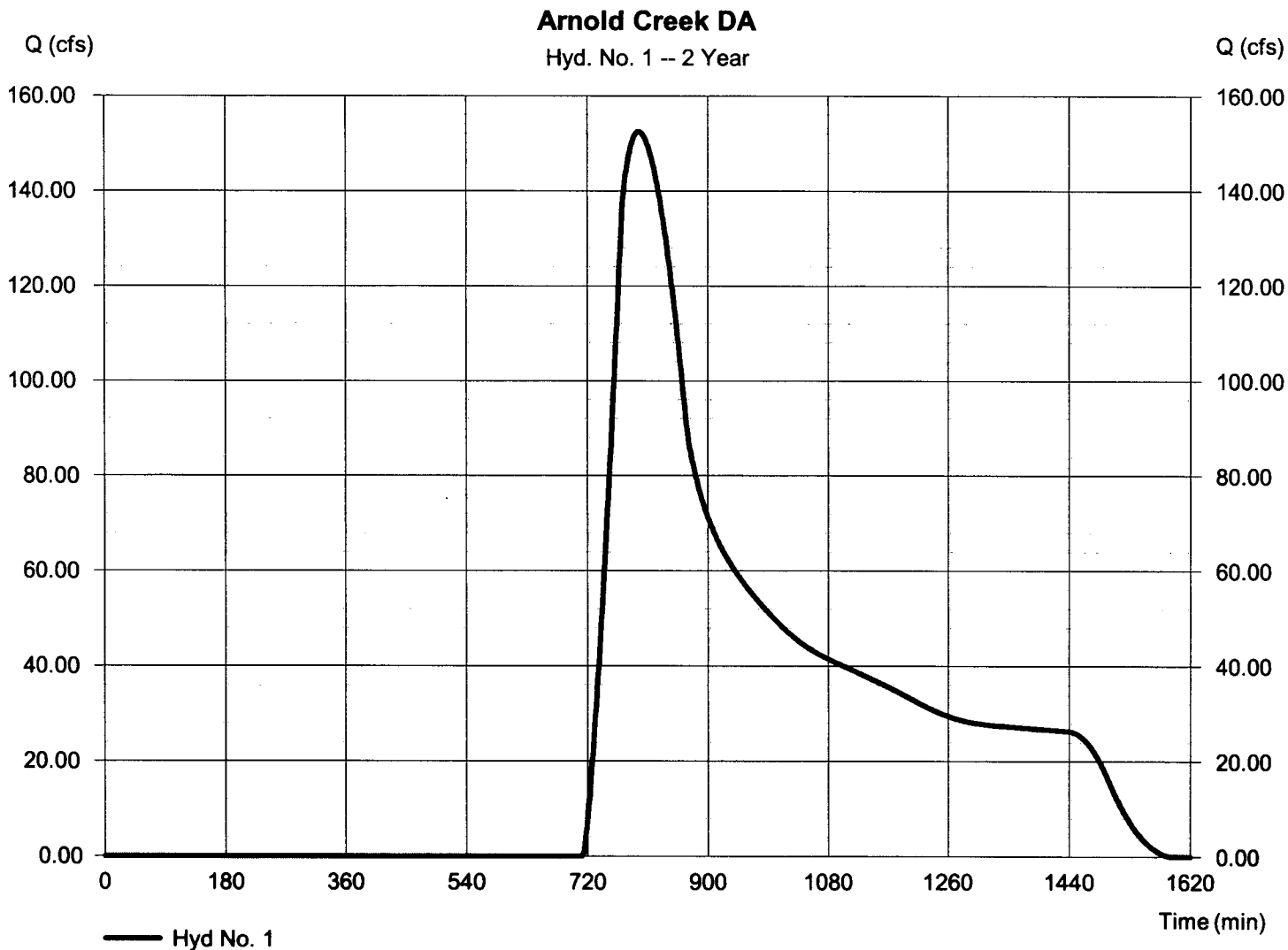
Thursday, 07 / 2 / 2015

Hyd. No. 1

Arnold Creek DA

Hydrograph type	= SCS Runoff	Peak discharge	= 152.50 cfs
Storm frequency	= 2 yrs	Time to peak	= 797 min
Time interval	= 1 min	Hyd. volume	= 2,493,291 cuft
Drainage area	= 3077.000 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 97.90 min
Total precip.	= 2.15 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(185.300 \times 30) + (44.900 \times 30) + (187.500 \times 71) + (2659.300 \times 70)] / 3077.000$



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No. 1

Arnold Creek DA

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.800	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.15	0.00	0.00	
Land slope (%)	= 5.00	0.00	0.00	
Travel Time (min)	= 31.62	+ 0.00	+ 0.00	= 31.62
Shallow Concentrated Flow				
Flow length (ft)	= 795.00	919.00	0.00	
Watercourse slope (%)	= 5.70	32.60	0.00	
Surface description	= Unpaved	Unpaved	Paved	
Average velocity (ft/s)	=3.85	9.21	0.00	
Travel Time (min)	= 3.44	+ 1.66	+ 0.00	= 5.10
Channel Flow				
X sectional flow area (sqft)	= 76.50	76.50	0.00	
Wetted perimeter (ft)	= 35.90	35.90	0.00	
Channel slope (%)	= 1.00	0.50	0.00	
Manning's n-value	= 0.050	0.050	0.015	
Velocity (ft/s)	=4.95	3.50	0.00	
Flow length (ft)	3791.0	10166.0	0.0	
Travel Time (min)	= 12.77	+ 48.43	+ 0.00	= 61.21
Total Travel Time, Tc				97.90 min

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	879.74	1	776	9,767,999	---	---	---	Arnold Creek DA
Janus CS Rates.gpw					Return Period: 10 Year		Thursday, 07 / 2 / 2015		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

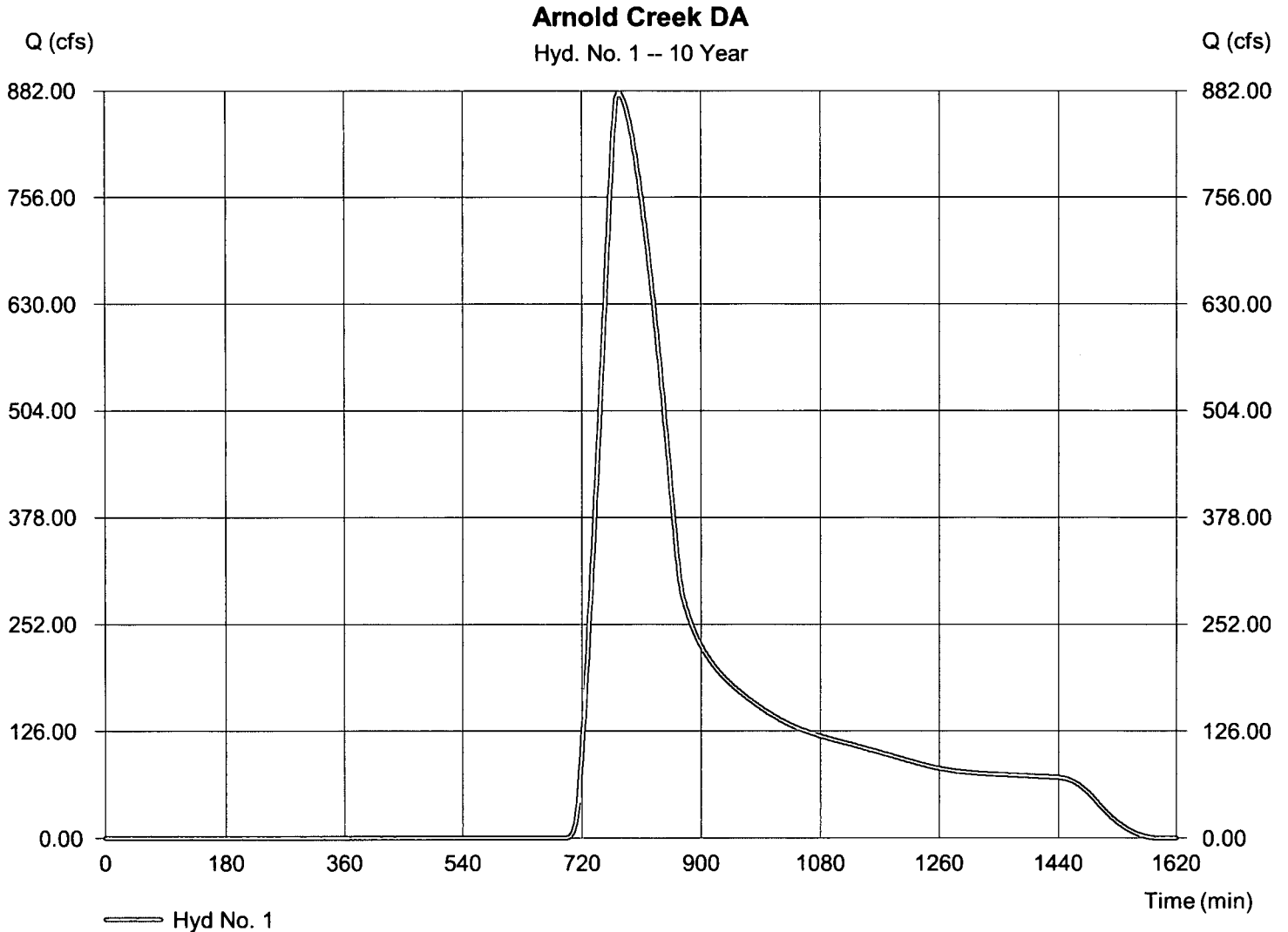
Thursday, 07 / 2 / 2015

Hyd. No. 1

Arnold Creek DA

Hydrograph type	= SCS Runoff	Peak discharge	= 879.74 cfs
Storm frequency	= 10 yrs	Time to peak	= 776 min
Time interval	= 1 min	Hyd. volume	= 9,767,999 cuft
Drainage area	= 3077.000 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 97.90 min
Total precip.	= 3.54 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(185.300 x 30) + (44.900 x 30) + (187.500 x 71) + (2659.300 x 70)] / 3077.000



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1742.23	1	774	17,502,110	----	---	----	Arnold Creek DA
Janus CS Rates.gpw					Return Period: 50 Year		Thursday, 07 / 2 / 2015		

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 07 / 2 / 2015

Hyd. No. 1

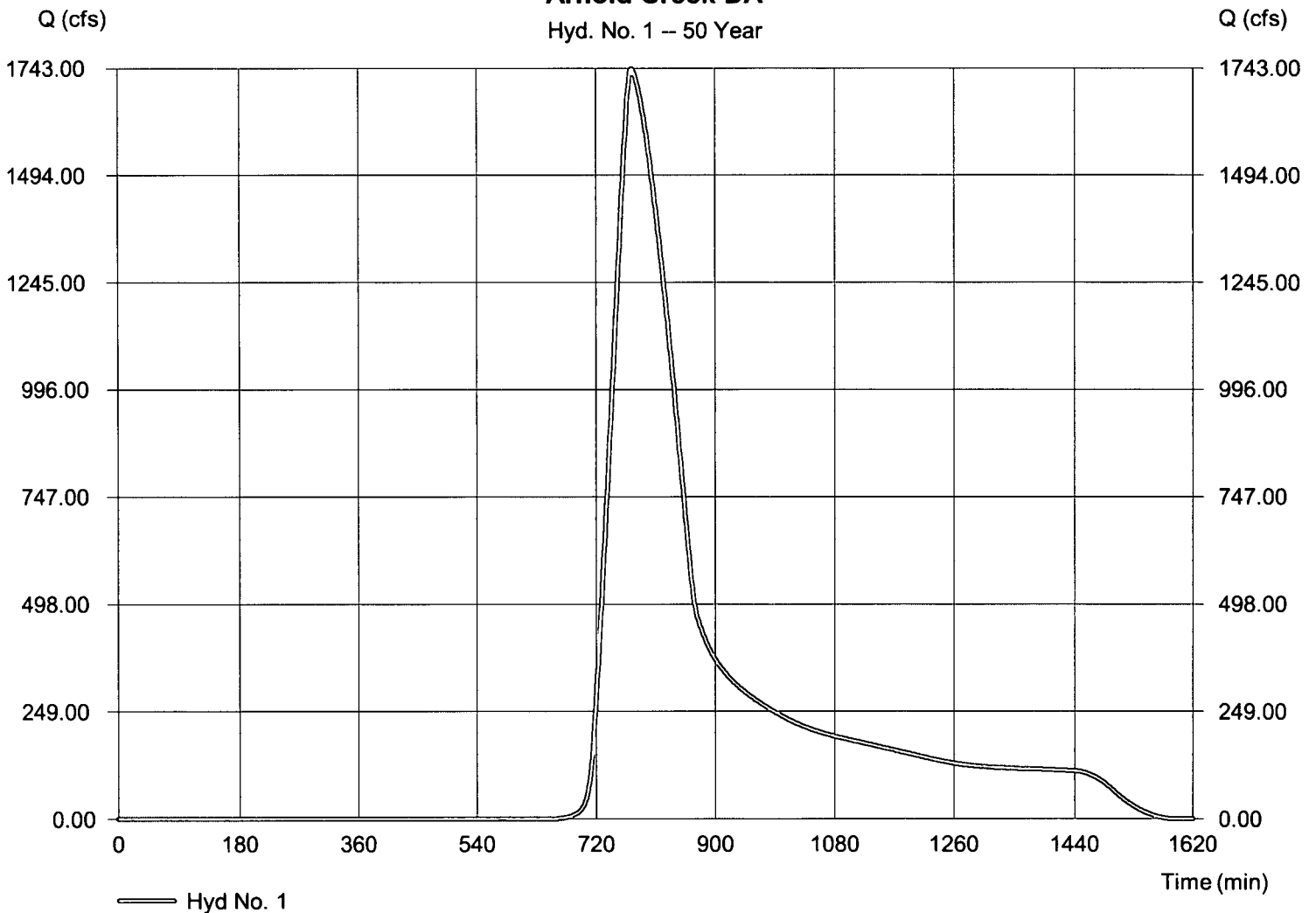
Arnold Creek DA

Hydrograph type	= SCS Runoff	Peak discharge	= 1742.23 cfs
Storm frequency	= 50 yrs	Time to peak	= 774 min
Time interval	= 1 min	Hyd. volume	= 17,502,110 cuft
Drainage area	= 3077.000 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 97.90 min
Total precip.	= 4.65 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(185.300 x 30) + (44.900 x 30) + (187.500 x 71) + (2659.300 x 70)] / 3077.000

Arnold Creek DA

Hyd. No. 1 – 50 Year



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2196.67	1	774	21,518,510	----	----	----	Arnold Creek DA

Janus CS Rates.gpw

Return Period: 100 Year

Thursday, 07 / 2 / 2015

Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

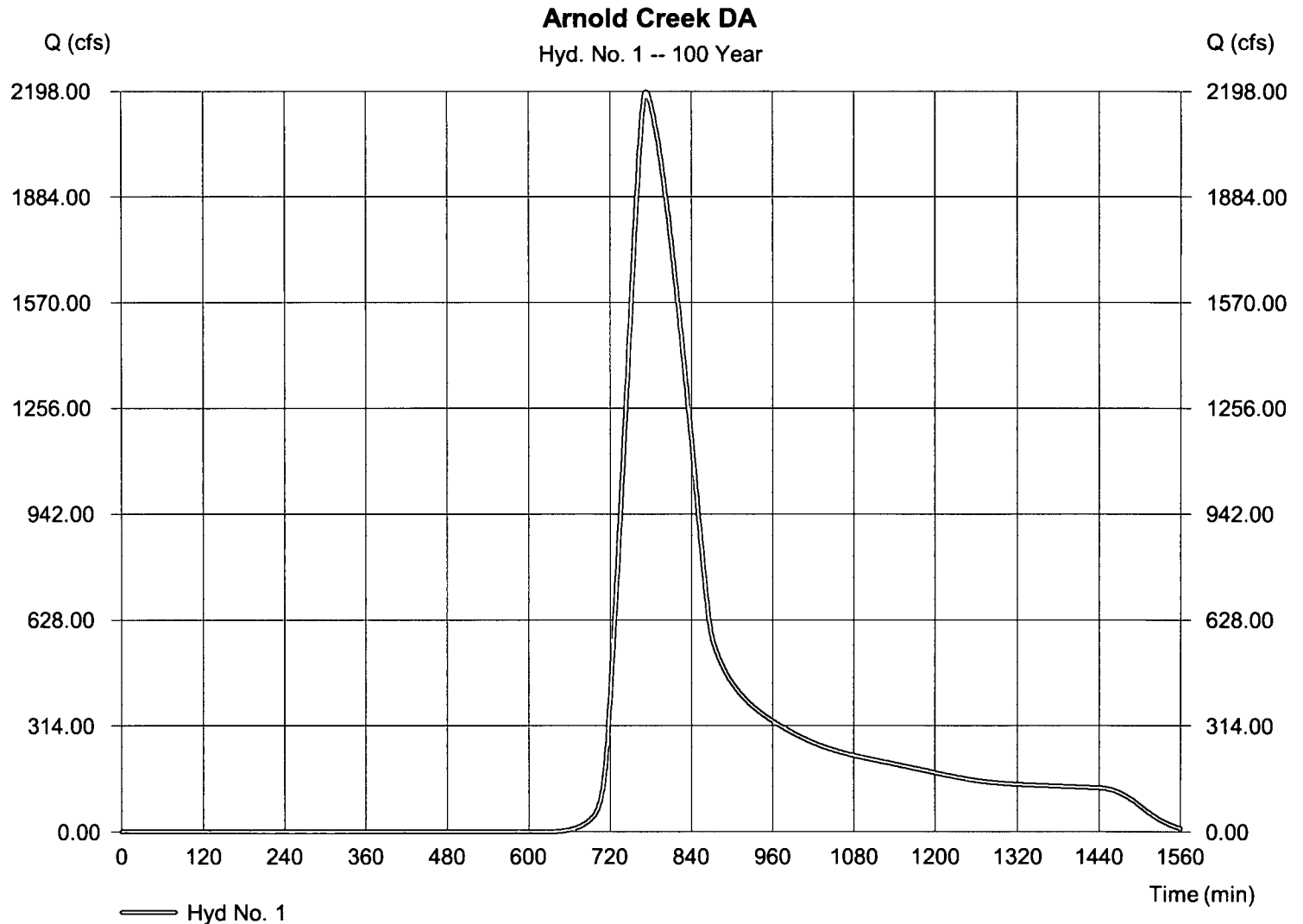
Thursday, 07 / 2 / 2015

Hyd. No. 1

Arnold Creek DA

Hydrograph type	= SCS Runoff	Peak discharge	= 2196.67 cfs
Storm frequency	= 100 yrs	Time to peak	= 774 min
Time interval	= 1 min	Hyd. volume	= 21,518,510 cuft
Drainage area	= 3077.000 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 97.90 min
Total precip.	= 5.17 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(185.300 x 30) + (44.900 x 30) + (187.500 x 71) + (2659.300 x 70)] / 3077.000



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Thursday, 07 / 2 / 2015

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(NA)
1	0.0000	0.0000	0.0000	----
2	69.8703	13.1000	0.8658	----
3	0.0000	0.0000	0.0000	----
5	79.2597	14.6000	0.8369	----
10	88.2351	15.5000	0.8279	----
25	102.6072	16.5000	0.8217	----
50	114.8193	17.2000	0.8199	----
100	127.1596	17.8000	0.8186	----

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

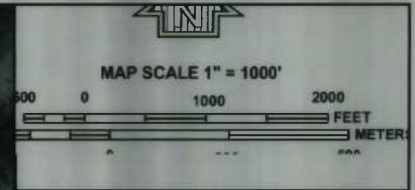
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.15	0.00	0.00	3.54	0.00	4.65	5.17
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**APPENDIX 2
FEMA FLOOD MAP**



NATIONAL FLOOD INSURANCE PROGRAM
 NFP

PANEL 0120C

FIRM
 FLOOD INSURANCE RATE MAP
 DODDRIDGE COUNTY,
 WEST VIRGINIA
 AND INCORPORATED AREAS

PANEL 120 OF 325
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	DEPTH
DODDRIDGE COUNTY	44824	0120	C
WEST UNION TOWNSHIP	44825	0120	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.

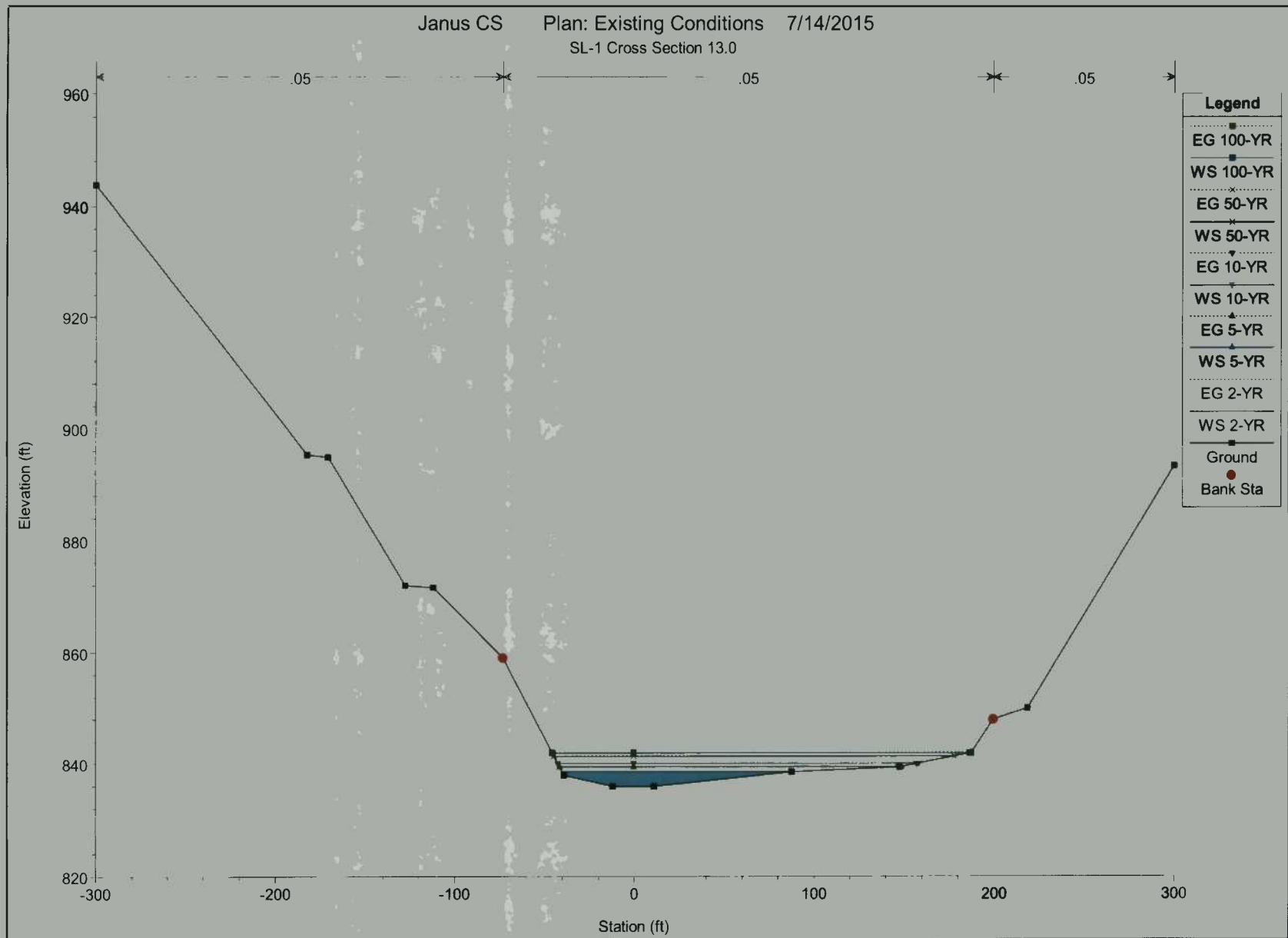


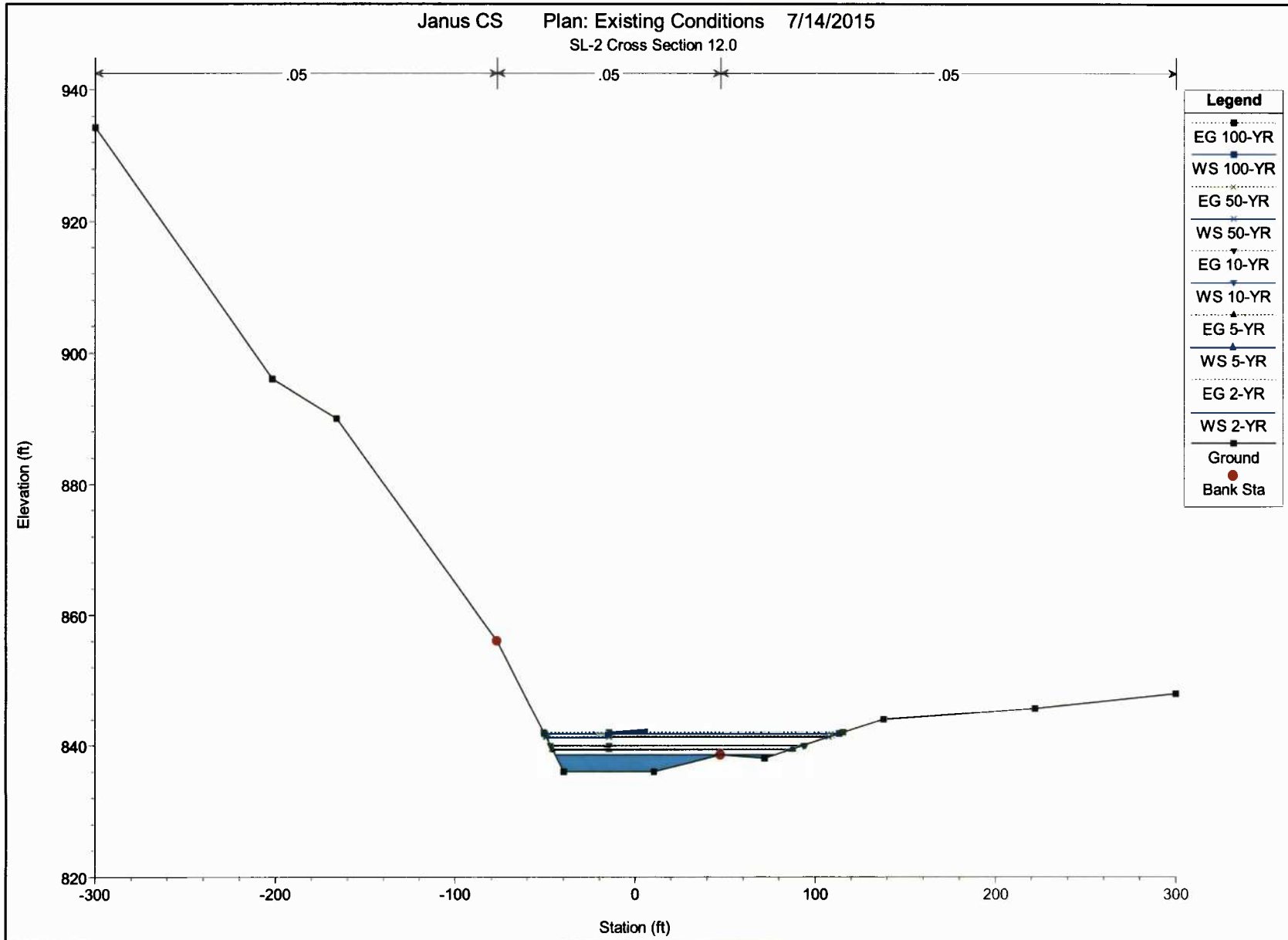
MAP NUMBER
 54017C0120C
 MAP REVISED
 OCTOBER 4, 2011

Federal Emergency Management Agency

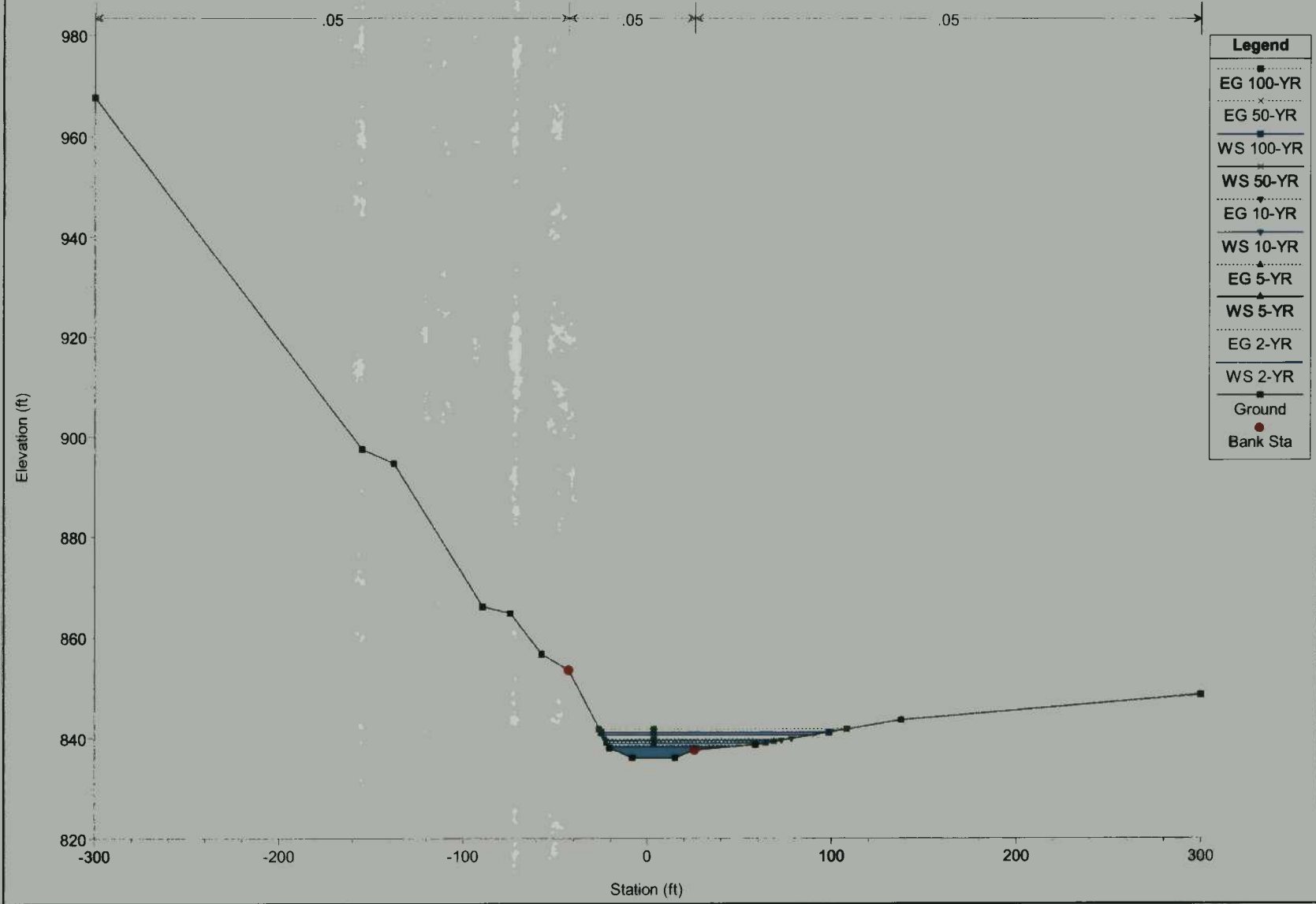
This is an official copy of a portion of the above referenced flood map. It was extracted using FIRM On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

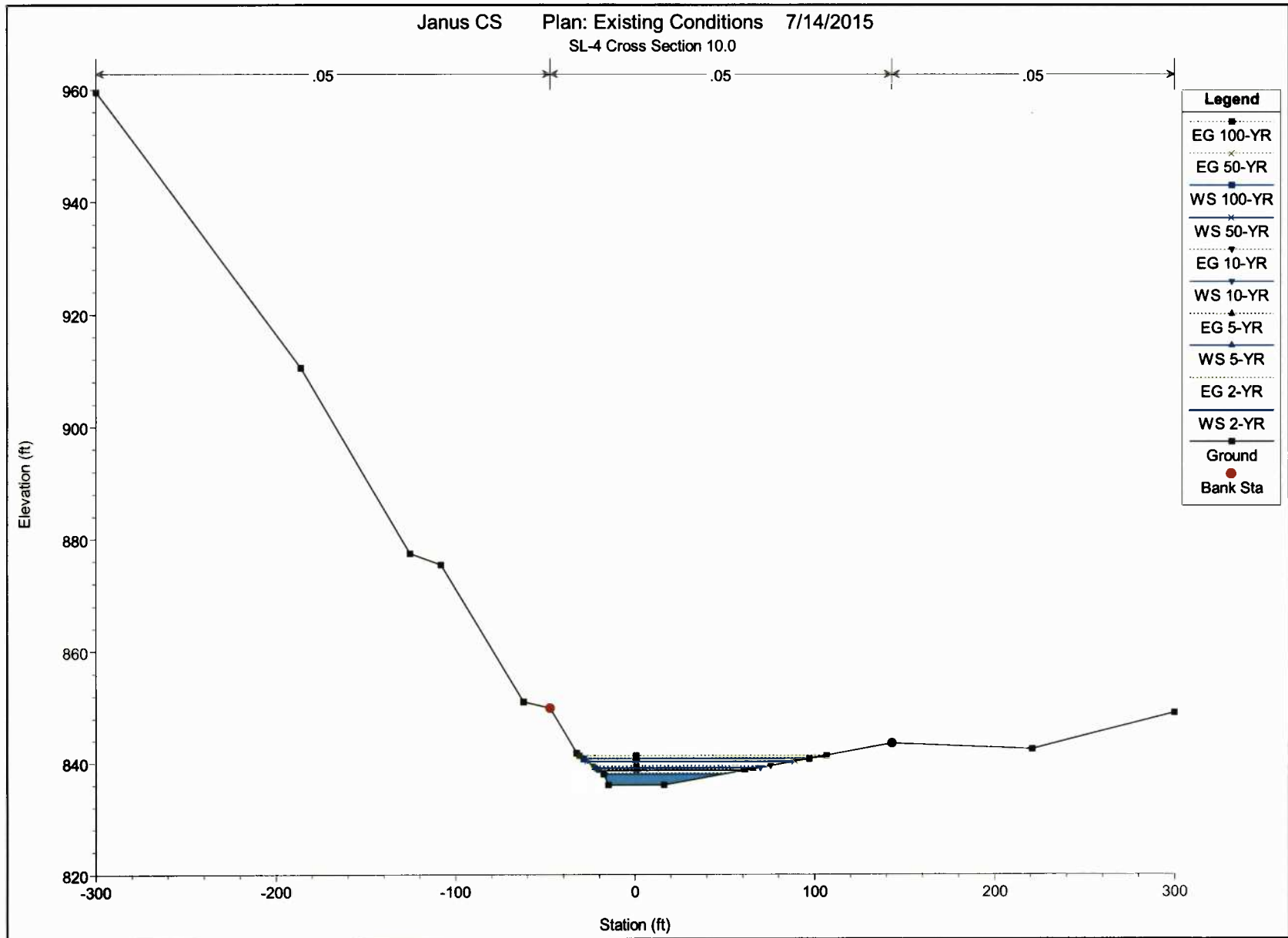
**APPENDIX 3
HEC-RAS RESULTS
(EXISTING CONDITIONS)**

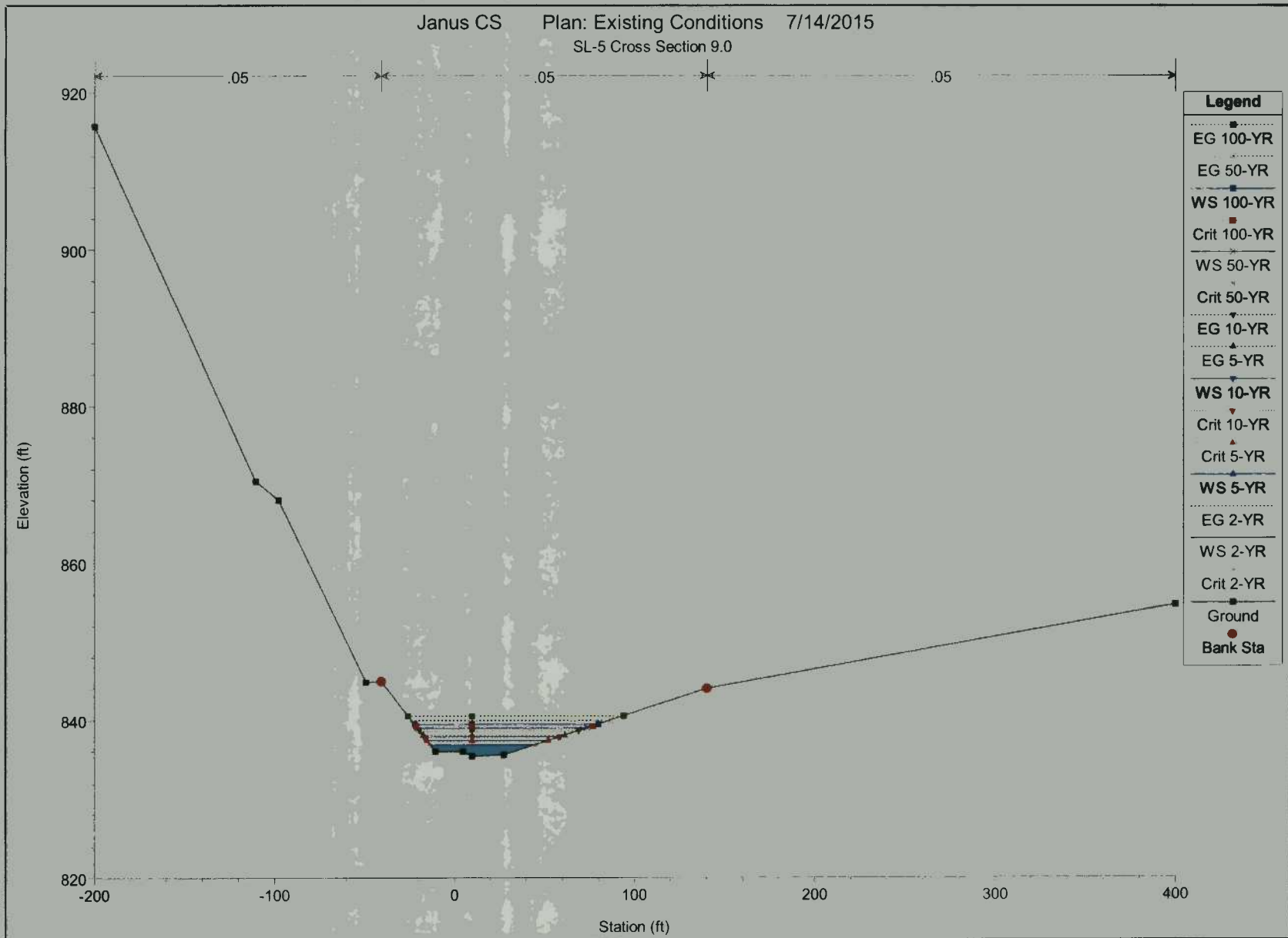


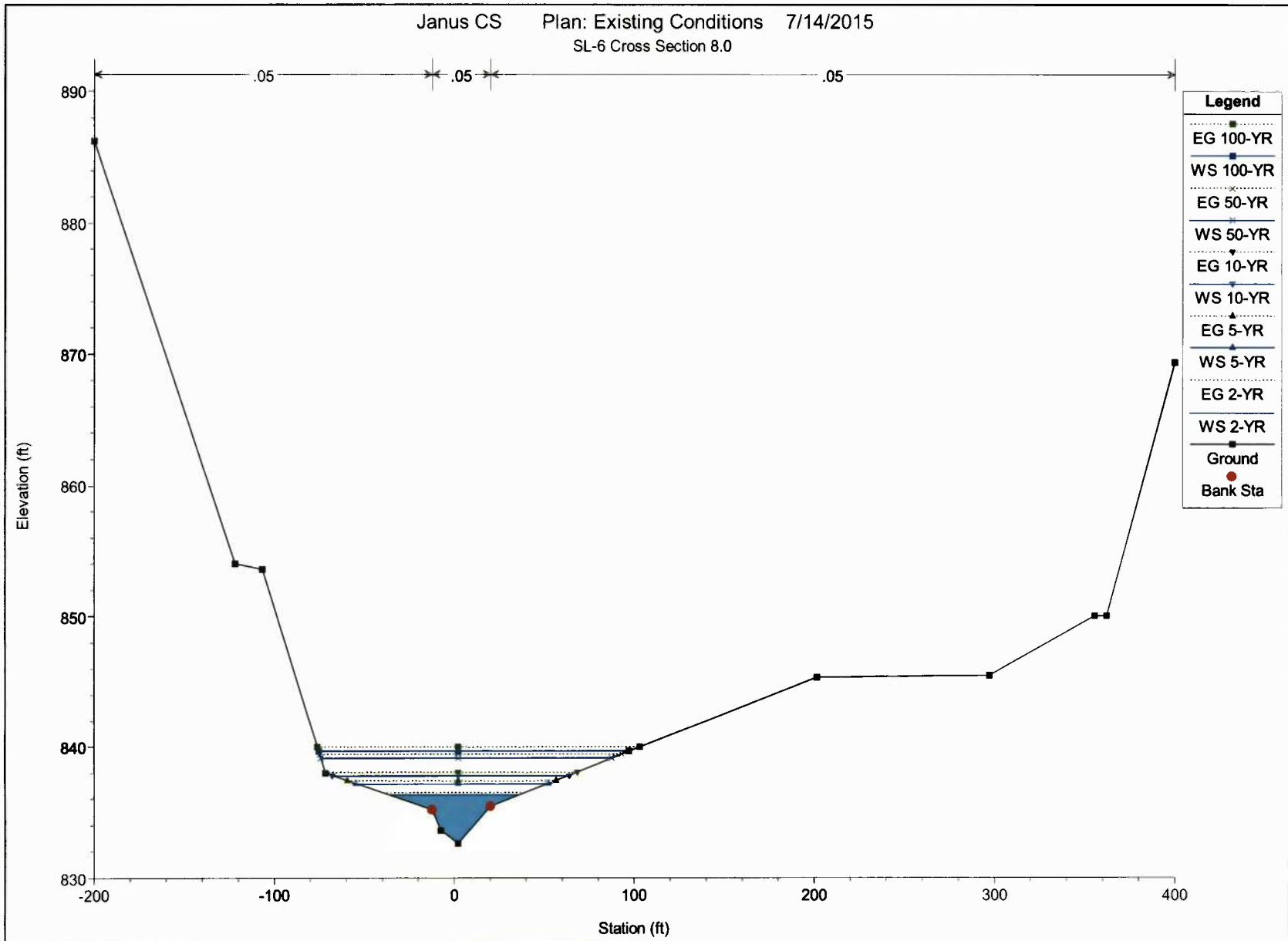


Janus CS Plan: Existing Conditions 7/14/2015
 SL-3 Cross Section 11.0

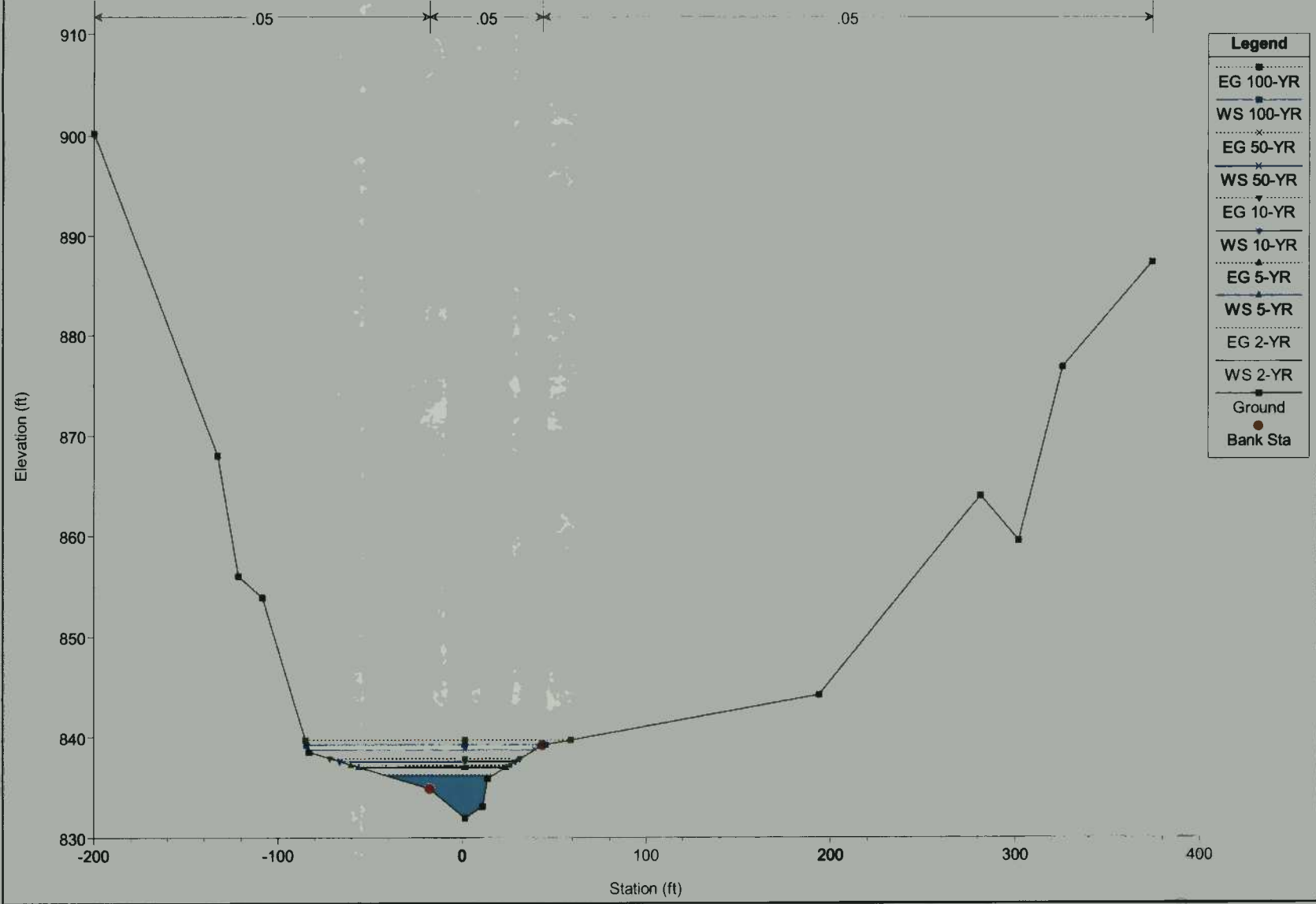


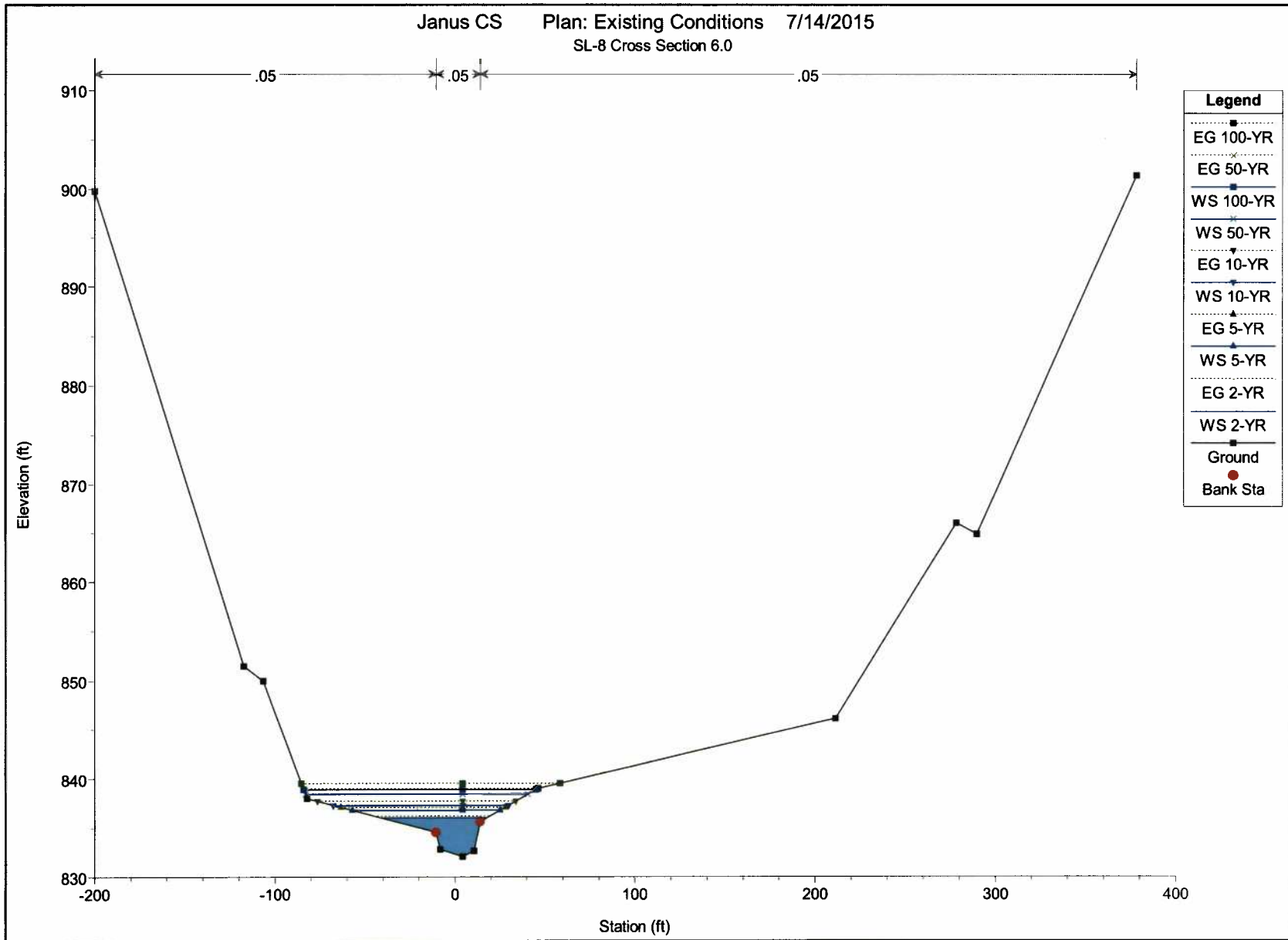


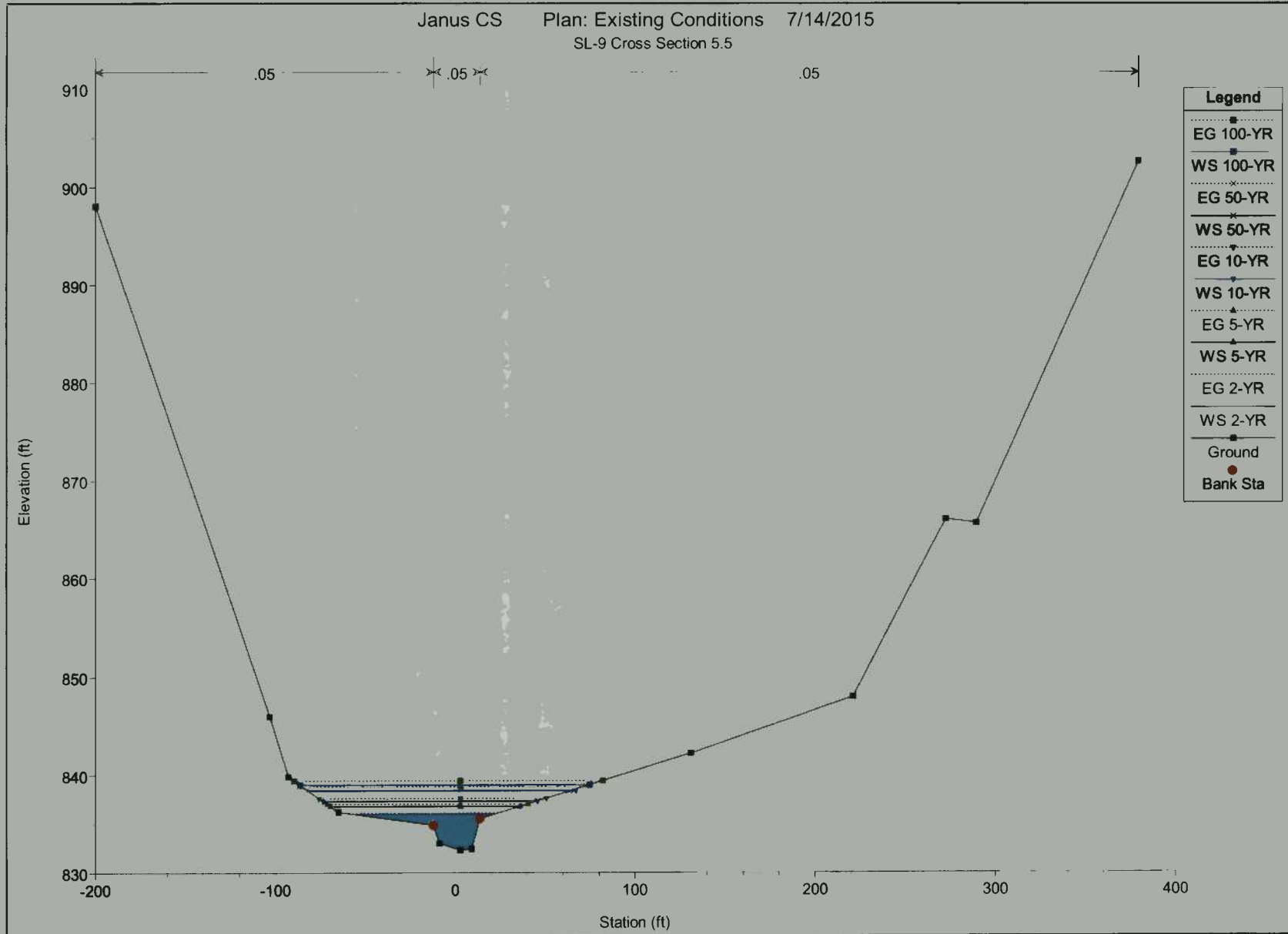


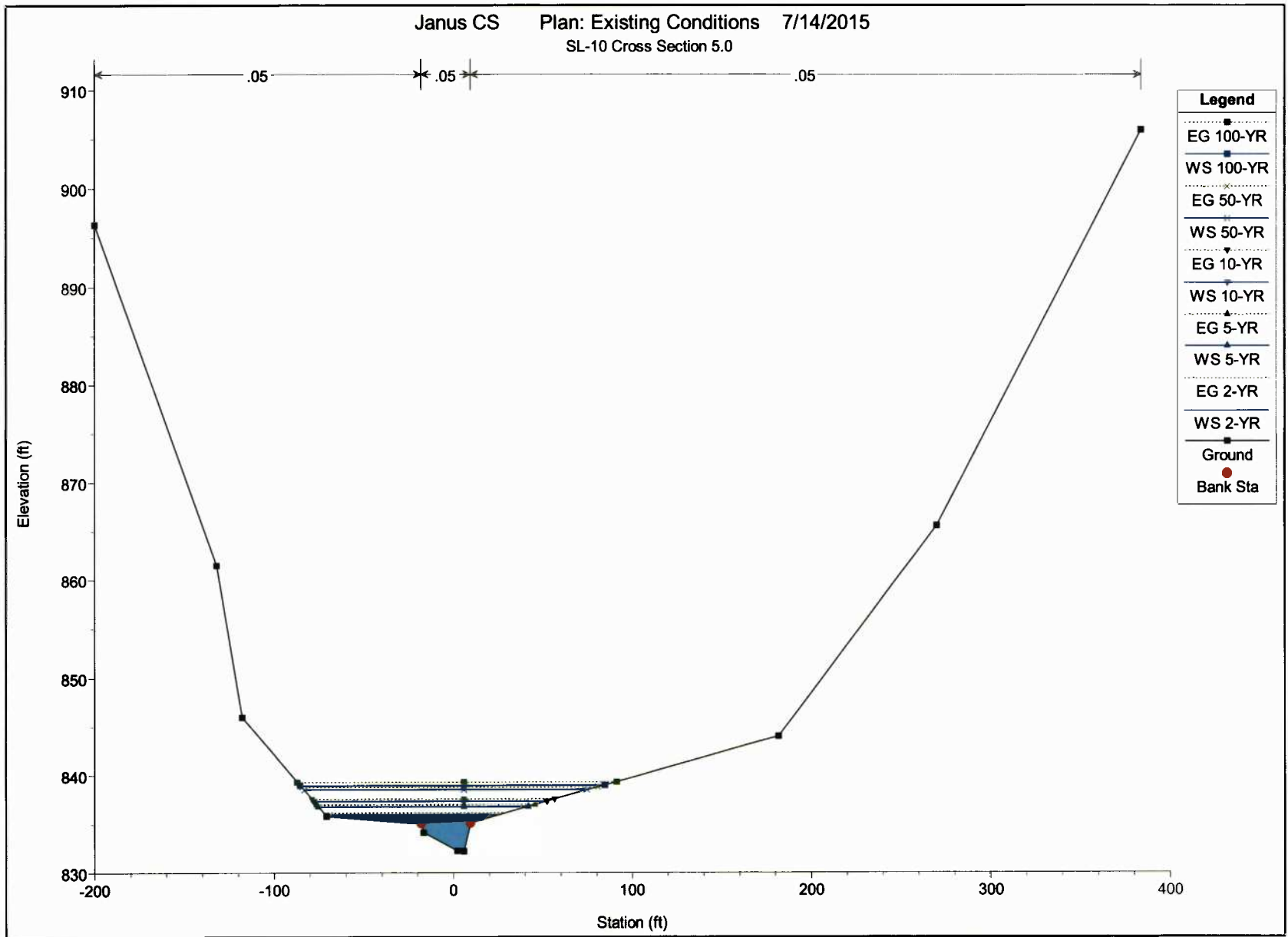


Janus CS Plan: Existing Conditions 7/14/2015
 SL-7 Cross Section 7.0

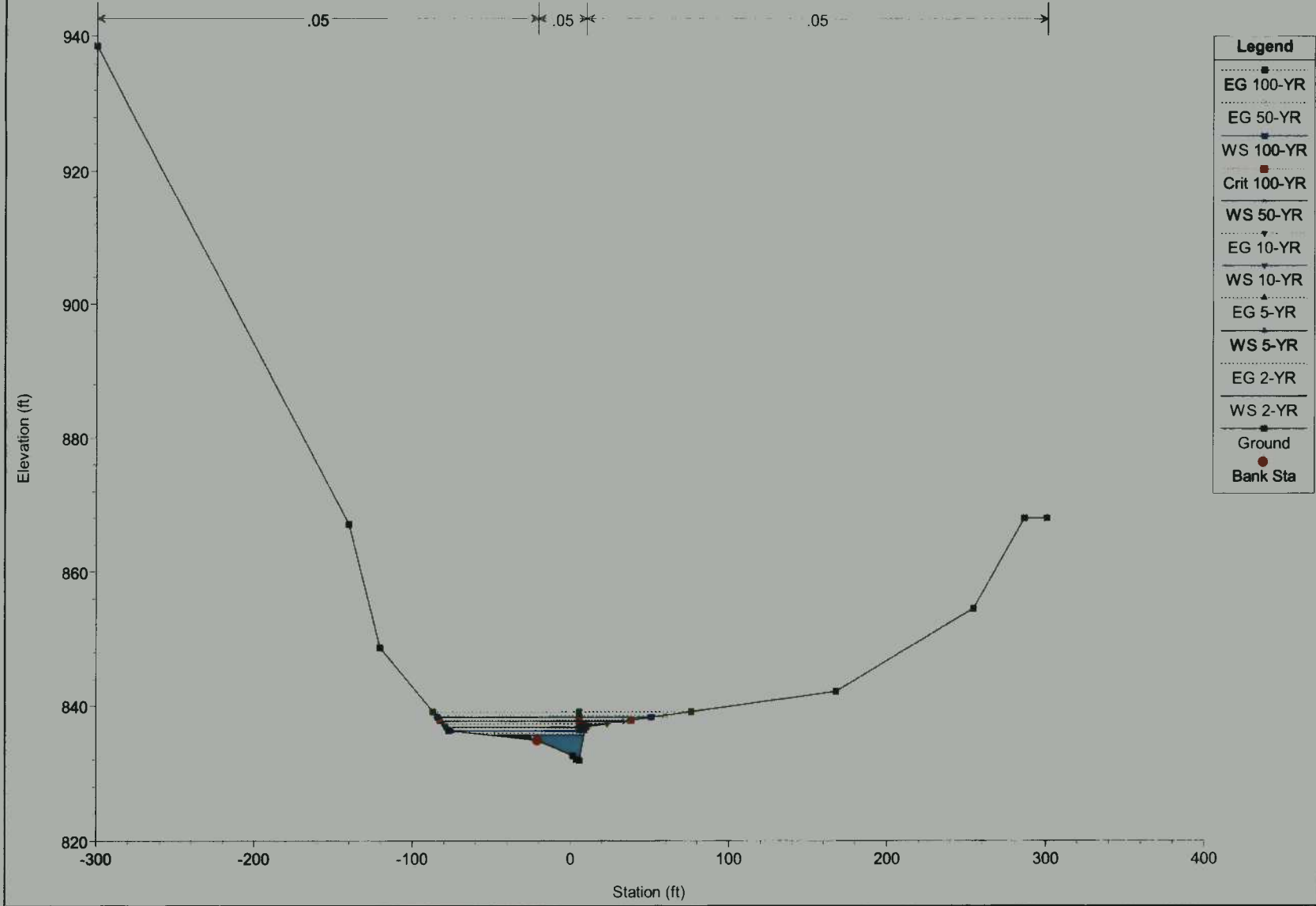


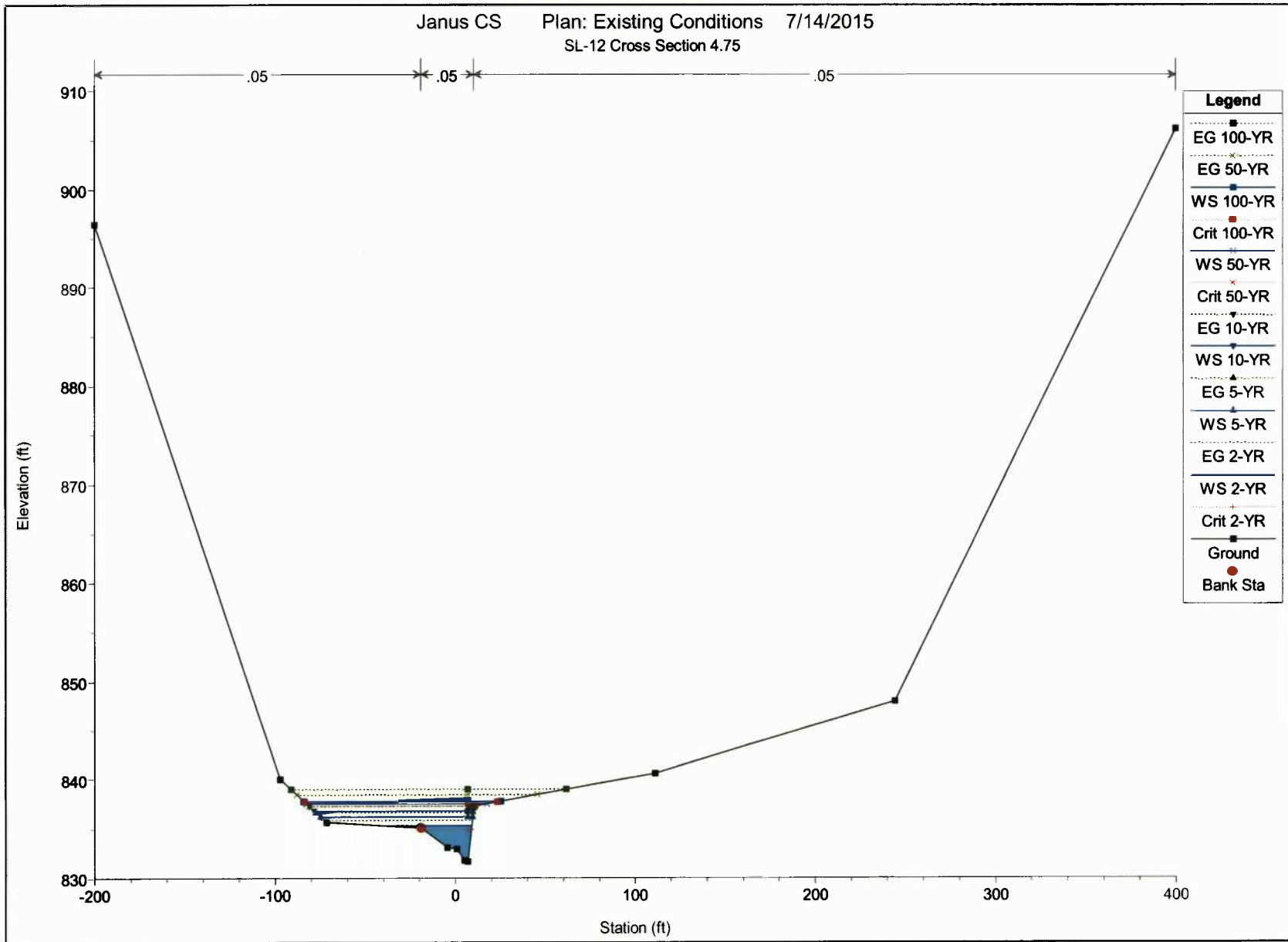




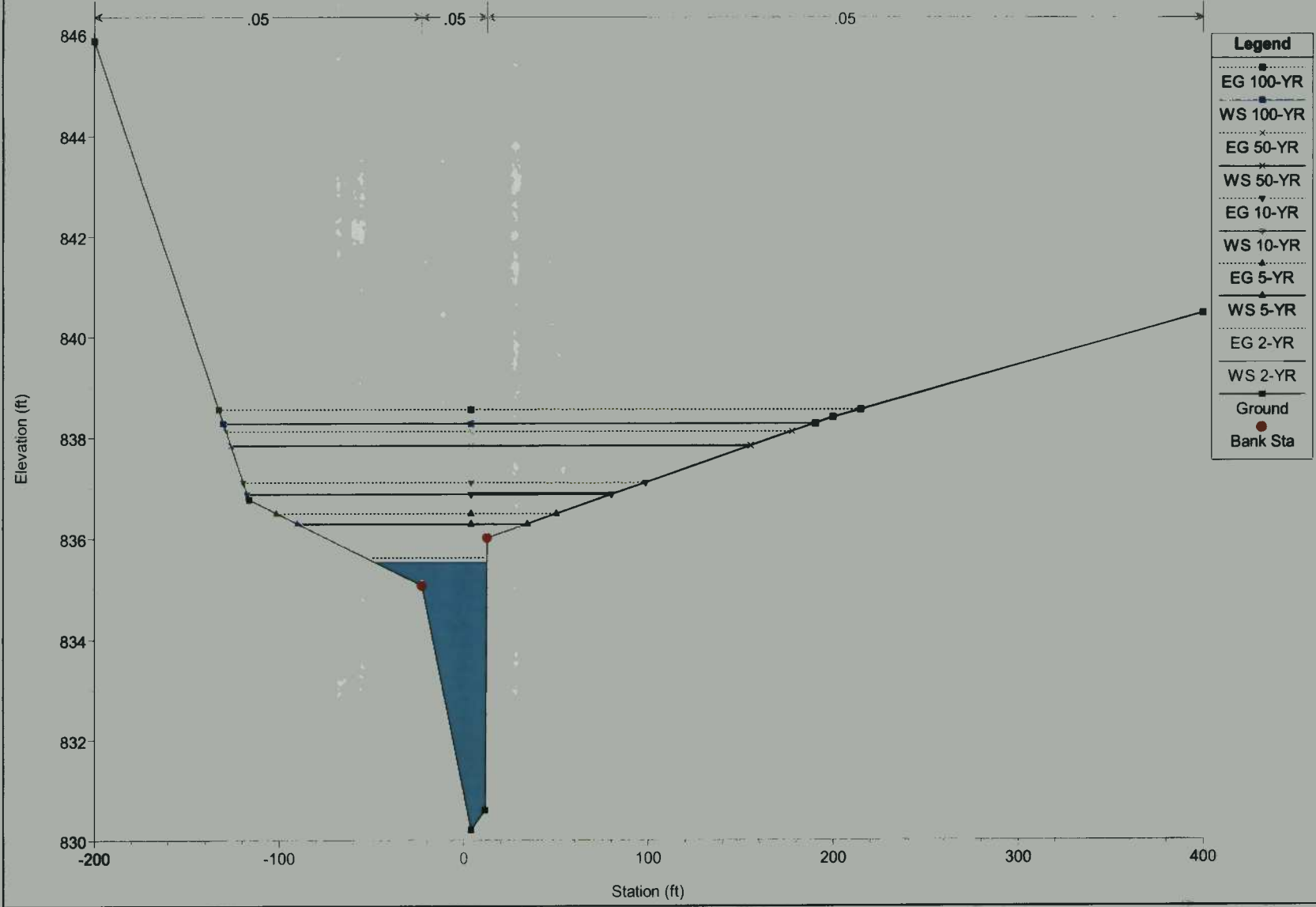


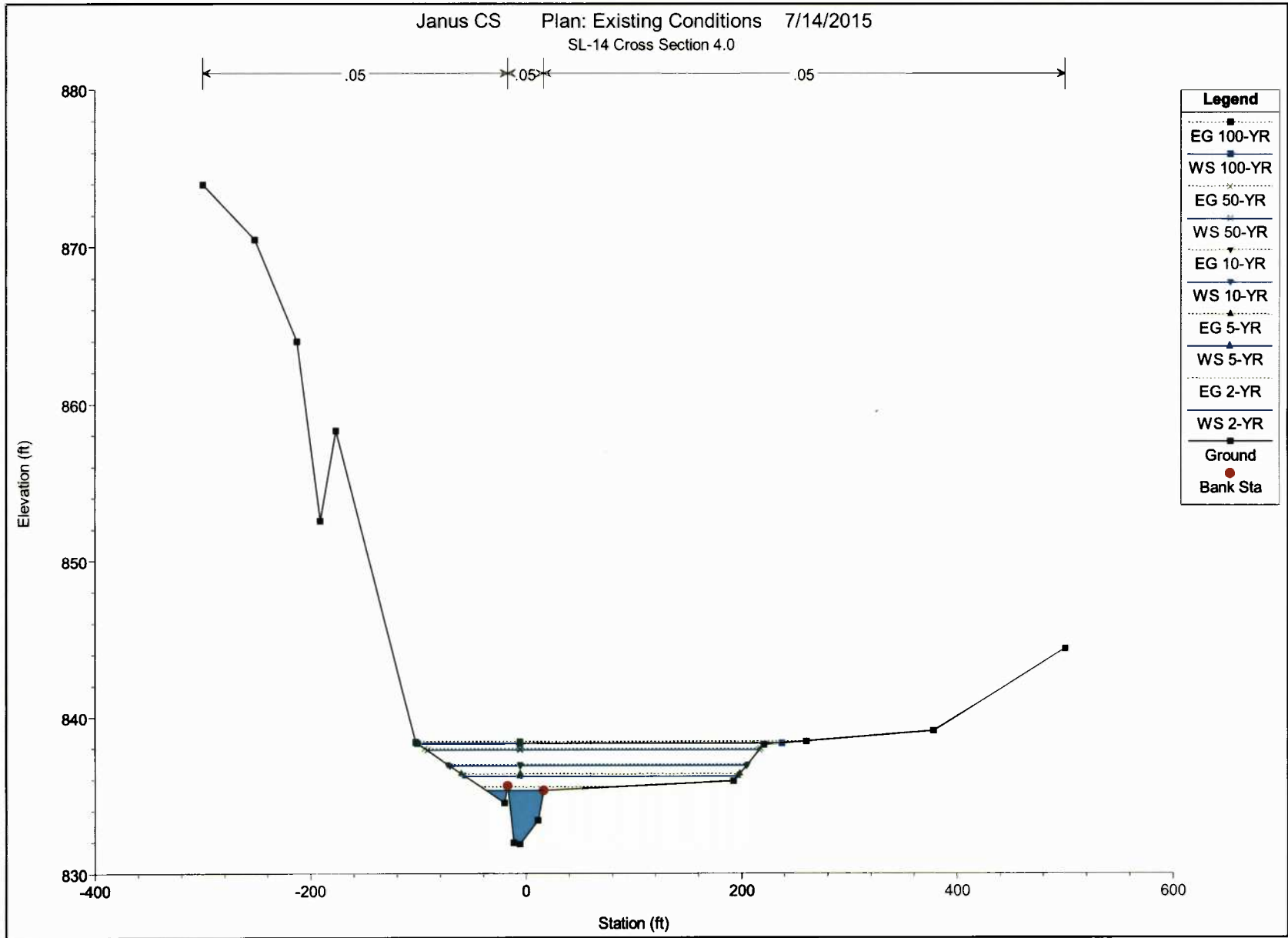
Janus CS Plan: Existing Conditions 7/14/2015
 SL-11 Cross Section 4.9



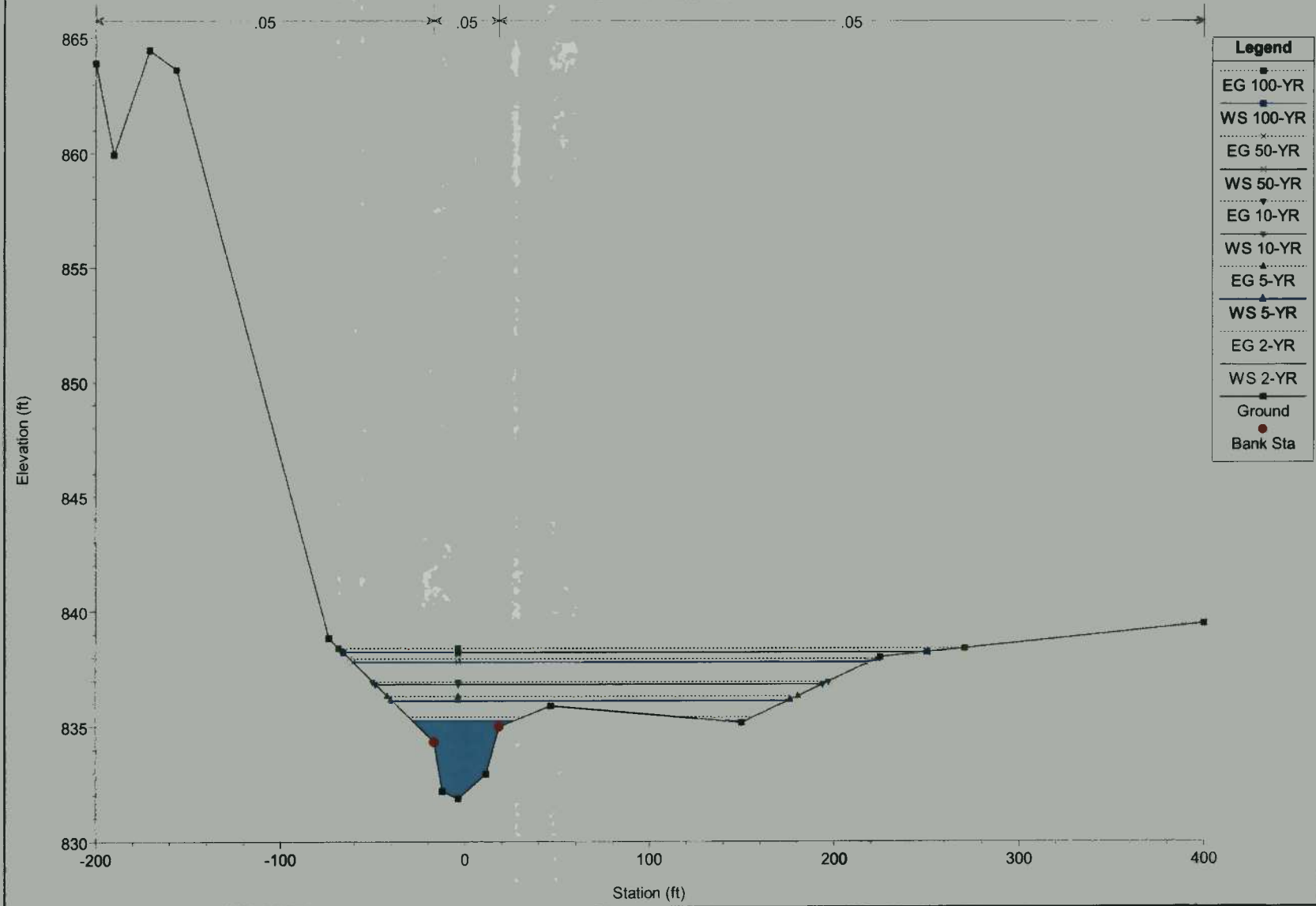


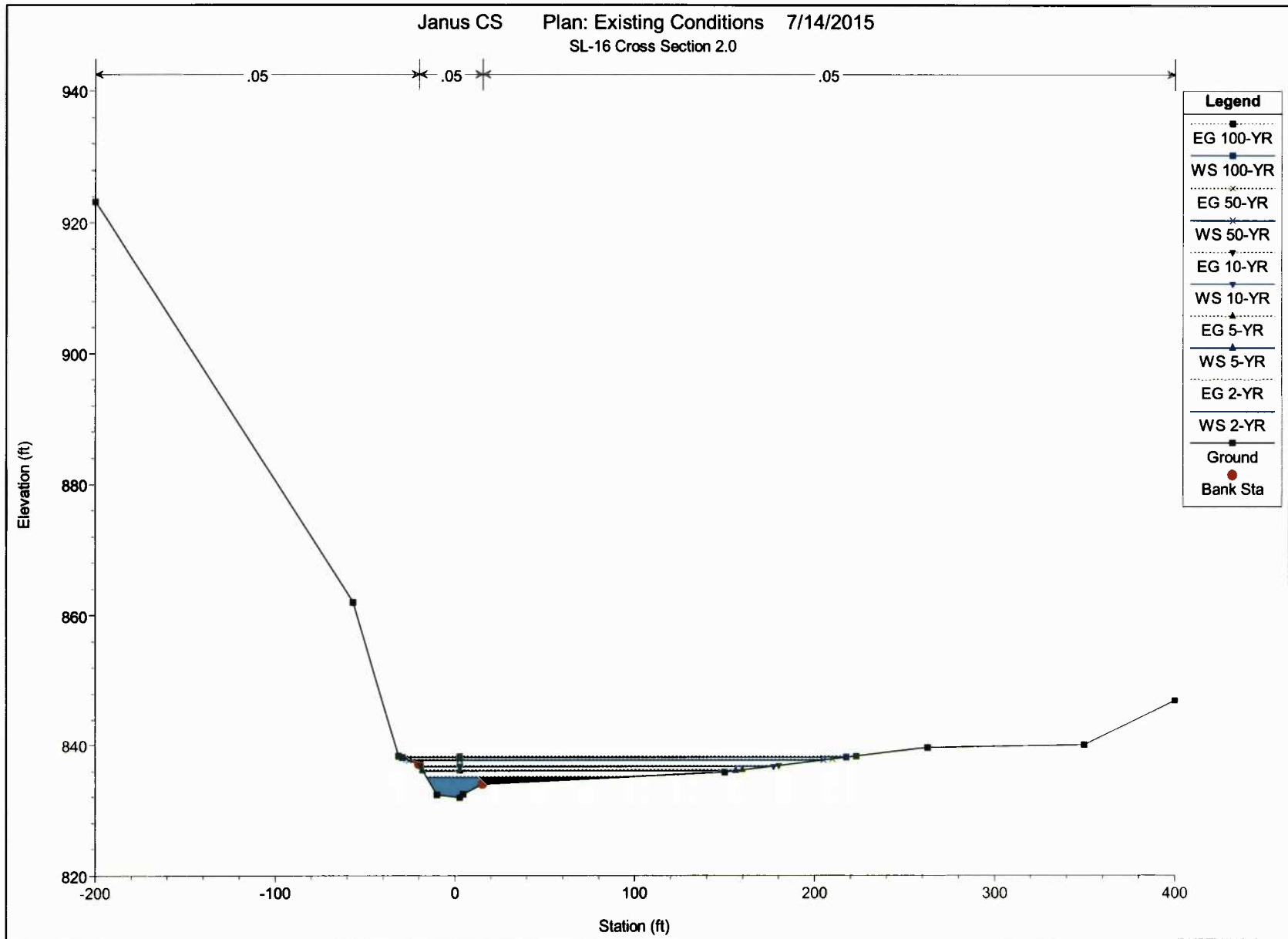
Janus CS Plan: Existing Conditions 7/14/2015
 SL-13 Cross Section 4.50



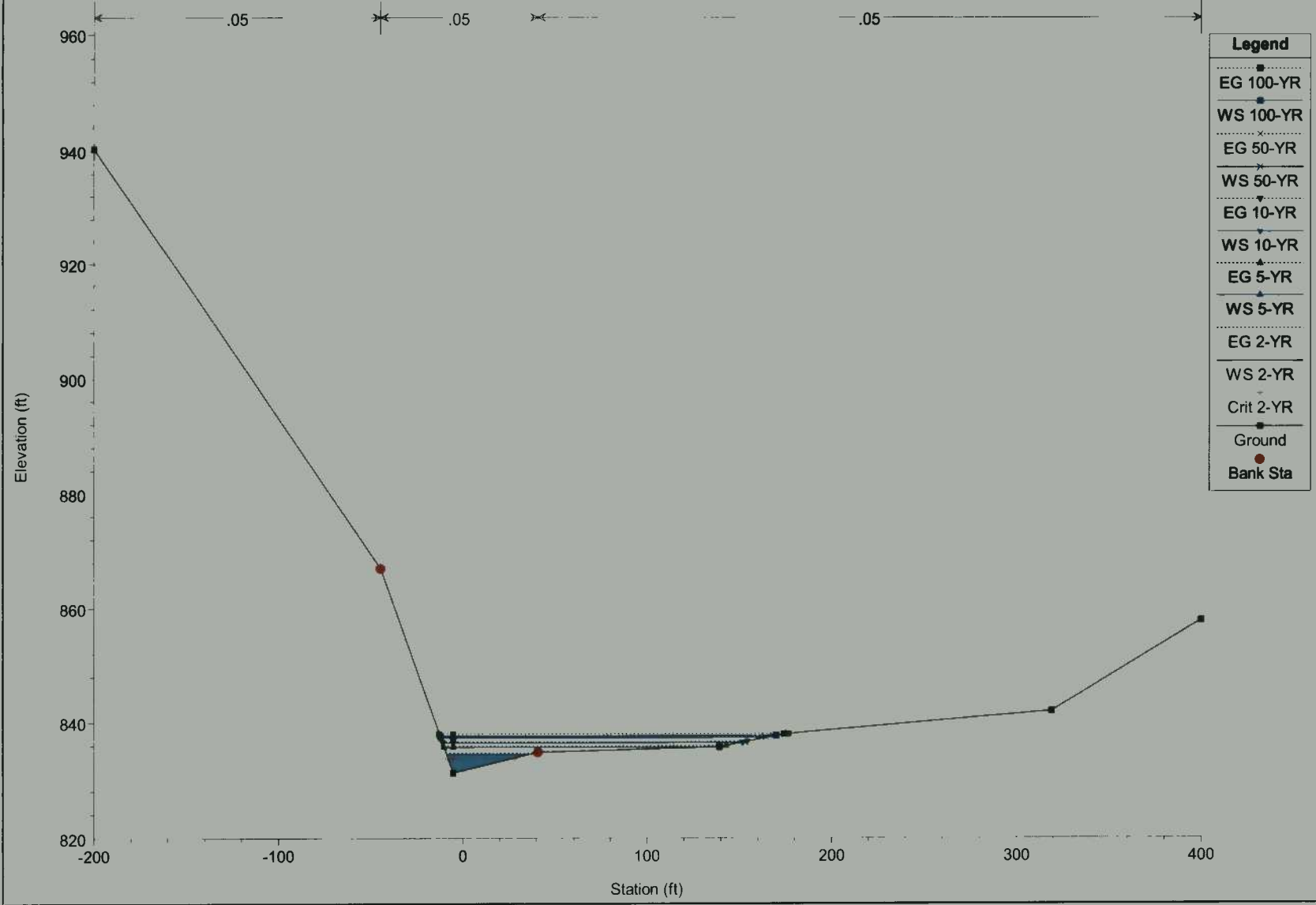


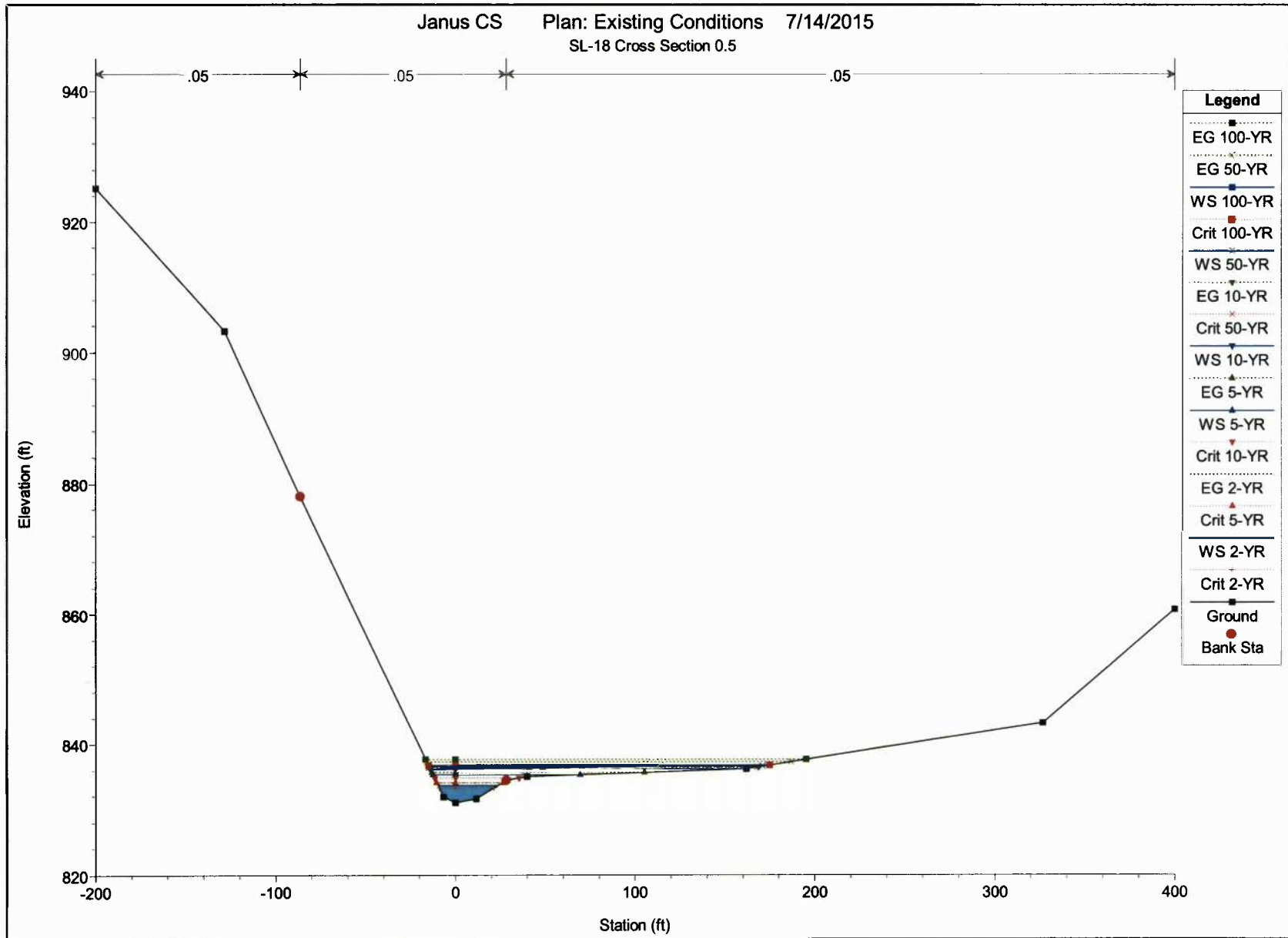
Janus CS Plan: Existing Conditions 7/14/2015
SL-15 Cross Section 3.0





Janus CS Plan: Existing Conditions 7/14/2015
 SL-17 Cross Section 1.0





JanusCS.rep

HEC-RAS Version 4.1.0 Jan 2010
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
XXXXXXXX XXXX      X        XXX XXXX      XXXXXX      XXXX
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PROJECT DATA

Project Title: Janus CS
Project File : JanusCS.prj
Run Date and Time: 7/14/2015 7:41:42 AM

Project in English units

PLAN DATA

Plan Title: Existing Conditions
Plan File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.p01

Geometry Title: Existing Conditions
Geometry File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC
Study\HEC-RAS\JanusCS.g06

Flow Title : Existing Flow
Flow File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC
Study\HEC-RAS\JanusCS.f01

Plan Summary Information:

Number of:	Cross Sections =	18	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

JanusCS.rep

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: Existing Flow
 Flow File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.f01

Flow Data (cfs)

River	Reach	RS	2-YR	5-YR	10-YR	50-YR
Arnold Creek	Main Fork	13.0	312.12	596.09	879.74	1742.23
Arnold Creek	Main Fork	11.0	312.12	596.09	879.74	1742.23
Arnold Creek	Main Fork	9.0	312.12	596.09	879.74	1742.23

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Arnold Creek	Main Fork	2-YR	Known WS = 837.99	Known WS = 833.66
Arnold Creek	Main Fork	5-YR	Known WS = 840.2	Known WS = 835.3
Arnold Creek	Main Fork	10-YR	Known WS = 841.51	Known WS = 836.23
Arnold Creek	Main Fork	50-YR	Known WS = 842.2	Known WS = 836.61

GEOMETRY DATA

Geometry Title: Existing Conditions
 Geometry File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.g06

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 13.0

INPUT

Description: SL-1 Cross Section 13.0

Station Elevation Data num= 15											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	943.814	-182.372	895.349	-170.721	894.887	-127.806	872	-112.122	871.614		
-73.41	859.07	-39.21	838	-12.029	836	11.054	836	87.656	838.557		
147.51	839.449	187.451	842	199.7	848	218.618	850	300	893.352		

Manning's n Values num= 3						
Sta	n Val	Sta	n Val	Sta	n Val	
-300	.05	-73.41	.05	199.7	.05	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-73.41	199.7		50	50		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 12.0

INPUT

Description: SL-2 Cross Section 12.0

Station Elevation Data num= 11											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	934.268	-201.837	896	-165.999	890	-77.011	856	-39.804	836		
10.518	836	47.377	838.58	72.081	838	138.032	844	222.116	845.624		
300	847.954										

Manning's n Values num= 3						
Sta	n Val	Sta	n Val	Sta	n Val	
-300	.05	-77.011	.05	47.377	.05	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-77.011	47.377		50	50		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 11.0

INPUT

JanusCS.rep

Description: SL-3 Cross Section 11.0

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	967.671	-154.843	897.538	-137.656	894.666	-89.327	866.008	-74.262	864.722
-57.343	856.669	-42.776	853.486	-20.567	838	-8.165	836	15.268	836
25.746	837.554	58.711	838.651	137.897	843.591	300	848.611		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.05	-42.776	.05	25.746	.05

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

-42.776	25.746	50	50	50	.1	.3
---------	--------	----	----	----	----	----

CROSS SECTION

RIVER: Arnold Creek

REACH: Main Fork RS: 10.0

INPUT

Description: SL-4 Cross Section 10.0

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	959.546	-186.237	910.475	-125.427	877.398	-108.276	875.305	-62.093	850.986
-47.489	849.866	-32.731	841.687	-17.466	838	-14.885	836	16.323	836
142.997	843.427	220.941	842.409	300	849.009				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.05	-47.489	.05	142.997	.05

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

-47.489	142.997	50	50	50	.1	.3
---------	---------	----	----	----	----	----

CROSS SECTION

RIVER: Arnold Creek

REACH: Main Fork RS: 9.0

INPUT

Description: SL-5 Cross Section 9.0

Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	915.784	-110.558	870.385	-97.669	868	-49.256	844.8	-40.756	844.913
-10.455	835.997	4.787	835.996	9.885	835.401	27.461	835.552	140.244	844
399.919	854.614								

Manning's n Values num= 3
 Sta n Val Sta n Val
 -200 .05 -40.756 .05 140.244 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -40.756 140.244 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 8.0

INPUT

Description: SL-6 Cross Section 8.0

Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 886.211 -121.839 854-106.835 853.559 -71.65 838 -12.398 835.176
 -7.519 833.595 2.068 832.602 19.976 835.433 201.603 845.329 297.328 845.451
 355.508 850.027 362.262 850 400 869.31

Manning's n Values num= 3
 Sta n Val Sta n Val
 -200 .05 -12.398 .05 19.976 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -12.398 19.976 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 7.0

INPUT

Description: SL-7 Cross Section 7.0

Station Elevation Data num= 15
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 900.223 -132.768 868 -121.55 856-108.571 853.875 -83.145 838.482
 -17.793 834.816 1.505 831.893 11.041 833.055 13.61 835.846 43.583 839.197
 193.887 844.226 281.438 864.015 302.006 859.514 325.741 876.854 374.397 887.397

Manning's n Values num= 3
 Sta n Val Sta n Val
 -200 .05 -17.793 .05 43.583 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -17.793 43.583 25 25 25 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 6.0

INPUT

Description: SL-8 Cross Section 6.0

Station Elevation Data		num=		14	
Sta	Elev	Sta	Elev	Sta	Elev
-200	899.798	-117.25	851.48	-106.434	850
-8.068	832.782	4.345	832.068	10.624	832.627
211.307	846.131	278.447	866	289.779	864.888
				378.453	901.423

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-10.553	.05	13.874	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-10.553	13.874		10	10		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 5.5

INPUT

Description: SL-9 Cross Section 5.5

Station Elevation Data		num=		14	
Sta	Elev	Sta	Elev	Sta	Elev
-200	898.1	-103.024	846	-92.656	839.805
-8.766	832.974	3.006	832.304	9.151	832.445
221.066	848	272.535	866	289.586	865.619
				379.519	902.644

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-12.104	.05	13.84	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-12.104	13.84		18.28	18.28		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 5.0

INPUT

Description: SL-10 Cross Section 5.0

Station Elevation Data		num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	896.299	-132.06	861.52	-117.71	846	-70.931	835.764	-18.067	835.016		
-16.751	834.113	2.227	832.199	5.868	832.157	9.599	835.086	181.721	844		
270.07	865.578	383.855	906								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-18.067	.05	9.599	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-18.067	9.599		16.72	16.72	.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.9

INPUT

Description: SL-11 Cross Section 4.9

Station Elevation Data		num= 13									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	938.534	-140.236	867.031	-120.693	848.678	-77.278	836.366	-21.038	834.909		
1.524	832.607	3.495	831.992	5.505	831.892	9.46	836.95	167.53	842.14		
254.523	854.507	286.691	868	300.868	868.01						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.05	-21.038	.05	9.46	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	-21.038	9.46		10	10	.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.75

INPUT

Description: SL-12 Cross Section 4.75

Station Elevation Data		num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	896.456	-97.292	840	-71.702	835.686	-19.124	835.088	-4.386	833.062		
.76	832.945	5.039	831.741	6.779	831.649	10.173	837.288	111.293	840.609		
244.386	848	400	906.217								

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -19.124 .05 10.173 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -19.124 10.173 20 20 20 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.50

INPUT

Description: SL-13 Cross Section 4.50
 Station Elevation Data num= 8
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 845.871 -116.252 836.77 -22.687 835.075 3.919 830.21 11.567 830.596
 12.743 836.023 200 838.406 400 840.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -22.687 .05 12.743 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -22.687 12.743 35.77 35.77 35.77 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.0

INPUT

Description: SL-14 Cross Section 4.0
 Station Elevation Data num= 16
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -300 873.98 -252.092 870.469 -212.881 864.191 -191.253 852.548 -176.649 858.324
 -102.627 838.373 -20.537 834.496 -17.346 835.587 -11.66 831.966 -6.069 831.871
 11.048 833.388 15.927 835.299 192.614 835.894 220.689 838.205 378.243 839.093
 500 844.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .05 -17.346 .05 15.927 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -17.346 15.927 14.23 14.23 14.23 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 3.0

INPUT

Description: SL-15 Cross Section 3.0

Station Elevation Data		num= 14									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	863.919	-190.156	859.933	-170.904	864.464	-156.435	863.631	-73.842	838.827		
-16.819	834.33	-12.511	832.174	-3.71	831.862	11.453	832.924	18.376	835.002		
46.503	835.91	150	835.175	224.997	838.011	400	839.466				

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-16.819	.05	18.376	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-16.819	18.376		50	50		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 2.0

INPUT

Description: SL-16 Cross Section 2.0

Station Elevation Data		num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	923.207	-56.735	862	-31.55	838.309	-20.016	837.066	-9.97	832.3		
2.707	831.895	4.536	832.403	15.288	834.016	150	835.844	262.924	839.569		
349.694	839.998	400	846.957								

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-20.016	.05	15.288	.05

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	-20.016	15.288		50	50		.1	.3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 1.0

INPUT

Description: SL-17 Cross Section 1.0

Station Elevation Data num= 8
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 940.324 -44.78 866.942 -5.375 831.251 40.657 834.86 139.319 835.724
 174.256 838 319.229 842 400 857.893

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -44.78 .05 40.657 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -44.78 40.657 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 0.5

INPUT

Description: SL-18 Cross Section 0.5

Station Elevation Data num= 11
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 925.222 -128.289 903.185 -86.279 878 -6.568 831.855 -.053 830.986
 11.549 831.551 28.346 834.414 39.857 835.003 161.886 836.223 326.823 843.271
 400 860.777

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -86.279 .05 28.346 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -86.279 28.346 50 50 50 .1 .3

SUMMARY OF MANNING'S N VALUES

River: Arnold Creek

Reach	River Sta.	n1	n2	n3
Main Fork	13.0	.05	.05	.05
Main Fork	12.0	.05	.05	.05
Main Fork	11.0	.05	.05	.05
Main Fork	10.0	.05	.05	.05
Main Fork	9.0	.05	.05	.05
Main Fork	8.0	.05	.05	.05
Main Fork	7.0	.05	.05	.05

		JanusCS.rep		
Main Fork	6.0	.05	.05	.05
Main Fork	5.5	.05	.05	.05
Main Fork	5.0	.05	.05	.05
Main Fork	4.9	.05	.05	.05
Main Fork	4.75	.05	.05	.05
Main Fork	4.50	.05	.05	.05
Main Fork	4.0	.05	.05	.05
Main Fork	3.0	.05	.05	.05
Main Fork	2.0	.05	.05	.05
Main Fork	1.0	.05	.05	.05
Main Fork	0.5	.05	.05	.05

SUMMARY OF REACH LENGTHS

River: Arnold Creek

Reach	River Sta.	Left	Channel	Right
Main Fork	13.0	50	50	50
Main Fork	12.0	50	50	50
Main Fork	11.0	50	50	50
Main Fork	10.0	50	50	50
Main Fork	9.0	50	50	50
Main Fork	8.0	50	50	50
Main Fork	7.0	25	25	25
Main Fork	6.0	10	10	10
Main Fork	5.5	18.28	18.28	18.28
Main Fork	5.0	16.72	16.72	16.72
Main Fork	4.9	10	10	10
Main Fork	4.75	20	20	20
Main Fork	4.50	35.77	35.77	35.77
Main Fork	4.0	14.23	14.23	14.23
Main Fork	3.0	50	50	50
Main Fork	2.0	50	50	50
Main Fork	1.0	50	50	50
Main Fork	0.5	50	50	50

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Arnold Creek

Reach	River Sta.	Contr.	Expan.
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			JanusCS.rep
Main Fork	13.0	.1	.3
Main Fork	12.0	.1	.3
Main Fork	11.0	.1	.3
Main Fork	10.0	.1	.3
Main Fork	9.0	.1	.3
Main Fork	8.0	.1	.3
Main Fork	7.0	.1	.3
Main Fork	6.0	.1	.3
Main Fork	5.5	.1	.3
Main Fork	5.0	.1	.3
Main Fork	4.9	.1	.3
Main Fork	4.75	.1	.3
Main Fork	4.50	.1	.3
Main Fork	4.0	.1	.3
Main Fork	3.0	.1	.3
Main Fork	2.0	.1	.3
Main Fork	1.0	.1	.3
Main Fork	0.5	.1	.3

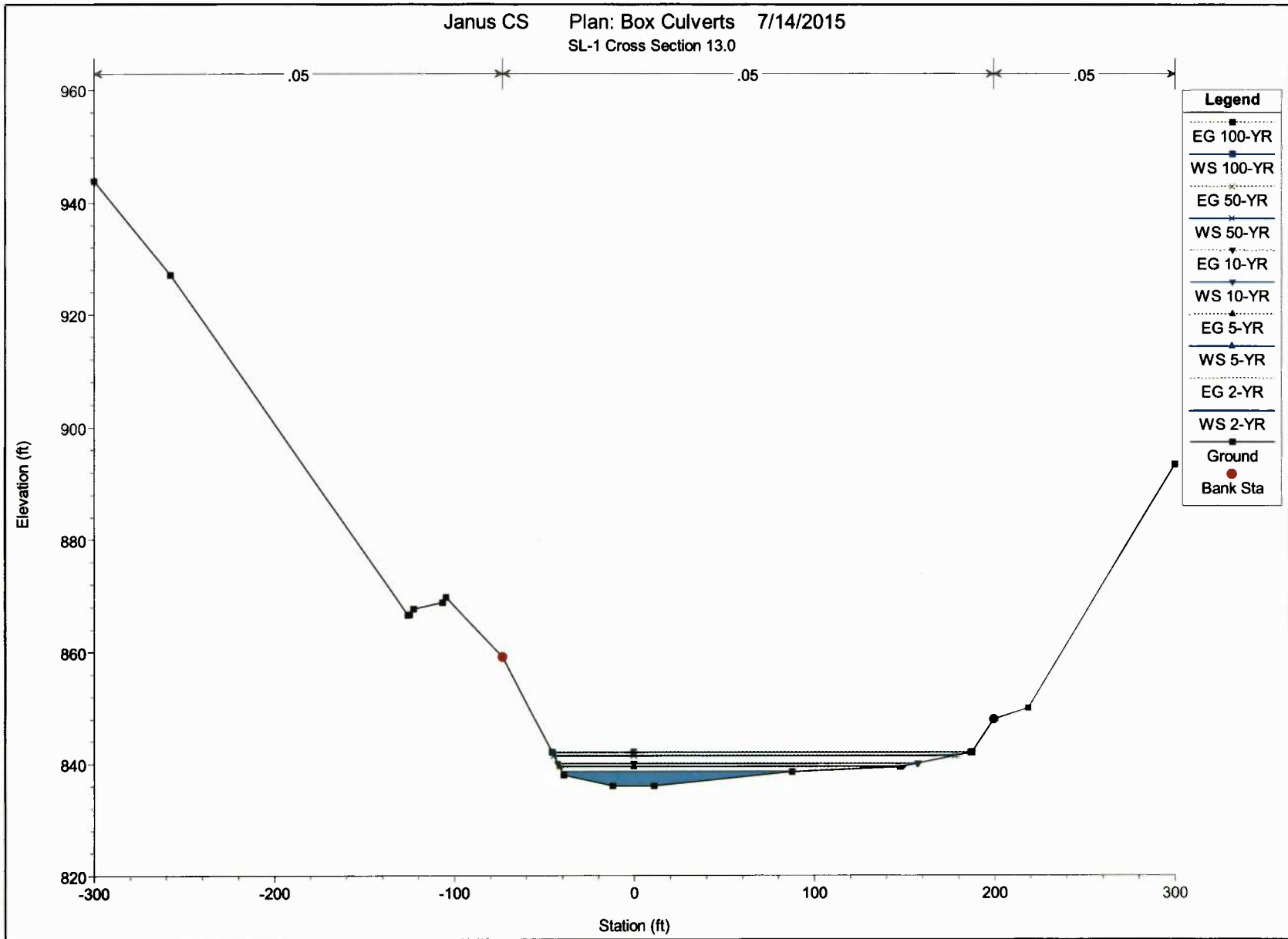
HEC-RAS Plan: EX River: Arnold Creek Reach: Main Fork

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Fork	13.0	2-YR	312.12	836.00	838.64		838.68	0.001355	1.48	210.88	133.74	0.21
Main Fork	13.0	5-YR	596.09	836.00	839.47		839.51	0.001539	1.73	344.05	189.37	0.23
Main Fork	13.0	10-YR	879.74	836.00	840.07		840.12	0.001359	1.91	460.97	199.75	0.22
Main Fork	13.0	50-YR	1742.23	836.00	841.40		841.49	0.001259	2.35	742.89	222.81	0.23
Main Fork	13.0	100-YR	2196.67	836.00	841.95		842.05	0.001259	2.53	868.38	232.34	0.23
Main Fork	12.0	2-YR	312.12	836.00	838.57		838.61	0.001309	1.69	190.92	122.11	0.21
Main Fork	12.0	5-YR	596.09	836.00	839.37		839.44	0.001407	2.17	293.44	133.18	0.23
Main Fork	12.0	10-YR	879.74	836.00	839.95		840.05	0.001513	2.54	373.90	140.73	0.25
Main Fork	12.0	50-YR	1742.23	836.00	841.25		841.41	0.001772	3.37	566.25	157.32	0.28
Main Fork	12.0	100-YR	2196.67	836.00	841.78		841.97	0.001879	3.71	651.38	164.12	0.29
Main Fork	11.0	2-YR	312.12	836.00	838.28		838.47	0.006492	3.55	93.04	68.54	0.46
Main Fork	11.0	5-YR	596.09	836.00	839.00		839.28	0.006808	4.47	149.50	86.27	0.50
Main Fork	11.0	10-YR	879.74	836.00	839.52		839.88	0.007052	5.11	197.13	95.43	0.52
Main Fork	11.0	50-YR	1742.23	836.00	840.67		841.21	0.007610	6.44	318.04	115.45	0.57
Main Fork	11.0	100-YR	2196.67	836.00	841.14		841.76	0.007787	6.95	374.60	123.71	0.58
Main Fork	10.0	2-YR	312.12	836.00	837.94		838.11	0.007699	3.28	95.22	66.84	0.48
Main Fork	10.0	5-YR	596.09	836.00	838.63		838.89	0.008708	4.07	146.30	81.31	0.54
Main Fork	10.0	10-YR	879.74	836.00	839.13		839.47	0.009386	4.64	189.75	91.94	0.57
Main Fork	10.0	50-YR	1742.23	836.00	840.26		840.76	0.010133	5.69	306.28	115.73	0.62
Main Fork	10.0	100-YR	2196.67	836.00	840.73		841.30	0.010141	6.04	363.84	125.83	0.63
Main Fork	9.0	2-YR	312.12	835.40	836.85	836.85	837.34	0.037876	5.60	55.70	58.20	1.01
Main Fork	9.0	5-YR	596.09	835.40	837.40	837.40	838.08	0.033862	6.62	90.08	67.37	1.01
Main Fork	9.0	10-YR	879.74	835.40	837.88	837.83	838.66	0.029405	7.08	124.18	75.37	0.97
Main Fork	9.0	50-YR	1742.23	835.40	839.02	838.85	839.98	0.022691	7.86	221.56	94.57	0.91
Main Fork	9.0	100-YR	2196.67	835.40	839.49	839.26	840.54	0.021512	8.23	267.03	102.30	0.90
Main Fork	8.0	2-YR	312.12	832.60	836.30		836.48	0.004312	3.55	100.81	71.73	0.40
Main Fork	8.0	5-YR	596.09	832.60	837.19		837.42	0.004077	4.24	180.86	106.97	0.41
Main Fork	8.0	10-YR	879.74	832.60	837.82		838.08	0.003903	4.65	256.36	131.84	0.41
Main Fork	8.0	50-YR	1742.23	832.60	839.12		839.42	0.003585	5.36	447.78	161.75	0.41
Main Fork	8.0	100-YR	2196.67	832.60	839.63		839.96	0.003543	5.67	533.71	172.35	0.41
Main Fork	7.0	2-YR	312.12	831.89	836.14		836.29	0.003051	3.13	109.27	57.73	0.33
Main Fork	7.0	5-YR	596.09	831.89	836.98		837.21	0.004524	4.07	166.68	80.04	0.41
Main Fork	7.0	10-YR	879.74	831.89	837.56		837.85	0.005368	4.65	217.61	95.57	0.46
Main Fork	7.0	50-YR	1742.23	831.89	838.76		839.17	0.006525	5.64	350.76	123.23	0.52
Main Fork	7.0	100-YR	2196.67	831.89	839.25		839.71	0.006540	5.90	413.28	129.64	0.52
Main Fork	6.0	2-YR	312.12	832.07	836.03		836.21	0.003145	3.51	103.64	59.30	0.34
Main Fork	6.0	5-YR	596.09	832.07	836.78		837.09	0.004558	4.84	156.46	82.09	0.43
Main Fork	6.0	10-YR	879.74	832.07	837.29		837.70	0.005555	5.79	202.19	97.62	0.48
Main Fork	6.0	50-YR	1742.23	832.07	838.38		838.98	0.006850	7.43	325.90	123.41	0.55
Main Fork	6.0	100-YR	2196.67	832.07	838.89		839.53	0.006711	7.78	389.64	129.24	0.55
Main Fork	5.5	2-YR	312.12	832.30	836.00		836.17	0.003553	3.57	106.04	79.00	0.36
Main Fork	5.5	5-YR	596.09	832.30	836.79		837.02	0.003957	4.40	180.93	105.58	0.40
Main Fork	5.5	10-YR	879.74	832.30	837.33		837.61	0.004204	4.96	242.30	119.34	0.42
Main Fork	5.5	50-YR	1742.23	832.30	838.47		838.86	0.004757	6.16	394.75	148.09	0.46
Main Fork	5.5	100-YR	2196.67	832.30	838.98		839.41	0.004725	6.51	473.49	160.94	0.47
Main Fork	5.0	2-YR	312.12	832.16	835.94		836.10	0.003810	3.51	112.76	97.72	0.37
Main Fork	5.0	5-YR	596.09	832.16	836.75		836.94	0.003532	4.01	200.43	117.20	0.37
Main Fork	5.0	10-YR	879.74	832.16	837.30		837.52	0.003597	4.45	268.76	130.38	0.39
Main Fork	5.0	50-YR	1742.23	832.16	838.45		838.76	0.003953	5.49	433.91	157.76	0.42
Main Fork	5.0	100-YR	2196.67	832.16	838.96		839.30	0.003915	5.81	517.86	169.99	0.43
Main Fork	4.9	2-YR	312.12	831.89	835.66		835.99	0.010026	4.70	73.73	58.67	0.57
Main Fork	4.9	5-YR	596.09	831.89	836.31		836.81	0.012103	6.07	120.00	84.18	0.65
Main Fork	4.9	10-YR	879.74	831.89	836.90		837.40	0.010474	6.34	170.92	88.57	0.62
Main Fork	4.9	50-YR	1742.23	831.89	837.78		838.60	0.013119	8.31	260.65	116.88	0.72
Main Fork	4.9	100-YR	2196.67	831.89	838.31	837.90	839.15	0.011536	8.45	328.45	135.16	0.69
Main Fork	4.75	2-YR	312.12	831.65	835.32	834.95	835.84	0.018069	5.80	55.78	48.59	0.74
Main Fork	4.75	5-YR	596.09	831.65	836.22		836.68	0.011966	5.99	123.28	84.38	0.64
Main Fork	4.75	10-YR	879.74	831.65	836.82		837.29	0.010013	6.17	175.61	88.34	0.60
Main Fork	4.75	50-YR	1742.23	831.65	837.53	837.30	838.45	0.016087	8.79	240.17	100.02	0.78
Main Fork	4.75	100-YR	2196.67	831.65	837.78	837.72	838.97	0.019105	9.99	267.32	109.46	0.85
Main Fork	4.50	2-YR	312.12	830.21	835.53		835.63	0.001796	2.61	124.22	60.29	0.25
Main Fork	4.50	5-YR	596.09	830.21	836.30		836.50	0.002870	3.76	189.98	124.41	0.33
Main Fork	4.50	10-YR	879.74	830.21	836.88		837.11	0.003101	4.26	284.87	197.30	0.35
Main Fork	4.50	50-YR	1742.23	830.21	837.84		838.13	0.003596	5.20	514.67	281.55	0.39

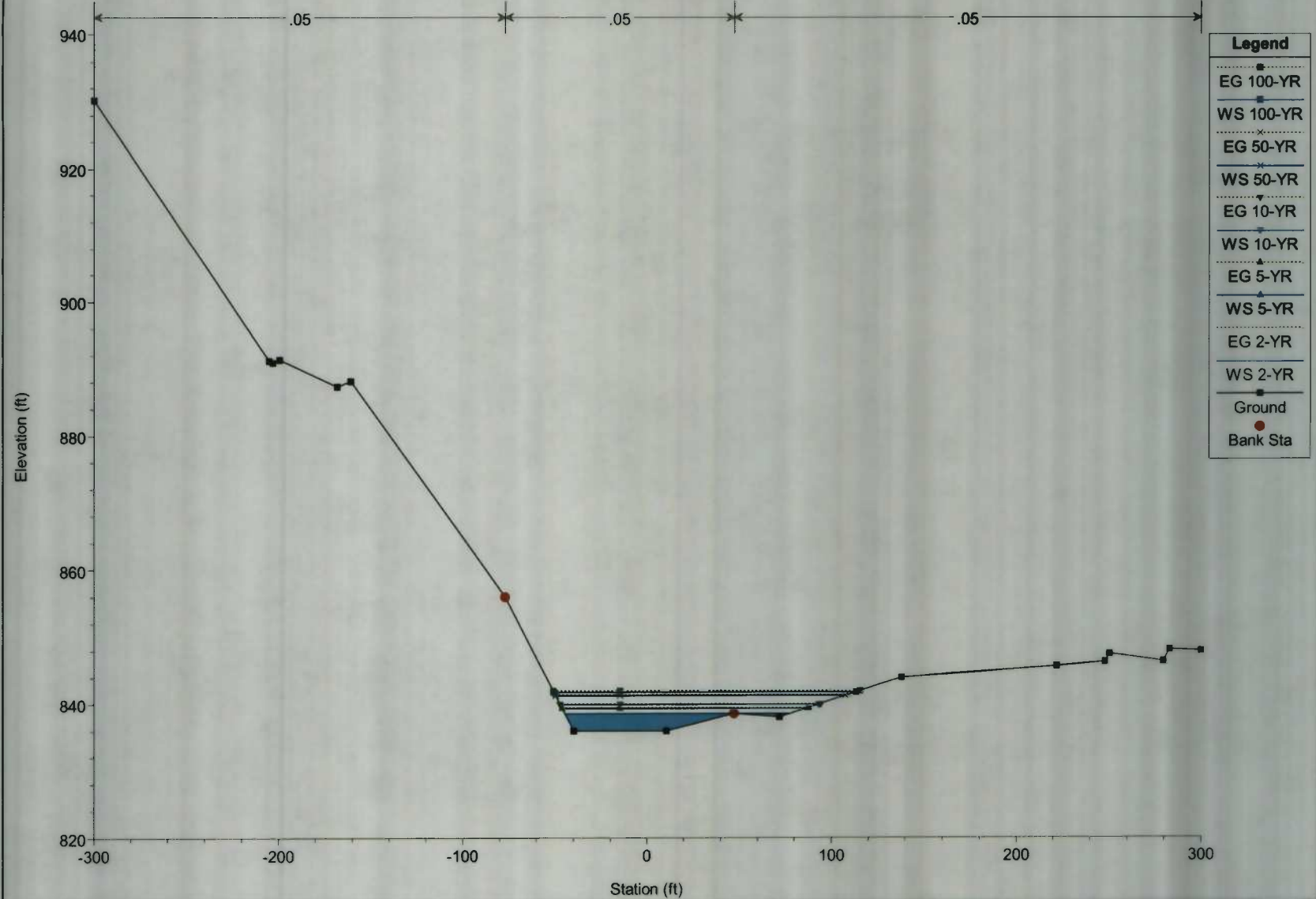
HEC-RAS Plan: EX River: Arnold Creek Reach: Main Fork (Continued)

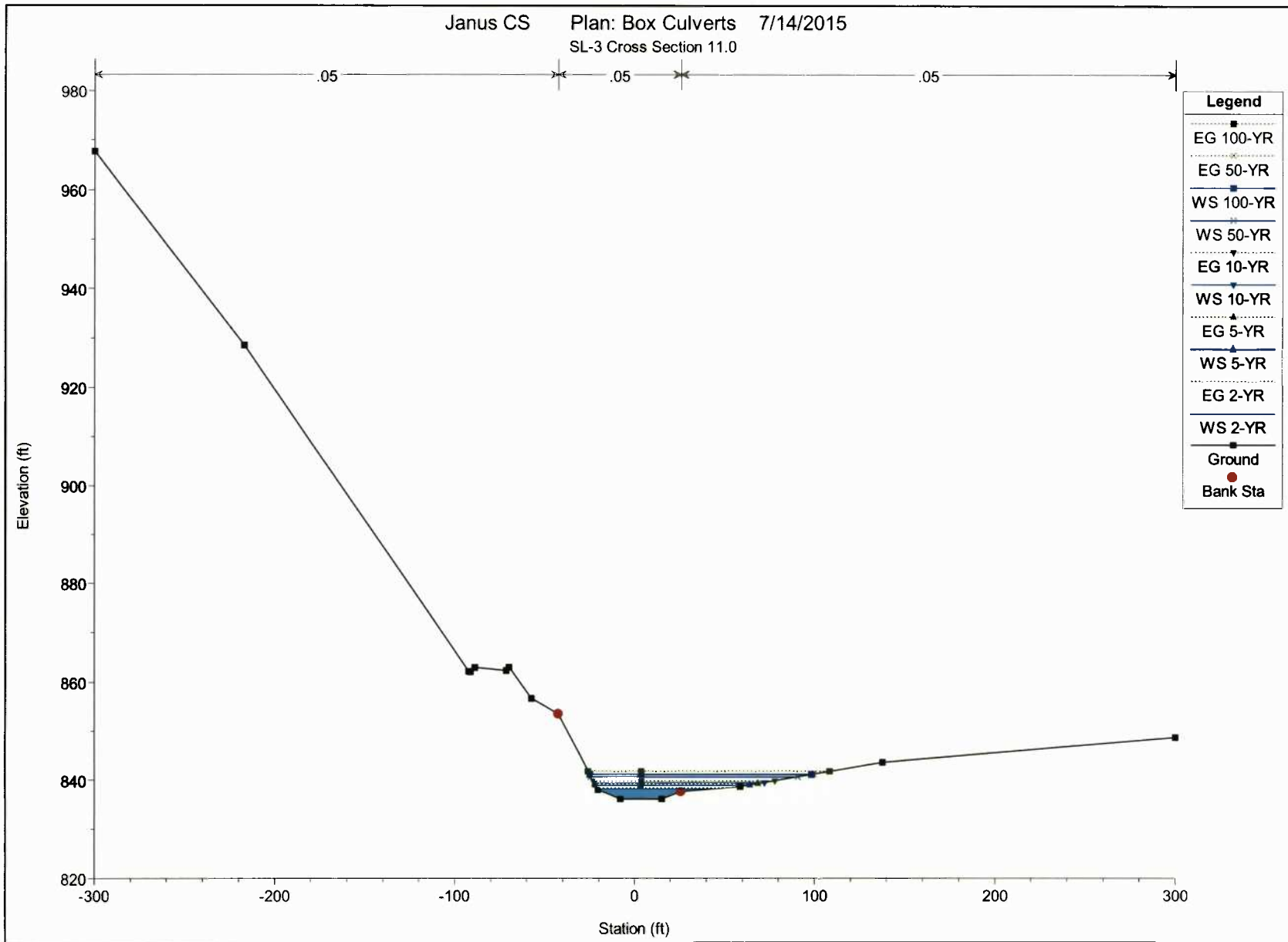
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chi
Main Fork	4.50	100-YR	2196.67	830.21	838.28		838.56	0.003407	5.32	648.36	320.54	0.38
Main Fork	4.0	2-YR	312.12	831.87	835.28		835.51	0.005832	3.92	84.83	51.67	0.45
Main Fork	4.0	5-YR	596.09	831.87	836.22		836.37	0.003384	3.69	254.90	253.66	0.36
Main Fork	4.0	10-YR	879.74	831.87	836.89		836.98	0.001989	3.21	431.78	275.91	0.29
Main Fork	4.0	50-YR	1742.23	831.87	837.87		837.98	0.001898	3.63	717.85	308.54	0.29
Main Fork	4.0	100-YR	2196.67	831.87	838.30		838.43	0.001931	3.88	854.98	338.64	0.30
Main Fork	3.0	2-YR	312.12	831.86	835.25		835.43	0.003953	3.42	96.15	67.32	0.38
Main Fork	3.0	5-YR	596.09	831.86	836.16		836.33	0.003051	3.69	239.83	216.21	0.35
Main Fork	3.0	10-YR	879.74	831.86	836.83		836.95	0.002090	3.44	393.70	242.46	0.30
Main Fork	3.0	50-YR	1742.23	831.86	837.80		837.95	0.002244	4.10	645.32	280.13	0.32
Main Fork	3.0	100-YR	2196.67	831.86	838.22		838.39	0.002354	4.43	769.88	316.54	0.33
Main Fork	2.0	2-YR	312.12	831.90	834.99		835.19	0.005869	3.81	104.07	103.06	0.45
Main Fork	2.0	5-YR	596.09	831.90	836.05		836.17	0.002914	3.34	253.68	174.04	0.33
Main Fork	2.0	10-YR	879.74	831.90	836.74		836.84	0.002142	3.18	382.31	196.54	0.29
Main Fork	2.0	50-YR	1742.23	831.90	837.66		837.83	0.002695	4.10	578.13	230.65	0.34
Main Fork	2.0	100-YR	2196.67	831.90	838.07		838.26	0.002784	4.42	676.65	246.98	0.35
Main Fork	1.0	2-YR	312.12	831.25	834.51	833.87	834.79	0.011121	4.25	73.44	45.12	0.59
Main Fork	1.0	5-YR	596.09	831.25	835.73		835.96	0.005365	4.05	176.90	149.68	0.44
Main Fork	1.0	10-YR	879.74	831.25	836.54		836.71	0.003150	3.66	304.25	163.08	0.35
Main Fork	1.0	50-YR	1742.23	831.25	837.35		837.64	0.004455	4.96	442.25	176.45	0.43
Main Fork	1.0	100-YR	2196.67	831.25	837.73		838.07	0.004743	5.39	510.27	182.68	0.45
Main Fork	0.5	2-YR	312.12	830.99	833.66	833.25	834.11	0.016120	5.36	58.20	33.61	0.72
Main Fork	0.5	5-YR	596.09	830.99	835.30	834.10	835.65	0.006434	4.82	132.44	82.08	0.49
Main Fork	0.5	10-YR	879.74	830.99	836.23	834.78	836.51	0.004304	4.61	252.78	176.17	0.42
Main Fork	0.5	50-YR	1742.23	830.99	836.61	836.49	837.28	0.009980	7.41	321.54	185.72	0.65
Main Fork	0.5	100-YR	2196.67	830.99	836.78	836.78	837.65	0.012688	8.54	353.67	190.02	0.73

**APPENDIX 4
HEC-RAS RESULTS
(PROPOSED CONDITIONS)**

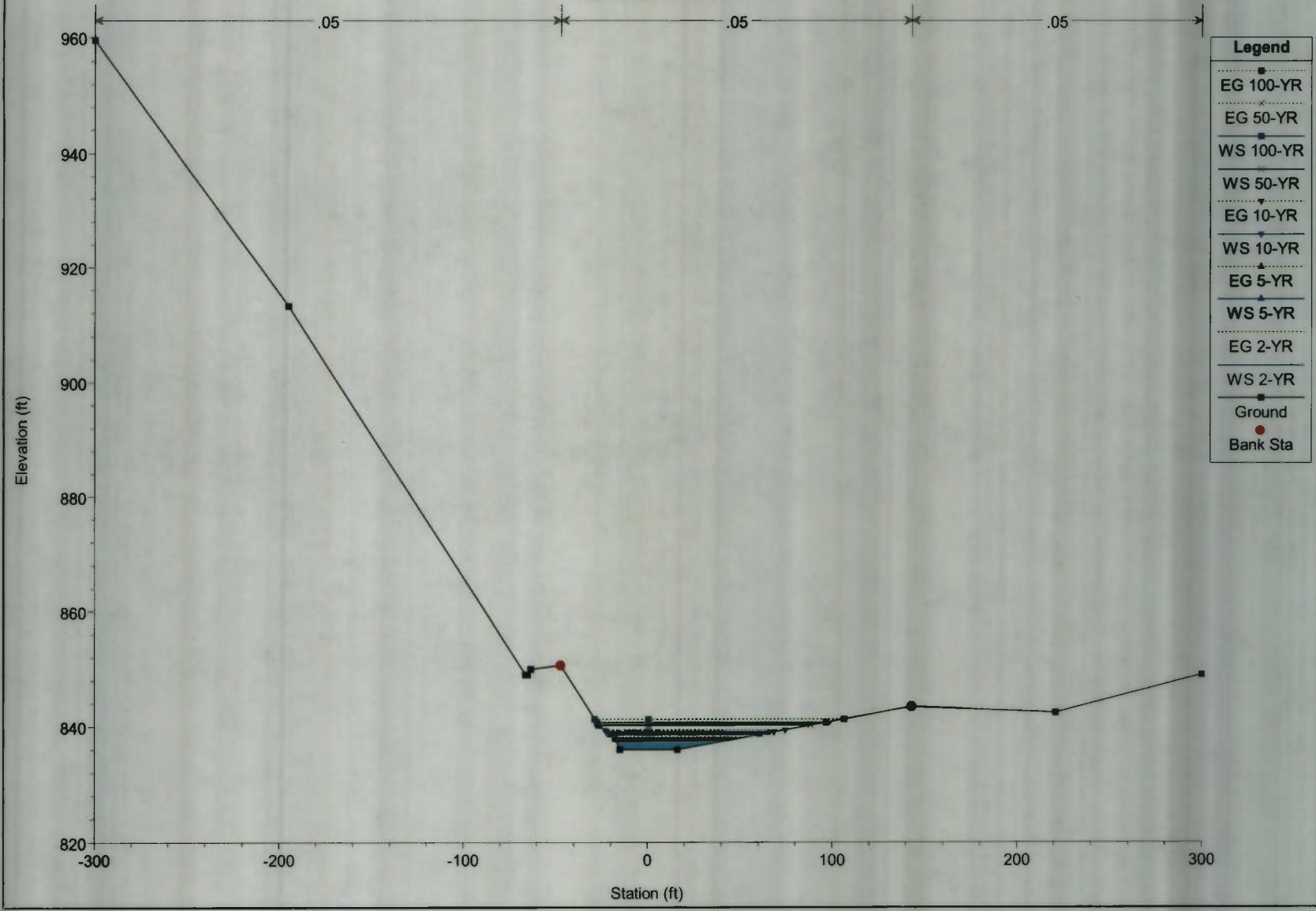


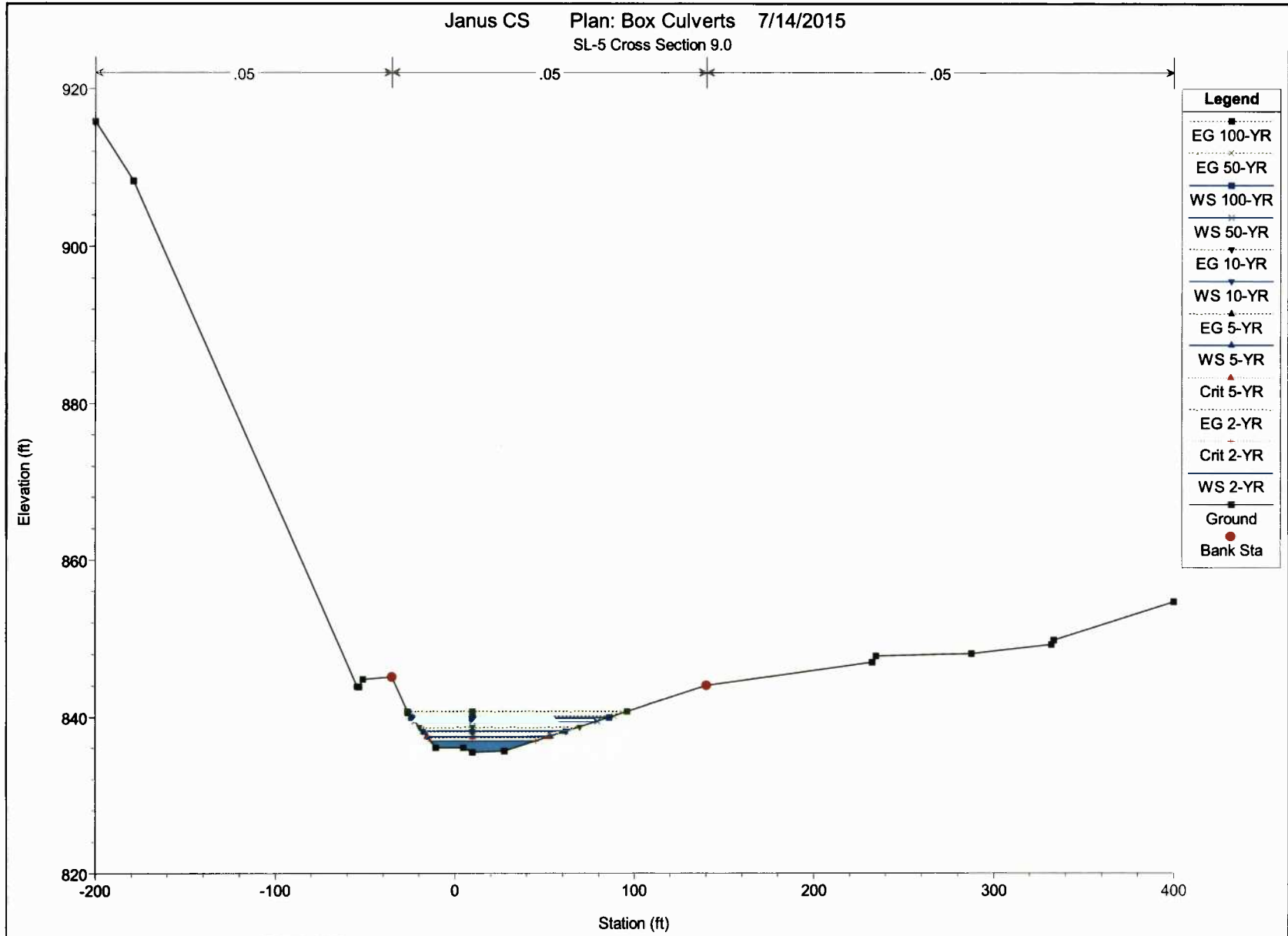
Janus CS Plan: Box Culverts 7/14/2015
 SL-2 Cross Section 12.0



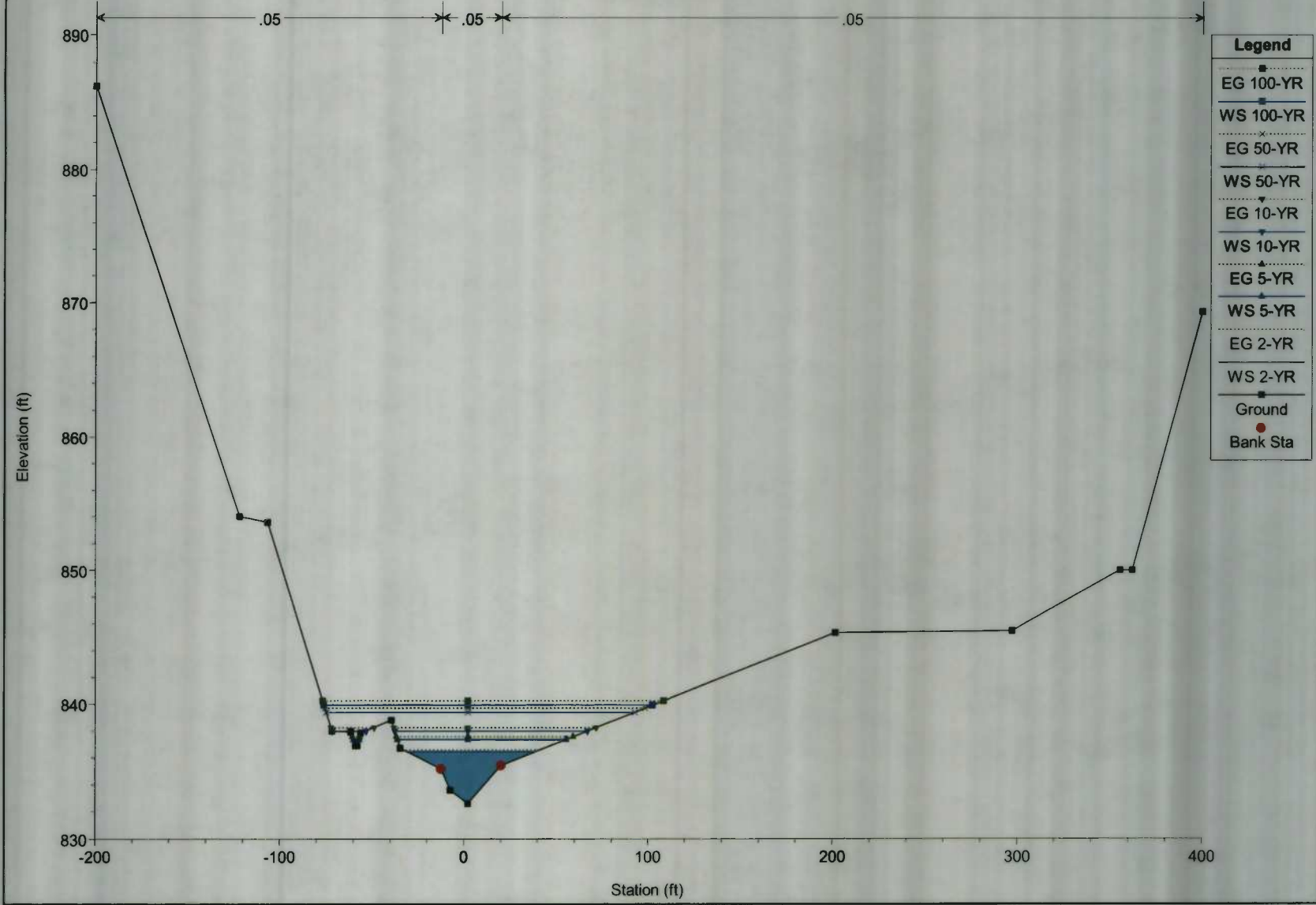


Janus CS Plan: Box Culverts 7/14/2015
 SL-4 Cross Section 10.0

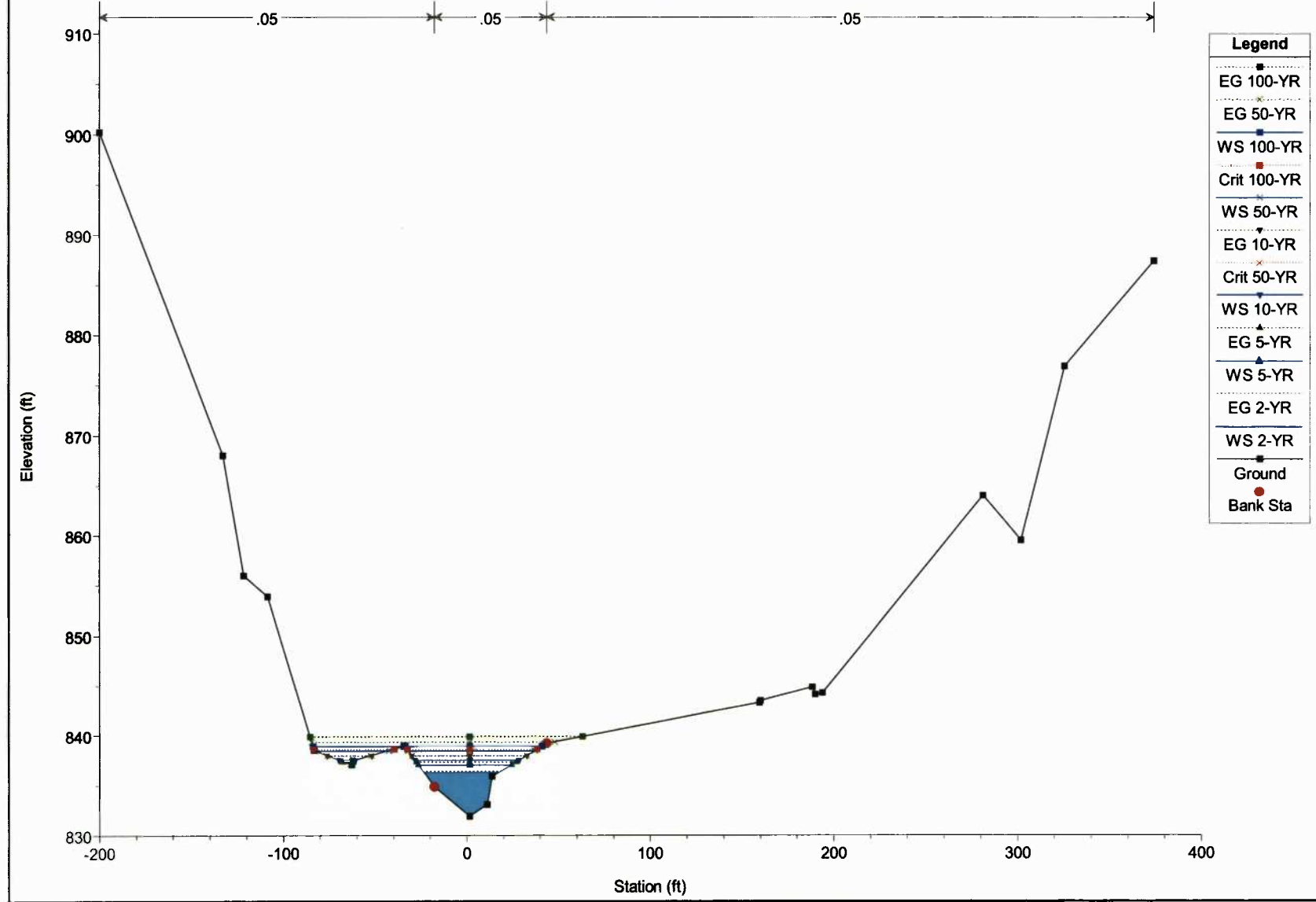




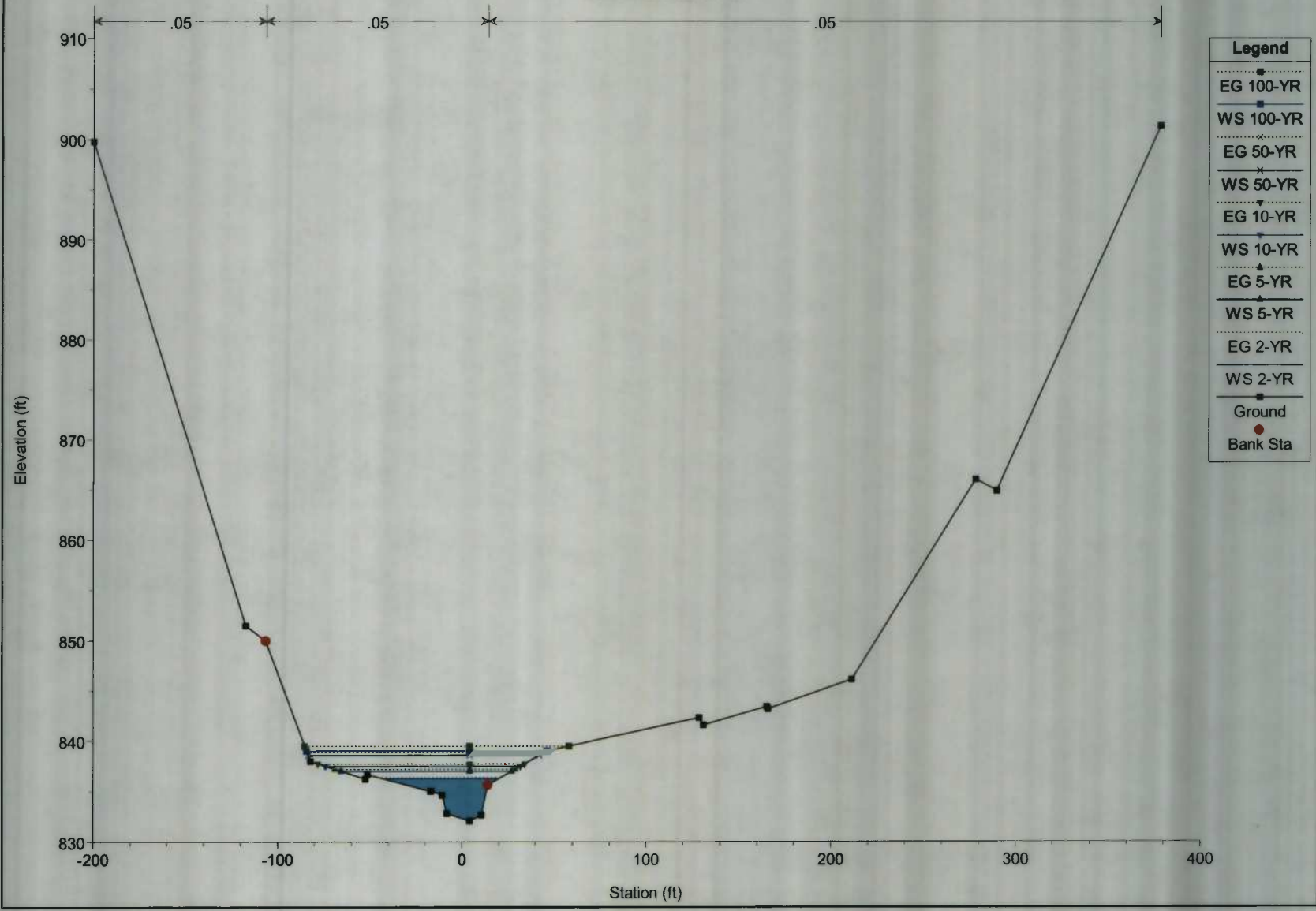
Janus CS Plan: Box Culverts 7/14/2015
 SL-6 Cross Section 8.0

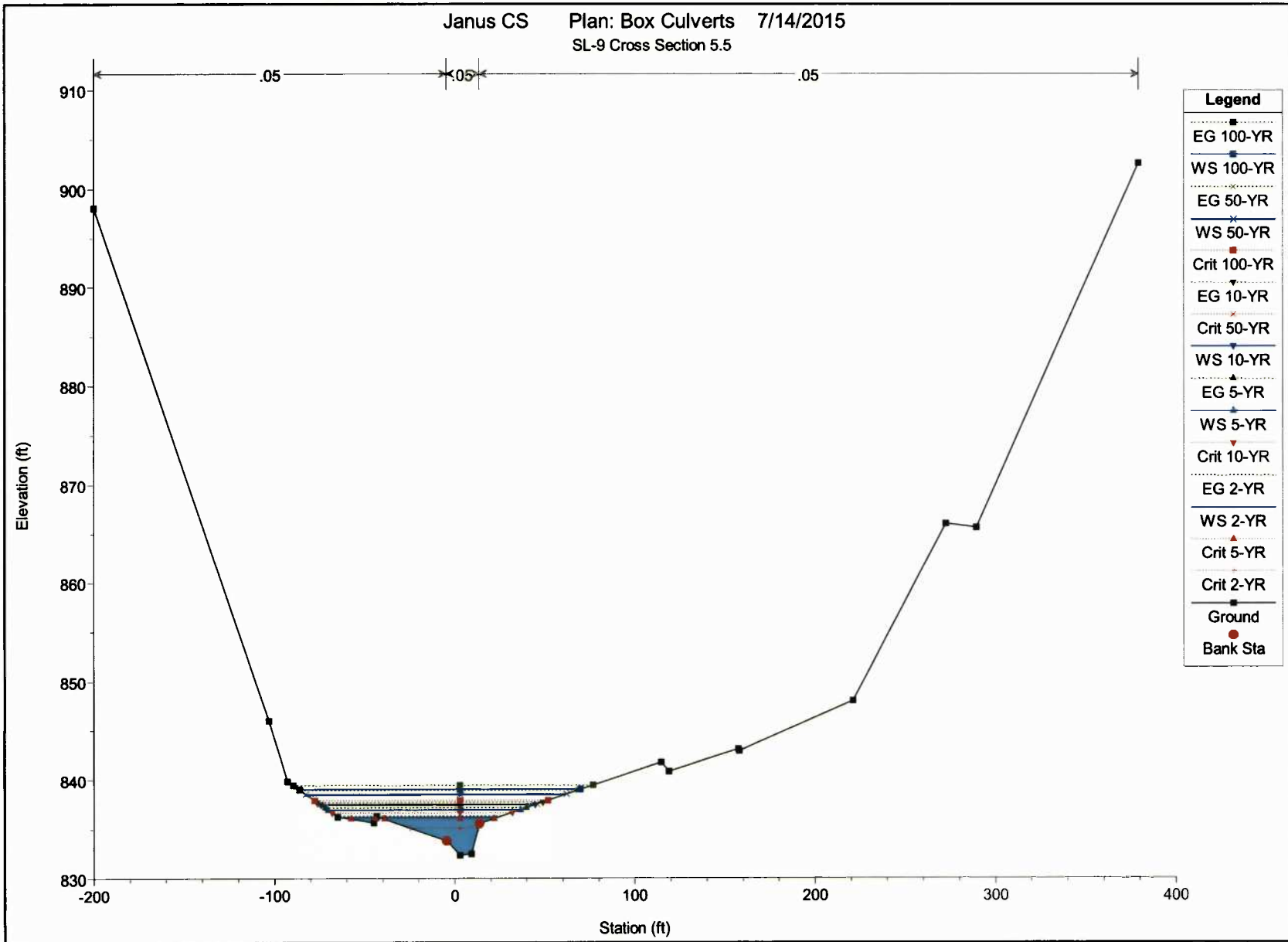


Janus CS Plan: Box Culverts 7/14/2015
 SL-7 Cross Section 7.0

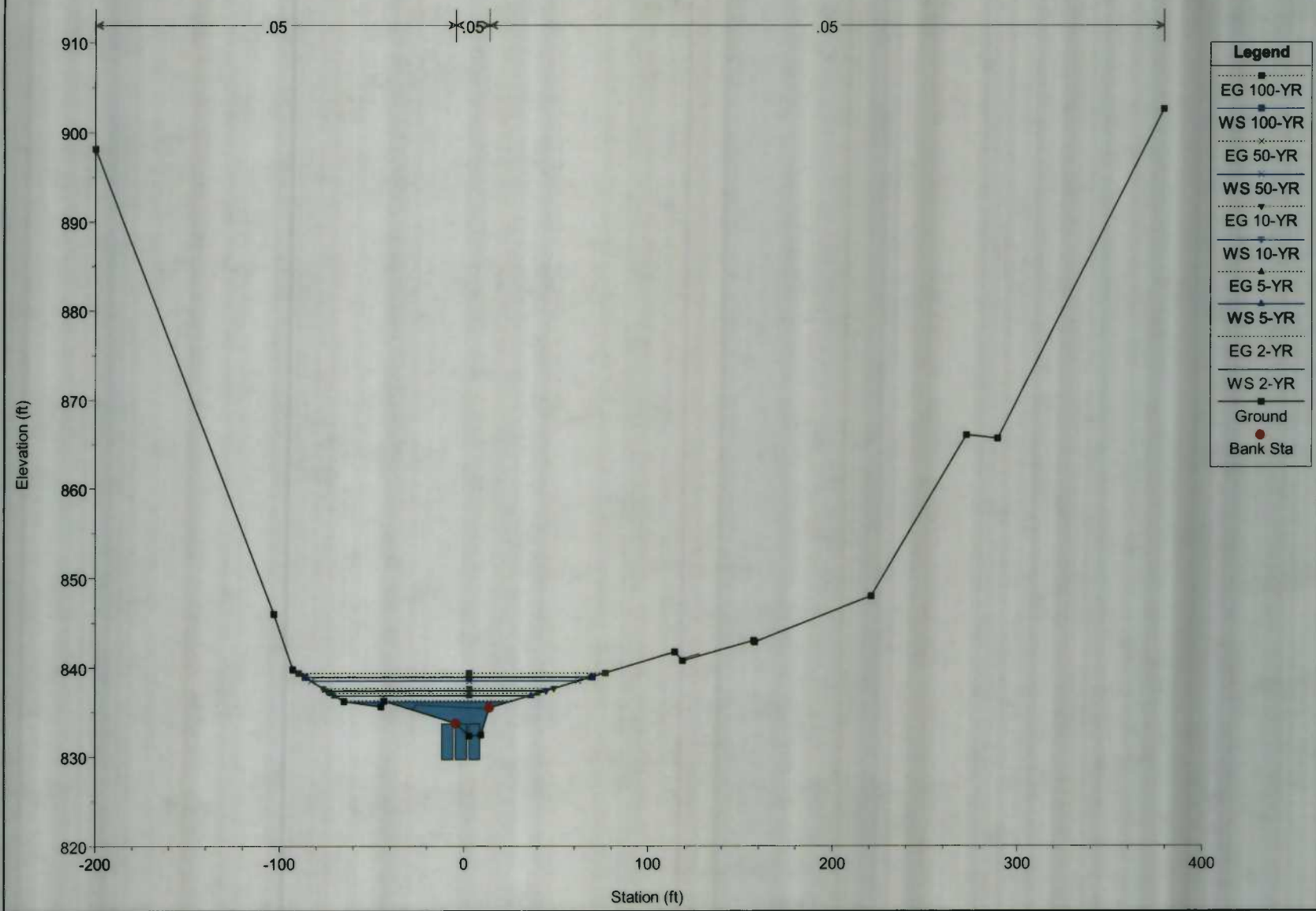


Janus CS Plan: Box Culverts 7/14/2015
 SL-8 Cross Section 6.0

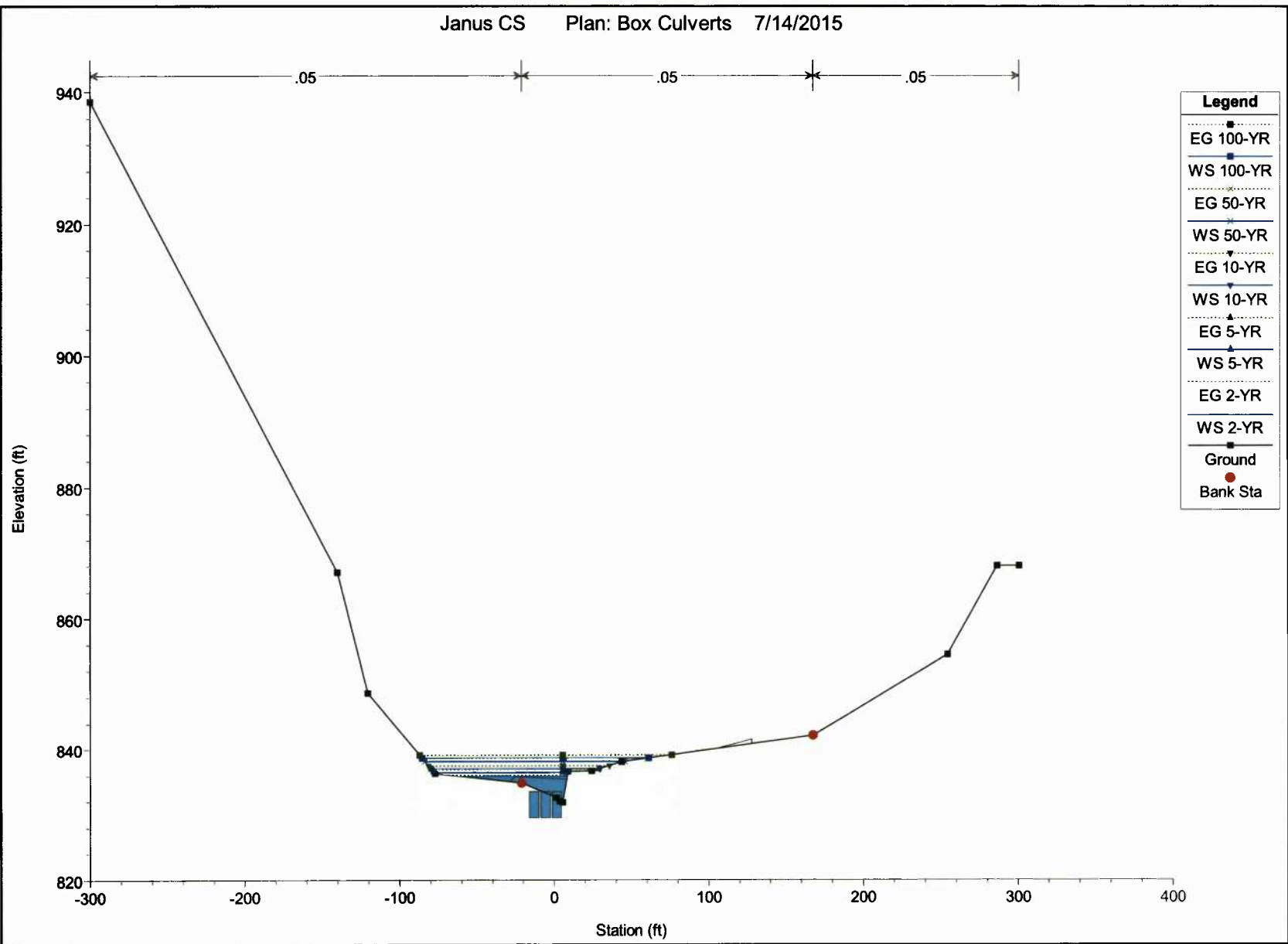




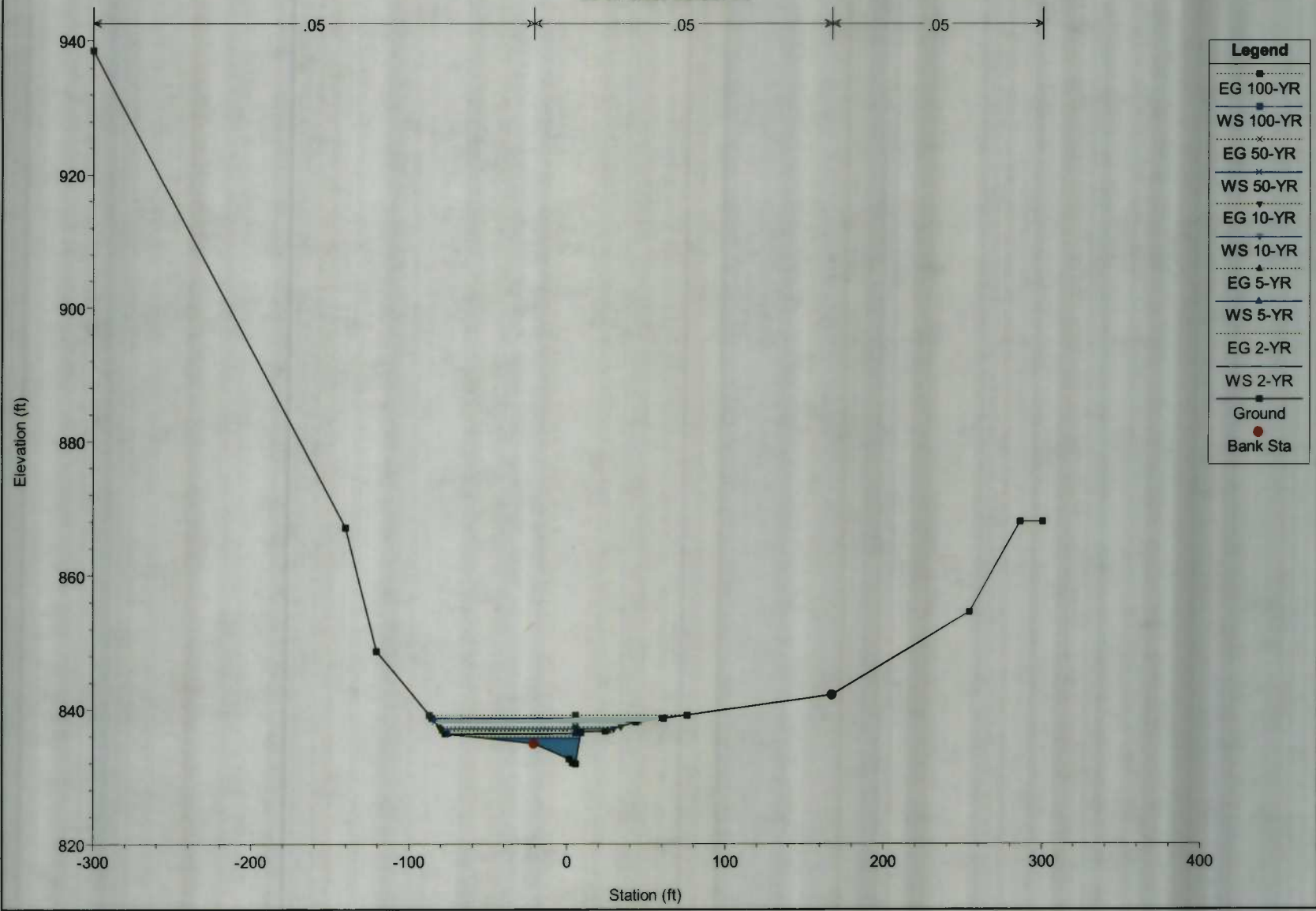
Janus CS Plan: Box Culverts 7/14/2015

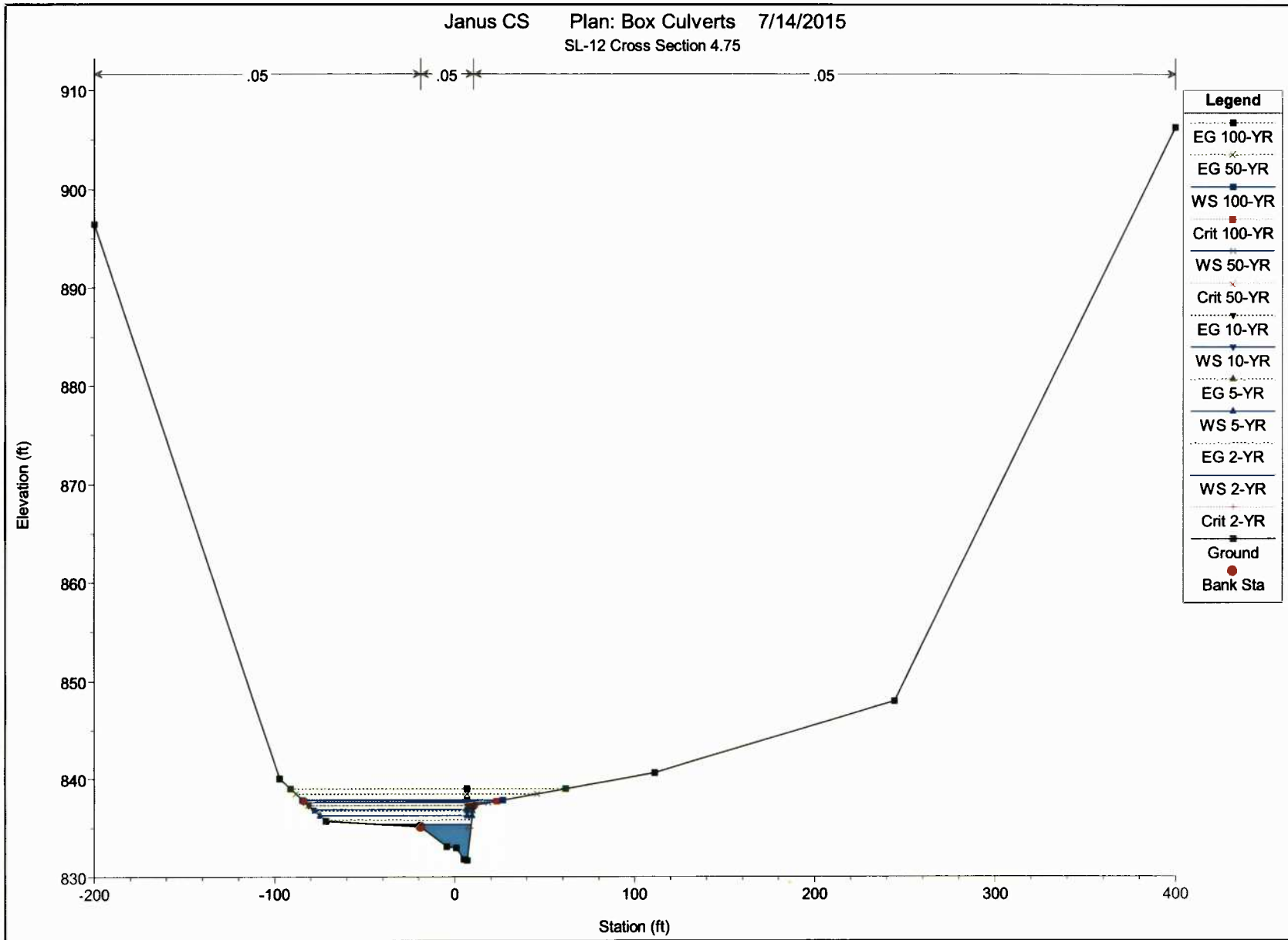


Janus CS Plan: Box Culverts 7/14/2015

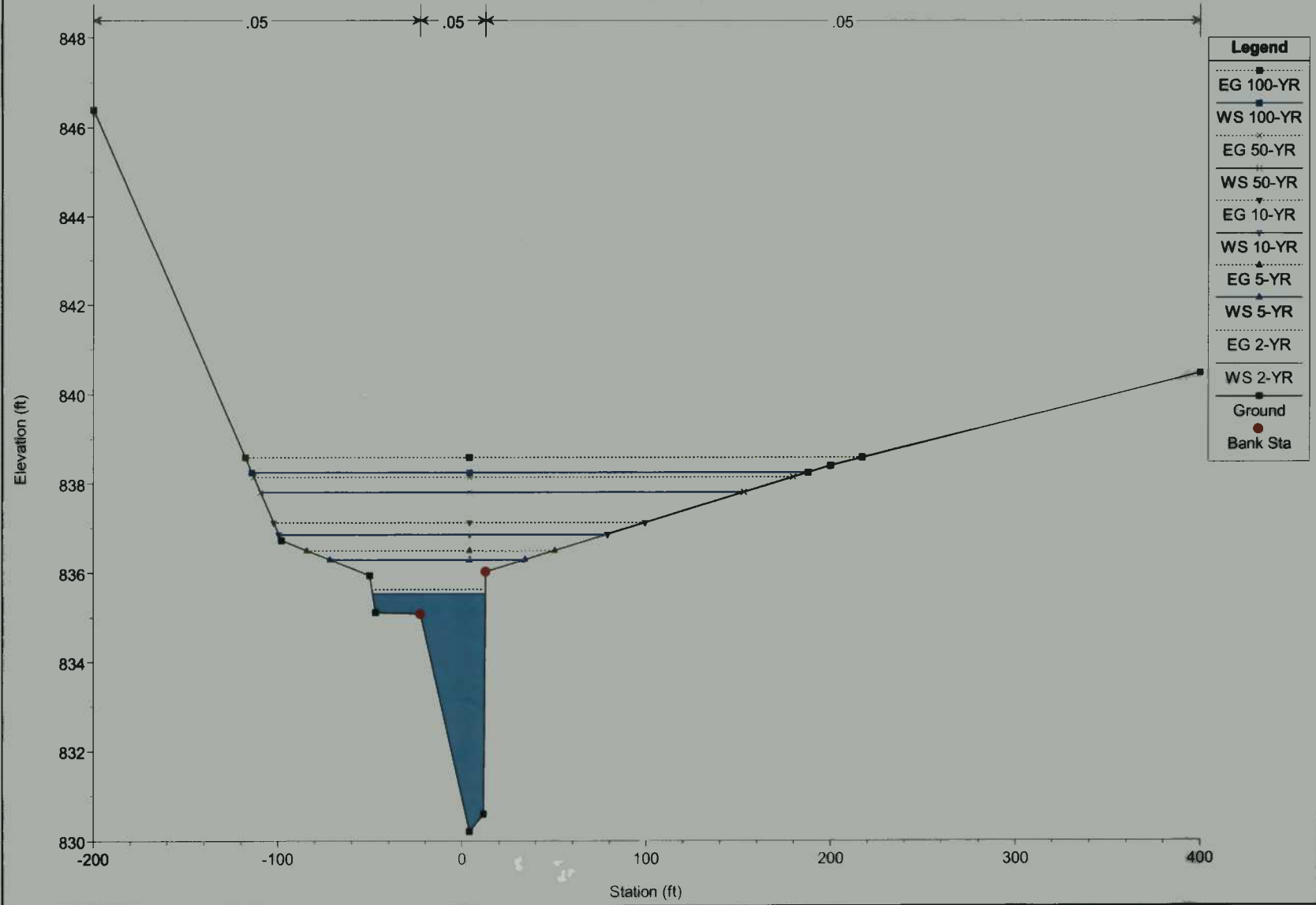


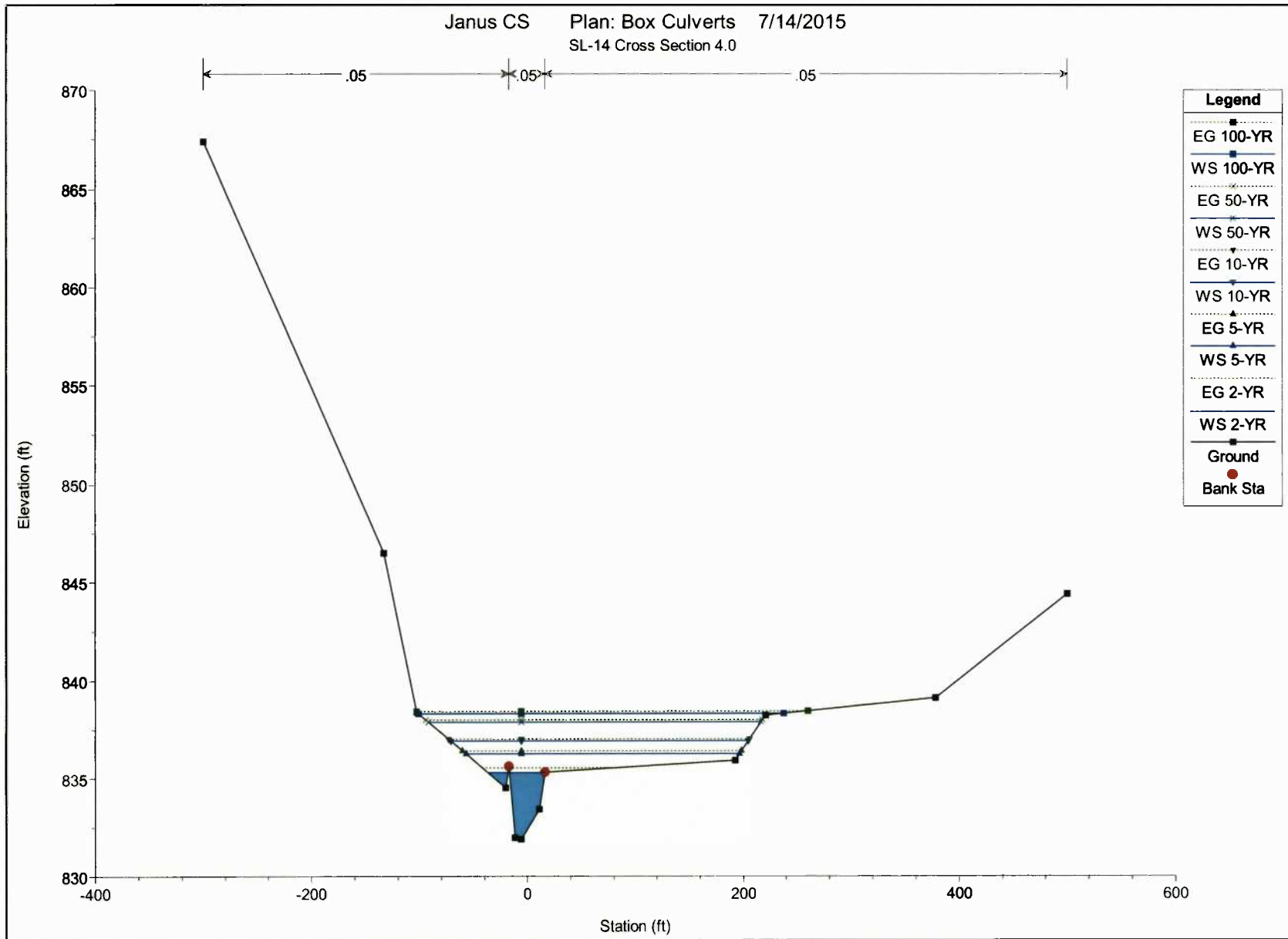
Janus CS Plan: Box Culverts 7/14/2015
 SL-11 Cross Section 4.9



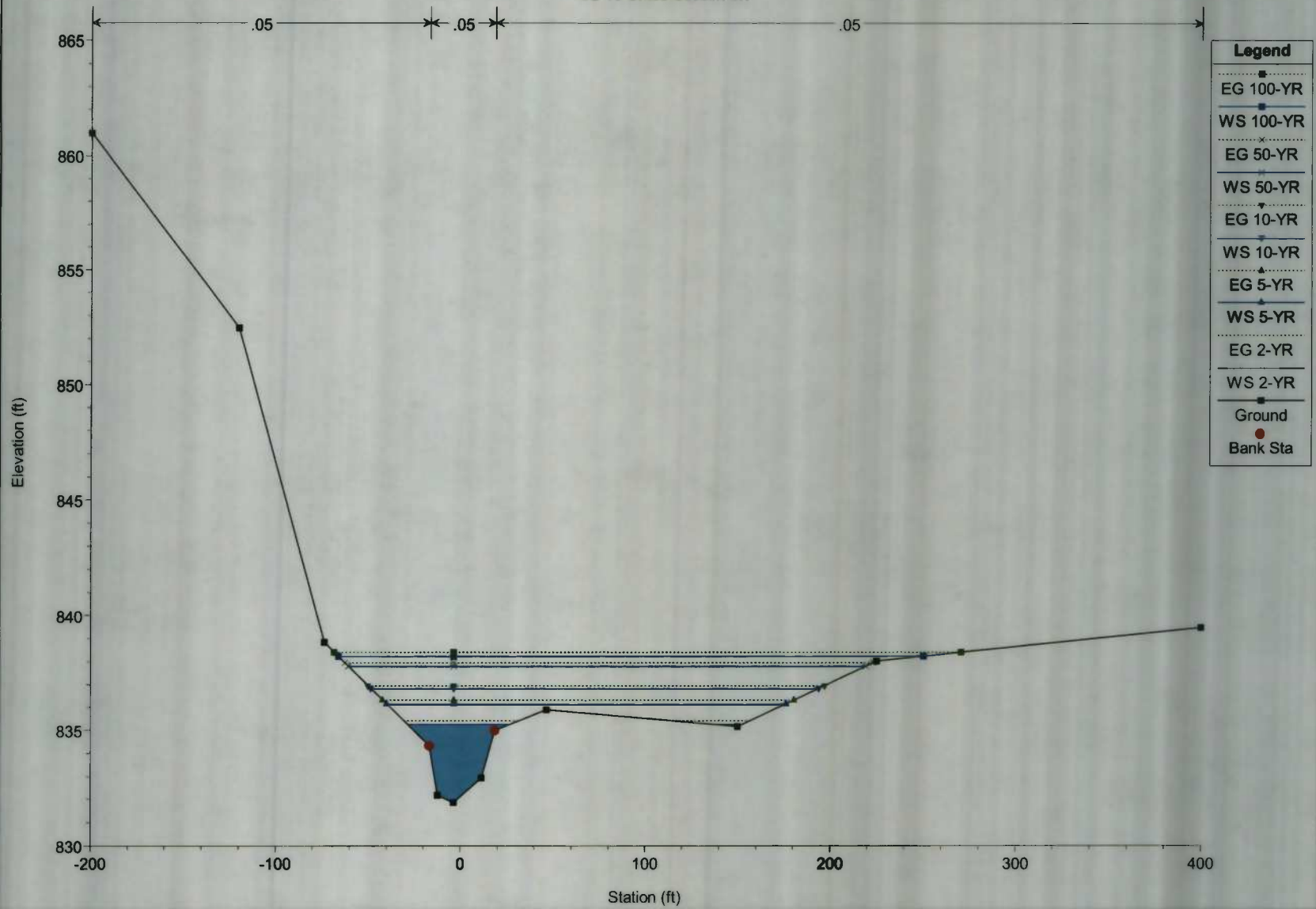


Janus CS Plan: Box Culverts 7/14/2015
 SL-13 Cross Section 4.50

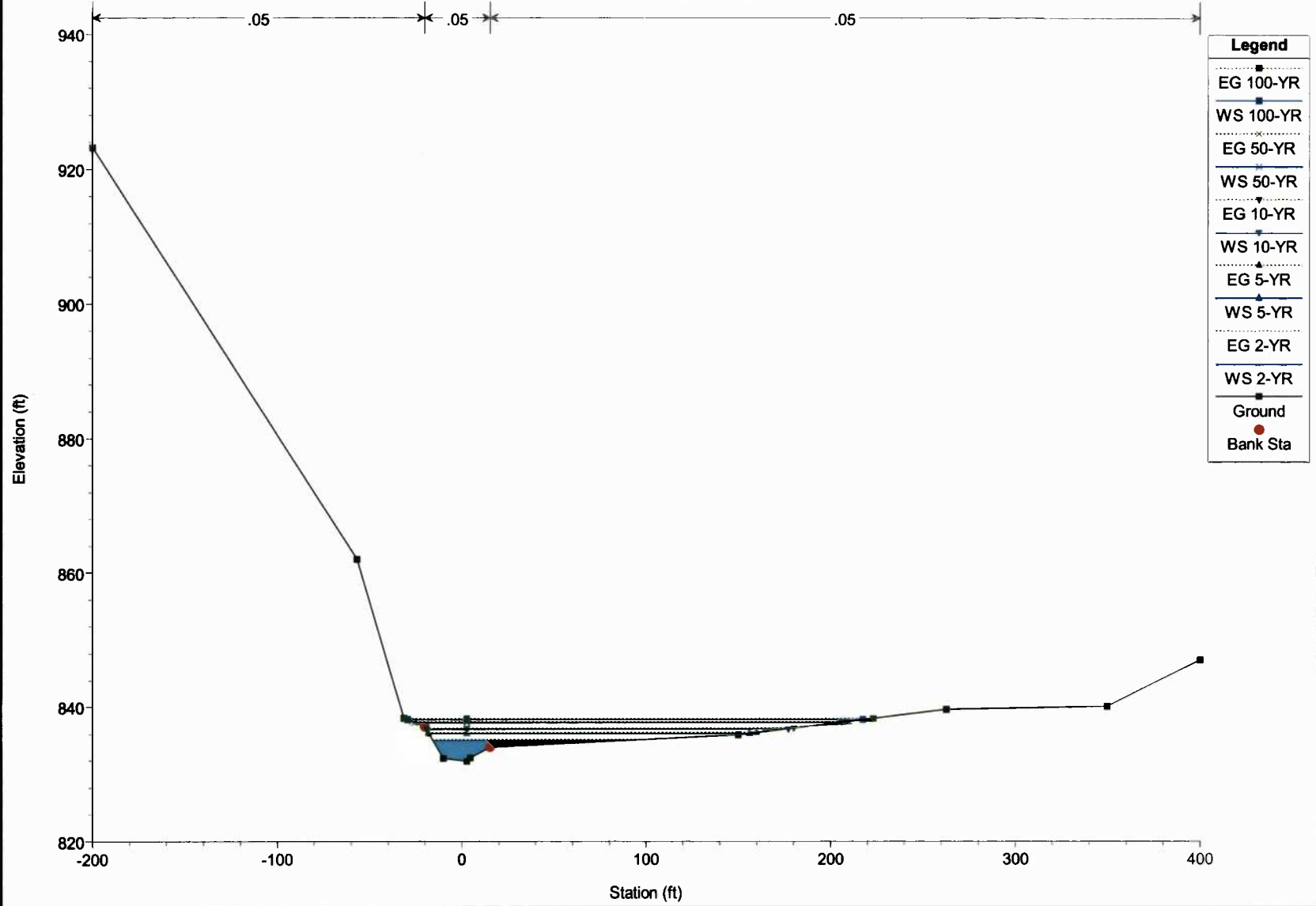




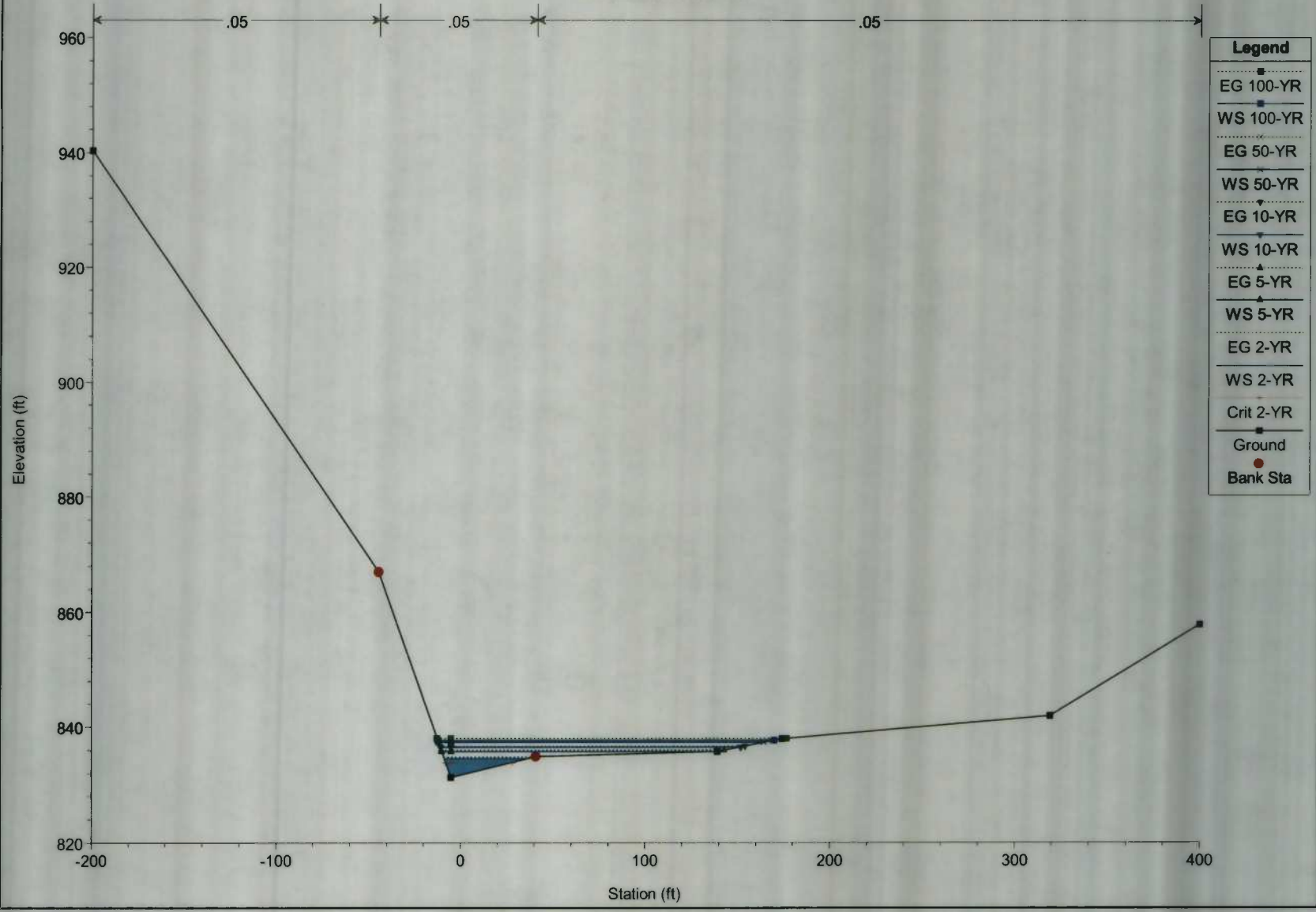
Janus CS Plan: Box Culverts 7/14/2015
 SL-15 Cross Section 3.0



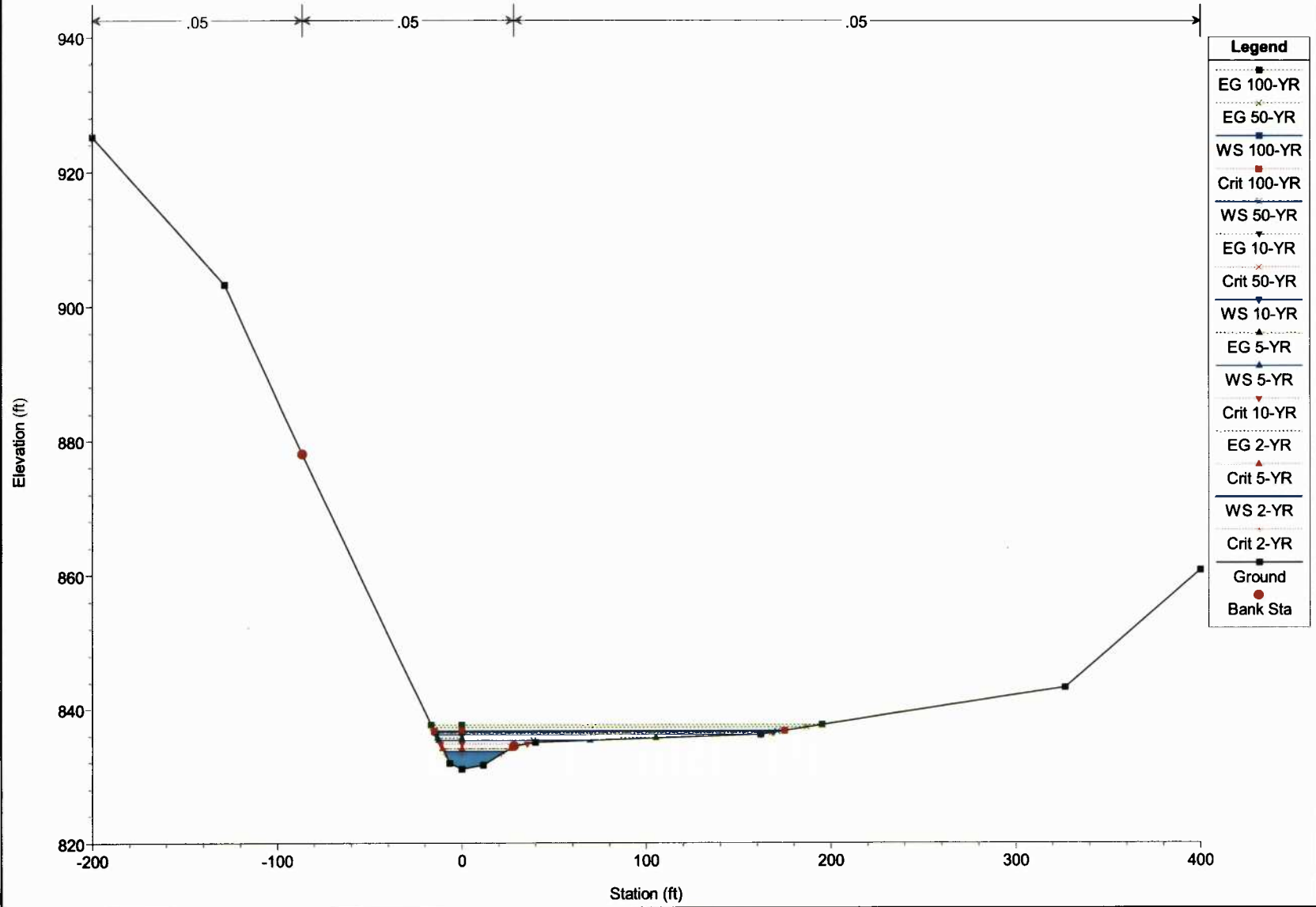
Janus CS Plan: Box Culverts 7/14/2015
 SL-16 Cross Section 2.0



Janus CS Plan: Box Culverts 7/14/2015
SL-17 Cross Section 1.0



Janus CS Plan: Box Culverts 7/14/2015
 SL-18 Cross Section 0.5



HEC-RAS Plan: BOX River: Arnold Creek Reach: Main Fork

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Crl
Main Fork	13.0	2-YR	312.12	836.00	838.64		838.68	0.001355	1.48	210.89	133.74	0.21
Main Fork	13.0	5-YR	596.09	836.00	839.46		839.51	0.001557	1.74	342.77	189.25	0.23
Main Fork	13.0	10-YR	879.74	836.00	840.05		840.11	0.001388	1.92	457.80	199.48	0.22
Main Fork	13.0	50-YR	1742.23	836.00	841.40		841.48	0.001266	2.35	741.49	222.70	0.23
Main Fork	13.0	100-YR	2196.67	836.00	841.95		842.05	0.001262	2.53	867.49	232.27	0.23
Main Fork	12.0	2-YR	312.12	836.00	838.57		838.61	0.001309	1.69	190.92	122.12	0.21
Main Fork	12.0	5-YR	596.09	836.00	839.36		839.43	0.001421	2.18	292.40	133.08	0.23
Main Fork	12.0	10-YR	879.74	836.00	839.94		840.03	0.001543	2.56	371.38	140.50	0.25
Main Fork	12.0	50-YR	1742.23	836.00	841.24		841.40	0.001782	3.38	565.13	157.23	0.28
Main Fork	12.0	100-YR	2196.67	836.00	841.77		841.96	0.001865	3.72	650.69	164.07	0.29
Main Fork	11.0	2-YR	312.12	836.00	838.28		838.47	0.006491	3.55	93.04	68.54	0.46
Main Fork	11.0	5-YR	596.09	836.00	838.98		839.27	0.006958	4.50	148.29	85.03	0.50
Main Fork	11.0	10-YR	879.74	836.00	839.49		839.86	0.007367	5.19	193.96	94.85	0.53
Main Fork	11.0	50-YR	1742.23	836.00	840.66		841.20	0.007714	6.47	316.44	115.21	0.57
Main Fork	11.0	100-YR	2196.67	836.00	841.13		841.75	0.007843	6.97	373.59	123.57	0.58
Main Fork	10.0	2-YR	312.12	836.00	837.94		838.11	0.007695	3.28	95.24	66.85	0.48
Main Fork	10.0	5-YR	596.09	836.00	838.60		838.87	0.009093	4.14	143.89	80.58	0.55
Main Fork	10.0	10-YR	879.74	836.00	839.07		839.42	0.010265	4.80	183.40	90.29	0.59
Main Fork	10.0	50-YR	1742.23	836.00	840.23		840.74	0.010417	5.75	302.74	114.76	0.62
Main Fork	10.0	100-YR	2196.67	836.00	840.72		841.29	0.010225	6.08	361.15	124.21	0.63
Main Fork	9.0	2-YR	312.12	835.40	836.85	836.85	837.34	0.038003	5.61	55.66	58.25	1.01
Main Fork	9.0	5-YR	596.09	835.40	837.47	837.40	838.08	0.029045	6.27	95.06	68.70	0.94
Main Fork	9.0	10-YR	879.74	835.40	838.12		838.71	0.019688	6.14	143.18	79.61	0.81
Main Fork	9.0	50-YR	1742.23	835.40	839.44		840.12	0.014187	6.63	262.72	101.79	0.73
Main Fork	9.0	100-YR	2196.67	835.40	839.92		840.68	0.013881	7.01	313.34	109.84	0.73
Main Fork	8.0	2-YR	312.12	832.60	836.46		836.62	0.003472	3.32	107.67	70.02	0.36
Main Fork	8.0	5-YR	596.09	832.60	837.36		837.58	0.003487	4.05	182.93	94.60	0.38
Main Fork	8.0	10-YR	879.74	832.60	838.01		838.26	0.003530	4.55	249.65	123.43	0.39
Main Fork	8.0	50-YR	1742.23	832.60	839.39		839.70	0.003412	5.41	456.22	167.49	0.40
Main Fork	8.0	100-YR	2196.67	832.60	839.92		840.25	0.003354	5.70	546.97	178.31	0.41
Main Fork	7.0	2-YR	312.12	831.89	836.31		836.45	0.002905	3.09	103.55	41.30	0.33
Main Fork	7.0	5-YR	596.09	831.89	837.05		837.35	0.005430	4.48	137.70	51.28	0.45
Main Fork	7.0	10-YR	879.74	831.89	837.52		837.98	0.007864	5.61	164.79	65.75	0.55
Main Fork	7.0	50-YR	1742.23	831.89	838.46	837.97	839.34	0.013376	7.89	247.27	109.06	0.73
Main Fork	7.0	100-YR	2196.67	831.89	838.90	838.62	839.88	0.014293	8.44	298.29	124.03	0.77
Main Fork	6.0	2-YR	312.12	832.07	836.24		836.36	0.003918	2.81	112.36	63.59	0.36
Main Fork	6.0	5-YR	596.09	832.07	836.99		837.18	0.005650	3.55	172.39	92.59	0.44
Main Fork	6.0	10-YR	879.74	832.07	837.49		837.74	0.006314	4.10	222.26	105.81	0.47
Main Fork	6.0	50-YR	1742.23	832.07	838.55		838.96	0.007008	5.26	347.15	125.35	0.52
Main Fork	6.0	100-YR	2196.67	832.07	839.01		839.49	0.006990	5.72	405.48	130.70	0.53
Main Fork	5.5	2-YR	312.12	832.30	836.15	835.07	836.32	0.003785	3.75	109.85	85.02	0.37
Main Fork	5.5	5-YR	596.09	832.30	836.90	836.00	837.13	0.004355	4.64	182.81	106.56	0.42
Main Fork	5.5	10-YR	879.74	832.30	837.41	836.63	837.69	0.004659	5.22	240.48	118.77	0.44
Main Fork	5.5	50-YR	1742.23	832.30	838.50	837.49	838.90	0.005325	6.47	384.03	144.77	0.49
Main Fork	5.5	100-YR	2196.67	832.30	838.97	837.86	839.42	0.005404	6.89	454.99	156.02	0.50
Main Fork	5.01		Culvert									
Main Fork	4.9	2-YR	312.12	831.89	835.66		835.99	0.010219	4.74	73.18	58.34	0.57
Main Fork	4.9	5-YR	596.09	831.89	836.32		836.81	0.012130	6.08	119.99	84.18	0.65
Main Fork	4.9	10-YR	879.74	831.89	837.07		837.41	0.010800	5.07	193.43	109.40	0.60
Main Fork	4.9	50-YR	1742.23	831.89	838.18		838.62	0.009799	5.49	324.80	129.17	0.59
Main Fork	4.9	100-YR	2196.67	831.89	838.69		839.17	0.009562	5.39	395.13	146.67	0.59
Main Fork	4.75	2-YR	312.12	831.65	835.32	834.95	835.84	0.018221	5.82	55.56	48.19	0.74
Main Fork	4.75	5-YR	596.09	831.65	836.22		836.68	0.011934	5.98	123.41	84.39	0.64
Main Fork	4.75	10-YR	879.74	831.65	836.83		837.29	0.009867	6.13	176.54	88.41	0.59
Main Fork	4.75	50-YR	1742.23	831.65	837.56	837.30	838.46	0.015442	8.67	243.74	101.31	0.76
Main Fork	4.75	100-YR	2196.67	831.65	837.83	837.72	838.98	0.018124	9.81	272.67	111.22	0.83
Main Fork	4.50	2-YR	312.12	830.21	835.53		835.63	0.001733	2.57	129.67	61.29	0.25
Main Fork	4.50	5-YR	596.09	830.21	836.30		836.50	0.002889	3.77	184.26	106.03	0.33
Main Fork	4.50	10-YR	879.74	830.21	836.87		837.12	0.003330	4.41	266.94	178.56	0.36
Main Fork	4.50	50-YR	1742.23	830.21	837.81		838.15	0.004141	5.56	474.54	262.46	0.41
Main Fork	4.50	100-YR	2196.67	830.21	838.25		838.58	0.003956	5.71	599.96	302.06	0.41
Main Fork	4.0	2-YR	312.12	831.87	835.28		835.51	0.005832	3.92	84.83	51.67	0.45
Main Fork	4.0	5-YR	596.09	831.87	836.22		836.37	0.003384	3.69	254.90	253.66	0.36

HEC-RAS Plan: BOX River: Arnold Creek Reach: Main Fork (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnt (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Fork	4.0	10-YR	879.74	831.87	836.89		836.98	0.001989	3.21	431.78	275.91	0.29
Main Fork	4.0	50-YR	1742.23	831.87	837.87		837.98	0.001898	3.63	717.85	308.54	0.29
Main Fork	4.0	100-YR	2196.67	831.87	838.30		838.43	0.001931	3.88	854.98	338.64	0.30
Main Fork	3.0	2-YR	312.12	831.86	835.25		835.43	0.003953	3.42	96.15	67.32	0.38
Main Fork	3.0	5-YR	596.09	831.86	836.16		836.33	0.003051	3.69	239.83	216.21	0.35
Main Fork	3.0	10-YR	879.74	831.86	836.83		836.95	0.002090	3.44	393.70	242.46	0.30
Main Fork	3.0	50-YR	1742.23	831.86	837.80		837.95	0.002244	4.10	645.32	280.13	0.32
Main Fork	3.0	100-YR	2196.67	831.86	838.22		838.39	0.002354	4.43	769.88	316.54	0.33
Main Fork	2.0	2-YR	312.12	831.90	834.99		835.19	0.005869	3.81	104.07	103.06	0.45
Main Fork	2.0	5-YR	596.09	831.90	836.05		836.17	0.002914	3.34	253.68	174.04	0.33
Main Fork	2.0	10-YR	879.74	831.90	836.74		836.84	0.002142	3.18	382.31	196.54	0.29
Main Fork	2.0	50-YR	1742.23	831.90	837.66		837.83	0.002695	4.10	578.13	230.65	0.34
Main Fork	2.0	100-YR	2196.67	831.90	838.07		838.26	0.002784	4.42	676.65	246.98	0.35
Main Fork	1.0	2-YR	312.12	831.25	834.51	833.87	834.79	0.011121	4.25	73.44	45.12	0.59
Main Fork	1.0	5-YR	596.09	831.25	835.73		835.96	0.005365	4.05	176.90	149.68	0.44
Main Fork	1.0	10-YR	879.74	831.25	836.54		836.71	0.003150	3.66	304.25	163.08	0.35
Main Fork	1.0	50-YR	1742.23	831.25	837.35		837.64	0.004455	4.96	442.25	176.45	0.43
Main Fork	1.0	100-YR	2196.67	831.25	837.73		838.07	0.004743	5.39	510.27	182.68	0.45
Main Fork	0.5	2-YR	312.12	830.99	833.66	833.25	834.11	0.016120	5.36	58.20	33.61	0.72
Main Fork	0.5	5-YR	596.09	830.99	835.30	834.10	835.65	0.006434	4.82	132.44	82.08	0.49
Main Fork	0.5	10-YR	879.74	830.99	836.23	834.78	836.51	0.004304	4.61	252.78	176.17	0.42
Main Fork	0.5	50-YR	1742.23	830.99	836.61	836.49	837.28	0.009980	7.41	321.54	185.72	0.65
Main Fork	0.5	100-YR	2196.67	830.99	836.78	836.78	837.65	0.012688	8.54	353.67	190.02	0.73

JanusCS.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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PROJECT DATA

Project Title: Janus CS
Project File : JanusCS.prj
Run Date and Time: 7/14/2015 7:45:26 AM

Project in English units

PLAN DATA

Plan Title: Box Culverts
Plan File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.p03

Geometry Title: Proposed Conditions-Box Culverts (6x4)
Geometry File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC
Study\HEC-RAS\JanusCS.g04

Flow Title : Existing Flow
Flow File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC
Study\HEC-RAS\JanusCS.f01

Plan Summary Information:

Number of: Cross Sections	=	17	Multiple Openings	=	0
Culverts	=	1	Inline Structures	=	0
Bridges	=	0	Lateral Structures	=	0

JanusCS.rep

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: Existing Flow

Flow File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.f01

Flow Data (cfs)

River	Reach	RS	2-YR	5-YR	10-YR	50-YR
100-YR Arnold Creek	Main Fork	13.0	312.12	596.09	879.74	1742.23
2196.67 Arnold Creek	Main Fork	11.0	312.12	596.09	879.74	1742.23
2196.67 Arnold Creek	Main Fork	9.0	312.12	596.09	879.74	1742.23

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Arnold Creek	Main Fork	2-YR	Known WS = 837.99	Known WS = 833.66
Arnold Creek	Main Fork	5-YR	Known WS = 840.2	Known WS = 835.3
Arnold Creek	Main Fork	10-YR	Known WS = 841.51	Known WS = 836.23
Arnold Creek	Main Fork	50-YR	Known WS = 842.2	Known WS = 836.61

JanusCS.rep

GEOMETRY DATA

Geometry Title: Proposed Conditions-Box Culverts (6x4)

Geometry File : g:\Projects\18000\18422 EQT\ -0009 Janus CS\Docs\Engineering\HEC Study\HEC-RAS\JanusCS.g04

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 13.0

INPUT

Description: SL-1 Cross Section 13.0

Station Elevation Data num= 17											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	943.814	-257.65	927.068	-125.843	866.543	-124.829	866.572	-122.801	867.63		
-106.588	868.725	-104.716	869.7	-73.41	859.07	-39.21	838	-12.029	836		
11.054	836	87.656	838.557	147.51	839.449	187.451	842	199.7	848		
218.618	850	300	893.352								

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
-300	.05	-73.41	.05	199.7	.05

Bank	Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
	-73.41	199.7	50	50	50	.1	.3	

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 12.0

INPUT

Description: SL-2 Cross Section 12.0

Station Elevation Data num= 18											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	930.251	-205.049	891.164	-203.11	890.876	-199.232	891.301	-168.206	887.343		
-160.659	888.17	-77.011	856	-39.804	836	10.518	836	47.377	838.58		
72.081	838	138.032	844	222.116	845.624	248.28	846.344	250.517	847.472		
279.678	846.386	283.177	848.135	300	847.954						

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .05 -77.011 .05 47.377 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -77.011 47.377 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 11.0

INPUT

Description: SL-3 Cross Section 11.0

Station Elevation Data num= 16
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -300 967.671 -217.166 928.445 -92.283 862.101 -91.19 862.023 -89.002 862.869
 -71.53 862.295 -69.789 862.975 -57.343 856.669 -42.776 853.486 -20.567 838
 -8.165 836 15.268 836 25.746 837.554 58.711 838.651 137.897 843.591
 300 848.611

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .05 -42.776 .05 25.746 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -42.776 25.746 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 10.0

INPUT

Description: SL-4 Cross Section 10.0

Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -300 959.546 -194.85 913.217 -66.24 848.974 -65.24 848.974 -63.24 849.975
 -47.24 850.622 -26.59 840.305 -17.466 838 -14.885 836 16.323 836
 142.997 843.427 220.941 842.409 300 849.009

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

-300 .05 -47.24 .05 142.997 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -47.24 142.997 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 9.0

INPUT

Description: SL-5 Cross Section 9.0

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	915.784	-178.956	908.298	-54.372	843.864	-53.359	843.844	-51.331	844.803		
-35.114	845.116	-26.119	840.501	-10.455	835.997	4.787	835.996	9.885	835.401		
27.461	835.552	140.244	844	232.576	846.961	234.586	847.709	287.667	848.013		
332.122	849.17	333.515	849.753	399.919	854.614						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-35.114	.05	140.244	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -35.114 140.244 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 8.0

INPUT

Description: SL-6 Cross Section 8.0

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	886.211	-121.839	854	-106.835	853.559	-71.65	838	-61.239	837.918		
-61.164	837.956	-58.965	836.881	-57.969	836.875	-55.904	837.846	-39.235	838.78		
-34.707	836.691	-12.398	835.176	-7.519	833.595	2.068	832.602	19.976	835.433		
201.603	845.329	297.328	845.451	355.508	850.027	362.262	850	400	869.31		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-12.398	.05	19.976	.05

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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -12.398 19.976 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 7.0

INPUT

Description: SL-7 Cross Section 7.0

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	900.223	-132.768	868	-121.55	856	-108.571	853.875	-83.145	838.482
-62.689	837.018	-61.758	837.457	-33.691	838.926	-17.793	834.816	1.505	831.893
11.041	833.055	13.61	835.846	43.583	839.197	159.676	843.256	160.055	843.434
188.265	844.817	189.909	844.06	193.887	844.226	281.438	864.015	302.006	859.514
325.741	876.854	374.397	887.397						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-17.793	.05	43.583	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -17.793 43.583 25 25 25 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 6.0

INPUT

Description: SL-8 Cross Section 6.0

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	899.798	-117.25	851.48	-106.434	850	-82.26	837.982	-52.319	836.194
-51.159	836.644	-16.789	834.964	-16.529	835.048	-10.553	834.588	-8.068	832.782
4.345	832.068	10.624	832.627	13.874	835.617	46.253	839.004	128.625	842.329
131.03	841.593	165.411	843.416	165.963	843.199	211.307	846.131	278.447	866
289.779	864.888	378.453	901.423						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

-200 .05-106.434 .05 13.874 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -106.434 13.874 10 10 10 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 5.5

INPUT

Description: SL-9 Cross Section 5.5

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	898.1	-103.024	846	-92.656	839.805	-64.898	836.211	-44.971	835.631		
-43.227	836.267	-4.532	833.743	3.006	832.304	9.151	832.445	13.84	835.506		
114.563	841.749	118.786	840.778	157.474	843.054	157.993	842.87	221.066	848		
272.535	866	289.586	865.619	379.519	902.644						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-4.532	.05	13.84	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -4.532 13.84 35 35 35 .1 .3

CULVERT

RIVER: Arnold Creek
 REACH: Main Fork RS: 5.01

INPUT

Description:
 Distance from Upstream XS = 3.03
 Deck/Roadway Width = 29.17
 Weir Coefficient = 2.6
 Upstream Deck/Roadway Coordinates

num= 4

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-28.703	835.035	835.035	-25.823	835.838	835.838	28.73	835.239	835.239
127.771	841.53	841.53						

Upstream Bridge Cross Section Data

JanusCS.rep

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	898.1	-103.024	846	-92.656	839.805	-64.898	836.211	-44.971	835.631
-43.227	836.267	-4.532	833.743	3.006	832.304	9.151	832.445	13.84	835.506
114.563	841.749	118.786	840.778	157.474	843.054	157.993	842.87	221.066	848
272.535	866	289.586	865.619	379.519	902.644				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-4.532	.05	13.84	.05

Bank Sta: Left Right Coeff Contr. Expan.

	-4.532	13.84	.1	.3
--	--------	-------	----	----

Downstream Deck/Roadway Coordinates num= 4

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-28.703	835.035	835.035	-25.823	835.838	835.838	28.73	835.239	835.239
127.771	841.53	841.53						

Downstream Bridge Cross Section Data Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-300	938.534	-140.236	867.031	-120.693	848.678	-77.278	836.366	-21.038	834.909
1.524	832.607	3.495	831.992	5.505	831.892	9.003	836.609	24.32	836.677
43.827	838.122	167.53	842.14	254.523	854.507	286.691	868	300.868	868.01

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-300	.05	-21.038	.05	167.53	.05

Bank Sta: Left Right Coeff Contr. Expan.

	-21.038	167.53	.1	.3
--	---------	--------	----	----

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
 Downstream Embankment side slope = 2 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 835.156
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span

JanusCS.rep

Station Elevation Data num= 12
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 896.456 -97.292 840 -71.702 835.686 -19.124 835.088 -4.386 833.062
 .76 832.945 5.039 831.741 6.779 831.649 10.173 837.288 111.293 840.609
 244.386 848 400 906.217

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -19.124 .05 10.173 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -19.124 10.173 20 20 20 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.50

INPUT

Description: SL-13 Cross Section 4.50
 Station Elevation Data num= 10
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 846.393 -98.076 836.726 -50.147 835.94 -47.122 835.113 -22.687 835.075
 3.919 830.21 11.567 830.596 12.743 836.023 200 838.406 400 840.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -22.687 .05 12.743 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -22.687 12.743 35.77 35.77 35.77 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 4.0

INPUT

Description: SL-14 Cross Section 4.0
 Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -300 867.374 -133.202 846.485 -102.627 838.373 -20.537 834.496 -17.346 835.587
 -11.66 831.966 -6.069 831.871 11.048 833.388 15.927 835.299 192.614 835.894

220.689 838.205 378.243 839.093 500 844.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -300 .05 -17.346 .05 15.927 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -17.346 15.927 14.23 14.23 14.23 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 3.0

INPUT

Description: SL-15 Cross Section 3.0

Station Elevation Data num= 12
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 860.982 -120.249 852.48 -73.842 838.827 -16.819 834.33 -12.511 832.174
 -3.71 831.862 11.453 832.924 18.376 835.002 46.503 835.91 150 835.175
 224.997 838.011 400 839.466

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -200 .05 -16.819 .05 18.376 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -16.819 18.376 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 2.0

INPUT

Description: SL-16 Cross Section 2.0

Station Elevation Data num= 12
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 -200 923.207 -56.735 862 -31.55 838.309 -20.016 837.066 -9.97 832.3
 2.707 831.895 4.536 832.403 15.288 834.016 150 835.844 262.924 839.569
 349.694 839.998 400 846.957

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
 -200 .05 -20.016 .05 15.288 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -20.016 15.288 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 1.0

INPUT

Description: SL-17 Cross Section 1.0

Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	940.324	-44.78	866.942	-5.375	831.251	40.657	834.86	139.319	835.724
174.256	838	319.229	842	400	857.893				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-44.78	.05	40.657	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 -44.78 40.657 50 50 50 .1 .3

CROSS SECTION

RIVER: Arnold Creek
 REACH: Main Fork RS: 0.5

INPUT

Description: SL-18 Cross Section 0.5

Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-200	925.222	-128.289	903.185	-86.279	878	-6.568	831.855	-.053	830.986
11.549	831.551	28.346	834.414	39.857	835.003	161.886	836.223	326.823	843.271
400	860.777								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-200	.05	-86.279	.05	28.346	.05

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

-86.279 28.346

50 50

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50

.1

.3

SUMMARY OF MANNING'S N VALUES

River:Arnold Creek

Reach	River Sta.	n1	n2	n3
Main Fork	13.0	.05	.05	.05
Main Fork	12.0	.05	.05	.05
Main Fork	11.0	.05	.05	.05
Main Fork	10.0	.05	.05	.05
Main Fork	9.0	.05	.05	.05
Main Fork	8.0	.05	.05	.05
Main Fork	7.0	.05	.05	.05
Main Fork	6.0	.05	.05	.05
Main Fork	5.5	.05	.05	.05
Main Fork	5.01	Culvert		
Main Fork	4.9	.05	.05	.05
Main Fork	4.75	.05	.05	.05
Main Fork	4.50	.05	.05	.05
Main Fork	4.0	.05	.05	.05
Main Fork	3.0	.05	.05	.05
Main Fork	2.0	.05	.05	.05
Main Fork	1.0	.05	.05	.05
Main Fork	0.5	.05	.05	.05

SUMMARY OF REACH LENGTHS

River: Arnold Creek

Reach	River Sta.	Left	Channel	Right
Main Fork	13.0	50	50	50
Main Fork	12.0	50	50	50
Main Fork	11.0	50	50	50
Main Fork	10.0	50	50	50
Main Fork	9.0	50	50	50
Main Fork	8.0	50	50	50
Main Fork	7.0	25	25	25

			JanusCS.rep	
Main Fork	6.0	10	10	10
Main Fork	5.5	35	35	35
Main Fork	5.01	Culvert		
Main Fork	4.9	10	10	10
Main Fork	4.75	20	20	20
Main Fork	4.50	35.77	35.77	35.77
Main Fork	4.0	14.23	14.23	14.23
Main Fork	3.0	50	50	50
Main Fork	2.0	50	50	50
Main Fork	1.0	50	50	50
Main Fork	0.5	50	50	50

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Arnold Creek

Reach	River Sta.	Contr.	Expan.
Main Fork	13.0	.1	.3
Main Fork	12.0	.1	.3
Main Fork	11.0	.1	.3
Main Fork	10.0	.1	.3
Main Fork	9.0	.1	.3
Main Fork	8.0	.1	.3
Main Fork	7.0	.1	.3
Main Fork	6.0	.1	.3
Main Fork	5.5	.1	.3
Main Fork	5.01	Culvert	
Main Fork	4.9	.1	.3
Main Fork	4.75	.1	.3
Main Fork	4.50	.1	.3
Main Fork	4.0	.1	.3
Main Fork	3.0	.1	.3
Main Fork	2.0	.1	.3
Main Fork	1.0	.1	.3
Main Fork	0.5	.1	.3

APPENDIX 5
100-yr FLOODWAY RESULTS

ARNOLD CREEK
100-YEAR FLOOD WSEL ANALYSIS

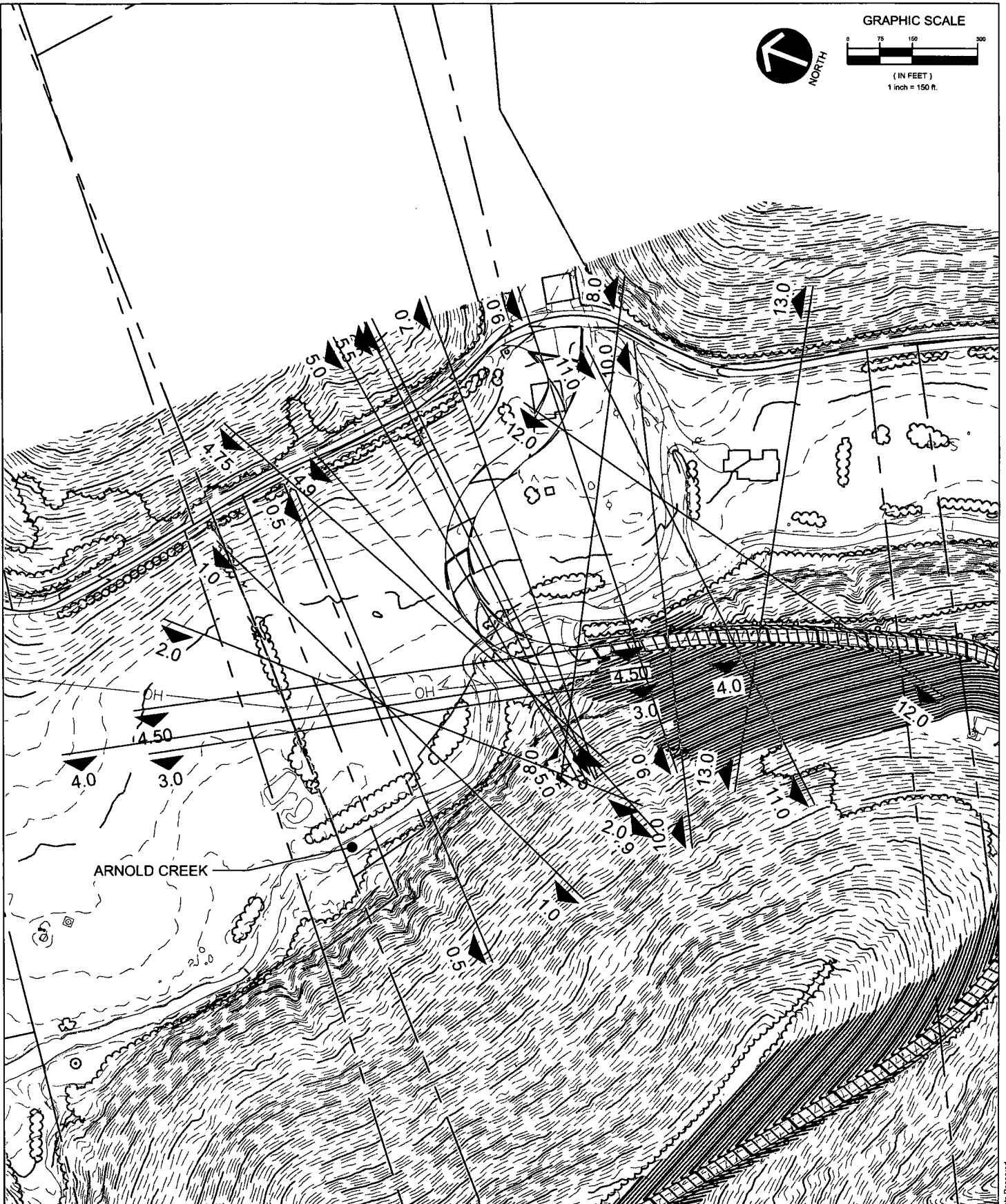
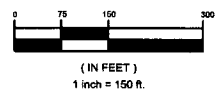
CROSS SECTION	STREAM LOCATION	HEC -RAS EXISTING CONDITIONS WSEL (ft)	HEC -RAS PROPOSED CONDITIONS BOX CULVERTS WSEL (ft)	DIFFERENCE BETWEEN EXISTING & BOX CULVERTS WSEL (ft)
13.00	SL-1	841.95	841.95	0.00
12.00	SL-2	841.78	841.77	-0.01
11.00	SL-3	841.14	841.13	-0.01
10.00	SL-4	840.73	840.72	-0.01
9.00	SL-5	839.49	839.92	0.43
8.00	SL-6	839.63	839.92	0.29
7.00	SL-7	839.25	838.90	-0.35
6.00	SL-8	838.89	839.01	0.12
5.50	SL-9	838.98	838.97	-0.01
*5.00	SL-10	838.96		
4.90	SL-11	838.31	838.69	0.38
4.75	SL-12	837.78	837.83	0.05
4.50	SL-13	838.28	838.25	-0.03
4.00	SL-14	838.30	838.30	0.00
3.00	SL-15	838.22	838.22	0.00
2.00	SL-16	838.07	838.07	0.00
1.00	SL-17	837.73	837.73	0.00
0.50	SL-18	836.78	836.78	0.00

*Denotes location of Stream Crossing

APPENDIX 6
SITE PLAN



GRAPHIC SCALE



ARNOLD CREEK

HEC-RAS STUDY SECTION LOCATIONS
Project Number: C-18127-0009
Drawing Scale: 1"=150'
Date Issued: JULY 2015
Index Number: _____
Drawn By: GSB
Checked By: GSB
Project Manager: MEB
EX-3

JANUS COMPRESSOR STATION
LEFT FORK RUN ROAD
WEST UNION, WEST VIRGINIA
PREPARED FOR:
EQT GATHERING, LLC.
625 LIBERTY AVENUE, SUITE 1700
PITTSBURGH, PA 15222

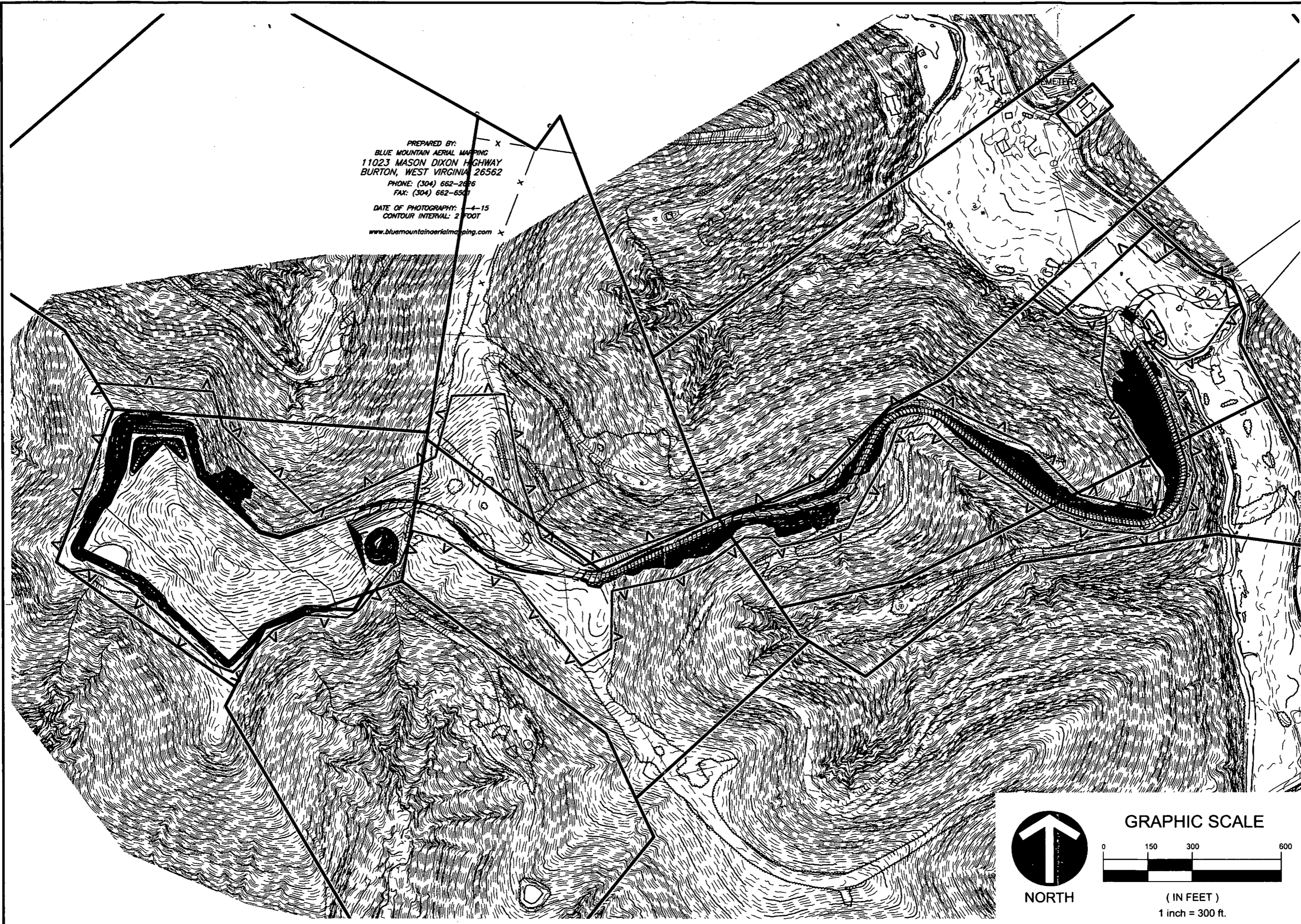
Date	No	REVISION RECORD
-	01	
-	02	
-	03	
-	04	
-	05	
-	06	
-	07	
-	08	



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I:\Path & Filename=G:\Projects\180001\18422 EQT-0009 Janus CSIDwg102-Sheet\FIGURE 3 - PLAN VIEW.dwg
 Plot Date=7/14/2015 10:42 AM Lindsay E. Appel, E.I.T. Save Date=7/14/2015 9:30 AM



PREPARED BY:
 BLUE MOUNTAIN AERIAL MAPPING
 11023 MASON DIXON HIGHWAY
 BURTON, WEST VIRGINIA 26562
 PHONE: (304) 662-2626
 FAX: (304) 662-6500
 DATE OF PHOTOGRAPHY: 4-15
 CONTOUR INTERVAL: 2 FOOT
 www.bluemountainaerialmapping.com



NORTH

GRAPHIC SCALE



(IN FEET)
 1 inch = 300 ft.

JANUS COMPRESSOR STATION
 LEFT FORK RUN ROAD
 WEST UNION, WEST VIRGINIA

PREPARED FOR:
 EQT GATHERING, LLC.
 625 LIBERTY AVENUE, SUITE 1700
 PITTSBURGH, PA 15222

JANUS PLAN VIEW

Project Number: C-18422-0009
 Drawing Scale: 1" = 300'
 Date Issued: JULY 2015
 Index Number:
 Drawn By: LEA
 Checked By: MEB
 Project Manager: MEB

FIGURE 3

REVISION RECORD

Date	No.	Description
2015-07-08	01	PERMIT DRAWINGS
	02	
	03	
	04	
	05	
	06	
	07	
	08	



The Gateway Engineers, Inc.
 Full-Service Civil Engineering & Surveying
 Pittsburgh, PA
 gatewayengineers.com
 855-634-9284

10/14 Matt Hoover
Case 412-258-5627

Janice Compressor



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

OCT 06 2015

Regulatory Division
Energy Resource Branch
LRH-2015-00672-OHR-UT to Arnold Creek

**PRELIMINARY JURISDICTIONAL DETERMINATION
AND NATIONWIDE PERMIT NO. 39 VERIFICATION**

Mr. Matt Hoover
EQT Gathering, LLC.
535 Southpoint Boulevard, Suite 200
Canonsburg, Pennsylvania 15317

Dear Mr. Hoover,

I refer to your pre-construction notification (PCN) received in this office on August 10, 2015, with final information received on September 28, 2015, regarding the Janus Compressor Station Project. The Janus Compressor Station Project will consist of the construction of an access road and natural gas compressor station. The purpose of the compressor station is to provide additional high pressure compression and flow capacity for the Saturn Suction field, located to the north of the proposed project. The project is located near Arnold Creek Road, southwest of West Union, in Doddridge County, West Virginia (39.257583°North, 80.805472°West). Waters on-site flow into Arnold Creek, an indirect tributary to the Ohio River, a traditional navigable water of the United States (U.S.). The PCN has been assigned the following number: LRH-2015-00672-OHR-UT to Arnold Creek. Please reference this number on all future correspondence related to this project.

The U.S. Army Corps of Engineers (Corps) authority to regulate waters of the U.S. is based on the definitions and limits of jurisdiction contained in 33 CFR 328 and 33 CFR 329. Section 404 of the Clean Water Act (Section 404) requires a Department of the Army (DA) permit be obtained prior to discharging dredged or fill material into waters of the U.S., including wetlands. Section 10 of the Rivers and Harbors Act of 1899 (Section 10) requires a DA permit be obtained for any work in, on, over or under a navigable water.

Preliminary Jurisdictional Determination

Based on a review of the aquatic resources in the PCN, two (2) perennial streams (Stream 3 and Stream 12) totaling 312 linear feet (lf), seven (7) intermittent streams totaling 1,179 lf, four (4) ephemeral streams totaling 402 lf, and one (1) open water feature (Pond 1) totaling 0.200 acre are located within the preliminary jurisdictional determination (PJD) boundary, as described in the enclosed PJD form. The on-site aquatic resources may be waters of the U.S. in accordance with the Regulatory Guidance Letter for Jurisdictional Determinations (JDs) issued by the Corps on June 26, 2008 (Regulatory Guidance Letter No. 08-02). As indicated in the guidance, this

PJD is non-binding and cannot be appealed (33 CFR 331.2) and only provides a written indication that waters of the U.S. may be present on-site. You have declined to exercise the option to obtain an approved JD in this instance and at this time. However, for the purposes of the determination of impacts, compensatory mitigation, and other resource protection measures for activities that require authorization from this office, the streams referenced above will be evaluated as if they are waters of the U.S.

Enclosed please find two (2) copies of the PJD form. If you agree with the findings of this PJD and understand your options regarding the same, please sign and date one copy of the PJD form and return it to this office within 30 days of receipt of this letter. You should submit the signed copy via email to michelle.m.staley@usace.army.mil or to the following address:

U.S. Army Corps of Engineers
Huntington District, Regulatory Division
Energy Resource Branch
Attn: Michelle Staley (LRH-2015-00672-OHR)
502 Eighth Street
Huntington, West Virginia 25701

Nationwide Permit #39

The proposed project, as described in the submitted information, has been reviewed in accordance with Section 404 and Section 10. Based on your description of the proposed work, and other information available to us, it has been determined that this project will not involve activities subject to the requirements of Section 10. However, this project will include the discharge of dredged and/or fill material into waters of the U.S. subject to the requirements of Section 404.

In the PCN received in this office on August 10, 2015, you have requested a DA authorization to discharge dredged and/or fill material into 67 lf of one (1) stream (Stream 12) and 0.20 acre of one (1) pond (Pond 1) in conjunction with the Janus Compressor Station Project. The proposed project will involve the temporary and permanent discharge of dredged and/or fill material into waters of the U.S for construction of an access road and the compressor station site. In order to allow site access during construction, you have proposed to install articulated concrete blocks at the existing stream ford for site access which will result in the temporary discharge of dredged and/or fill material into 20 lf of Stream 12. Once construction of the site is complete, a box culvert will be installed as a permanent stream crossing which would result in the permanent discharge of dredged and/or fill material into 47 lf of Stream 12. Construction of the compressor station would include the permanent discharge of dredged and/or fill material into 0.20 acre of one (1) open water feature (Pond 1) to provide adequate space for the compressor station site. All temporarily disturbed areas will be returned to their original slope and contour, stabilized, and seeded. The proposed discharge of dredged and/or fill material into waters of the U.S. is described in Table 1 below.

Based on your description of the proposed construction activities project, and other information available to us, it has been determined the proposed discharge of dredged and/or fill material into waters of the U.S., as described on Table 1 below, for the construction of the Janus Compressor Station Project meets the criteria for authorization under Nationwide Permit (NWP) #39 (enclosed) under the February 21, 2012 Federal Register, Notice of Reissuance of NWPs (77 FR 10184) provided you comply with all terms and conditions of the enclosed material, including **the enclosed special conditions**. The West Virginia Department of Environmental Protection has issued 401 Water Quality Certification for this NWP. A copy of this NWP can be found on our website at <http://www.lrh.usace.army.mil/Missions/Regulatory.aspx>.

In view of the above, your commercial development project is authorized subject to the terms and conditions of the enclosed material, including the enclosed special conditions. It is your responsibility to ensure that your work conforms to all of the environmental management conditions listed within the enclosed material. Please be aware this NWP verification does not obviate the requirement to obtain any state or local assent required by law for the activities.

This verification is valid until the expiration date of the NWPs, unless the NWP authorization is modified, suspended, or revoked. The verification will remain valid if the NWP authorization is reissued without modification or the activity complies with any subsequent modification of the NWP authorization. All of the existing NWPs are scheduled to be modified, reissued, or revoked on March 18, 2017. Prior to this date, it is not necessary to contact this office for re-verification of your project unless the plans for the proposed activity are modified. Furthermore, if you commence or are under contract to commence this activity before March 18, 2017, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

A copy of this NWP and verification letter must be supplied to your project engineer responsible for construction activities. A copy of the verification letter must be kept at the site during construction. Upon completion of the work, the enclosed certification must be signed and returned to this office. If you have any questions concerning the above, please contact Michelle Staley at (304) 399-5273 or by email at michelle.m.staley@usace.army.mil.

Sincerely,



Audrey Richter
Regulatory Project Manager
Energy Resource Branch

Enclosures

Copy Furnished:

Mr. Matt Bagaley
The Gateway Engineers, Inc.
400 Holiday Drive, Suite 300
Pittsburgh, Pennsylvania 15220-2727
mbagaley@gatewayengineers.com

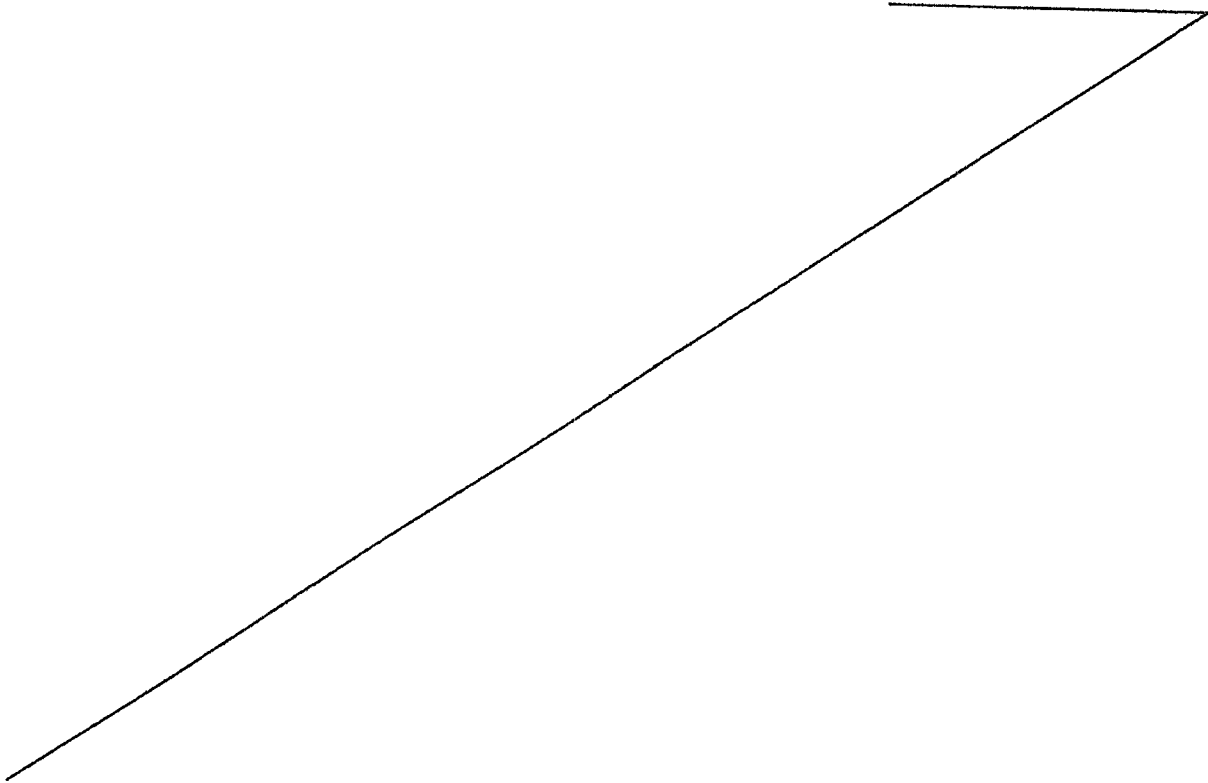
Ms. Wilma Reip
West Virginia Department of Environmental Protection
601 57th Street
Charleston, West Virginia 25304
wilma.reip@wv.gov

**Table 1- Authorized discharge of dredged and/or fill material into waters of the U.S.
 associated with the construction of the
 EQT Gathering, LLC, Janus Compressor Station Project LRH-2015-00672-
 OHR-UT to Arnold Creek**

Waters ID	Latitude °N & Longitude °W		Flow Regime/ Cowardin Class	Length (lf) of Fill	Area (ac) of Fill	Other Pertinent Information
Stream 12	39.260066	80.794675	Perennial	47	0.032	Permanent Access Road- Culvert
Stream 12	39.260066	80.794675	Perennial	20	0.014	Temporary Impact- articulated concrete blocks
Pond 1	39.257683	80.806794	Open Water	N/A	0.200	Well Pad Development- Filling/grading

Nationwide Permit 39 Verification Special Conditions
EQT Gathering, LLC, Janus Compressor Station Project
LRH-2015-00672-OHR-UT to Arnold Creek

1. Should new information regarding the scope and/or impacts of the project become available that was not submitted to this office during our review of the proposal, the permittee shall submit written information concerning proposed modification(s) to this office for review and evaluation, as soon as practicable.
2. Section 7 obligations under Endangered Species Act must be reconsidered if new information reveals impacts of the project that may affect federally listed species or critical habitat in a manner not previously considered, the proposed project is subsequently modified to include activities which were not considered during Section 7 consultation with the United States Fish and Wildlife Service, or new species are listed or critical habitat designated that might be affected by the subject project.
3. The enclosed Myotis Bat Conservation Plan (MBCP) dated June 2015 contains conservation measures for the federally listed Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*). Your authorization under this Corps permit is conditional upon your compliance with the conservation measures incorporated by reference in this permit. Failure to comply with the conservation measures identified in the MBCP would constitute non-compliance with your Corps permit. The USFWS is the appropriate authority to determine compliance with the conservation measures identified within the MBCP, and with the Endangered Species Act.



NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: EQT Gathering, LLC.

File Number: 2015-672-OHR

Date: 10/6/2015

Attached is:

	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	See Section below
	PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PERMIT DENIAL	B
	APPROVED JURISDICTIONAL DETERMINATION	C
X	PRELIMINARY JURISDICTIONAL DETERMINATION	D
		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://usace.army.mil/inet/functions/cw/ceowo/reg> or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): October 6, 2015

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Mr. Matt Hoover
EQT Gathering, LLC.
555 Southpointe Boulevard, Suite 200
Canonsburg, PA 15317

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

U.S. Army Corps of Engineers
Huntington District
LRH-2015-00672-OHR-UT to Arnold Creek
Janus Compressor Station Project

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:

State: West Virginia
County: Doddridge
City: West Union
Coordinates: 39.257583°North, 80.805472°West
Name of nearest waterbody: Arnold Creek

Identify (estimate) amount of waters in the review area:

Non-wetland waters: 1,893 linear feet and 0.20 acre, refer to Table 1
Cowardin Class: Riverine and palustrine
Stream Flow: Perennial, intermittent, and ephemeral
Wetlands: None
Cowardin Class: N/A

Name of any water bodies on the site that have been identified as Section 10 waters:

None

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- Office (Desk) Determination. Date: September 29, 2015
 Field Determination. Date(s): N/A

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary jurisdictional determination (JD) is hereby advised of his or her option to request and obtain an approved JD for that site. Nevertheless, the permit applicant or other person who

- USGS NHD data.
- USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s): 7.5 Quads for Doddridge County, WV.
- USDA Natural Resources Conservation Service Soil Survey. Custom Soil Resource Report for Doddridge County, WV.
- National wetlands inventory map(s): NWI for West Virginia. USACE ORM NWI Dataset
- State/Local wetland inventory map(s):
- FEMA/FIRM maps:
- 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date):
or Other (Name & Date): Site Photographs 1-26 provided in PCN submittal
- Previous determination(s). File no. and date of response letter:
- Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Wille, SS 10/6/15

Signature and date of
Regulatory Project Manager
(REQUIRED)

Signature and date of
person requesting preliminary JD
(REQUIRED, unless obtaining the
signature is impracticable)

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

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B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Mr. Matt Hoover
EQT Gathering, LLC.
555 Southpointe Boulevard, Suite 200
Canonsburg, PA 15317

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Stream Flow: Perennial, intermittent, and ephemeral
Wetlands: None
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E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- Office (Desk) Determination. Date: September 29, 2015
 Field Determination. Date(s): N/A

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- USGS NHD data.
- USGS 8 and 12 digit HUC maps.
- U.S. Geological Survey map(s): 7.5 Quads for Doddridge County, WV.
- USDA Natural Resources Conservation Service Soil Survey. Custom Soil Resource Report for Doddridge County, WV.
- National wetlands inventory map(s): NWI for West Virginia. USACE ORM NWI Dataset
- State/Local wetland inventory map(s):
- FEMA/FIRM maps:
- 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- Photographs: Aerial (Name & Date):
or Other (Name & Date): Site Photographs 1-26 provided in PCN submittal
- Previous determination(s). File no. and date of response letter:
- Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

M. L. [Signature] 10/6/15
 Signature and date of
 Regulatory Project Manager
 (REQUIRED)

 Signature and date of
 person requesting preliminary JD
 (REQUIRED, unless obtaining the
 signature is impracticable)

COMPLETION OF WORK FORM

Permit: LRH-2015-00672-OHR-UT to Arnold Creek
Janus Compressor Station Project

Permittee: EQT Gathering, LLC.

Date of Issue: 6 October 2015

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Huntington District
U.S. Army Corps of Engineers
502 8th Street
Huntington, WV 25701-2070
Attn: RD-E

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Signature of Permittee

Date

Issuance Date: March 19, 2012
Expiration Date: March 18, 2017

NWP # 39

NATIONWIDE PERMITS FOR THE STATE OF WEST VIRGINIA

CORPS OF ENGINEERS REGULATORY PROGRAM ISSUANCE OF NATIONWIDE PERMITS

On February 21, 2012, the Corps of Engineers published, in the Federal Register, the final rule for the administration of its nationwide permit program regulations under the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and the Marine Protection, Research and Sanctuaries Act. The rule became effective on March 19, 2012.

An integral part of the Corps' regulatory program is the concept of nationwide permits (NWP) for minor activities. NWP are activity specific, and are designed to relieve some of the administrative burdens associated with permit processing for both the applicant and the Federal government. The NWP, published in the February 21, 2012, Federal Register, Issuance of Nationwide Permits (77 FR 10184), are issued by the Chief of Engineers, and are intended to apply throughout the entire United States and its territories. The Corps Districts representing West Virginia have imposed regional conditions on the NWP that are applicable throughout the entire state. For convenience, all NWP with the appropriate regional, general and special conditions are attached.

In response to the Federal Register Notice (77 FR 10184), the West Virginia Department of Environmental Protection (WVDEP) has issued 401 water quality certification, pending compliance with certain conditions and/or limitations, for the following NWP: 3, 4, 5, 6, 7, 12, 13, 14, 16, 18, 19, 20, 21, 22, 25, 27, 29, 30, 31, 32, 33, 36, 37, 38, 39, 40, 41, 42, 45, 46, 48, 49, 50 and 51.

An individual State Water Quality Certification is required for the following NWP: 15, 17, 23, 34 and 43. Certification response is not applicable to NWP: 1, 2, 8, 9, 10, 11, 24, 26, 28, 35, 44, 47, and 52.

Authorization for discharges covered by NWP is denied without prejudice if: (1) the State Certification has been denied; or (2) the discharge is not in compliance with conditions imposed in the State Certification. Applicants wishing to conduct such discharges must first obtain either an individual water quality certificate or waiver from:

Director
West Virginia Department of Environmental Protection
601 57th Street
Charleston, West Virginia 25304

Some NWP's require advance notification. The notification must be made in writing as early as possible prior to commencing the proposed activity. The notification procedures are located under General Condition 31. The notification to the Corps can be made concurrently with the request for individual state certification, if required. The District Engineer may require an individual permit for any activity determined to have more than minimal adverse environmental effects, individually or cumulatively, or would be contrary to the public interest.

The NWP's provide a simplified, expeditious means of project authorization under various authorities of the Corps. We encourage prospective permit applicants to consider the advantages of nationwide permit authorization during the preliminary design of their projects. Assistance and further information regarding all aspects of the Corps regulatory program may be obtained by contacting:

HUNTINGTON DISTRICT

Name: Ginger Mullins, Chief, Regulatory Division
Address: U.S. Army Corps of Engineers, Huntington District
502 Eighth Street
Huntington, West Virginia 25701-2070
Phone: 304-399-5710

PITTSBURGH DISTRICT

Name: Scott Hans, Chief Regulatory Branch
Address: U.S. Army Corps of Engineers, Pittsburgh District
William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, Pennsylvania 15222-4186
Phone: 412-395-7154

Attached is a map showing the district boundaries for the State of West Virginia.

Ginger Mullins, Chief
Regulatory Division

A. U.S. Army Corps of Engineers Nationwide Permit #39 for Commercial and Institutional Development Activities in West Virginia

39. Commercial and Institutional Developments. Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of commercial and institutional building foundations and building pads and attendant features that are necessary for the use and maintenance of the structures. Attendant features may include, but are not limited to, roads, parking lots, garages, yards, utility lines, storm water management facilities, and recreation facilities such as playgrounds and playing fields. Examples of commercial developments include retail stores, industrial facilities, restaurants, business parks, and shopping centers. Examples of institutional developments include schools, fire stations, government office buildings, judicial buildings, public works buildings, libraries, hospitals, and places of worship. The construction of new golf courses and new ski areas is not authorized by this NWP.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in minimal adverse effects. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 31.) (**Sections 10 and 404**)

Note: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

B. Specific Regional Conditions for Nationwide Permit # 39:

- Notification shall include information sufficient to demonstrate the proposed project represents a single and complete project and a description of the ways in which the proposed project has been designed to avoid and minimize adverse impacts to waters of the U.S.
- Issuance of waivers of the 300 linear foot limit for ephemeral and intermittent streams will be limited to those projects located in degraded waters of the U.S. If a waiver is being requested, notification shall include documentation on the nature of stream degradation.
- Compensatory mitigation will be required for the loss of greater than 300 linear feet of intermittent and ephemeral stream for which a waiver has been obtained. Mitigation will be required unless the applicant demonstrates that adverse effects of the project are minimal without mitigation. In such cases, the applicant may submit for the DE's consideration justification explaining why compensatory mitigation may not be required.

C. West Virginia 401 Water Quality Certification Special Conditions for Nationwide Permit # 39:

For activities involving a discharge, the West Virginia 401 Water Quality Certification Standard Conditions apply.

- A. The permittee shall, concurrent with the nationwide permit application, submit written notification to the West Virginia Department of Environmental Protection, Division of Water and Waste Management of any use of this nationwide permit.
- B. Individual State Water Quality Certification is required for perennial and intermittent stream impacts greater than 300 linear feet.
- C. Projects impacting Section 10 waters and adjacent wetlands require Individual State Water Quality Certification.

**D. U.S. Army Corps of Engineers Nationwide Permit General Conditions
Applicable to ALL NWP**

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to

impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. **Spawning Areas**. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. **Migratory Bird Breeding Areas**. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. **Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWP 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. **Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. **Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. **Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. **Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. **Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. **Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. **Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are

encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the

proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWP.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at <http://www.fws.gov/> or <http://www.fws.gov/ipac> and <http://www.noaa.gov/fisheries.html> respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on

the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district

engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWP's 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWP's 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWP's only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine

credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office

to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

“When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.”

(Transferee)

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(1)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) **Timing.** Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general

condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWP's 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

- (1) Name, address and telephone numbers of the prospective permittee;
- (2) Location of the proposed project;
- (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);
- (4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;
- (5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants

the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) **Form of Pre-Construction Notification:** The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) **Agency Coordination:** (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWP's and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWP's, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential

Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

E. Regional General Conditions

Regional General Condition 1

Full Agency Pre-construction Notification: In an effort to expedite full agency permit review it is requested that all pre-construction notifications (PCNs) submitted for activities requesting a waiver and for those activities resulting in the loss of greater than ½ acre of waters of the United States (U.S.), include one original hard copy and five (5) additional copies of the PCN package. Applicants are encouraged to submit the five agency copies in electronic format as CDs, in order to minimize the use of paper and postage resources.

Regional General Condition 2

Pre-Construction Notification Submittals: In addition to the PCN requirements listed in NWP General Condition 31, all PCNs should include the following information:

- Graphic illustrations on 8 1/2" x 11" paper. The illustrations must clearly depict the project boundaries, including all elements and phases of the proposed project. Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map {a location map such as the U.S. Geological Survey (USGS) 7.5 Minute Series topographical map is highly encouraged}, a Plan View and a Typical Cross-Section Map. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross-section). In addition, each illustration should be identified with a figure or attachment number and the project Latitude and Longitude.
- A written description of the proposed project including acreage(s) of waters of the U.S. (according to aquatic resource type) proposed to be directly or indirectly affected as a result of the proposed project, the linear footage of proposed direct and indirect stream impacts associated with the project, and cubic yards of fill proposed to be discharged.
- A description of the ways in which the project has been designed to avoid and minimize adverse impacts to waters of the U.S.
- Information concerning whether the proposed activity would affect any historic properties listed, determined to be eligible, or which they have reason to believe may be eligible, for listing on the National Register of Historic Places.
- Basic information about the general project area (encompassing a search radius of 2 miles

centered on the project area) including USGS 7.5' series topographic maps, National Register of Historic Places (NRHP) files including Historic Districts, and county atlases, histories and/or any historic USGS 15' series topographic map(s), brief description of the terrain and topography of the project area, acreage of the project area, proximity of the project area to major waterways, past land uses in the project area, and any past cultural resources studies or coordination for the project area, if available, along with photographs, keyed to mapping, showing the project area and any buildings or structures on adjacent parcels.

- The submittal of ground photographs to illustrate current conditions of the overall project site and impact site is highly encouraged.

Regional General Condition 3

Compensatory Mitigation: Compensatory mitigation will typically be required as indicated in accordance the terms and conditions of the NWP's in addition to all General and Regional conditions for projects with impacts that result in the conversion of a water of the U.S. to uplands or the conversion of one aquatic resource type to another.

Regional General Condition 4

Passage of Aquatic Life: Culverted crossings should be sized in a manner that allow the passage of aquatic life and freely pass bankfull flows. The only exception to this requirement would involve culvert placement in bedrock and/or extremely high gradient streams, in which countersinking of culverts is determined not to be practicable. In the event proposed crossings do not meet these criteria, compensatory mitigation may be required.

Regional General Condition 5

Endangered Species: Federally listed endangered species, subject to Section 7 of the Endangered Species Act, are located in nearly every county within West Virginia. As part of the PCN process, the district engineer (DE) will assume responsibility for determining project-related effects to endangered species. For projects that do not require a PCN, it is the applicant's responsibility to ensure that all elements of a proposed single and complete project comply with Section 7 of the Endangered Species Act.

Regional General Condition 6

Endangered Species Habitat: Due to the potential presence of endangered species or their habitats applicants are required to provide notification to the U.S. Fish and Wildlife Service Elkins Field Office, 694 Beverly Pike, Elkins, West Virginia 26241, for any work in the waterways listed in Appendix A. This appendix will be update as new species are listed by the U.S. Fish and Wildlife Service.

Regional General Condition 7

All PCNs involving work in the below listed waters require notification to the National Park Service and/or the Forest Service.

- New River;
- Bluestone River from the upstream boundary of Pipestem Park to Bluestone Reservoir;
- Meadow River from an area near the US 19 Bridge to its junction with the Gauley River;
- All streams within the Monongahela National Forest designated as National Wild and Scenic Study Rivers;
- All streams and other bodies of water in State and National Forests and Recreation Areas (included are streams and bodies of water located within the Spruce Knob, Seneca Rocks and Gauley River National Recreation Areas); and
- Streams and their tributaries as contained within the boundaries of the designated National Wilderness Areas or the headwaters of such rivers and their tributaries; Cranberry River, Red Creek, Laurel Fork and Otter Creek.

Regional General Condition 8

West Virginia Natural Stream Preservation Act: In accordance with the West Virginia Natural Stream Preservation Act, the following streams or rivers are protected from activities that would impound, divert or flood the body of water:

West Virginia Natural Stream Preservation Act

- Greenbrier River from its confluence with Knapps Creek to its confluence with the New River;
- Anthony Creek from its headwaters to its confluence with the Greenbrier River;
- Cranberry River from its headwaters to its confluence with the Gauley River;
- Birch River from Cora Brown Bridge in Nicholas County to its confluence with the Elk River; and
- New River from its confluence with the Greenbrier River to its confluence with the Gauley River.

Regional General Condition 9

Tier 3 Protected Waters: All PCNs involving work in Tier 3 Protected Waters (West Virginia Code of State Regulations, Requirements Governing Water Quality Standards, Title 47, Series 2) shall include prior written notification to the West Virginia Department of Environmental Protection, Division of Water and Waste Management. Tier 3 Protected Waters include, but are not limited to, all streams and rivers within the boundaries of Wilderness Areas designated by The Wilderness Act (16 U.S.C. §1131 et seq.) within the State, all Federally designated rivers under the "Wild and Scenic Rivers Act", 16 U.S.C. §1271 et seq.; all streams and other bodies of

water in state parks which are high quality waters or naturally reproducing trout streams; waters in national parks and forests which are high quality waters or naturally reproducing trout streams; waters designated under the "National Parks and Recreation Act of 1978", as amended; and pursuant to subsection 7.1 of 60CSR5, those waters whose unique character, ecological or recreational value, or pristine nature constitutes a valuable national or state resource.

Regional General Condition 10

Archeological Sites and Human Remains: In the event any archeological sites or human remains are uncovered during construction, the permittee shall cease all work immediately and contact the appropriate Corps District office, the West Virginia Division of Culture and History at 304-558-0240 and the appropriate county Sheriff's Office.

F. West Virginia Department of Environmental Protection 401 Water Quality Certification Standard Conditions Applicable to ALL NWP's

The following are West Virginia's Section 401 Water Quality Certification standard and special conditions that apply to the Nationwide Permits 1-52 as published on February 21, 2012 in Part III of the *Federal Register* (77 FR 10184), by the U.S. Army Corps of Engineers. These conditions must be implemented into any activity authorized by a U.S. Army Corps of Engineers Nationwide Permit(s). The State's certification of these Nationwide Permit activities does not replace the need for the applicant proposing an activity under the Nationwide Permit Program from obtaining other applicable permits/authorizations from the West Virginia Department of Environmental Protection and/or the Division of Natural Resources. Each permittee shall, if they do not understand or are not aware of applicable Nationwide Permit conditions, contact the Corps of Engineers prior to conducting any activity authorized by a Nationwide Permit in order to be advised of applicable conditions. These 401 Water Quality Certifications, with all attendant standard conditions and special conditions, are applicable to Corps of Engineers Civil Works Projects in West Virginia.

1. The permittee will investigate for the presence of water supply intakes or other activities within 1/2 mile downstream, which may be affected by suspended solids and turbidity increases caused by work in the watercourse. The permittee will give notice to operators of any such water supply intakes and such other water quality dependent activities as necessary before beginning work in the watercourse in sufficient time to allow preparation for any change in water quality.
2. Excavation, dredging or filling in the watercourse will be done only to the extent necessary to achieve the project's purpose.
3. Spoil materials from the watercourse or onshore operations, including sludge deposits, will not be dumped in the watercourse, or deposited in wetlands or other areas where the deposit may adversely affect the surface or ground waters of the state.

4. The permittee will employ measures to prevent or control spills from fuels, lubricants or any other materials used in connection with construction and restrict them from entering the watercourse. Storage areas for chemicals, explosives, lubricants, equipment fuels, etc., as well as equipment refueling areas, must include containment measures (e.g., liner systems, dikes, etc.) to ensure that spillage of any material will not contact surface or ground waters. Storage areas and refueling areas shall be a minimum distance of 100 feet from any surface water body. All spills shall be promptly reported to the State Center for Pollution, Toxic Chemical and Oil Spills, 1-800-642-3074.
5. Upon completion of in-stream operations all disturbances below the ordinary high water mark will be properly stabilized within 24 hours to prevent soil erosion. Where possible, stabilization shall incorporate revegetation using bioengineering as an alternative to rip rap. If rip rap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created due to its placement. Fill is to be clean, nonhazardous and of such composition that it will not adversely affect the biological, chemical or physical properties of the receiving waters. Unsuitable materials include but are not limited to : Cadmium chromium arsenate (CCA) and creosote treated lumber, car bodies, tires, large household appliances, construction debris, and asphalt. To reduce potential slope failure and/or erosion behind the material, fill containing concrete must be of such weight and size that promotes stability during expected high flows. Loose large slab placement of concrete sections from demolition projects greater than thirty-six inches in its longest dimension and tires are prohibited. Rebar or wire in concrete should not extend further than one (1) inch. All activities require the use of clean and coarse non erodible materials with 15% or less of like fines that is properly sized to withstand expected high flows.
6. Runoff from any storage areas or spills will not be allowed to enter storm sewers without acceptable removal of solids, oils and toxic compounds. Discharges from retention/detention ponds must comply with permit requirements of the National Pollutant Discharge Elimination System permit program of the West Virginia Department of Environmental Protection, Division of Water and Waste Management.
7. Land disturbances, which are integral to the completion of the permitted activity and are one (1) acre or greater in total area, must comply with the National Pollutant Discharge Elimination System or other state stormwater permit requirements as established by the West Virginia Department of Environmental Protection, Division of Water and Waste Management, if applicable. Best Management Practices for Sediment and Erosion Control, as described in the West Virginia Department of Environmental Protection's Erosion and Sediment Control Best Management Practice Manual, 2006, or similar documents prepared by the West Virginia Division of Highways may be used. These handbooks are available from the respective agency offices.
8. Concrete will not be permitted to enter the watercourse unless contained by tightly sealed forms or cells. Concrete handling equipment shall not discharge waste washwater into wetlands or watercourses at any time without adequate wastewater treatment as approved by the West Virginia Department of Environmental Protection, Division of Water and Waste Management.

9. In stream work in designated warm water streams and their adjacent tributaries during the fish spawning season, April - June and trout waters and their adjacent tributaries during the trout water fish spawning season September 15-March 31st requires a spawning season waiver from the West Virginia Division of Natural Resources, Wildlife Resources Section. For information about specific stream designations contact DEP's Water Quality Standards Section at 304-926-0495. The Wildlife Resources Section, Trout Fisheries Program at 304-637-0245 or Warm Water fisheries Program 304-558-2771 should be contacted if a waiver is needed. In stream work may occur during the respective spawning season in ephemeral waters without a waiver if all reasonable measures are taken to minimize turbidity and sedimentation downstream associated with the proposed project.
10. Removal of well-established riparian vegetation not directly associated with the project construction is prohibited. Disturbance and removal of vegetation from project construction area is to be avoided, where possible, and minimized when necessary. Removal of vegetation shall not be allowed where stream bank stability under normal flow conditions would be compromised.
11. Operation of equipment instream is to be minimized and accomplished during low flow periods when practical. Ingress and egress for equipment shall be within the work site. Location of ingress and egress outside the immediate work area requires prior approval of the West Virginia Department of Environmental Protection, Division of Water and Waste Management in concurrence with the West Virginia Division of Natural Resources.
12. The permittee will comply with water quality standards as contained in the West Virginia Code of State Regulations, Requirements Governing Water Quality Standards, Title 47, Series 2.
13. Stream activities permitted under the Nationwide Permit Program require that a West Virginia Public Lands Corporation Right of Entry be obtained. Application for this authorization should be made to the West Virginia Division of Natural Resources, Office of Lands and Streams, Building 74, Room 200, 324 Fourth Avenue, South Charleston, West Virginia 25303, or by contacting them at 304-558-3225. Any activity within the 100-year floodplain requires approval from the appropriate Floodplain Manager. The following website provides a statewide listing of Floodplain Managers in West Virginia: www.dhsem.wv.gov/mitigation/floodplain/Pages/default.aspx
14. The deposit of dredged or fill materials in island back channels, embayments or stream mouths on Section 10 Rivers is not certified for any of the Nationwide Permits. Stream mouth is defined as the area extending 100 feet upstream and 100 feet downstream on receiving streams that are classified as a Section 10 stream.
15. This Standard Condition requires prior written authorization from the West Virginia Department of Environmental Protection, Division of Water and Waste Management for use of any of the Nationwide Permits for all work in Outstanding National Resource Waters

listed within Section A below. Prior written notification to the West Virginia Department of Environmental Protection, Division of Water and Waste Management, is required for use of Nationwide Permits 3, 6, 7, 12, 13, 14, 16, 17, 18, 19, 27, 29, 33, 39, 40, 41, 42, 45, and 48 in any of the streams listed in Sections B and C as follows, except as may be provided for in the individual nationwide permit:

A. Tier 3 Protection-- West Virginia Code of State Regulations, Requirements Governing Water Quality Standards, Title 47, Series 2. **Outstanding National Resource Waters:** Outstanding National Resource Waters include, but are not limited to, all streams and rivers within the boundaries of Wilderness Areas designated by The Wilderness Act (16 U.S.C. §1131 et seq.) within the State, all Federally designated rivers under the "Wild and Scenic Rivers Act", 16 U.S.C. §1271 et seq.; all streams and other bodies of water in state parks which are high quality waters or naturally reproducing trout streams; waters in national parks and forests which are high quality waters or naturally reproducing trout streams; waters designated under the "National Parks and Recreation Act of 1978", as amended; and pursuant to subsection 7.1 of 60CSR5, those waters whose unique character, ecological or recreational value, or pristine nature constitutes a valuable national or state resource. The listing of Tier 3 streams is located at:
http://www.dep.wv.gov/WWE/Programs/wqs/Documents/Tier%203%20Info/WV_Tier_3_Maps_20101006.pdf

B. All naturally reproducing trout streams in the following counties; Barbour, Fayette, Grant, Greenbrier, Hampshire, Hardy, Mercer, Mineral, Monroe, Nicholas, Pendleton, Pocahontas, Preston, Raleigh, Randolph, Summers, Tucker, Upshur and Webster. For information about specific streams contact Wildlife Resource Section, Trout Fisheries Program at 304-637-0245;

C. 'West Virginia Natural Stream Preservation Act' - The following streams or rivers are protected from activities that would impound, divert or flood the body of water: Greenbrier River from its confluence with Knapps Creek to its confluence with the New River, Anthony Creek from its headwaters to its confluence with the Greenbrier River, Cranberry River from its headwaters to its confluence with the Gauley River, Birch River from Cora Brown Bridge in Nicholas County to the confluence of the river with the Elk River, and New River from its confluence with the Greenbrier River to its confluence with the Gauley River.

16. Wetland and Stream Mitigation guidelines – The discharge of fill material into a stream or wetland is authorized based upon the following criteria:
1. One-tenth to ½ acre of wetland impact requires a Pre-Construction Notice (PCN) and plan for mitigation to be submitted to the Corps of Engineers along with the proposed plan for mitigation provided to the state for approval.

2. The amount of fill in a wetland, wetland complex or wetland system without mitigation is not to cumulatively exceed 1/10 acre.
3. "West Virginia Stream Wetland Valuation Metric" (SWVM) will be used to assist with the determination of required mitigation. The metric is available at the Huntington and Pittsburgh Army Corps of Engineers web sites:

In all instances, mitigation for all impacts incurred through use of these Nationwide Permits must first be directed to elimination of the impacts, then minimization of the impacts and lastly through compensatory mitigation. In many cases, the environmentally preferable compensatory mitigation may be provided through approved mitigation banks or the West Virginia in-lieu fee program. Permittee responsible compensatory mitigation may be performed using the methods of: restoration, enhancement, establishment and in certain circumstances preservation. In general, the required compensatory mitigation should be located in the same watershed as the impact site, and located where it is most likely to successfully replace lost functions and services as the impacted site. However, the use of mitigation banks or in-lieu fee for in-kind replacement is not restricted to the major watershed in which the impact has occurred until such time as mitigation banks or in-lieu projects are developed in each major watershed.

When permittee responsible in-kind replacement mitigation is used it is to be accomplished at the following ratios until such time an approved functional assessment methodology is established for the state of West Virginia:

Impacts to open water wetlands are to be one (1) acre replaced for one (1) acre impacted.

Impacts to wet meadow/emergent wetlands are to be two (2) acres replaced for one (1) acre impacted.

Impacts to shrub-shrub and forested wetlands are to be three (3) acres replaced for one (1) acre impacted.

In instances where compensatory in-kind mitigation is completed 12 months prior to the impact of the resource, the replacement ratio may be reduced to as low as one (1) acre created/restored to every one (1) acre impacted.

NOTE: The ratio of created/restored wetlands to impacted wetlands not only insure no net loss, but assure the adequate replacement of the impacted wetlands functions and values at the level existing prior to the impact. For many of the more complicated type wetlands, such as scrub-scrub and forested, the values and functions cannot readily be replaced through creation. Furthermore, not all wetland creation is successful.

In certain instances, the West Virginia Department of Environmental Protection, Division of Water and Waste Management may consider the acquisition of existing wetlands. Acquisition ratios are the following:

- 5 to 1 for open water wetlands;
- 10 to 1 for wet meadow/emergent wetlands and
- 15 to 1 for scrub-scrub and forested wetlands

Under extenuating circumstances the director may accept lower ratios for high quality wetlands under significant threat of development.

All wetlands acquired, using the acquisition method of mitigation, will either be deeded to the West Virginia Division of Natural Resources' Public Land Corporation for management by the Wildlife Resources Section or placed under a conservation easement and be protected from disturbance by the permittee or their designee. Third party oversight of the conservation easement by a non-profit conservation organization is preferred.

Streams. Compensatory mitigation projects for stream impacts should attempt to replace lost functions. Mitigation will be determined on a case-by-case basis based on the pre and post condition stream quality and complexity of the mitigation project utilizing the SWVM worksheets. Compensatory mitigation may require protection through deed restrictions or conservation easements by the permittee or their designee.

17. Streams with Mussel populations.

A. Should native freshwater mussels be encountered during the use of any Nationwide Permit, all activity is to cease immediately and the Wildlife Resources Section, Wildlife Diversity Program is to be contacted (304-637-0245) to determine significance of the mussel population and the action to be taken.

B. The following list of streams are known to have mussel populations which are established as a protected "no take" species by the state or contain protected habitat of mussels on the Federal Endangered Species list. Applicants wishing to conduct projects in these streams are strongly encouraged to contact the Wildlife Resources Section, Wildlife Diversity Program with a detailed project description and an accurate project location. For further information please contact the Wildlife Resources Section, Wildlife Diversity program at 304-637-0245.

Applicants should also give consideration to utilizing WVDNR's Wildlife Data Base Inquiry process. This resource is designed for the applicant as an informative preplanning tool. It allows the applicant to know, in advance, if they will be encountering any federally listed endangered species (ES), state species of concern and high quality fish and wildlife habitats such as trout streams, warm water fisheries, wetlands, karst and cave habitats. This inquiry can be obtained from the: Wildlife Data Base Coordinator, PO Box 67, Elkins West Virginia 26241. Information on what to submit to receive an inquiry should be directed to data base coordinator at 304-637-0245.

HUNTINGTON DISTRICT

	James River Drainage
J-1	Potts Creek
J-1-E	South Fork Potts Creek
J-3	Cove Creek
	Big Sandy River Drainage
BS	Big Sandy River
BST	Tug Fork River
	Kanawha River Drainage
K	Kanawha River
K-1	Crooked Creek
K-12	Thirteenmile Creek
K-14	Sixteenmile Creek
K-21	Buffalo Creek
K-22	Hurricane Creek
K-22-F	Mill Creek (Tackett Branch ?)
K-24	Little Hurricane Creek
K-26	Guano Creek
KC	Coal River
KC-10	Little Coal River
KE	Elk River
KE-23	Big Sandy Creek
KE-23-N	Granny Creek
KE-23-Q-.5	Hollywood Trace Fork
KE-31	King Shoals Run
KE-37	Laurel Creek
KE-74	Strange Creek
KE-76	Birch River
KE-9	Little Sandy Creek
KN	New River
KN-51	Indian Creek
KNB	Bluestone River
KNG	Greenbrier River
KNG-18	Wolf Creek
KNG-22	Muddy Creek
KNG-22-B	Mill Creek
KNG-23	Second Creek
KNG-53	Knapp Creek
KNG-61	Clover Creek (Cloverlick Creek)
KNG-66	Sitlington Creek
KNG-68	Deer Creek
KNG-79	West Fork Greenbrier River
KP	Pocatalico River
KP-17	Pocatalico Creek (Left Fork)
KP-17-B	Middle Fork Pocatalico Creek

KP-33-E	Cox Fork
KP-39	Big Lick
KP-41	Rush Creek
KP-45	Cranes Nest Run
	Little Kanawha River Drainage
LK	Little Kanawha River
LK- 86	Sand Fork
LK-11	Slate Creek
LK-23	Tucker Creek
LK-25	Reedy Creek
LK-25-?	Left Fork Reedy Creek
LK-25-R	Middle Fork Reedy Creek
LK-31	Spring Creek
LK-31-AA	Right Fork Spring Creek
LK-31-Z	Left Fork Spring Creek
LK-39	Straight Creek
LK-40	Leading Creek
LK-45	Yellow Creek
LK-53	Pine Creek
LK-66	Tanner Creek
LK-72	Cedar Creek
LK-75	Leading Creek
LK-75-K	Cove Creek
LK-75-N	Fink Creek
LK-86	Sand Fork
LK-94	Oil Creek
LK-95	Saltlick Creek
LKH	Hughes River
LKH-10	North Fork Hughes River
LKH-10-C	Gillespie Run
LKH-10-G	Devilhole Creek
LKH-10-J	Addis Run
LKH-10-R	Bonds Creek
LKH-4	Goose Creek
LKH-9	South Fork Hughes River
LKH-9-AA	Middle Fork South Fork Hughes River
LKH-9-J	Indian Creek
LKH-9-M	Leatherbark Creek
LKH-9-R	Spruce Creek
LKH-9-W	Slab Creek
LKH-9-X	Bone Creek
LKH-9-Y	Otterslide Creek
LKS	Steer Creek
LKS-10	Left Fork Steer Creek
LKS-9	Right Fork Steer Creek

LKW	West Fork Little Kanawha River
LKW-15	Henry's Fork
LKW-15-F	Laurel Run
LKW-15-J	Beech Fork
LKW-31	Left Fork West Fork Little Kanawha River
	Guyandotte River Drainage
OG	Guyandotte River
OG	Barboursville Lake
OG-14	Charley's Creek
OG-24	TwOMile Creek
OGM	Mud River
OGM-12-A	Kilgore Creek
OGM-20	Trace Fork
OGM-22	Buffalo Creek
OGM-25	Middle Fork Mud River
OGM-33	Big Laurel Creek
	Middle Island Creek Drainage
OMI	Middle Island Creek
OMI-4	McKim Creek
OMI-9	Sugar Creek
OMI-21	Sancho Creek
OMI-23	Point Pleasant Creek
OMI-23-A	Pursley Creek
OMI-23-B	Elk Fork
OMI-29	Indian Creek
OMI-30	McElroy Creek
OMI-40	Arnold Creek
OMI-43	Bluestone Creek
OMI-46	Meathouse Fork
OMI-46-E	Toms Fork
OMI-46-J	Indian Fork
OMI-47	Buckeye Creek
OMI-46-E	Toms Fork
OMI-46-J	Indian Fork
OMI-47	Buckeye Creek
	Ohio River Direct Drainage
O	Ohio River
O-2	Twelvepole Creek
O-2-H	Beech Fork
O-2-P	West Fork Twelvepole Creek
O-2-Q	East Fork Twelvepole Creek
O-9	Guyan Creek
O-30-A	Tombleson Run embayment
O-31	Little Mill Creek
O-32	Mill Creek

O-32-D	Cow run
O-32-H	Parchment Creek
O-32-L-7	Grasslick Creek
O-32-L-8	Bear Fork
O-32-M	Elk Fork
O-32-N	Little Mill Creek
O-36	Sandy Creek
O-36-D	Crooked Fork
O-36-J	Left Fork Sandy Creek
O-36-J-5	Nesselroad Run
O-38	Little Sandy Creek
O-43-D	Little Pond Creek
O-44	Lee Creek
O-44-A	South Fork Lee Creek
O-44-B	North Fork Lee Creek

PITTSBURGH DISTRICT

Ohio River Direct Drainage

	Ohio River
O-57	French Creek
O-69	Fishing Creek
O-69-N	South Fork Fishing Creek
O-69-O	North Fork Fishing Creek
O-77	Fish Creek
O-77-J	Valley Run
O-77-O	WV Fork Fish Creek
O-77-O-8	Long Drain Creek
O-88	Wheeling Creek
O-88-D-2	Middle Wheeling Creek
O-88-L	Turkey Run
O-88-O	Enlow Fork
O-88-O-?	Dunkard Fork
O-92	Buffalo Creek

Cheat River Drainage

M	Monongahela River
M-1	Dunkard Creek
M-1-?	Blacks Run
M-1-C	Days Run
M-1-E	Miracle Run
M-1-E-?	Right Branch Miracle Run
M-1-F	WV Fk Dunkard
M-1-F-6	North Fork WV Fork Dunkard Creek
M-1-F-6-A	Camp Run
M-1-F-7	South Fork WV Fork Dunkard Creek

MT	Tygart Valley River
MW	West Fork River
MW-13	Tennile Creek upstream of Little Tenmile
MW-13-I-4	Jacob's Fork
MW-13-I-4	Salem Fork
MW-2	Booths Creek
MW-21	Elk Creek
MW-21-G	Brushy Fork of Elk Creek
MW-21-M	Gnatty Creek
MW-29	Isaacs Creek
MW-31	Hackers Creek
MW-31-C	Jesse Run
MW-32	Kincheloe Creek
MW-36	Freemans Creek
MW-36-D	Right Fork Freemans Creek
MW-38	Stonecoal Creek
MW-55	Right Fork West Fork River
MC-60-D	Blackwater River
MC-60-D-10	Sand Run
MC-60-D-8-	
A ?	Glade Run
MC-60-K-16	West Fork Glady
P	Potomac River Drainage
P-4-M	Mill Creek
P-6	Back Creek
P-9	Sleepy Creek
PC	Cacapon River
PC-24	Lost River
PC-7	North River
PNB-4	Patterson Creek
PNB-4-EE	North Fork Patterson Creek (below dam near mouth)
PSB	South Branch Potomac River
PSB-21	South Fork South Branch

18. Isolated Wetlands.

In some cases, the Corps of Engineers may determine that an activity will not impact waters of the United States because the water is an isolated wetland, and therefore does not require a 404 permit. However, under West Virginia State code (§§22-11-3(23)) isolated wetlands are designated waters of the State. Accordingly, any applicant proposing to impact an isolated wetland must contact the West Virginia Department of Environmental Protection, Division of Water and Waste Management to obtain all necessary approvals for activities impacting any isolated wetlands.

APPENDIX A

Streams with potential presence of Federally listed threatened and endangered species or their habitat

HUNTINGTON DISTRICT:

1. Big Sandy Creek; Kanawha County: Snuffbox.
2. Bluestone River; Mercer and Summers counties (Bluestone Gorge to slackwater of Bluestone Reservoir): Virginia spiraea.
3. Cedar Creek; Braxton and Gilmer counties: Snuffbox.
4. Cove Creek; Monroe County: James spinymussel.
5. Elk River; Braxton, Clay, and Kanawha counties (Sutton Dam to slackwater below Coonskin Park), including the lower one-half mile reaches of its tributaries Birch River, Blue Creek, and Laurel Creek: Clubshell, Pink mucket pearlymussel, Northern riffleshell, Rayed bean, and Snuffbox. The Elk River also contains the Diamond darter (candidate).
6. Fishing Creek; Wetzel County: Snuffbox.
7. Gauley River; Fayette and Nicholas counties (Summersville Dam to Swiss): Virginia spiraea.
8. Greenbrier River; Greenbrier and Pocahontas counties: Virginia spiraea.
9. Henry Fork; Calhoun and Roane counties: Snuffbox.
10. Hughes River; Ritchie and Wirt counties, including the lower one-half mile reach of its tributary Goose Creek: Snuffbox.
11. Kanawha River; Fayette, Kanawha, Mason, and Putnam counties: Fanshell, Pink mucket pearlymussel, Sheepnose, Spectaclecase, and Tubercled-blossum pearlymussel.
12. Leading Creek; Gilmer and Lewis counties, including the lower one-half mile reach of its tributary Fink Creek: Snuffbox.
13. Little Kanawha River; Braxton, Calhoun, Gilmer, Wirt, and Wood counties, including the lower one-half mile reaches of its tributaries Leading Creek (Calhoun Co., different stream than 5.d. above), Pine Creek, Sand Fork, Slate Creek, Straight Creek, Tanner Creek, Tucker Creek, and Walker Creek: Snuffbox.

14. Marsh Fork River including Dingess Branch and Millers Camp Branch and associated palustrine emergent and scrub-shrub wetlands; Raleigh County: Virginia spiraea.
15. McElroy Creek; Doddridge and Tyler counties: Snuffbox.
16. Meadow River; Fayette, Greenbrier, and Nicholas counties: Virginia spiraea.
17. Meathouse Fork of Middle Island Creek; Doddridge County, including the lower one-half mile reaches of its tributary Toms Fork: Clubshell and Snuffbox.
18. Middle Island Creek; Doddridge, Pleasants, and Tyler counties, including the lower one-half mile reaches of its tributaries Arnold Creek, Bluestone Creek, Buckeye Creek, Indian Creek, McKim Creek, Point Pleasant Creek, and Sancho Creek: Clubshell, Rayed bean, and Snuffbox.
19. New River (Lower); Fayette County (Route 19 to Gauley Bridge): Virginia spiraea.
20. North Fork Hughes River; Ritchie and Wirt counties, including the lower one-half mile reaches of its tributaries Addis Run, Bonds Creek, Devilhole Creek, and Gillespie Run: Snuffbox.
21. Ohio River; Cabell, Jackson, Mason Pleasants, Tyler, Wetzel, and Wood counties: Fanshell, Pink mucket pearlymussel, Sheepnose, and Snuffbox.
22. Potts Creek and South Fork of Potts Creek; Monroe County: James spinymussel.
23. Reedy Creek; Roane and Wirt counties: Snuffbox.
24. South Fork Hughes River; Doddridge, Ritchie, and Wirt counties, including the lower one-half mile reaches of its tributaries Bone Creek, Indian Creek, Leatherbark Creek, Otterslide Creek, Slab Creek, and Spruce Creek: Clubshell and Snuffbox.
25. Spring Creek; Roane and Wirt counties: Snuffbox.
26. Steer Creek; Calhoun and Gilmer counties: Snuffbox.
27. Sugar Creek; Pleasants County: Snuffbox.
28. West Fork Little Kanawha River; Calhoun, Roane, and Wirt counties: Snuffbox.

PITTSBURGH DISTRICT

29. Back Creek; Berkeley County: Harperella.
30. Cacapon River; Morgan County: Harperella.

31. Dunkard Creek; Monongalia County: Snuffbox.
32. Fish Creek; Marshall County: Snuffbox.
33. Hackers Creek (of the West Fork River); Harrison and Lewis counties: Clubshell and Snuffbox.
34. Potomac River; Morgan County (from the mouth of the Cacapon River to the mouth of Sleepy Creek): Harperella.
35. Sleepy Creek; Morgan County: Harperella.
36. West Fork River; Harrison, Lewis, and Marion counties: Snuffbox.
37. Streams, springs, and wetlands connected to the groundwater system including caves, areas near sinkholes, and other groundwater/surface interfaces, from the Potomac River west to Opequon Creek, especially in the Rippon and Leetown Areas, and the Evitts Run Watershed; Jefferson and Berkeley counties: Madison Cave isopod.
38. Wetlands; Berkeley and Hardy counties: Northeastern bulrush.

Updated 7/13/12

The Doddridge Independent



The Doddridge Independent PUBLISHER'S CERTIFICATE

I, Michael D. Zorn, Publisher of The Doddridge Independent, A newspaper of general circulation published in the town of West Union, Doddridge County, West Virginia, do hereby certify that:

Floodplain Permit Application # 15-373

Please take notice that on the 17th day of August, 2015

EQT Gathering LLC

filed an application for a Floodplain Permit to develop land located at or about:

15-373- EQT Gathering LLC -

Permanent and Temporary Bridges Location: Left Fork Arnolds Creek Coordinates: 39.15'37.1"N - 80.47'36.2"W

Doddridge County
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Permanent and Temporary Bridges
Location: Left Fork Arnolds Creek
Coordinates: 39.15'37.1"N - 80.47'36.2"W
Received: 08/17/2015
Announced: 08/18/2015
Publication Date: Week of 08/17/2015
20-Day Comment Period Window (from Commission Meeting)
08/18/2015
The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. As this project is outside the FEMA identified floodplain of Doddridge County, Doddridge County Floodplain Management has no regulatory authority. Any interested persons who desire to comment shall present the same in writing by August 28, 2015, delivered to:
Clerk of the County Court
118 E. Court Street, West Union, WV 26456
Beth A Rogers, Doddridge County Clerk
George Eidel, Doddridge County Flood Plain Manager
8/21 - 8/28

was published in The Doddridge Independent
2 times commencing on Friday, August 21, 2015 and
Ending on Friday, August 28, 2015 at the request of:

**George Eidel, Doddridge County Floodplain
Manager & Doddridge County Commission**

Given under my hand this Tuesday, September 8, 2015

The publisher's fee for said publication is:

\$ 25.27 1st Run/\$ 18.95 Subsequent Runs

This Legal Ad Total: \$ 44.22

Michael D. Zorn
Publisher of The Doddridge Independent

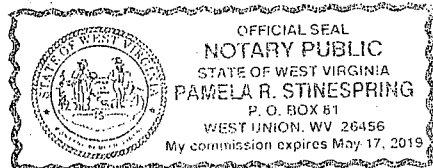
Subscribed to and sworn to before me on

this date: 9/8/15

Notary Public in and for Doddridge County

My Commission expires on

The 17th day of MAY 20 19

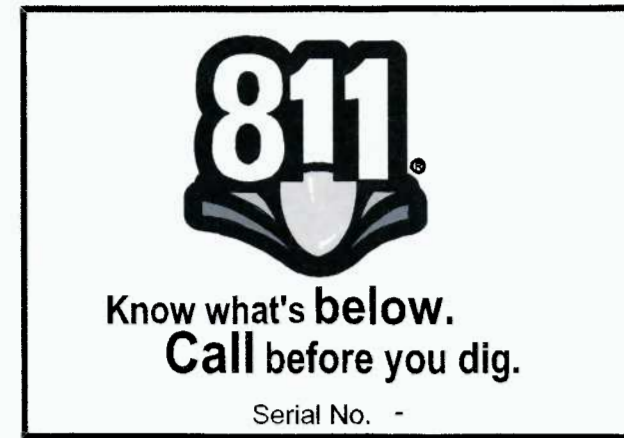


EQT GATHERING, LLC.

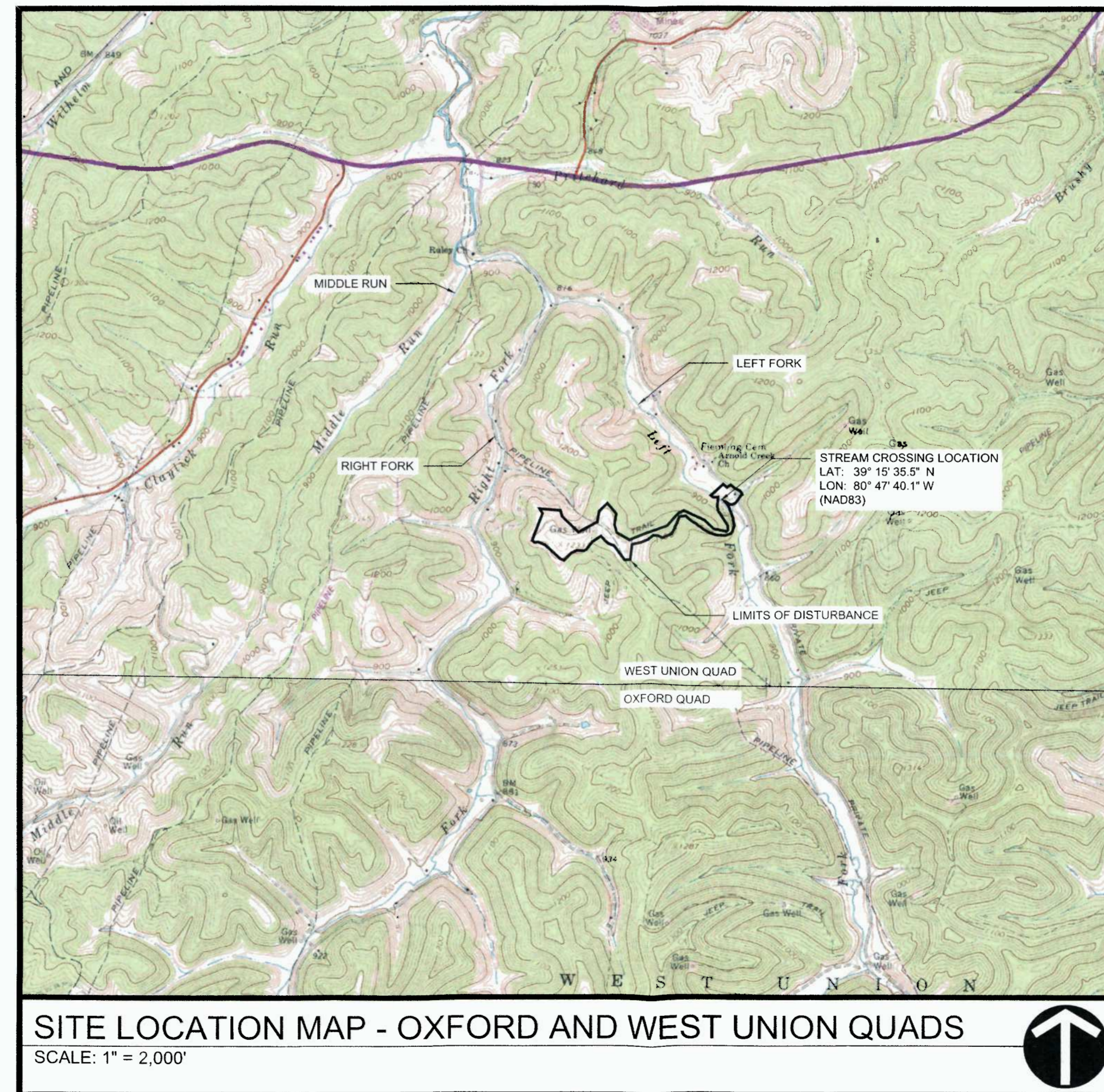
FLOODPLAIN DEVELOPMENT PERMIT DRAWINGS

JANUS COMPRESSOR STATION

AUGUST, 2015



NOTE: THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING ALL UTILITIES. UTILITY LINES SHOWN ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT SURVEYED LINE INFORMATION.



Sheet List Table	
Sheet Number	Sheet Title
1	COVER SHEET
2	OVERALL SITE PLAN
3	FLOODPLAIN EXHIBIT
4	STREAM CROSSING DETAILS
5	STREAM CROSSING-STRUCTURAL

START OF ACCESS ROAD: 39° 15' 37.1" N
80° 47' 36.2" W

STREAM CROSSING LOCATION: 39° 15' 35.5" N
80° 47' 40.1" W

WATERSHED: MIDDLE OHIO RIVER NORTH

NO.	DATE	DESCRIPTION
01	2015-08-11	PERMIT DRAWINGS
02	-	-
03	-	-
04	-	-
05	-	-
06	-	-
07	-	-
NO.	DATE	DESCRIPTION

EQT GATHERING, LLC.
 JANUS COMPRESSOR STATION
 LEFT FORK RUN ROAD
 EQT GATHERING, LLC.
 625 LIBERTY AVENUE, SUITE 1700
 PITTSBURGH, PA 15222



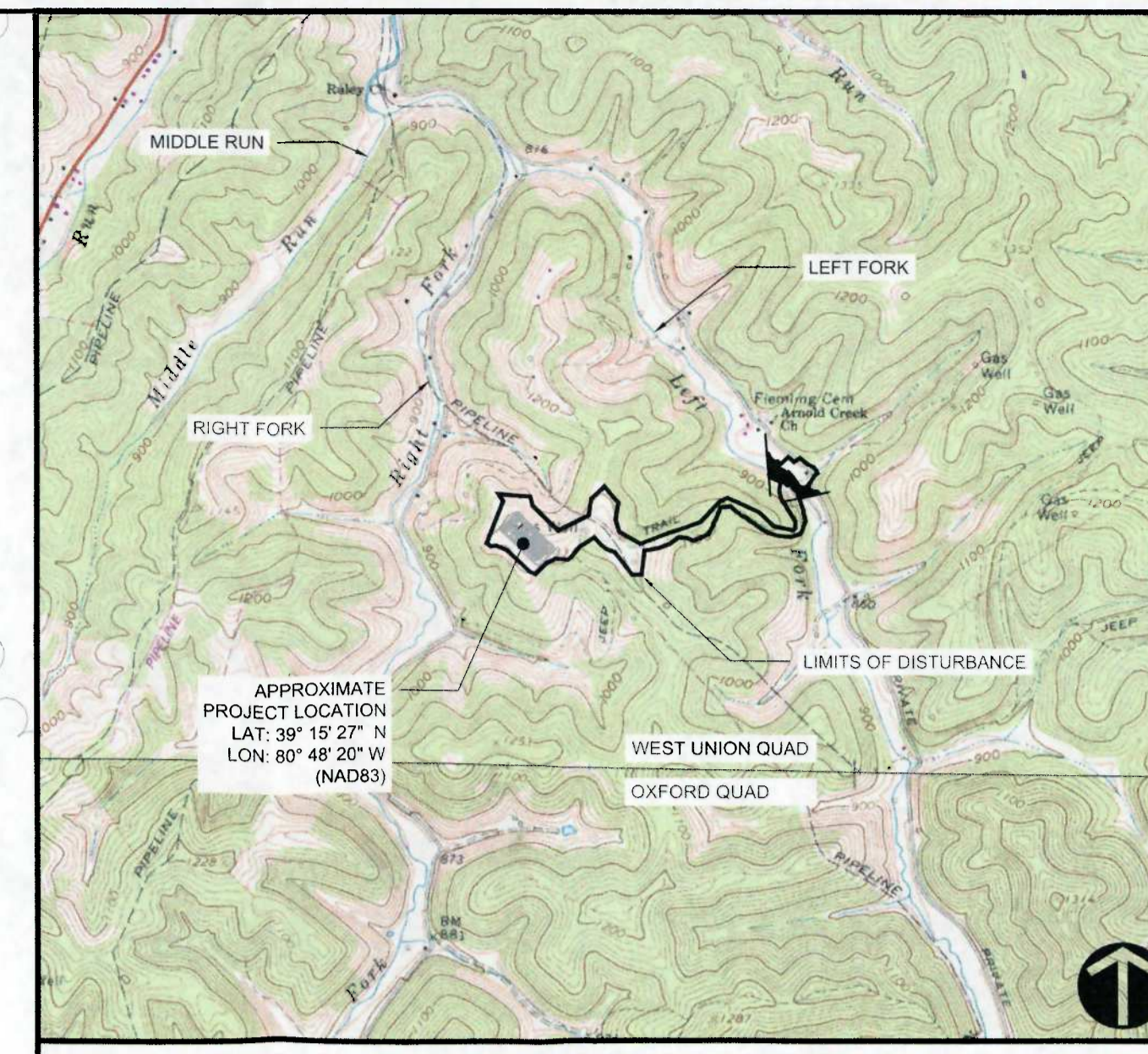
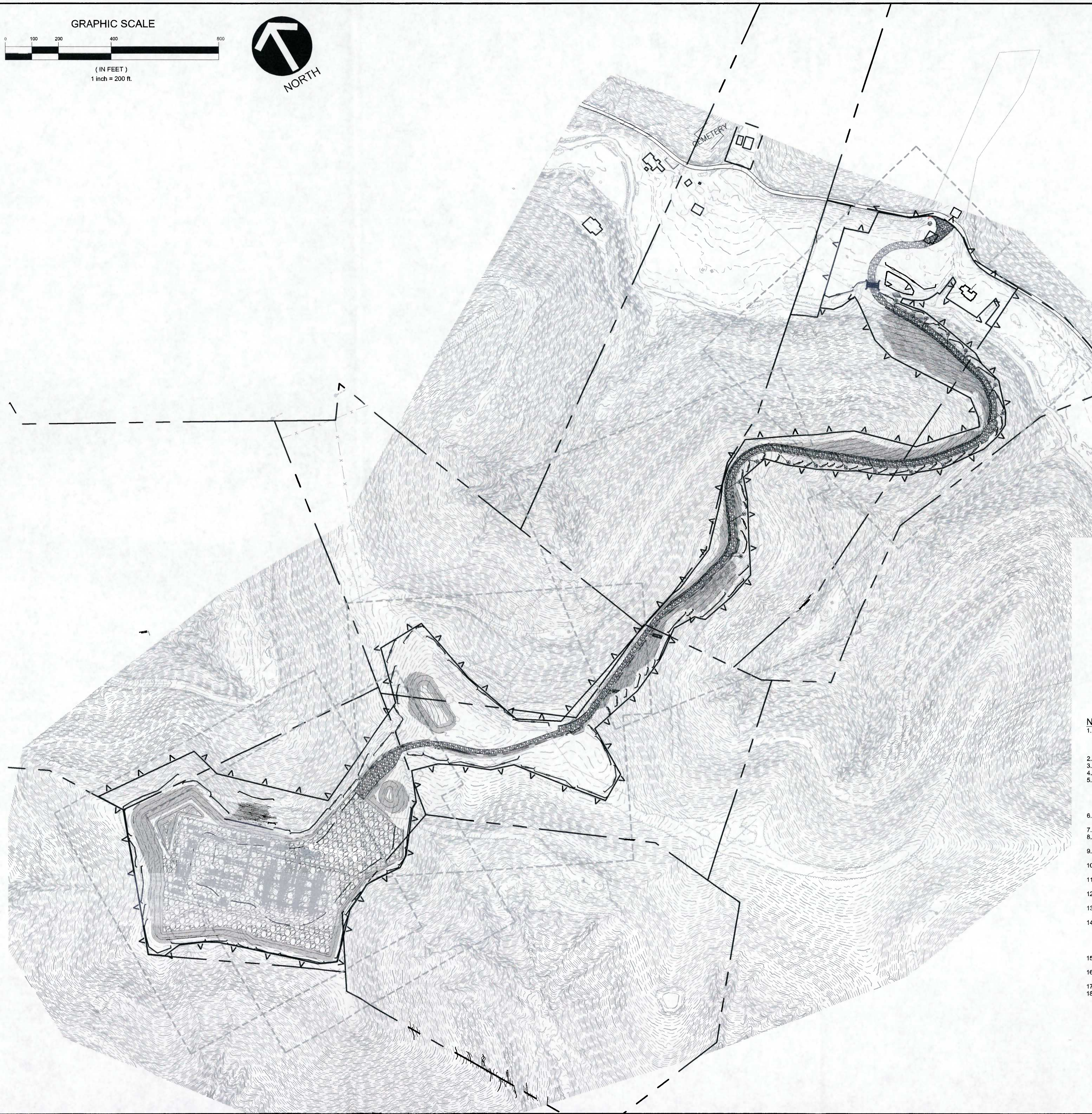
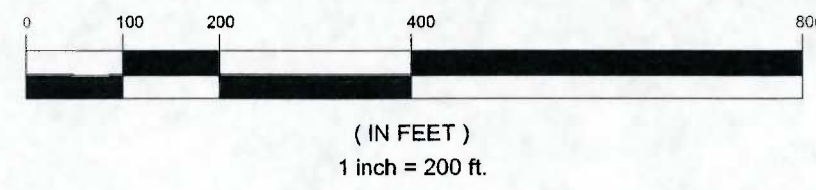
This drawing was produced with computer-aided drafting technology and is supported by electronic drawing files. Do not revise this drawing via manual drafting methods.

PROJECT NO.:	C-18422-0009
DRAWN BY:	LEA
CHECKED BY:	MEB
APPROVED BY:	MEB
DATE:	JULY 2015
SCALE:	AS NOTED

SHT. NO.	1	OF	5
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GRAPHIC SCALE



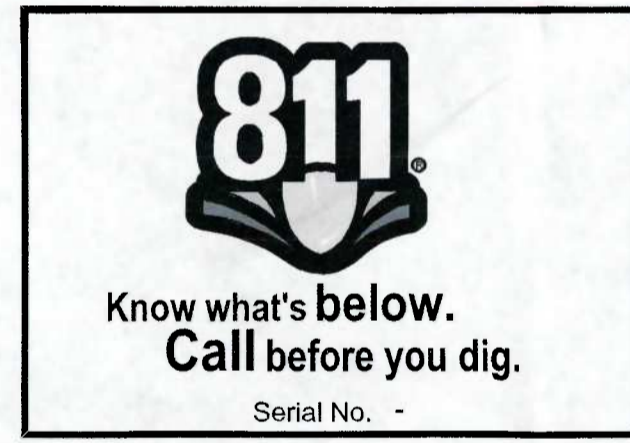
USGS SITE LOCATION MAP - OXFORD AND WEST UNION QUADS
SCALE: 1" = 2,000'

PROJECT AREAS

TOTAL PERMIT AREA = 33.5 ACRES
DISTURBED AREA = 33.5 ACRES

EROSION AND SEDIMENT CONTROL LEGEND

	04	ROLLED EROSION CONTROL
	01	STONE CONSTRUCTION ENTRANCE
	02	COMPOST FILTER SOCK
	03	TRIPLE STACK FILTER SOCK
	05	INLET PROTECTION
	07	ROCK FILTER
	02	INTERCEPTOR / DIVERSION CHANNEL
	03	GUARDRAIL
		SOIL BOUNDARIES
		LIMITS OF DISTURBANCE/PERMIT BOUNDARY
		TOP OF SLOPE BERM



NOTES:

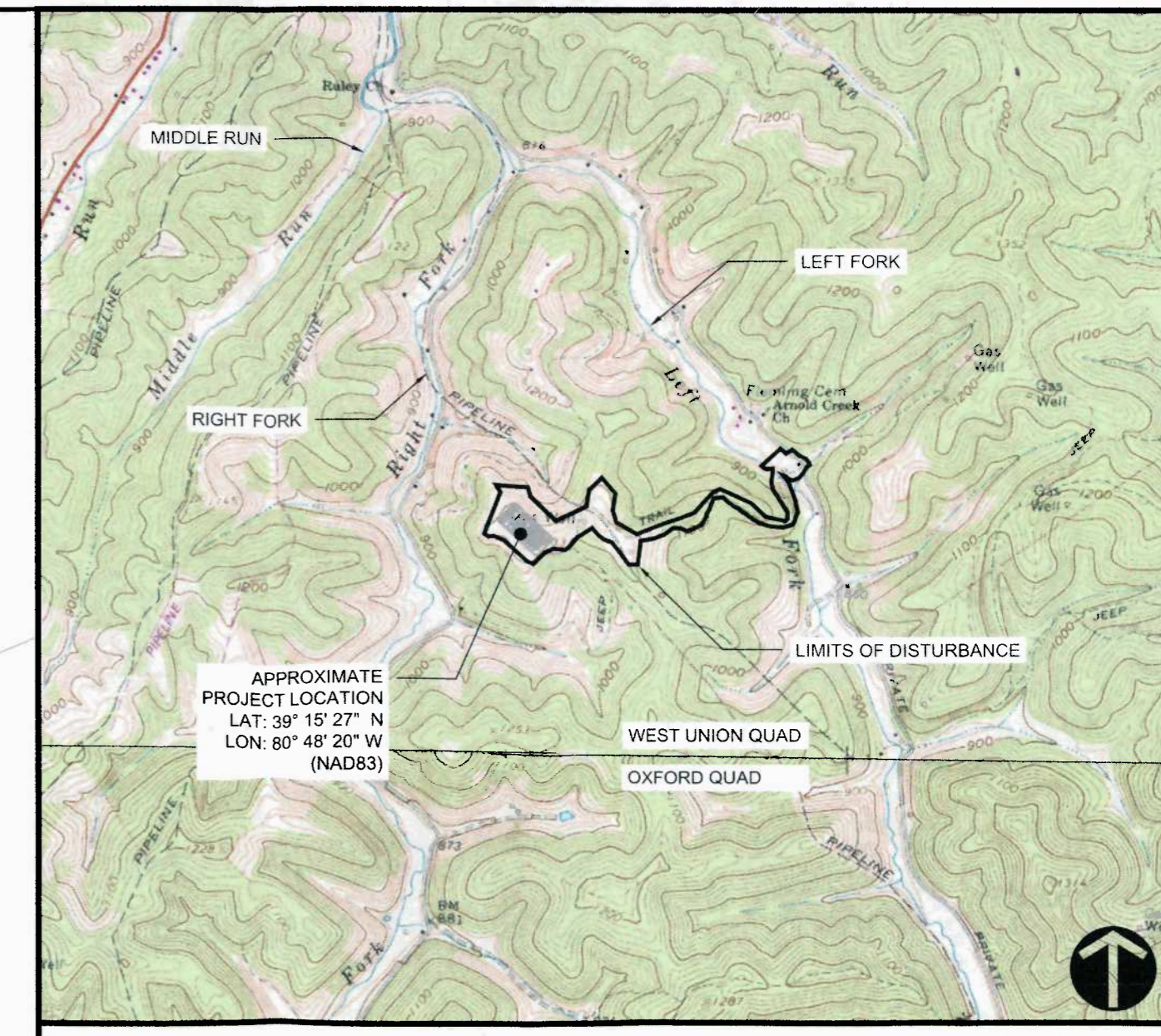
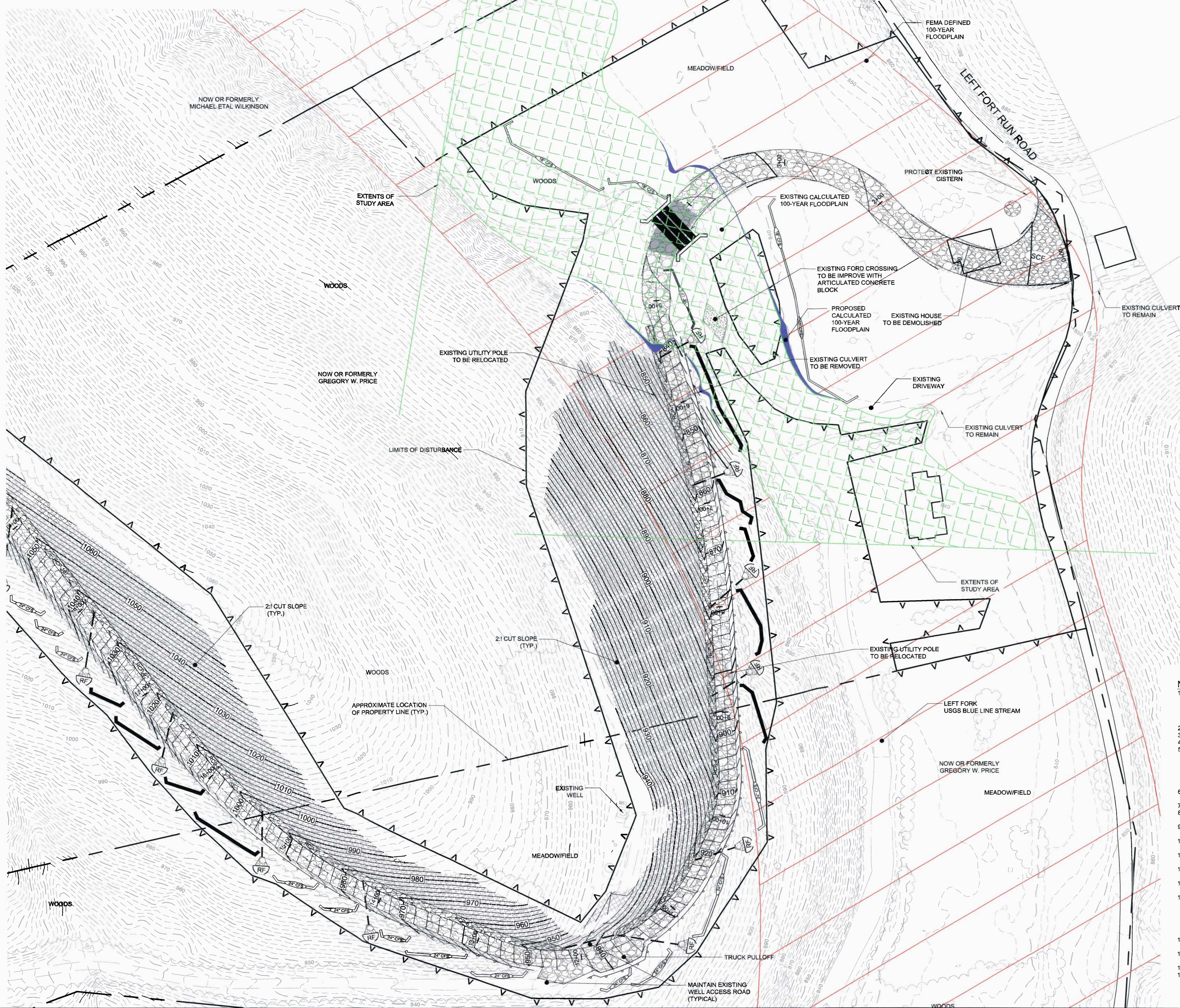
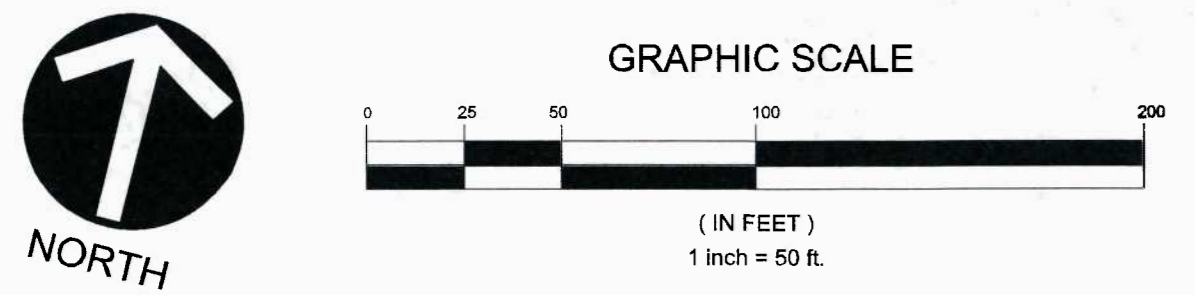
1. THE UNDERGROUND UTILITIES SHOWN HEREON HAVE NOT BEEN PHYSICALLY LOCATED BY THE SURVEYOR. THE GATEWAY ENGINEERS, INC. MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE GATEWAY ENGINEERS, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE SHOWN AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE.
2. GRADE ALL CHANNELS TO PROVIDE POSITIVE FLOW TO OUTFALL.
3. ROCK FILTERS BELOW CROSS DRAINS TO BE CONSTRUCTED PER DETAILS.
4. EROSION CONTROL BLANKETS FOR SLOPED APPLICATIONS TO BE NA GREEN S150 OR APPROVED EQUIV.
- FOR DIRT OR GRAVEL SURFACE PUBLIC ROADS, RIGOROUS MANUAL REMOVAL OF MUD/DIRT FROM VEHICLE/EQUIPMENT TIRES IS REQUIRED PRIOR TO EXITING CONSTRUCTION SITE. SUPPLEMENTED BY IMMEDIATE RECOVERY, BY MANUAL OR MECHANICAL MEANS, OF SOIL WHICH MAY BECOME DISCHARGED ONTO PUBLIC ROADWAYS. DUST CONTROL AND/OR COMPACTION VIA ROLLING OF THE DIRT PUBLIC ROAD SURFACE WILL BE IMPLEMENTED AS NEEDED.
5. ALL EARTHWORK SHALL BE COMPLETED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GATEWAY GEOTECHNICAL REPORT AND UNDER THE SUPERVISION OF OWNER'S REPRESENTATIVE.
6. ALL WORK MUST BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE WV DEP PERMITS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR STAKING THE PROPERTY LINES AND LIMITS OF DISTURBANCE PRIOR TO THE START OF CONSTRUCTION FOR REVIEW BY ALL PARTIES.
8. THE CONTRACTOR WILL NOT BE PERMITTED TO ENTER EXISTING UTILITY RIGHT OF WAYS WITHOUT PERMISSION/SUPERVISION OF UTILITY OWNING EASEMENT/RIGHT OF WAY.
9. THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THAT THE RIGHT OF WAY, ENVIRONMENTAL FEATURES, AND SITE ARE STAKED PRIOR TO THE START OF CONSTRUCTION TO ENSURE THAT THE E&S CONTROLS ARE INSTALLED AS SHOWN.
10. ADDITIONAL EROSION CONTROL MEASURES OR SILT BARRIERS TO BE PLACED AS SHOWN AND/OR DIRECTED BY THE PROJECT ENGINEER AND/OR LOCAL JURISDICTIONAL INSPECTOR.
11. THE CONTRACTOR HEREBY AGREES TO STOP ALL WORK AND RESTORE AREAS IMMEDIATELY UPON NOTIFICATION BY THE LOCAL JURISDICTIONAL INSPECTOR AND/OR PROFESSIONAL ENGINEER.
12. A COPY OF THE APPROVED STORMWATER POLLUTION PREVENTION PLAN SHALL BE PRESENT ON THE SITE WHENEVER LAND DISTURBING ACTIVITY IS IN PROGRESS.
13. THE LOCATION OF SOME OF THE EROSION CONTROL DEVICES MAY HAVE TO BE ALTERED FROM THAT SHOWN ON THE APPROVED PLANS IF DRAINAGE PATTERNS DURING CONSTRUCTION ARE DIFFERENT FROM THE FINAL PROPOSED DRAINAGE PATTERNS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACCOMPLISH EROSION CONTROL FOR ALL DRAINAGE PATTERNS CREATED AT VARIOUS STAGES DURING CONSTRUCTION. ANY DIFFICULTY IN CONTROLLING EROSION DURING ANY PHASE OF CONSTRUCTION OR USE OF ALTERNATIVE EROSION CONTROL METHODS TO THE APPROVED PLANS SHALL BE REPORTED TO THE OWNER IMMEDIATELY.
14. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PERFORM REQUIRED MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL DEVICES TO ENSURE THEIR FUNCTION AT ALL TIMES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE ABANDONMENT OF THE EXISTING GAS LINES WITH THE OWNER, THE PHASING OF THEIR RELOCATION AND ANY TEMPORARY PROVISIONS SHALL BE CONSIDERED INCIDENTAL.
16. THE CONTRACTOR IS RESPONSIBLE FOR THE PROVIDED ACCESS TO ALL WELLS AT ALL TIMES DURING CONSTRUCTION.
17. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING ALL UTILITIES. UTILITY LINES SHOWN ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT SURVEYED LINE INFORMATION.

NO.	DATE	DESCRIPTION
01	2015-08-11	PERMIT DRAWINGS
02	-	-
03	-	-
04	-	-
05	-	-
06	-	-
07	-	-

EQT GATHERING, LLC.
 JANUS COMPRESSOR STATION
 LEFT FORK RUN ROAD
 EQT GATHERING, LLC.
 625 LIBERTY AVENUE, SUITE 1700
 PITTSBURGH, PA 15222

This drawing was produced with computer aided drafting technology and is supported by electronic drawing files. Do not revise this drawing via manual drafting methods.

PROJECT NO.:	C-18422-0009
DRAWN BY:	LEA
CHECKED BY:	MEB
APPROVED BY:	MEB
DATE:	JULY 2015
SCALE:	1" = 50'
SHT. NO.	2 OF 5

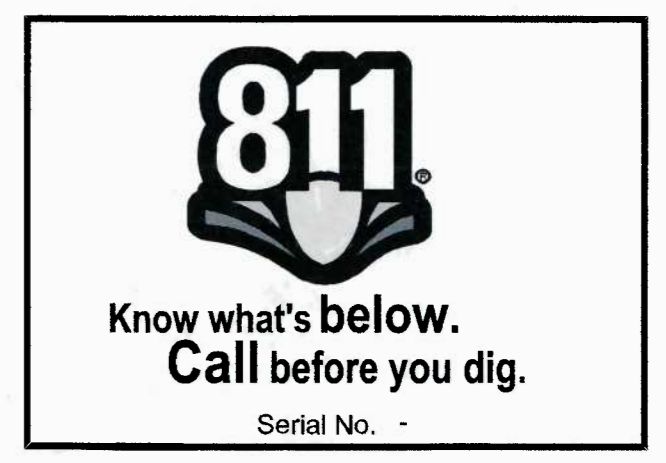


USGS SITE LOCATION MAP - OXFORD AND WEST UNION QUADS
SCALE: 1" = 2,000'

PROJECT AREAS
TOTAL PERMIT AREA = 33.5 ACRES
DISTURBED AREA = 33.5 ACRES

EROSION AND SEDIMENT CONTROL LEGEND

	04	ROLLED EROSION CONTROL
	01	STONE CONSTRUCTION ENTRANCE
	01	COMPOST FILTER SOCK
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	03	GUARDRAIL
		SOIL BOUNDARIES
		LIMITS OF DISTURBANCE/PERMIT BOUNDARY
		TOP OF SLOPE BERM



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 - GRADE ALL CHANNELS TO PROVIDE POSITIVE FLOW TO OUTFALL.
 - ROCK FILTERS BELOW CROSS DRAINS TO BE CONSTRUCTED PER DETAILS.
 - EROSION CONTROL BLANKETS FOR SLOPED APPLICATIONS TO BE MA GREEN S150 OR APPROVED EQUAL.
 - DIRT TRACKED ON PUBLIC ROADS SHALL BE REMOVED IN THE FOLLOWING MANNER:
- FOR DIRT OR GRAVEL SURFACE PUBLIC ROADS, RIGOROUS MANUAL REMOVAL OF MUDDIRT FROM VEHICLE/EQUIPMENT TIRES IS REQUIRED PRIOR TO EXITING CONSTRUCTION SITE. SUPPLEMENTED BY IMMEDIATE RECOVERY, BY MANUAL OR MECHANICAL MEANS, OF SOIL WHICH MAY BECOME DISCHARGED ONTO PUBLIC ROADWAYS. DUST CONTROL AND/OR COMPACTION VIA ROLLING OF THE DIRT PUBLIC ROAD SURFACE WILL BE IMPLEMENTED AS NEEDED.
 - ALL EARTHWORK SHALL BE COMPLETED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GATEWAY GEOTECHNICAL REPORT AND UNDER THE SUPERVISION OF OWNER'S REPRESENTATIVE.
 - ALL WORK MUST BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE W/ DEP PERMITS.
 - THE CONTRACTOR SHALL BE RESPONSIBLE FOR STAKING THE PROPERTY LINES AND LIMITS OF DISTURBANCE PRIOR TO THE START OF CONSTRUCTION FOR REVIEW BY ALL PARTIES.
 - THE CONTRACTOR WILL NOT BE PERMITTED TO ENTER EXISTING UTILITY RIGHT OF WAYS WITHOUT PERMISSION/SUPERVISION OF UTILITY OWNING EASEMENT/RIGHT OF WAY.
 - THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THAT THE RIGHT OF WAY, ENVIRONMENTAL FEATURES, AND SITE ARE STAKED PRIOR TO THE START OF CONSTRUCTION TO ENSURE THAT THE E&S CONTROLS ARE INSTALLED AS SHOWN.
 - ADDITIONAL EROSION CONTROL MEASURES OR SILT BARRIERS TO BE PLACED AS SHOWN AND/OR DIRECTED BY THE PROJECT ENGINEER AND/OR LOCAL JURISDICTIONAL INSPECTOR.
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 - A COPY OF THE APPROVED STORMWATER POLLUTION PREVENTION PLAN SHALL BE PRESENT ON THE SITE WHENEVER LAND DISTURBING ACTIVITY IS IN PROGRESS.
 - THE LOCATION OF SOME OF THE EROSION CONTROL DEVICES MAY HAVE TO BE ALTERED FROM THAT SHOWN ON THE APPROVED PLANS IF DRAINAGE PATTERNS DURING CONSTRUCTION ARE DIFFERENT FROM THE FINAL PROPOSED DRAINAGE PATTERNS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACCOMPLISH EROSION CONTROL FOR ALL DRAINAGE PATTERNS CREATED AT VARIOUS STAGES DURING CONSTRUCTION. ANY DIFFICULTY IN CONTROLLING EROSION DURING ANY PHASE OF CONSTRUCTION OR USE OF ALTERNATIVE EROSION CONTROL METHODS TO THE APPROVED PLANS SHALL BE REPORTED TO THE OWNER IMMEDIATELY.
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 - THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE ABANDONMENT OF THE EXISTING GAS LINES WITH THE OWNER. THE PHASING OF THEIR RELOCATION AND ANY TEMPORARY PROVISIONS SHALL BE CONSIDERED INCIDENTAL.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE PROVIDED ACCESS TO ALL WELLS AT ALL TIMES DURING CONSTRUCTION.
 - THE CONTRACTOR IS RESPONSIBLE FOR UTILITIES UTILITY LINES SHOWN ON THE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND DO NOT REPRESENT SURVEYED LINE INFORMATION.

PERMIT DRAWINGS

01	2015-08-11		
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NO.	DATE:		DESCRIPTION:

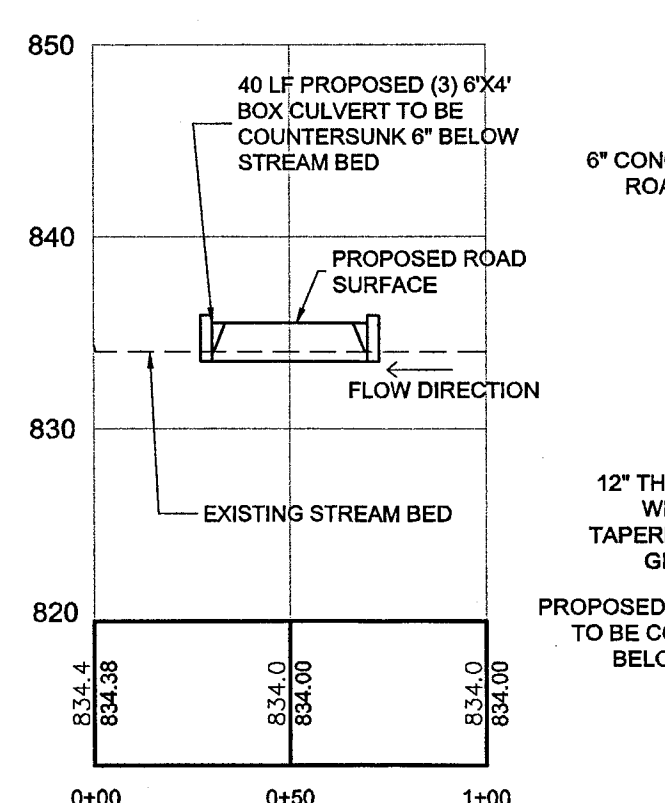
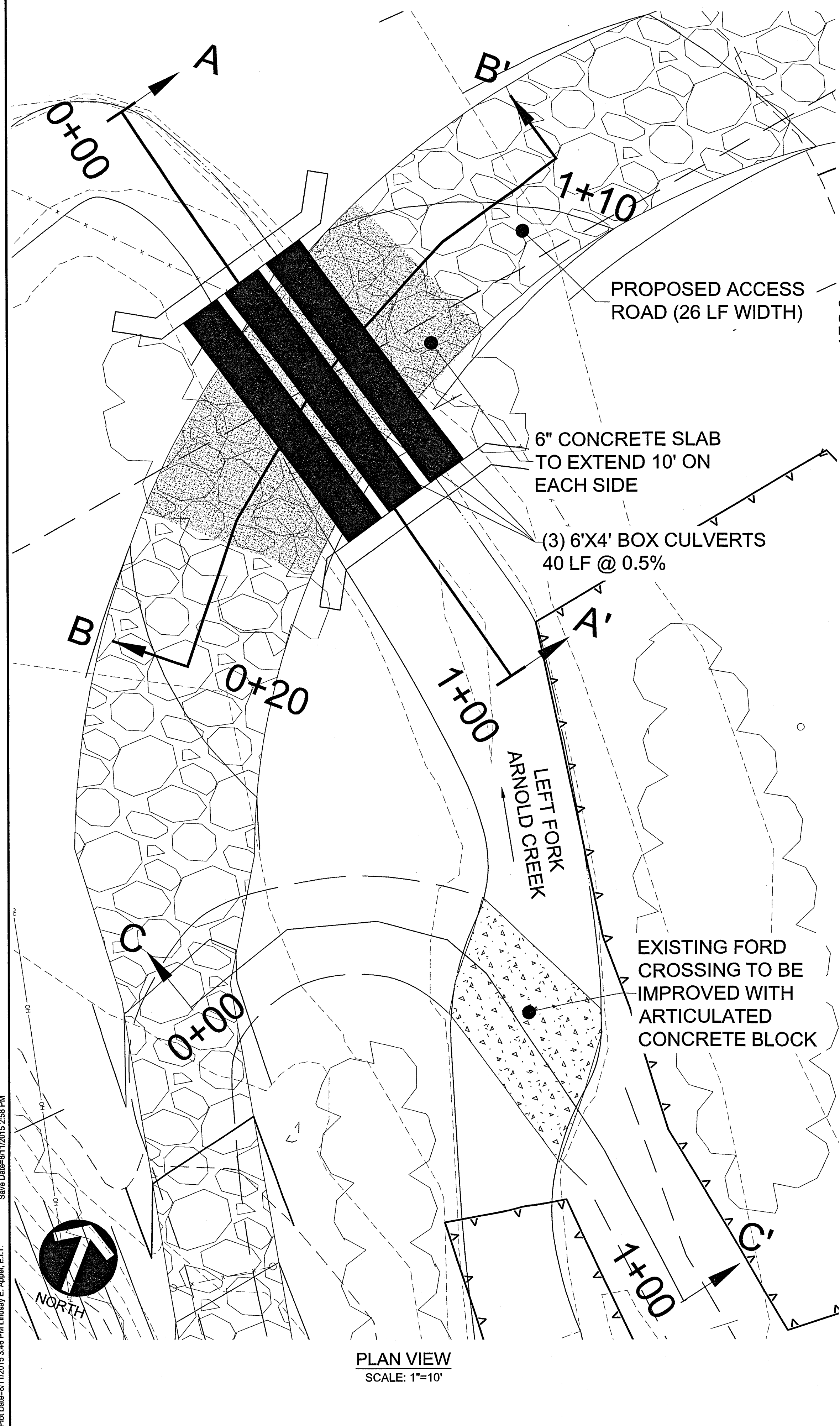
EQT GATHERING, LLC.
JANUS COMPRESSOR STATION
LEFT FORK RUN ROAD
EQT GATHERING, LLC.
625 LIBERTY AVENUE, SUITE 1700
PITTSBURGH, PA 15222



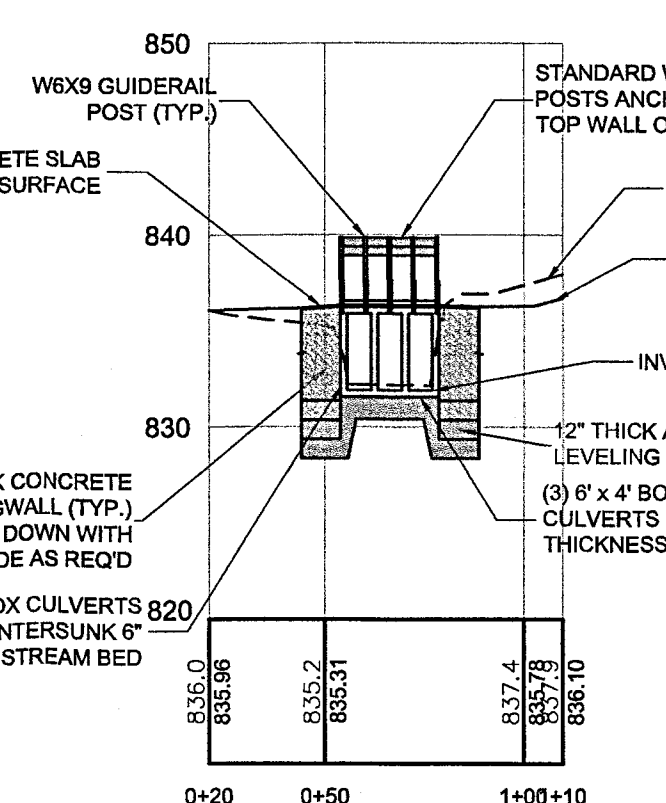
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PROJECT NO.:	C-18422-0009
DRAWN BY:	LEA
CHECKED BY:	MEB
APPROVED BY:	MEB
DATE:	JULY 2015
SCALE:	1" = 50'
SHT. NO.:	3 OF 5

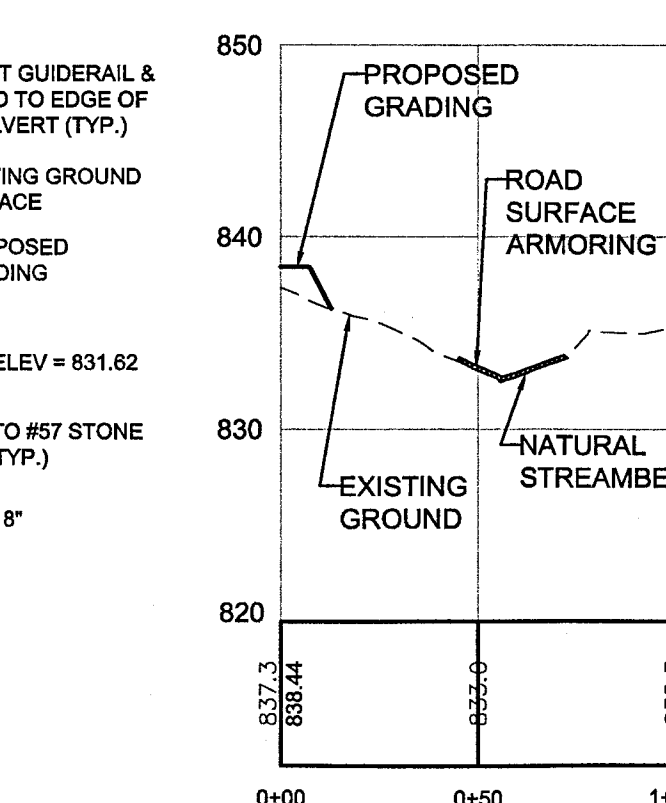
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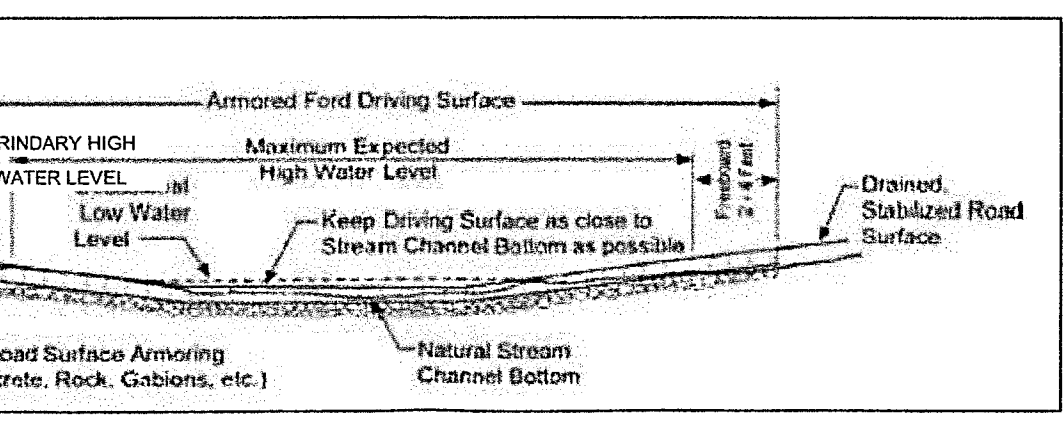
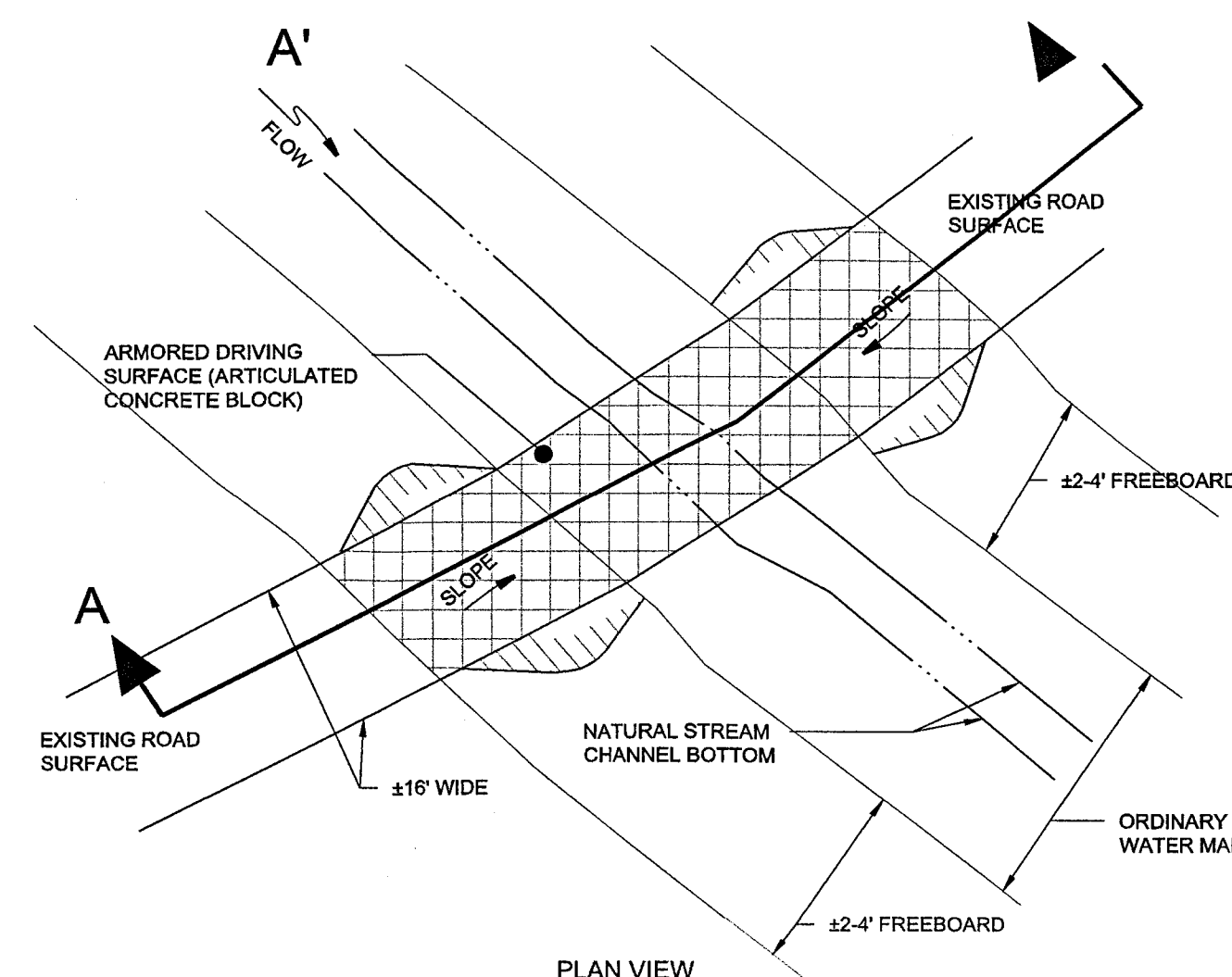
CROSS SECTION A-A'
(PERMANENT BOX CULVERT CROSSING)
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 10'



CROSS SECTION B-B'
(PERMANENT BOX CULVERT CROSSING)
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 50'



CROSS SECTION C-C'
(TEMPORARY FORD CROSSING)
HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 10'



- NOTES:**
- ALL SPOIL SHALL BE DEPOSITED OUTSIDE OF THE FLOODWAY AND WETLANDS, IF PRESENT AND PROTECTED BY EROSION AND SEDIMENTATION CONTROLS.
 - ARTICULATED CONCRETE BLOCK TO BE PLACED BELOW LEVEL OF NATURAL STREAM CHANNEL BOTTOM.
 - STONE SHALL BE KEYED INTO THE STREAMBANK BED.
 - USE ARMORFLEX MAT OR APPROVED EQUAL.
 - AT THE TIME OF BID, THE CONTRACTOR SHALL SUBMIT SPECIFICATIONS FOR THE ROAD ARMORING SURFACE THAT THEY INTEND TO USE TO BE APPROVED BY EQT PRIOR TO PURCHASING.

TEMPORARY FORD CROSSING DETAIL

CONSTRUCTION SEQUENCE

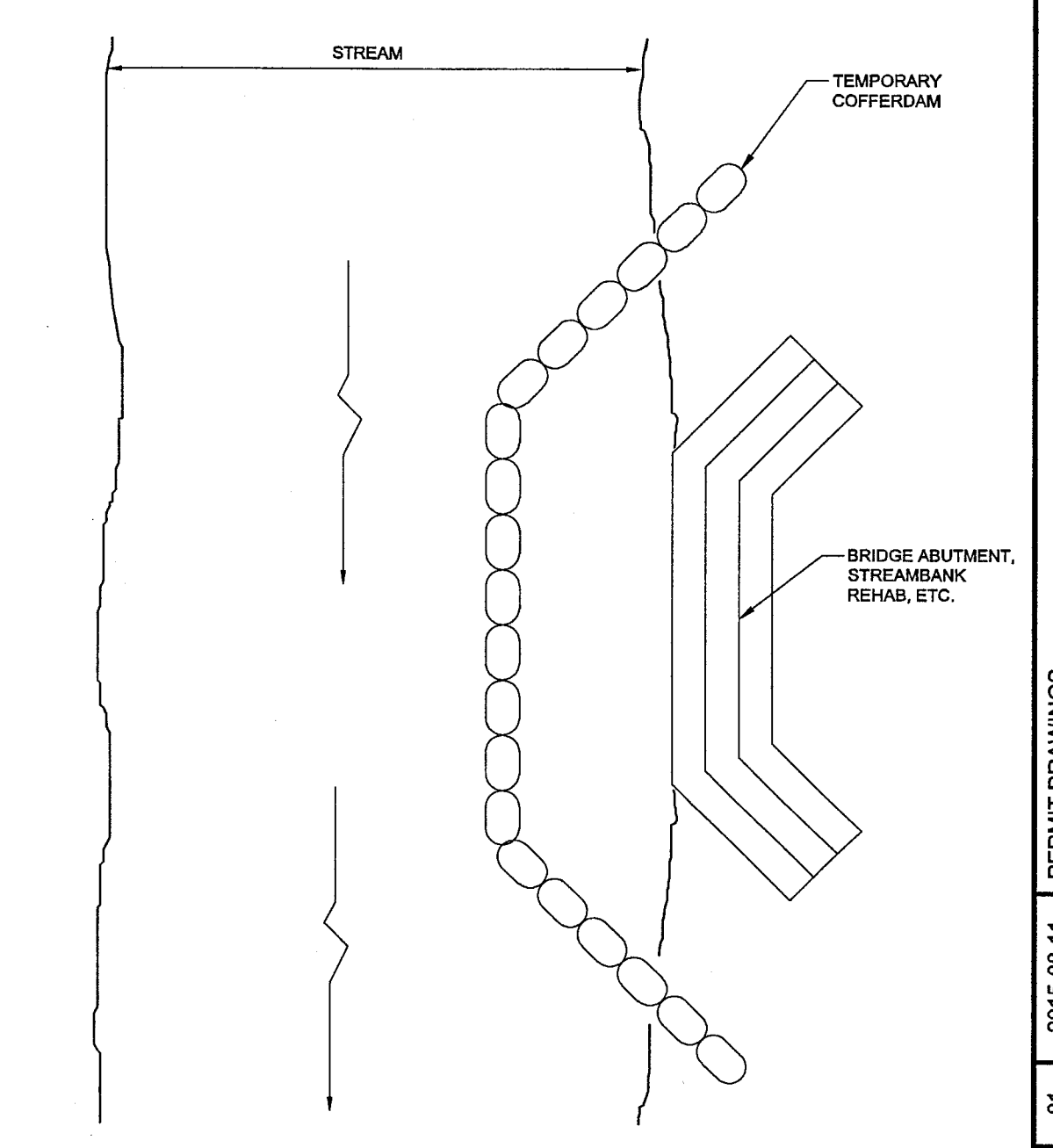
FORD STREAM CROSSING INSTALLATION

- PRIOR TO STARTING THE INSTALLATION OF THE FORD CROSSING, ENSURE RAIN IS NOT IN THE FORECAST.
- INSTALL TEMPORARY COFFERDAM PHASE 1 AT LOCATION OF PROPOSED CROSSING, AS SHOWN ON THE PLANS, TO REDIRECT STREAM FLOW SO THAT THE NORTHERN MOST MATTING MAY BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND SPECIFICATIONS.
- EXCAVATE THE NORTHERN STREAMBED TO A DEPTH TO ENSURE THAT THE INSTALLATION OF THE ARTICULATED BLOCK WILL BE AT OR BELOW THE EXISTING STREAM BED ELEVATION.
- IF REQUIRED DURING CONSTRUCTION OF THE STREAM CROSSING, DEWATERING MAY OCCUR USING PUMPED WATER FILTER BAGS PER THE DETAIL PROVIDED. ANY EXCAVATED MATERIAL MUST BE PLACED UPSTREAM OF SEDIMENT CONTROLS AND OUTSIDE THE CHANNEL FLOODWAY.
- ALL EXCAVATED MATERIAL NOT INTENDED FOR USE ON SITE MUST BE DISPOSED OF AT AN APPROVED FACILITY.
- STABILIZE THE EXISTING FORD STREAM CROSSING BY PLACING ARTICULATED CONCRETE BLOCK IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS ON THE NORTHERN HALF OF THE STREAM. FILL THE CONCRETE BLOCK ACCORDING TO MANUFACTURER RECOMMENDATIONS.
- BACKFILL AROUND THE NORTHERN END OF THE BLOCK ACCORDING TO MANUFACTURER RECOMMENDATIONS.
- INSTALL COFFERDAM PHASE 2 AT THE LOCATION SHOWN ON THE PLANS TO REDIRECT FLOW TO THE SOUTH TO ALLOW INSTALLATION OF THE SOUTHERN SIDE OF THE FORD CROSSING.
- EXCAVATE THE SOUTHERN STREAMBED TO A DEPTH TO ENSURE THAT THE INSTALLATION OF THE ARTICULATED BLOCK WILL BE AT OR BELOW THE EXISTING STREAM BED ELEVATION.
- IF REQUIRED DURING CONSTRUCTION OF THE STREAM CROSSING, DEWATERING MAY OCCUR USING PUMPED WATER FILTER BAGS PER THE DETAIL PROVIDED. ANY EXCAVATED MATERIAL MUST BE PLACED UPSTREAM OF SEDIMENT CONTROLS AND OUTSIDE THE CHANNEL FLOODWAY.
- ALL EXCAVATED MATERIAL NOT INTENDED FOR USE ON SITE MUST BE DISPOSED OF AT AN APPROVED FACILITY.
- STABILIZE THE EXISTING FORD STREAM CROSSING BY PLACING ARTICULATED CONCRETE BLOCK IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS ON THE SOUTHERN HALF OF THE STREAM. FILL THE CONCRETE BLOCK ACCORDING TO MANUFACTURER RECOMMENDATIONS.
- BACKFILL AROUND THE SOUTHERN END OF THE BLOCK ACCORDING TO MANUFACTURER RECOMMENDATIONS.
- REMOVE THE TEMPORARY COFFERDAM.
- STABILIZE THE APPROACHES OF THE ROADWAY ON BOTH SIDES OF THE STREAM WITH STONE.

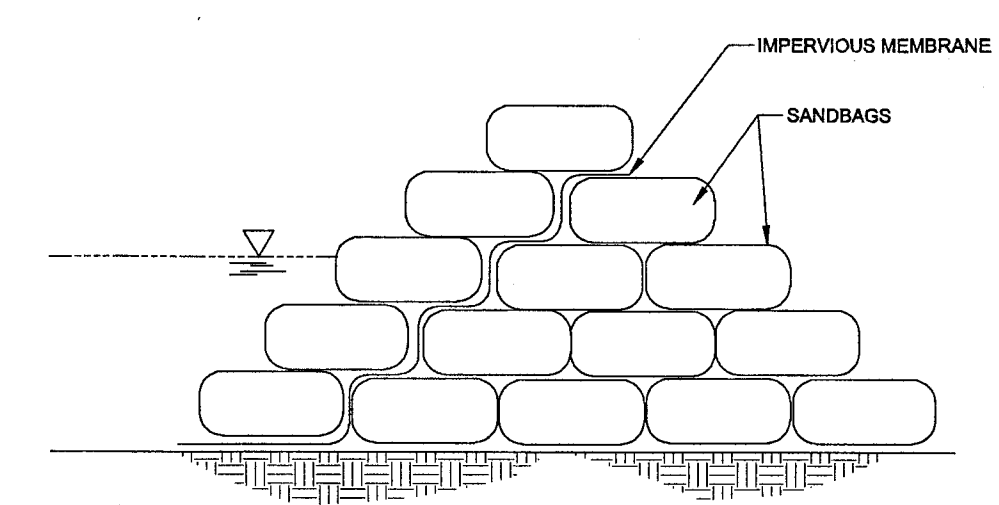
PERMANENT BOX CULVERT STREAM CROSSING INSTALLATION

- PRIOR TO STARTING THE INSTALLATION OF THE CULVERT CROSSING, ENSURE RAIN IS NOT IN THE FORECAST.
- INSTALL TEMPORARY COFFERDAM PHASE 1 AT LOCATION OF PROPOSED BOX CULVERTS, AS SHOWN ON THE PLANS, TO REDIRECT STREAM FLOW SO THAT THE NORTHERN MOST BOX CULVERT MAY BE INSTALLED IN ACCORDANCE WITH THE DETAILS AND SPECIFICATIONS PROVIDED.
- INSTALL THE FIRST BOX CULVERT ON THE NORTHERN END OF THE STREAM CROSSING WITH HEADWALL/ENDWALL. RECESSING CULVERT 6" BELOW STREAMBED. IF REQUIRED DURING CONSTRUCTION OF THE STREAM CROSSING, DEWATERING MAY OCCUR USING PUMPED WATER FILTER BAGS PER THE DETAIL PROVIDED. ANY EXCAVATED MATERIAL MUST BE PLACED UPSTREAM OF SEDIMENT CONTROLS AND OUTSIDE THE CHANNEL FLOODWAY. ALL EXCAVATED MATERIAL NOT INTENDED FOR USE ON SITE MUST BE DISPOSED OF AT AN APPROVED FACILITY.
- ONCE INITIAL CULVERT IS INSTALLED, REMOVE COFFERDAM PHASE 1 SO THAT THE FLOW AREA THROUGH THE INSTALLED PIPE MAY BE UTILIZED.
- INSTALL COFFERDAM PHASE 2 AT THE LOCATION SHOWN ON THE PLANS TO REDIRECT FLOW. INSTALL MIDDLE BOX CULVERT, RECESSING 6" BELOW STREAMBED.
- REMOVE COFFERDAM PHASE 2 SO THAT BOTH INSTALLED CULVERTS MAY RECEIVE FLOW. INSTALL COFFERDAM PHASE 3 AT THE LOCATION SHOWN ON THE PLANS SO THAT FINAL BOX CULVERT MAY BE INSTALLED.
- INSTALL FINAL BOX CULVERT, HEADWALL, AND ENDWALL RECESSING 6" BELOW STREAMBED.
- ONCE FINAL SLOPE AND GRADES ARE ACHIEVED, IMMEDIATELY SEED AND MULCH FOR STABILIZATION TO PROMOTE EARLY STABILIZATION OF SURROUNDING DISTURBED AREAS.
- DEWATER SANDBAGS BY POURING WATER INTO SEDIMENT FILTER BAGS (SEE DETAIL SHEET). ONCE THE ACCUMULATED SEDIMENT IS REMOVED, PLACE AT APPROPRIATE ON-SITE LOCATIONS. SPREAD THE SEDIMENT MIXED WITH FILL MATERIALS TO AREAS WITH SEDIMENT CONTROL.

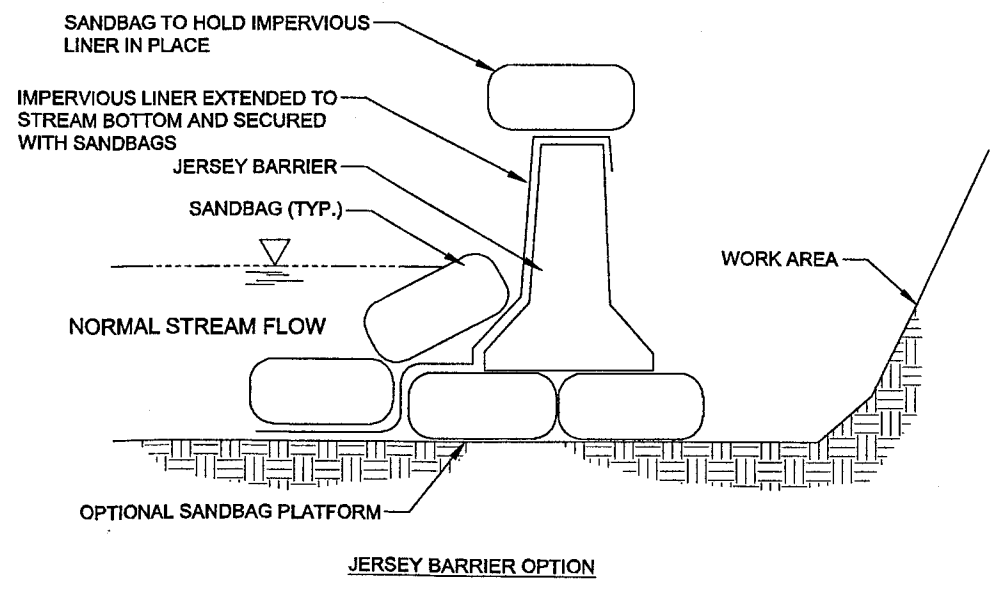
CONSTRUCTION SEQUENCE



IN-STREAM COFFERDAM DIVERSION



SANDBAG DIVERSION DAM OR COFFERDAM



NO.	DATE	DESCRIPTION
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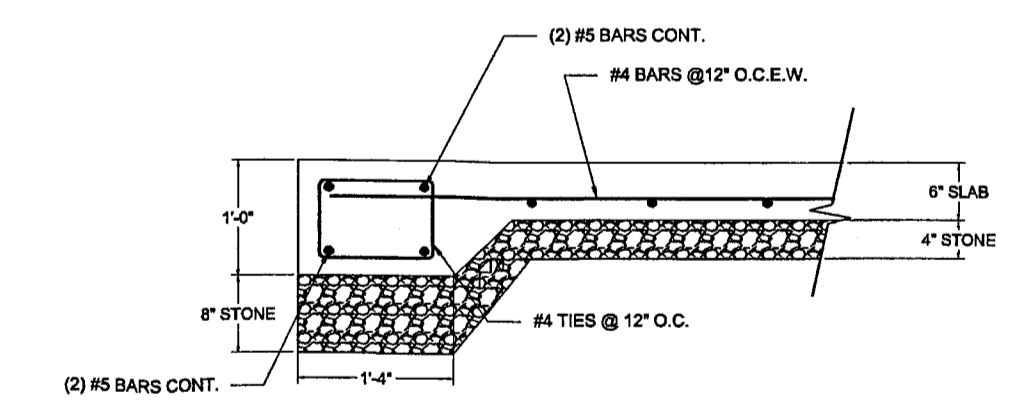
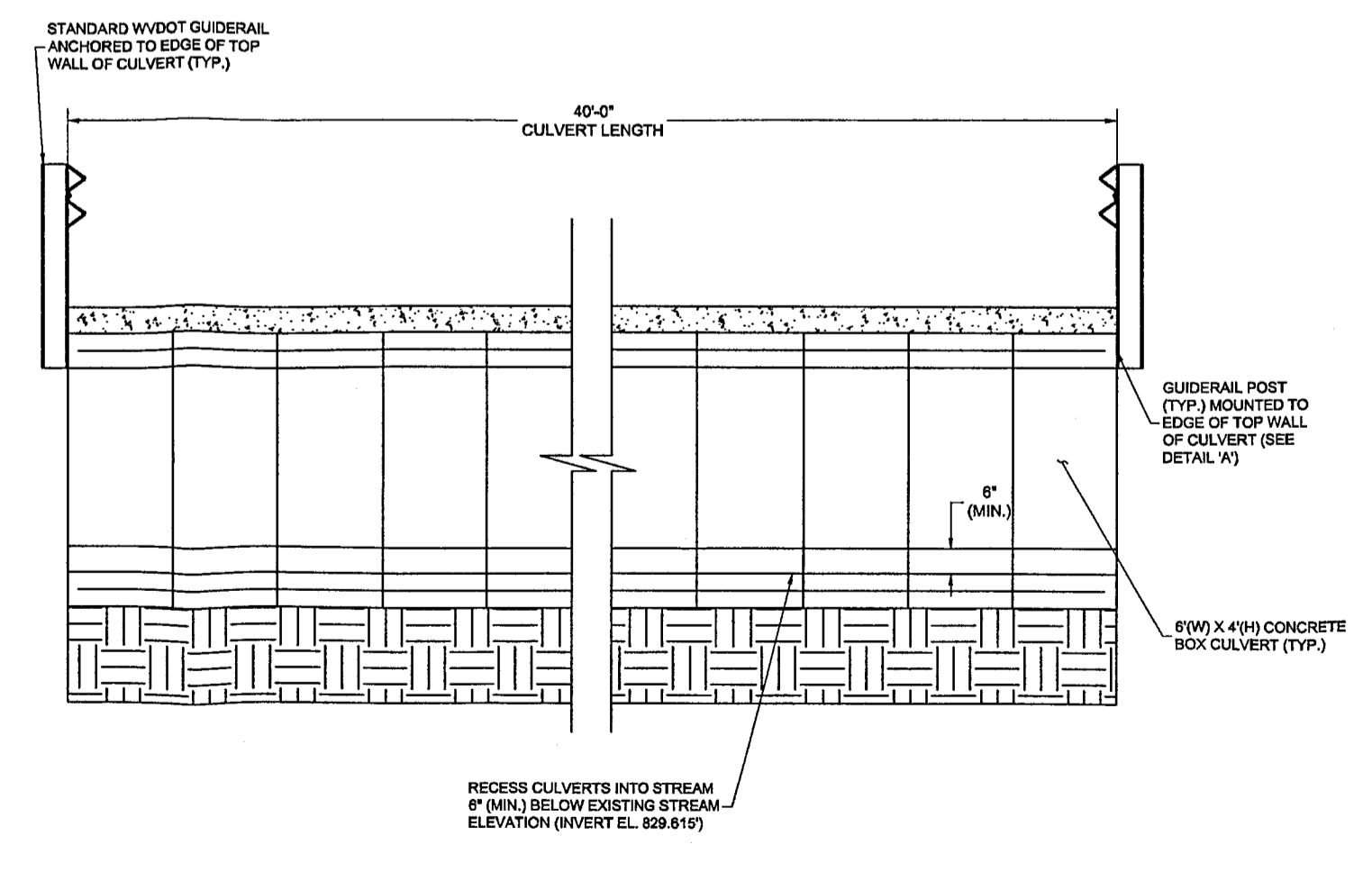
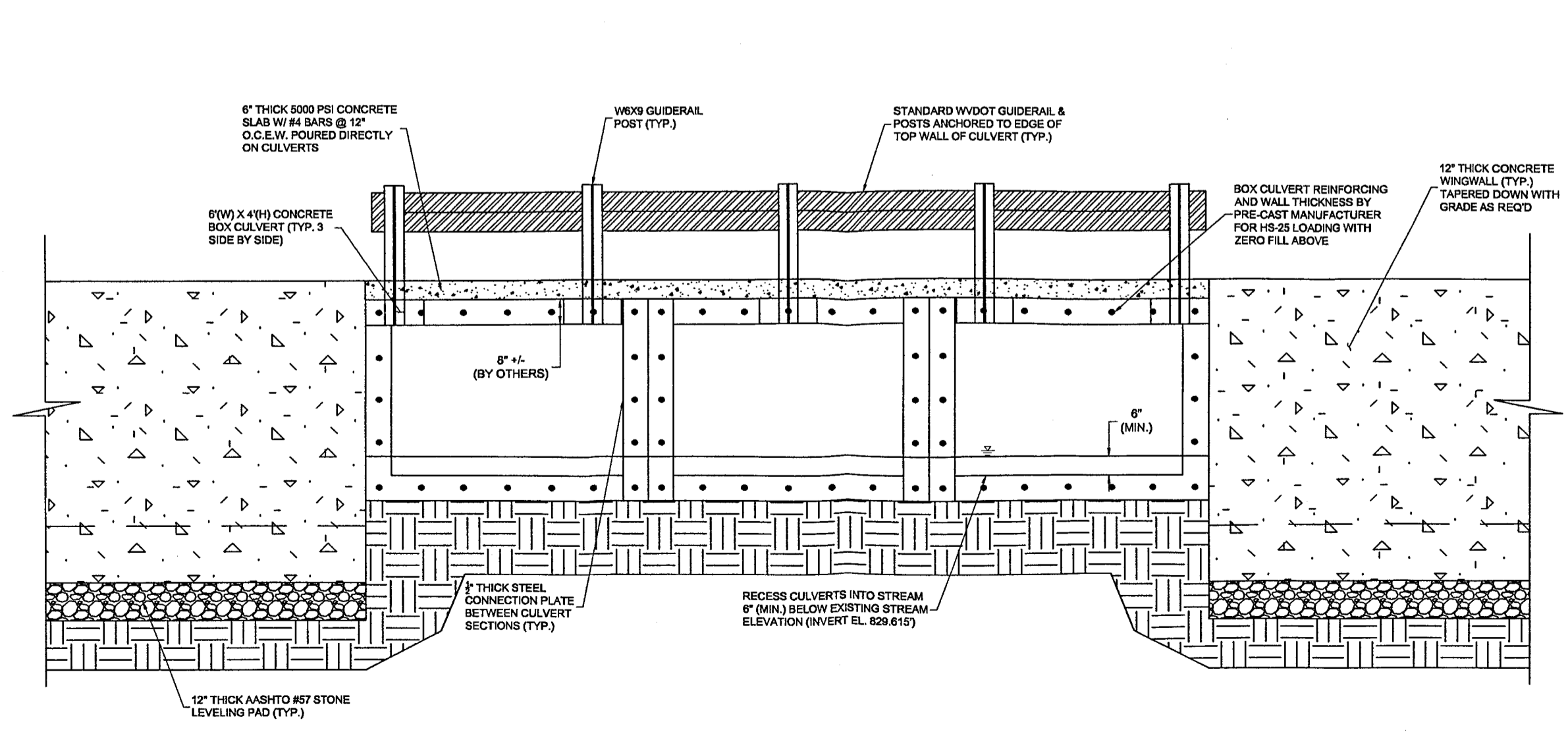
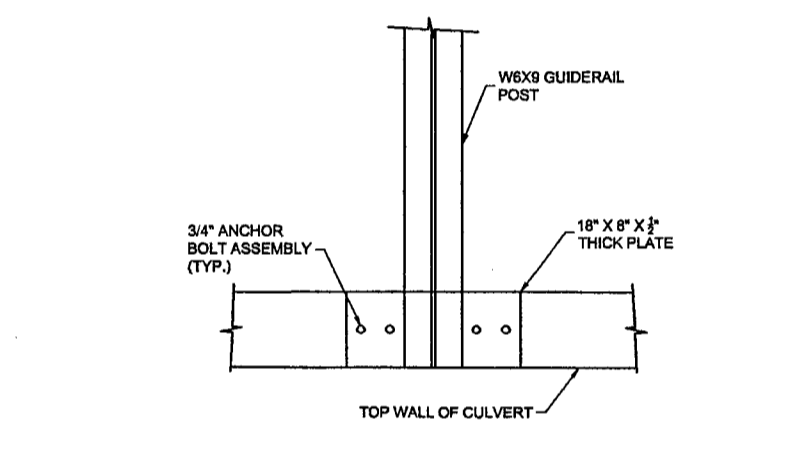
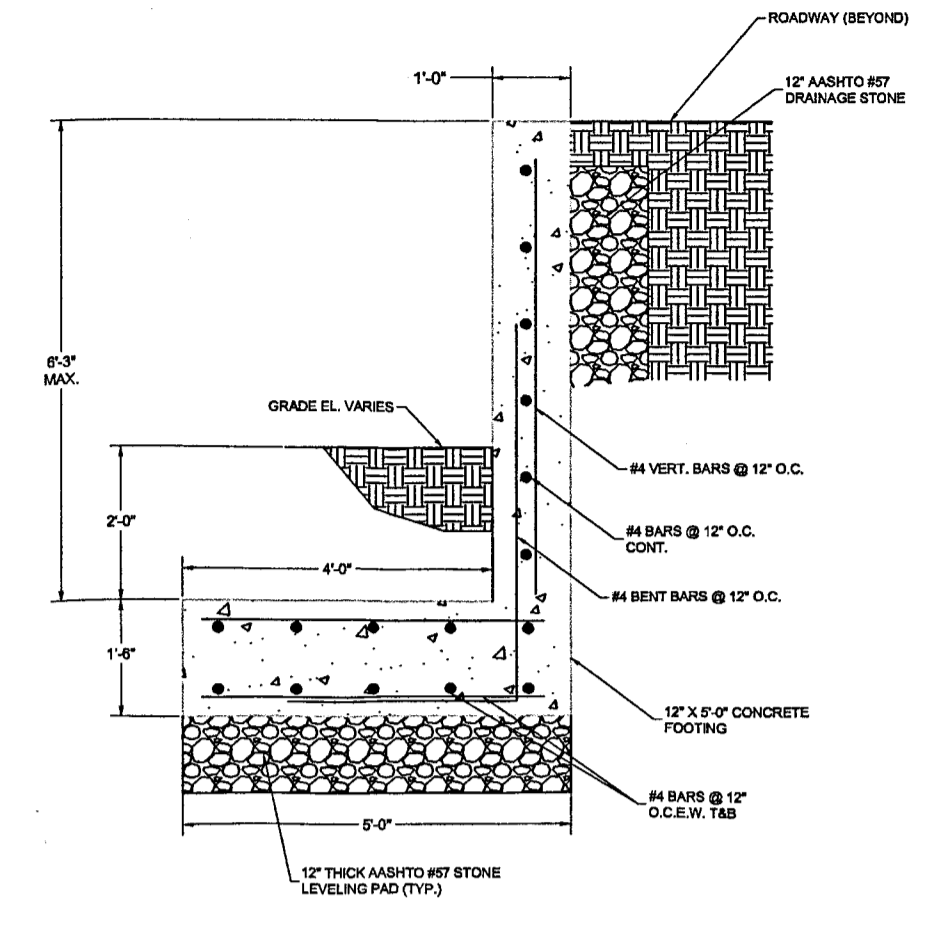
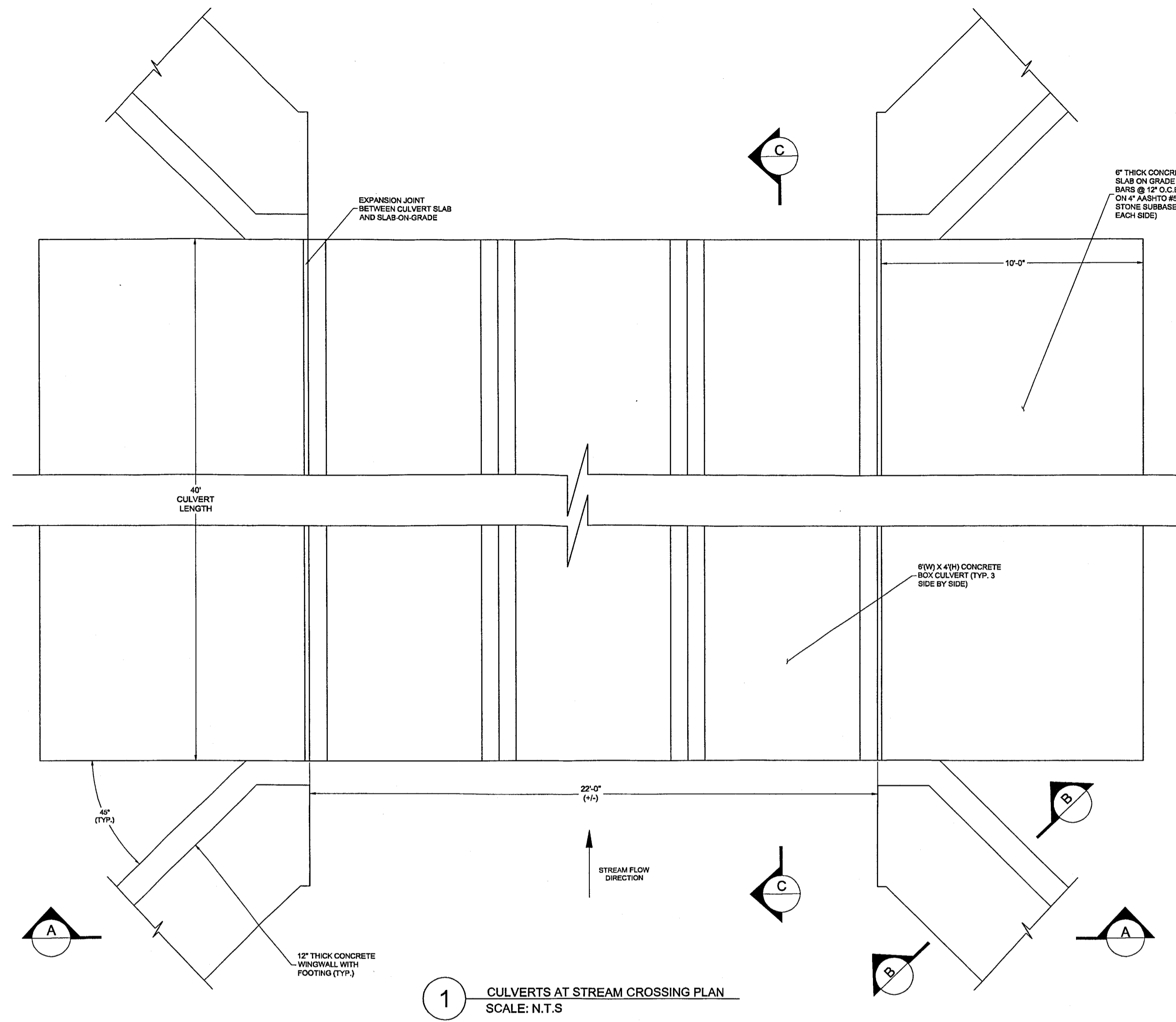
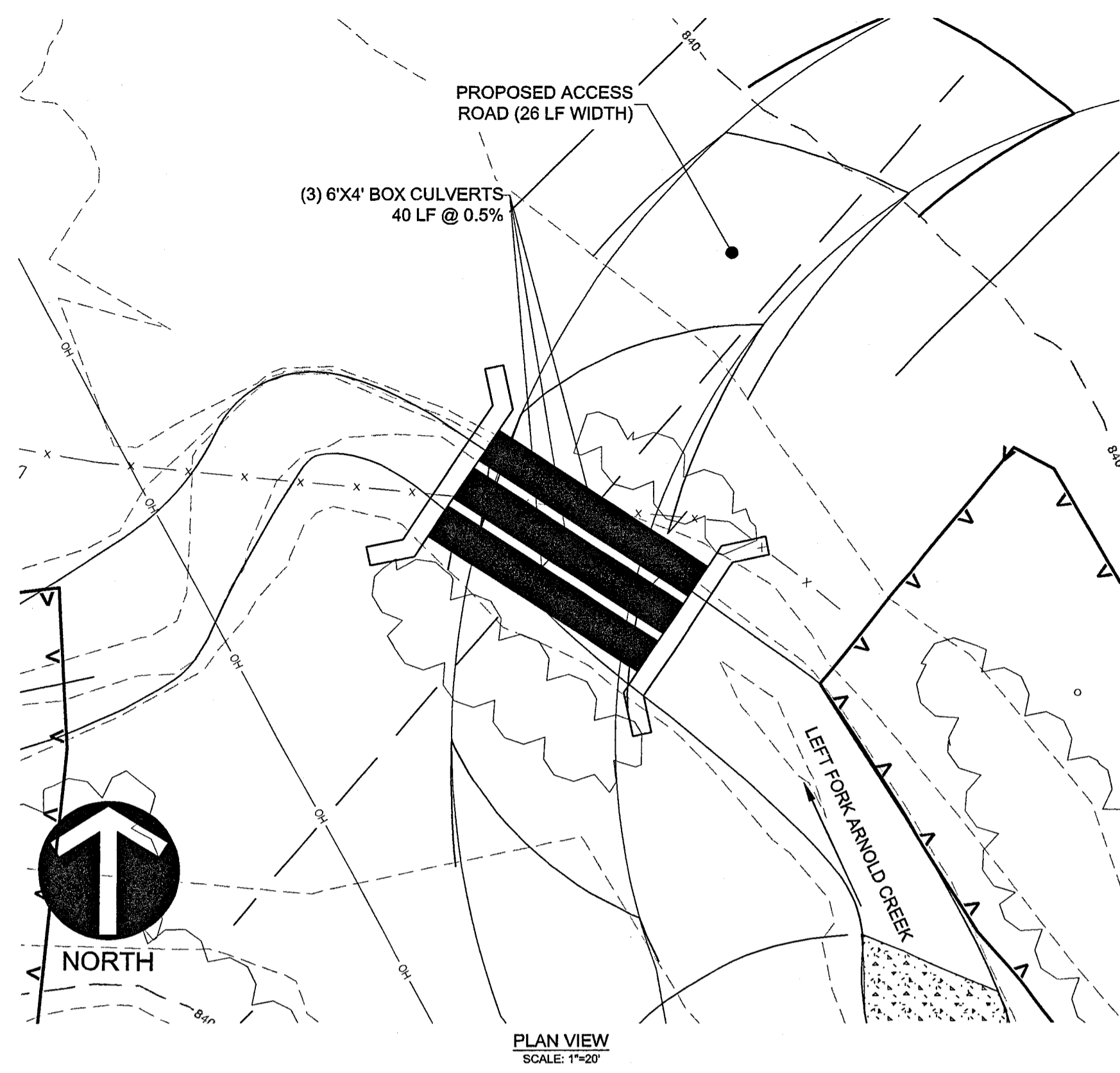
EQT GATHERING, LLC.
 JANUS COMPRESSOR STATION
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 EQT GATHERING, LLC.
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 PITTSBURGH, PA 15222

GATEWAY
 The Gateway Engineers, Inc.
 Full-Service Civil Engineering & Surveying
 Pittsburgh, PA
 gatewayengineers.com 855-634-6284

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PROJECT NO.:	C-18422-0009
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CHECKED BY:	MEB
APPROVED BY:	MEB
DATE:	JULY 2015
SCALE:	N.T.S.
SHT. NO.	4 OF 5

Plan & File: 1800018422 EQT JANUS Comp Station and Sediment Control Details-Crossings-Floodplain Development Drawings.dwg
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 Save Date: 8/11/2015 2:58 PM



PERMIT DRAWINGS		REVISIONS:	
NO.	DATE	NO.	DESCRIPTION
01	2015-08-11		
02			
03			
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07			

EQT GATHERING, LLC.
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 gatewayengineers.com 855-634-6284

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CHECKED BY:	MEB
APPROVED BY:	MEB
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SCALE:	N.T.S.
SHT. NO. <u>5</u> OF <u>5</u>	

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