Commercial/Industrial Floodplain Development Permit

Doddridge County, WV Floodplain Management

This permit has been issued to **Antero Resources**, and is for the approved commercial and/or industrial development project associated with this permit 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: #14-324 ~ Antero Resources ~
Cabin Run Road

Date Approved: 01/28/2015 **Expires: 01/28/2016**

Issued to: Antero Resources

POC: Rachel Grzybek
304-842-4008

Company Address: 535 White Oaks Blvd
Bridgeport, WV 26330

Project Address: Central District

Lat/Long: 39.267896N/80.916078W to 39.242819N/80.894725W

Purpose of development: Road construction project.

Issued by: Edwin L. "Bo" Wriston, Doddridge County FPM (*or designee*)

Date: 01/28/2015

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

Legal Advertisement:

Doddridge County

Floodplain Permit Application

Please take notice that on the 19th day of December, 2014

Antero Resources

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

Central District

39.267896N/80.916078W to 39.242819N/80.894725W

Permit #14-324 Cabin Run Road

The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by **January 26, 2015,** delivered to:

Clerk of the County Court

118 E. Court Street, West Union, WV 26456

Beth A Rogers, Doddridge County Clerk

Edwin L. "Bo" Wriston. Doddridge County Flood Plain Manager

ANTERO RESOURCES CORPORATION
1615 WYNKOOP STREET
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Feb-16-2015	82652	$500.00

VOUCHER	VENDOR INV #	INV DATE	TOTAL AMOUNT	PRIOR PMTS & DISCOUNTS	NET AMOUNT
02-AP-11879	AO2132015CRR	02/13/15	500.00	0.00	500.00
CABIN RUN ROAD					
TOTAL INVOICES PAID					500.00

#14-324

FILED
2015 FEB 24 PM 3:28
DODDRIDGE COUNTY, WV
COUNTY CLERK

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County, West Virginia

RECEIPT NO: 4542 DATE: 2015/04/20

FROM: ANTERO RESOURCES CORP **AMOUNT:** $ 500.00

FIVE HUNDRED DOLLARS AND 00 CENTS

FOR: FP BUILDING PERMITS #14-324

00000082652 FP-BUILDING PERMITS 020-318 **TOTAL:** $500.00

MICHAEL HEADLEY
SHERIFF &TREASURER

PMS
CLERK

Customer Copy

From: Cole Kilstrom
To: Steven Cooper; Rachel Grzybek
Subject: FW: Approval for WVR310436, Upgrade for WV Ritchie CR 10, 10/1, and 10/2, Ritchie Co., 2.91 Acres
Date: Tuesday, January 06, 2015 12:19:31 PM

FYI below

From: DEP NPDESEP [mailto:DEP.NPDESEP@wv.gov]
Sent: Thursday, December 11, 2014 11:14 AM
To: DEP NPDESEP; Cole Kilstrom
Cc: Hodge, Timothy W; Swiger, Bradley C; Minigh, Christina D
Subject: Approval for WVR310436, Upgrade for WV Ritchie CR 10, 10/1, and 10/2, Ritchie Co., 2.91 Acres

Cole Kilstrom
Antero Resources Appalachian Corp.
1615 Wynkoop Street
Denver, CO 80202

Physical Site Location: Ritchie CR 10, 10/1, & 10/2 & Dodd CR 19/3

Please be advised that this e-mail constitutes approval for your project associated with Oil and Gas Construction Activities and your registration no. is **WVR310436**. You are now authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0116815, issued on May 13, 2013.

You should carefully read the contents of this General Permit and become familiar with all requirements needed to remain in compliance with your permit. A "Notice of Termination" form is to be completed and submitted when all disturbed areas are stabilized. You can find the permit and Notice of Termination form via the Internet by visiting Permitting, Division of Water and Waste Management at www.dep.wv.gov . Your annual permit fee has been assessed as $ 100.00. You will be invoiced by this agency upon the anniversary date of this approval date. Failure to submit the annual fee within ninety (90) days of the due date will render your permit void upon the date you are mailed a certified written notice to that effect. Please be advised that a pro-rated annual permit fee may be assessed upon the completion date and proper stabilization.

If you have any questions relative to this approval, please do not hesitate to contact **Alice Cooper** at (304) 926-0499 Ext. **1103** or by email at **alice.e.cooper@wv.gov** .

Scott G. Mandirola, Director
WV DEP-Division of Water & Waste Mgt.
601 57th St. SE
Charleston, WV 25304-2345
Phone: (304) 926-0495
Fax: (304) 926-0496

Antero Resources
535 White Oaks Blvd.
Bridgeport, WV 26330
Office 304.842.4100
Fax 304.842.4102

December 11, 2014

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

FILED
2014 DEC 29 PM 1:4?
BETH A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY

Mr. Wriston:

Antero Resources Appalachian Corporation (Antero) would like to submit a Doddridge County Floodplain permit application for our Cabin Run Road. Our project is located in Doddridge County, Central District where the road upgrade will be begin at coordinates 39.267896 N, 80.916078 W and will continue to the Mackay Pad at coordinates 39.242819 N, 80.894725 W. Per the FIRM Map #54017C0200C, this location is **in** the floodplain.

Attached you will find the following:

- Doddridge County Floodplain Permit Application
- Bid Sheet
- Surface Owner Information
- Design Plans
- HEC-RAS study
- FIRM Map
- WV Flood Tool Map

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

Thank you in advance for your consideration.

Sincerely,

Rachel Grzybek
Floodplain Engineer
Antero Resources Appalachian Corporation

Enclosures

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 12/11/14

SECTION 2: PROPOSE 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: Randy Kloberdanz

ADDRESS: 1615 Wynkoop Street, Denver, CO 80202

TELEPHONE NUMBER: (303) 357-7310

BUILDER'S NAME: Antero Resources Corporation
ADDRESS: 1615 Wynkoop Strett, Denver, CO 80202
TELEPHONE NUMBER: (303)-357-7310

ENGINEER'S NAME: Jackson Surveying Inc.
ADDRESS: 677 W. Main St, Clarksburg, WV 26301
TELEHONE NUMBER: (304) 623-5851

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see Surface Owner Table

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see Surface Owner Table

DISTRICT:
DATE/FROM WHOM PROPERTY PURCHASED:
LAND BOOK DESCRIPTION: Please see Surface Owner Table
DEED BOOK REFERENCE: Please see Surface Owner Table
TAX MAP REFERENCE: Please see Surface Owner Table
EXISTING BUILDINGS/USES OF PROPERTY: None
NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Please see Surface Owner Table
ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY

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

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

B. OTHER DEVEOPLMENT ACTIVITIES:

[] Fill [] Mining [] Drilling [] Pipelining

X Grading

[] Excavation (except for STRUCTURAL DEVELOPMENT checked above)

[] Watercourse Altercation (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)

_____

C. STANDARD SITE PLAN OR SKETCH

1. **SUBMIT ALL STANDARD SITE PLANS, IF ANY HAVE BEEN PREPARED.**
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 IRRESPECTIVE OF WHETHER ALL OR ANY PART OF THE SUBJECT PROPOSED CONSTRUCTION PROJECT IS WITHIN THE FLOODPLAIN $ 1,075,516

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: Please see attached landowner
ADDRESS: information

NAME:
ADDRESS:

NAME:
ADDRESS:

NAME:
ADDRESS:

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: Please see attached landowner
ADDRESS: information

NAME:
ADDRESS:

NAME:
ADDRESS:

NAME:
ADDRESS:

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.

Property Owner Table-Doddridge County Floodplain Permit
Antero Resources Corporation-Cabin Run Road Upgrade

Property Owner Name	Mailing Address	Parcel ID	Deed Book Reference
Host Properties-Inside Floodplain			
Heartwood Forestland Fund IV	2911 Emerson Ave Suite A, Parkersburg, WV 26104	1-11-4.1	Book 253, Page 671
Heartwood Forestland Fund IV	2911 Emerson Ave Suite A, Parkersburg, WV 26104	1-11-6	Book 253, Page 671
Morris I L (Ike)	PO Box 397, Glenville, WV 26351	1-11-8	Book 230, Page 307
Properties Abutting Host Properties-Inside Floodplain			
Britton Robert L & Jacqueline	RT 1 Box 553, Greenwood, WV 26415	1-11-9	Book 202, Page 523
Whitehair Donald W & Bonita L	RT 1 Box 557, Greenwood, WV 26415	1-11-9.3	Book 219, Page 565
Britton Rober L	RT 1 Box 553, Greenwood, WV 26415	1-11-11	Book 239, Page 347

(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): Randy Kloberdanz

SIGNATURE: _____ **DATE:** 12/11/14

After completing SECTION 2, APPLICANT should submit form to Floodplain Administrator/Manager 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 FLOOPLAIN DEVELOPMENT PERMIT IS REQUIRED**).

[] Is located in Special Flood Hazard Area.

FIRM zone designation _____

100-Year flood elevation is: _____ NGVD (MSL)

[] Unavailable

[] The proposed development is located in a floodway.

FBFM Panel No. _____ Dated _____

[] See section 4 for additional instructions.

SIGNED_____ **DATE**_____

SECTION 4: ADDITIONAL INFORMATION REQUIRED (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, lot dimensions 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 proffing 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 50 lots or 5 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 (MSL).
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 floodplain 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 complete an appealing process below.

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).

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 (MSL)

2 Actual (As Built) elevation of floodproofing is_____FT. NGVD (MSL)

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 COST ESTIMATE – ANTERO RESOURCES

RTE 10, 10/1,10/2, 19/3 UPGRADE (MACKAY PAD)

Mobilization		$	15,000
Construction Entrance			3,500
Clearing & Grubbing	1 acre @ $ 6,000/acre		6,000
12" Compost Filter Sock	5,800 ft @ $ 4.50/ft		26,100
Signage			1,500
Traffic Control	4 flaggers/day x 30 days @ $ 55.00/hr		66,000
Tree Removal	25 Trees @ $ 500/tree		12,500
Concrete Step Blocks	155 @ $ 700/block		108,500
Gabion Baskets	225 @ $ 450/basket		101,250
Tensar TX190 GeoGrid	200 sy @ $ 3.00/sy		600
Excavation from Area A	860 cy @ $ 5.00/cy		4,300
Excavation from Pad	3180 cy @ $ 6.00/cy		19,080
Grade Ditches	3000 feet @ $ 7.00/ft		21,000
Excavation in Rock	1720 cy @ $ 12.00 cy		20,640
Toe Key Bench	75 cy @ $ 5.00/cy		375
Blanket Drain and Outlet	32 cy @ $ 22.00/cy		704
Mirafi Fabric	160 sy @ $ 3.00/sy		480
4" Perforated Pipe	180 ft @ $ 14.00/ft		2520
2"-3" Clean Aggregate	2,000 T @ $ 24.00/T		48,000
Crusher Run (4" thick)	7,550 T @ $ 22.00/T		166,100
FDR	13,200 sy @ $ 10.00/sy		132,000
15" HDPE Culvert	15 feet @ $ 27.50/ft		412
18" HDPE Culvert	362 feet @ $ 33.50/ft		12,127
24" HDPE Culvert	10 feet @ $ 42.50/ft		425

15" CMP Culvert	6 feet @ $ 32.50/ft	195
Clean and Flush Culvert	8 culverts @ $ 100/culvert	800
Rip Rap Outlets	12 T @ $ 24.00/T	288
Shoulder Stabilization	10 T @ $ 30.00/T	300
Ditch Checks	30 T @ $ 24.00/T	720
Site Seeding	2.6 Acres @ $ 2500/ac	6,500
Farm Fence	1600 feet @ $ 20.00/ft	32,000
Gates – 12 foot	4 gates @ $ 800/gate	3,200
Gates – 16 foot	4 gates @ $ 1000/gate	4,000
12.5'x30' Bridge		35,800
12.5'x50' Bridge	4 bridges @ $ 42,900/bridge	171,600
Guardrail	510 feet @ $ 100/ft	51,000
	TOTAL	**$ 1,075,516**

Note : The total does **not** include engineering and construction staking (generally 20%), contingency (generally 10%) or Antero personnel and administrative costs.

WEST VIRGINIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
AGREEMENT
ANTERO RESOURCES CORPORATION
RITCHIE COUNTY 10, 10/1, 10/2, & DODDRIDGE 19/3 SLS
ROAD IMPROVEMENT

THIS AGREEMENT, executed in duplicate, made and entered into this 9 day of Jan 20 15, by and between the West Virginia Department of Transportation, Division of Highways, hereinafter called "Department," and Antero Resources Corporation, 1625 17 St., Suite 300, Denver, CO, 80202, hereinafter called "Company,"

WHEREAS, to improve access to oil and gas operations in the vicinity of Pennsboro, Ritchie County, Company desires to participate in roadway improvement of subject roadway sections by performing certain construction activities within and adjacent to Department's right-of-way; and

WHEREAS, Department considers it to be in the public interest to cooperate with Company to facilitate Company's implementation of the highway improvement, as it pertains to the State Highway System;

NOW, THEREFORE, in consideration of the faithful performance of each party of the mutual covenants hereinafter set forth, Department and Company agree as follows:

I. Company shall first obtain Department's approval regarding the proposed activities Company desires to implement within or directly affecting the State Highway System and Company shall comply with the provisions described throughout this Agreement. Company acknowledges that execution of this Agreement does not constitute Department's approval of any part of Company's proposed work nor does execution of this Agreement represent Department's Notice to Proceed. Further, Company acknowledges that any work performed by Company, including work solely within Company's property that will directly affect Department's right-of-way, prior to receipt of Department's approval and notice to proceed with work pertaining to the State Highway System, is performed by Company with the understanding that subsequent review by Department of Company's plans and studies may result in necessary additional modifications to be performed at no cost to Department.

II. Unless otherwise directed by Department, Company is to submit for Department's review and approval appropriate construction plans and related documents, including appropriate right-of-way, utility, and maintenance of traffic plans, which collectively are referred to as the "Plans," prepared in accordance with Department's Directives, criteria, guidelines and publications, for the performance of work that will occur within or that will directly affect Department's right-of-way of Ritchie Co 10, 10/1, 10/2 & Doddridge Co 19/3. Department's approvals shall be in writing. Unless otherwise directed by Department, Company shall provide Department with five (5) copies of the approved Plans and as-built Plans, as appropriate.

III. The scope of Company's work, hereinafter called "Project," as it pertains to the State Highway System, is to consist primarily of, but may not be limited to, roadway drainage improvement spot widening slope dressing as needed, Full Depth Base stabilization as called for, and placing new roadway surface between approximate Milepost 4.75 & 5.63 of Co. 10, Milepost 0.56 & 1.19 of Co. 10/1, Milepost 0.00 & 0.68 of Co. 10/1 and Milepost 0.00 & 0.31 of Co. 19/3 , and other modifications that may be deemed necessary by Department, as set forth on the Plans, as approved by Department.

IV. After receipt of Department's written approval of the Plans pertaining to the State Highway System and Department's authorization to proceed with construction and related work, Company then shall be authorized to construct Project as shown on the approved Plans, in accordance with

Department's specifications, at no cost to Department. For duration of Project, Company shall be responsible for providing full-time construction inspection, materials acceptance, and traffic control. Department's authorization to proceed is contingent upon receipt of any Federal Highway Administration approval and authorization that may be required and upon Company's compliance with the other stipulations and requirements set forth herein.

Prior to construction of Project, Department and Company shall review and document, as appropriate, the existing condition of the State Highway System to be affected by Project, and Department shall be notified of Company's anticipated construction schedule and Department shall have the right at all times to inspect the work pertaining to Project. If the results of Department's inspection indicate that the work is not being performed in accordance with the approved Plans and/or specifications, Department then will report such fact to Company for appropriate remedial action. Department shall perform an inspection of the work within thirty (30) days after receipt by Department of notice from Company that the work is complete. Upon completion of said inspection, Department shall, in writing, accept the completed work associated with Project or reject the work. If rejected, any deficiencies in the construction performed by Company, which are disclosed by Department's inspection, shall be promptly corrected by and at the expense of Company. Neither Department's review of Company's Plans nor its inspection of Company's construction relieves Company of the duty imposed by West Virginia Code Section 17-16-1 et seq. to refrain from casting water upon the public road.

V. Company shall secure the approvals and/or permits, if any, required by other governmental agencies, and shall comply with all applicable Federal, State, and local environmental regulations including, but not limited to, the National Environmental Policy Act, Section 404 of the Clean Water Act, Section 106 of the National Historic Preservation Act, Rare, Threatened and Endangered Species Act, State 401 Water Quality Certification, and hazardous waste requirements. Upon request of Department, Company shall furnish Department with acceptable documentation of such approvals, permits, and compliance.

VI. Company's implementation of Project may necessitate the conveyance to Department of additional right-of-way and/or easements. Any additional right-of-way and any easements necessary for Project shall be clearly indicated on the approved Plans, which Plans may include separate Right-of-Way plans that are to be prepared by Company in accordance with Department's Design Directives. Prior to Department's acceptance of construction of Project, Company shall convey to Department, or shall cause to be conveyed to Department, any additional right-of-way and any easements associated with Project, free and clear of all encumbrances with covenants of general warranty. Company shall provide for Department's review and approval appropriate deed descriptions and plats necessary to allow said conveyance of right-of-way. After the deed descriptions and plats have been approved by Department, Department then shall prepare and subsequently record the Deed(s) regarding conveyance.

VII. Company shall be responsible, at no cost to Department, for all necessary installation, relocation or adjustment of utilities associated with Project. All utility work within Department's existing and proposed right-of-way shall be performed in accordance with the West Virginia Division of Highways manual entitled, "Accommodation of Utilities on Highway Right of Way and Adjustment and Relocation of Utility Facilities on Highway Projects, June 2007," or later version. Prior to any conveyance to Department of any right-of-way or easements associated with Project, Company shall not install or allow to be installed any utilities within the area that is to be conveyed to Department. If Company installs or allows to be installed any such utility prior to conveyance to Department of the right-of-way or easements associated with Project, Company shall provide to Department a written commitment that Company and any successors or assigns of Company shall be fully responsible for all financial obligations regarding any relocation of such utility that may be necessary in the future as part of any project implemented by Department.

VIII. In the performance of Company's work, no construction equipment shall be permitted on the travel lanes or shoulders of subject roads or any other roadway, except as shown on Plans approved by Department. Company shall submit for Department's approval as part of Plans Company's maintenance of traffic plans regarding all affected highways. Company shall provide Department with documentation that Company has appropriately coordinated Project implementation and traffic control with the Ritchie and Doddridge County Boards of Education

concerning school bus traffic and with all public transit and 911 agencies affected by Project. After approval of Plans by Department and for duration of Project, Company shall:

A. Implement such maintenance of traffic plan;
B. Ensure that public travel is adequately maintained within the Project limits;
C. Ensure that access to all other properties within Project construction limits is maintained at all times;
D. Coordinate traffic control, as necessary and appropriate, with any events, festivals, sporting events or other similar activities, public or private, that may be affected by Company's construction of Project; and
E. Promptly repair, at Company's total expense, any and all damage to the State Highway System that is directly attributable to Company's implementation of Project.

Company shall identify as part of the Plans and submit for Department's approval any anticipated temporary closure of any lane(s) of any State highway associated with the implementation of Project. In the event that Company's implementation of Project results in the closure of any lane(s) of any State highway, which closure is not identified on the Plans as approved by Department, Company then shall:

A. Pay one hundred percent (100%) of the cost associated with the manufacture and/or installation of all signing and other traffic control devices Department installs to address the closure;
B. Provide the name and phone number of Company's contact person regarding Project, which shall be provided to the public so that Company may timely address questions and concerns of the public regarding such closure; and
C. Pay one hundred percent (100%) of the cost associated with notice to local media and any other public notice Company must provide to notify the public of the closure, the purpose of the closure, the anticipated duration of the closure, and the alternate routing that may be used during closure.

IX. In connection with Project, Company shall indemnify and hold Department harmless from and against any and all loss, damage, and liability, and from all claims for damages on account of or by reason of bodily injury, including death, which may be sustained, or claimed to be sustained, by any person or persons including employees of Department, and from and against any and all damages to property arising out of the Project, except if any such claim or liability results from

A. the sole negligence of Department; or
B. the willful misconduct or intentional unlawful acts of Department.

Further, Company shall furnish evidence of having at least the minimum amounts of insurance required of the Contractor in Section 103.6 through and including Section 103.6.5 of the "West Virginia Division of Highways, Standard Specifications, Roads and Bridges, Adopted 2010," and supplements hereto. Company also shall require its contractor(s) to have the aforesaid minimum insurance coverage and to provide evidence, as necessary, that contractor has a current license and is qualified to perform work in West Virginia.

X. The review and approval of Plans by Department does not relieve the applicant from errors or omissions in the design. The review and approval by Department is solely to identify patent or obvious defects or apparent deviations from current applicable design standards in the manner that the proposed work connects to the highway network maintained by Department. This review and approval does not relieve the applicant, their engineer, their contractor, or any other personnel working on behalf of the applicant from liability for the design and/or construction of Project.

XI. This Agreement shall be binding upon the successors and assigns of each party thereto. After obtaining prior written consent of Department and after the bond requirements described in this Agreement have been fulfilled, this Agreement may be assigned by Company to any Affiliate or entity providing financing for the Project.

IN WITNESS WHEREOF, the parties hereto have caused their respective names to be signed by their duly authorized officers.

ATTEST:

Sasha Hughes
Title:
Executive Secretary

WEST VIRGINIA
DEPARTMENT OF TRANSPORTATION,
DIVISION OF HIGHWAYS

Gregory Bailey
By: Gregory L. Bailey, P.E.
State Highway Engineer

ATTEST:

Ashlie Steele
By: Ashlie Steele
Title: Permitting Supervisor

ANTERO RESOURCES CORPORATION

By: Kevin Kilstrom
Title: Vice President of Production

APPROVED AS TO FORM ...
5 DAY OF 1 20 15

ATTORNEY LEGAL DIVISION
WEST VIRGINIA DIVISION
OF HIGHWAYS

(To be executed in duplicate)

Distribution: Master File
Maintenance
Company

ANTERO RESOURCES

CABIN RUN UPGRADE

WV SEC. RTE 19/3

DODDRIDGE COUNTY, WV

PROJECT COST ESTIMATE FOR AREA WITHIN THE 100-YR FLOOD ZONE

163 cy fill @ $ 6.00/cy	$ 978.00
126 ft 18" compost filter sock @ $ 5.00/ft	$ 630.00
36 gabion baskets @ $ 450.00/ea	$ 16,200.00
1% Mobilization	$ 150.00
Clearing and grubbing	$ 450.00
Seeding and mulching	$ 200.00
TOTAL	$ 18,608.00

DLF DENNIS L. FISHER
Professional Engineer
Professional Surveyor

PO BOX 281, PHILIPPI, WEST VIRGINIA 26416
CELL (304) 677-4129
Fisher.Engineering@gmx.com

Rachael Grzybek

Flood Plain Engineer

Antero Resources Corporation

535 White Oaks Blvd

Bridgeport, WV 26330

Re : Flood Study

Cabin Run

Doddridge County

Ritchie County

(Mackay Pad)

Dear Ms. Grzybek :

Two flood studies were prepared by Engineering Perfection, LLC for the above reference project. The 4x6 box culvert study is dated September 19, 2014 (Doddridge County) and the 4x4 box culvert study is dated September 11, 2014 (Ritchie County). In both cases, the analysis concluded that the proposed box culverts will have little to no impact on flooding in the surrounding area.

Since that time, we have designed 50-foot temporary bridges (40-foot span) to replace the box culverts. These bridges will be removed after completion and the areas regraded. I am attaching a sketch to show the temporary bridge and the previous box culvert at each location.

It is evident that the proposed temporary bridges will have even less an impact on flooding in the immediate areas.

If you have any questions, please do not hesitate to contact me.

Cordially yours,

Dennis L. Fisher

Dennis L. Fisher, PE

DENNIS L. FISHER REGISTERED No. 8684 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

HYDRAULIC INVESTIGATION
for Proposed Natural Gas Development Access on Cabin Run in Vicinity of Greenwood Doddridge County, West Virginia

Prepared for:

Mr. David Jackson PS
Jackson Surveying, Inc.
Clarksburg, WV
davidjackson@frontier.com

Prepared by:

ENGINEERING PERFECTION, PLLC
339 Sixth Avenue
South Charleston, WV 25303
jerry@engineeringperfection.net

September 19, 2014

HYDRAULIC INVESTIGATION
for Proposed Natural Gas Development Access on Cabin Run Vicinity of Greenwood Doddridge County, West Virginia

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HYDRAULIC INVESTIGATION
for Proposed Natural Gas Development Access
Cabin Run, Vicinity of Greenwood
Doddridge County, West Virginia

1 PURPOSE

Engineering Perfection was requested by Jackson Surveying, Inc. to determine the impact on the Base Flood elevation for a natural gas development access project site located on a small tributary to Cabin Run, in the vicinity of Greenwood, Doddridge County, West Virginia. A determination of the rise in water surface elevation for the Base Flood event resulting from the project was requested. The project scope within Doddridge County includes a realignment of County Road 10/1, the abandonment of a portion of County Road 10/1 and the addition of a new culvert The project design criteria include the passing of the 10-year recurrence storm through the proposed culvert without overtopping the realigned roadway, while not increasing the existing flood profile by a foot or more. The project scope is shown in Figure 1 below.

The term Base Flood is the predicted flood event with a one percent probability of being equaled or exceeded in any given year and is used extensively in the Federal Emergency Management Agency program for flood insurance. The Base Flood has also been incorporated in local ordinances, including the floodplain ordinance for Doddridge County.

This investigation was conducted using HEC-RAS to model the effect of proposed improvements on the Base Flood event for Cabin Run and an unnamed tributary to Cabin Run. The HEC-RAS model was compiled using survey data provided by Jackson Surveying Inc.

2 SITE DATA

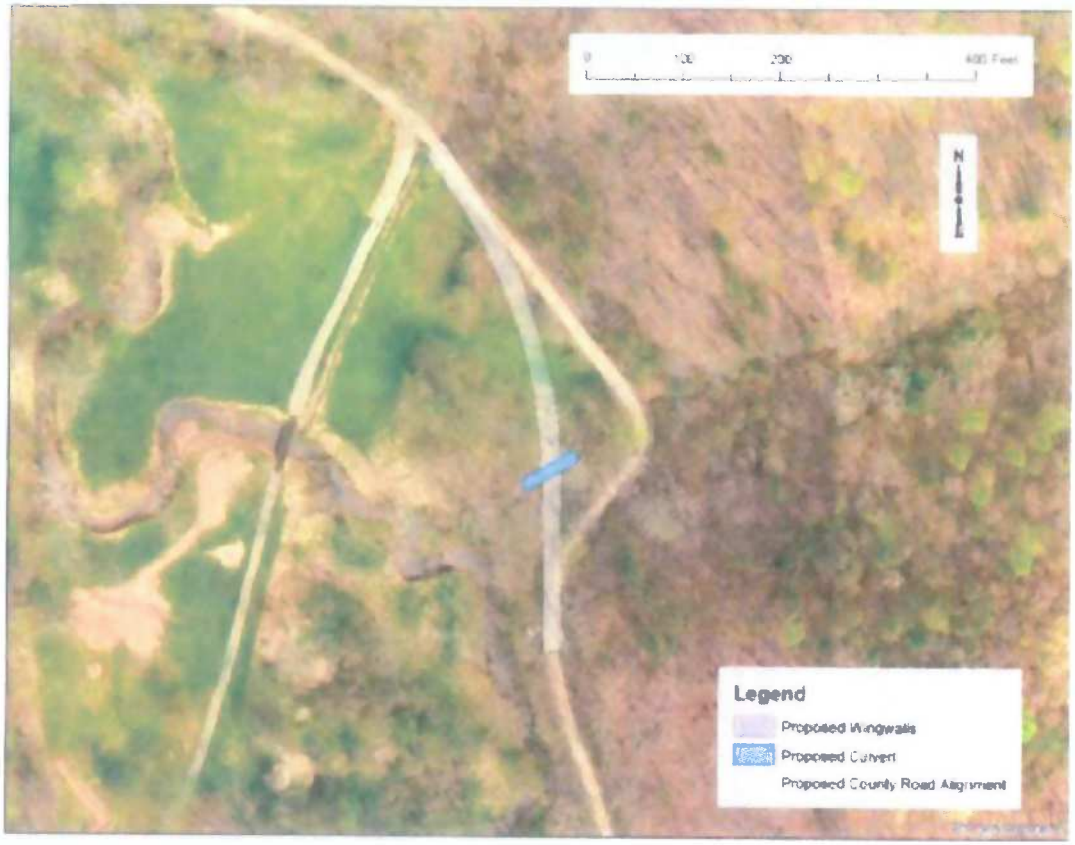
The proposed box culvert is located in Doddridge County, along an unnamed tributary to Cabin Run at longitude 80.899 degrees W and latitude 39.248 degrees N. The FEMA Community Number is 540024 with the site shown on panel 0200C, revised October 4, 2011. On the Flood Insurance Rate Map, a portion of the site is shown to be an A Zone. An A Zone means the area is subject to flooding during the Base Flood event, but a precise elevation of the flooding has not been determined.

Site data used in this project included the following:

1. Topographic cross sections, elevations, and photographs provided by Jackson Surveying. The data forms included textfile, CAD and portable document format files. A detailed list of the data provided is listed in Appendix A.

2. The Base Flood and select other flow rates for Cabin Run and the unnamed tributary were calculated using a method developed by the US Geological Survey.
3. Aerial photography and topographic map data obtained from the West Virginia Geographic Information System Technical Center, at West Virginia University in Morgantown.
4. A site tour and photographs were taken by an Engineering Perfection engineer.

Figure 1 Project Scope



3 HYDRAULIC ANALYSIS

The hydraulic analysis was comprised of six elements. They were:

- determination of drainage areas for Cabin Run and the unnamed tributary,
- determination of a range of flows needed for culvert design,
- preparation of cross sections for the HEC-RAS model,
- execution of the Existing and Proposed Condition models,
- culvert conceptual design, and
- execution of the Proposed Condition models.

Determination of Drainage Area For Cabin Run and the Unnamed Tributary

The area draining to Cabin Run at the site was determined by inspection of a USGS topographic map. The drainage area of Cabin Run at the project site was determined to be approximately 7.85 square miles. The area draining to the unnamed tributary to Cabin Run was also determined by inspection of a USGS topographic map. This drainage area was determined to be approximately 0.12 square miles.

Determination of a Range of Flows Needed for Culvert Design

The discharges were computed using the regional regression equation developed by the US Geological Survey Doddridge County is located in the Western Plateaus Region of West Virginia according to the USGS report. The discharges used for this investigation were the 10%, and 1% probability return storm event. The equations for estimating flood-frequency discharge for the desired probability storm events are:

PK10(10%AOP) = 292*DRNAREA ^ 0.699
PK100(1%AOP)= 557*DRNAREA ^ 0.674

where DRNAREA is the drainage area in square miles and the term starting with PK represents the peak discharge for that particular return storm event for the point of interest. Table 1 lists the discharge used for this study. Further information is provided in Appendix B.

Table 1 Regional Discharge Values

Stream	Drainage Area (sq. mi)	Frequency	Peak Flow (cfs)
Cabin Run	7.85	10-year	1220
Cabin Run	7.85	100-year	2210
Unnamed Tributary	0.12	10-year	66
Unnamed Tributary	0.12	100-year	133

Preparation of Cross Sections for the HEC-RAS Model

Six cross sections were surveyed along the study reach for use in the HEC-RAS model, including through the existing bridge and culvert. Their locations are shown in Figure 2 below. Additional cross sections were incorporated in the HEC-RAS model; their geometries were derived through interpolation or transposition from the survey cross sections, a usual practice in HEC-RAS modeling.

The U.S. Army Corps of Engineers Hydrologic Engineering Center developed the River Analysis System, or HEC-RAS computer program. Version 4.1.0, issued January 2010, was used to compute stream profiles in this study. The study employed the steady state model analysis.

A typical Existing Condition profile includes the stream at the point of interest and sufficient distances up- and downstream to quantify the hydraulic effects. For this project, there are two streams, Cabin Run and the unnamed tributary to Cabin Run. The model considers the two streams as one, with a flow change at the section representing their confluence. The existing 36 inch culvert on the unnamed tributary crosses under the current route of County Road 10/1 was included in the Doddridge Existing Condition model. An existing bridge that crosses over Cabin Run just downstream of the project site is included in the models. It was determined to have no impact at the project site.

The elevation data for the cross sections, culvert geometry and photos were obtained by field surveying collected by Jackson Surveying in July and August 2014. Jackson Surveying used real time kinetic surveying methods to establish site control. The datum used in the Jackson Surveying data was in NAVD 88 and all elevations presented in this report are referenced to this datum.

The cross section information includes estimates of the Manning's roughness coefficient. A site inspection as well as location photographs were used to confirm these values and to determine placement of these values along the modeled cross section geometry. For Cabin Run and this unnamed tributary the stream channel roughness in the model was 0.055 and for the overbank areas, 0.07 and 0.09 were used.

Figure 2 Location of Surveyed Cross Sections

Culvert Conceptual Design

The basic objective is to provide heavy vehicle access to County Road 10/1. A number of alternatives were considered to meet this objective.

County Road 10/1 is an unpaved road that currently crosses the unnamed tributary at a sharp turn that is impassable for long trucks. Currently, County Road 10/1 crosses the unnamed tributary with a three foot diameter corrugated metal culvert. The proposed design for the crossing of relocated County Road 10/1 over this tributary includes straightening the sharp turn by realigning the road downstream. Table 3 lists the design criteria the proposed design for the County Road 10/1 box culvert.

Table 2 Proposed County Road 10/1 Culvert Design Criteria

Item	Proposed Design
Centerline Stream Station (feet)	1250
Upstream Invert Elevation (feet)	797.40
Downstream Invert Elevation (feet)	796.80
Culvert Length (feet)	60
Road elevation above culvert (feet)	807.3

Riprap erosion protection is recommended from the top to the toe of stream banks for a distance of 25 feet upstream and 50 feet downstream of the culvert. Guardrails for the road over the proposed culvert, if required, will be well above the highest flow profile and would have no impact on flows.

Execution of the Existing Condition and Proposed Condition Models

The Proposed Condition model was prepared with the Doddridge Existing Condition model as a foundation and design proposals were added to check their performance. Features included in the Proposed Condition model include the existing 36 inch culvert, the proposed 6 foot by 4 foot concrete box culvert, and the downstream bridge.

Table 3 lists the river station, water surface elevations for the existing and proposed conditions, and their differences for the 10-year and Base Flood events. The maximum water surface difference for this recurrence interval resulting from the project is calculated to be a lowering of the water by 0.29 feet, at station 1300. All impacts from the proposed project occur between stations 1175 and 1300.

The proposed design will pass the Base Flood event through the concrete box culvert. The existing 36 inch culvert under the existing highway does not presently pass this event. The current proposal has no impact on the existing culvert for the neither the 10-year nor Base Flood event.

4 Discussion of Results

Table 3 lists a comparison of the 10-year recurrence and Base Flood events for the Existing and Proposed Condition. Figure 3 is a stream profile for the impacted reach of the tributary to Cabin Run for the 10-year recurrence event. Figure 4 is the same information for the Base Flood Event.

Table 3 10-Year Recurrence and Base Flood HEC-RAS Results Comparison

River Station	Plan	10-Year Water Surface Elevation (feet)	Difference (feet)	Base Flood Water Surface Elevation (feet)	Difference (feet)
1475	D. Proposed	807.50		808.43	
1475	D. Existing	807.50	0.00	808.43	0.00
1405	D. Proposed	806.39		806.78	
1405	D. Existing	806.39	0.00	806.78	0.00
1375	County Road 10/1				
1340	D. Proposed	803.32		803.67	
1340	D. Existing	803.32	0.00	803.67	0.00
1300	D. Proposed	800.92		801.60	
1300	D. Existing	800.92	0.00	801.31	(0.29)
1250	New Culvert Location				
1175	D. Proposed	798.59		798.82	
1175	D. Existing	798.58	(0.01)	798.82	0.00

Figure 3 10-Year Flood Profiles for Existing and Proposed Conditions

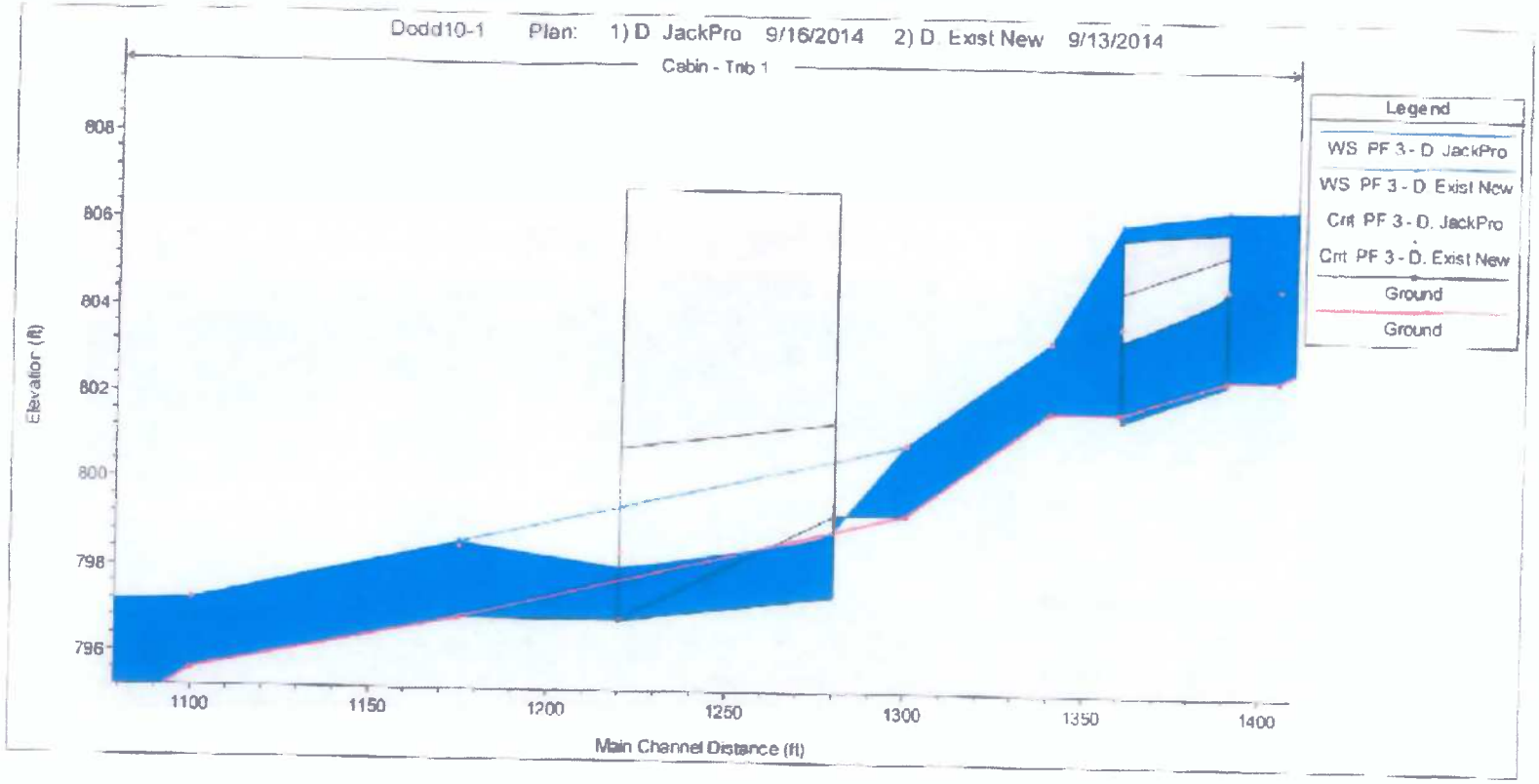
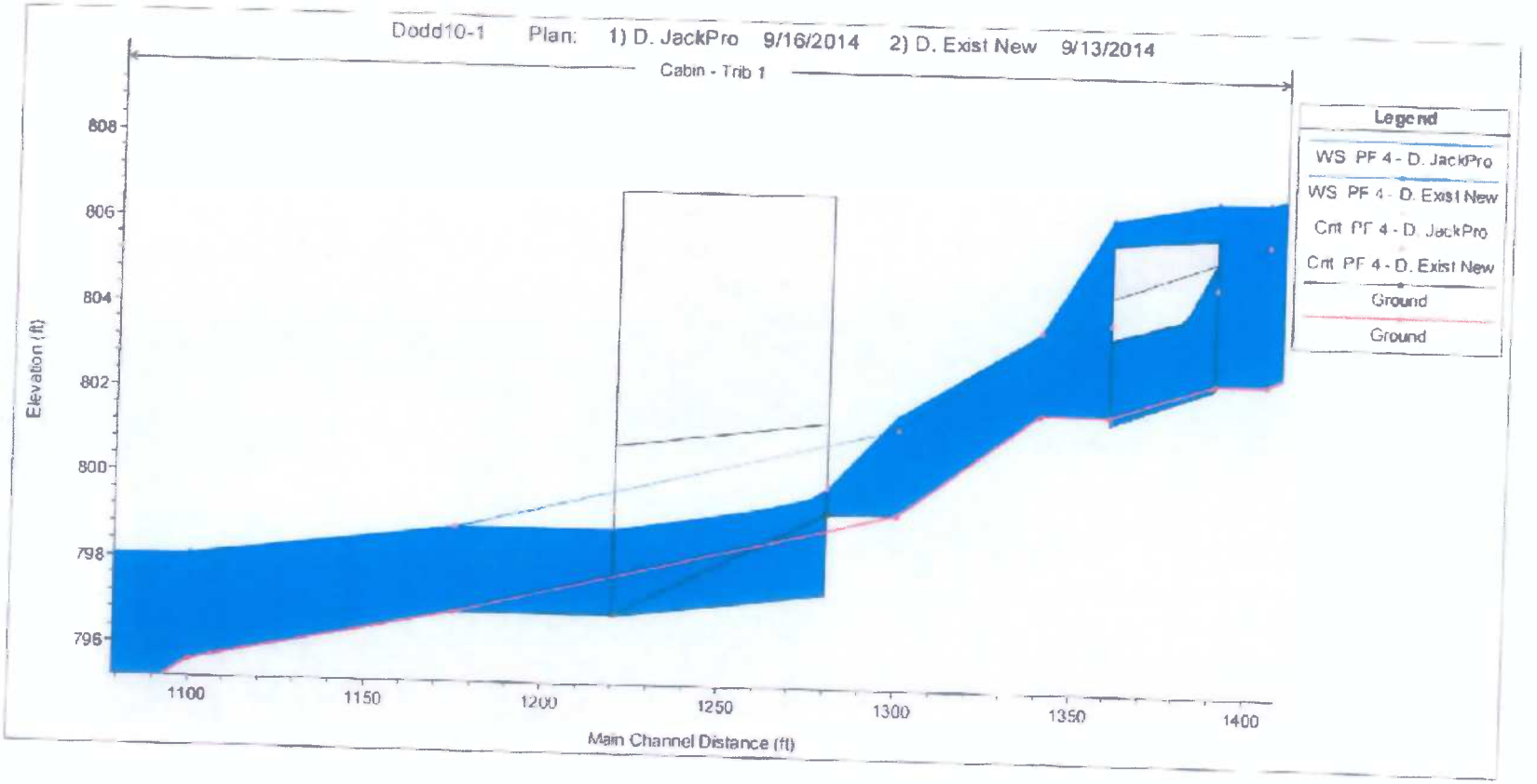


Figure 4 Base Flood Profiles for Existing and Proposed Conditions



5 CONCLUSIONS

The proposed culvert will pass the Base Flood event without any increase in water levels.

6 LIMITATIONS

The design proposed in this report considers only floodplain effects. Consideration of other elements, such as structural and transportation design have not been performed by Engineering Perfection, PLLC. The conclusions submitted in this report apply to the proposed project only. They are not applicable to on-site subsequent construction, or adjacent or nearby projects. In the event that conclusions or recommendations based on this report and relating to any other projects are made by other, such conclusions and recommendations are not the responsibility of Engineering Perfection, PLLC. In performing our professional services, we used that degree of care and skill ordinarily exercised under similar circumstances by members of the engineering profession. No other warranty, expressed or implied is made.

Appendix A
Data Provided by Jackson Surveying

AutoCAD files received on July 17, August 6, 7, 11, 21, 26, 29, September 5, 10
Survey data tables received on July 17, August 6
PDF drawings received on July 17, August 21, 29, September 5, 10
Photographs received on August 26

Appendix B:
Regional Regression Analysis

Regression Equation Regions

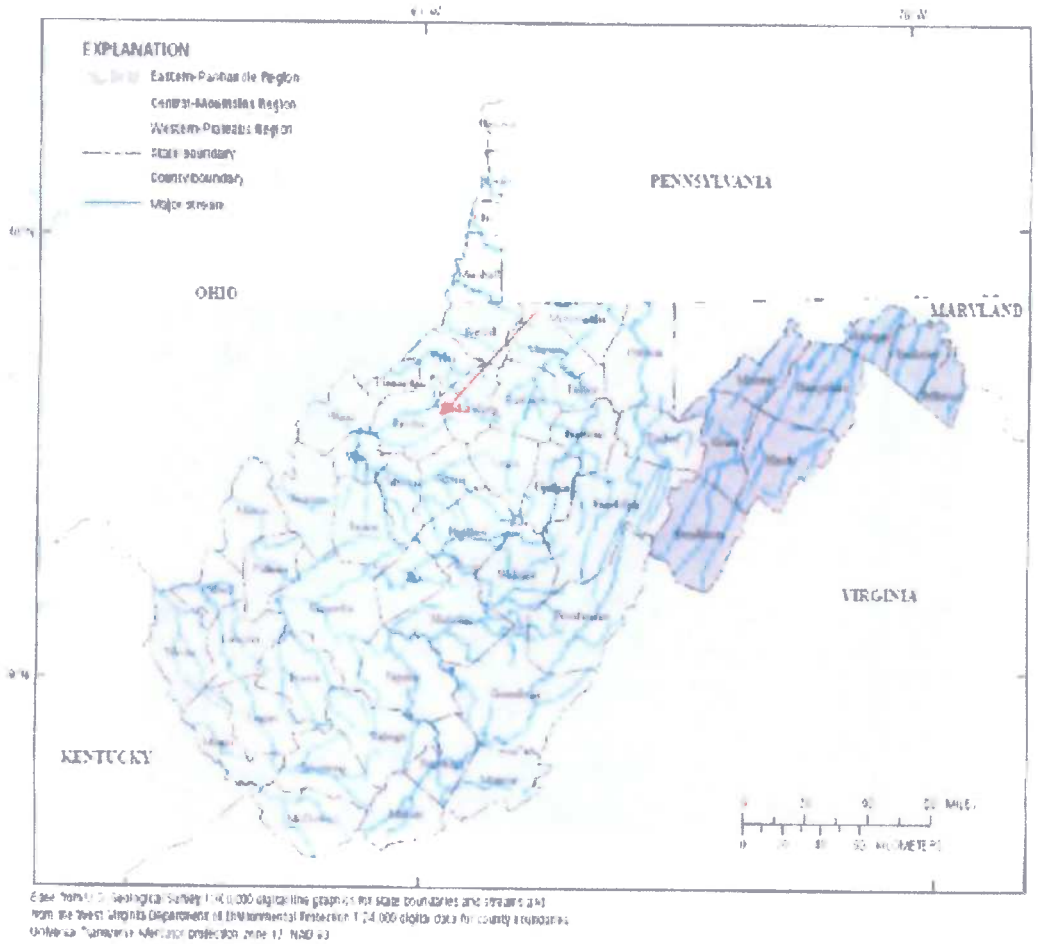


Figure 4 The Eastern Panhandle, Central Mountains, and Western Plateaus Regions of West Virginia for which equations for estimation of flood-frequency discharges were developed in this study.

Regression Equation

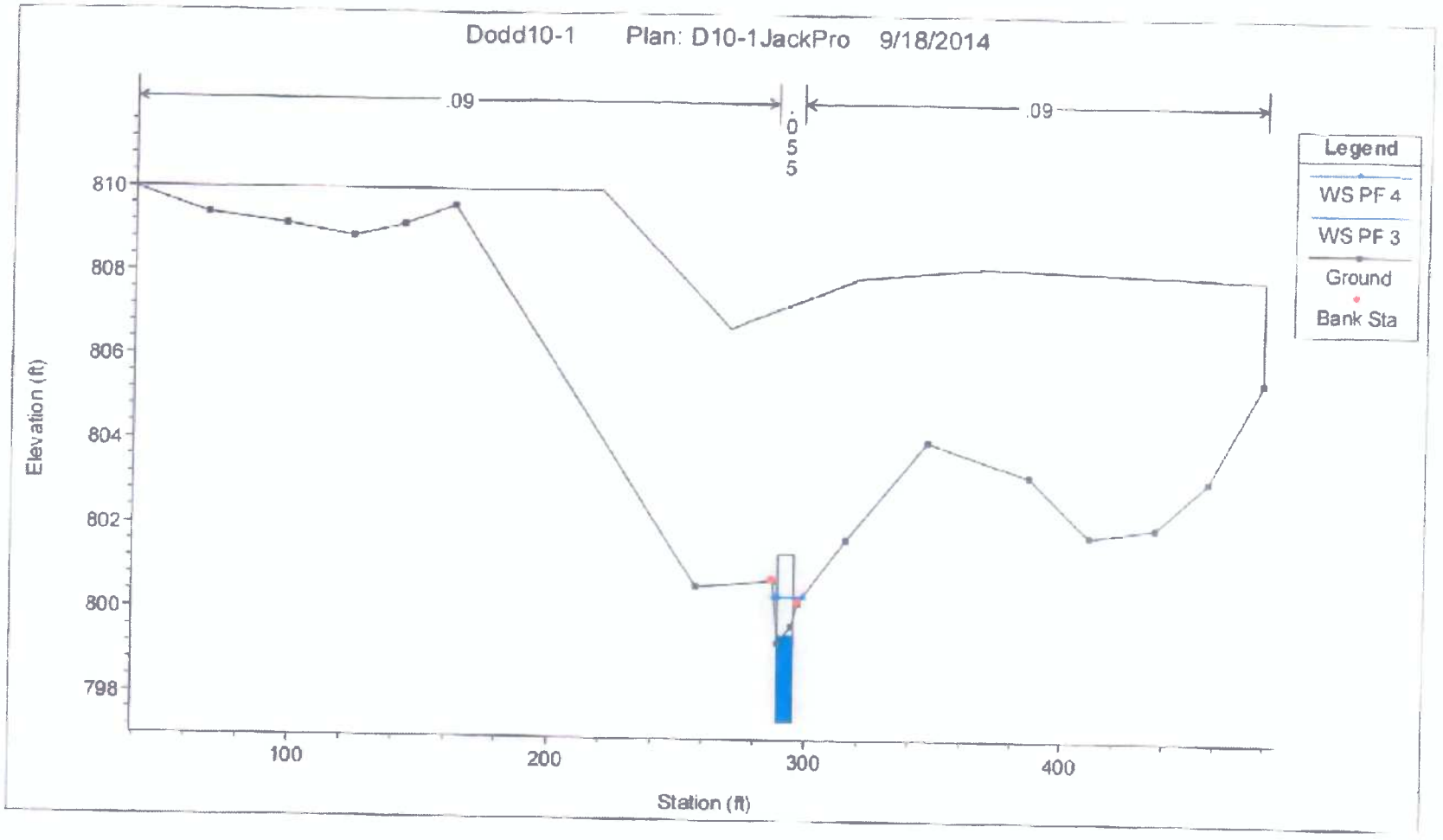
Table 6. Equations used to estimate selected flood-frequency discharges for streams in the Eastern Panhandle, Central Mountains and Western Plateaus Regions of West Virginia

[PK_n_t1 peak discharge in cubic feet per second for the n-percent recurrence interval; PKn_t peak discharge in cubic feet per second for the n-percent recurrence interval; n, percent; AOP, annual-exceedance probability; DRNAREA, drainage area in square miles]

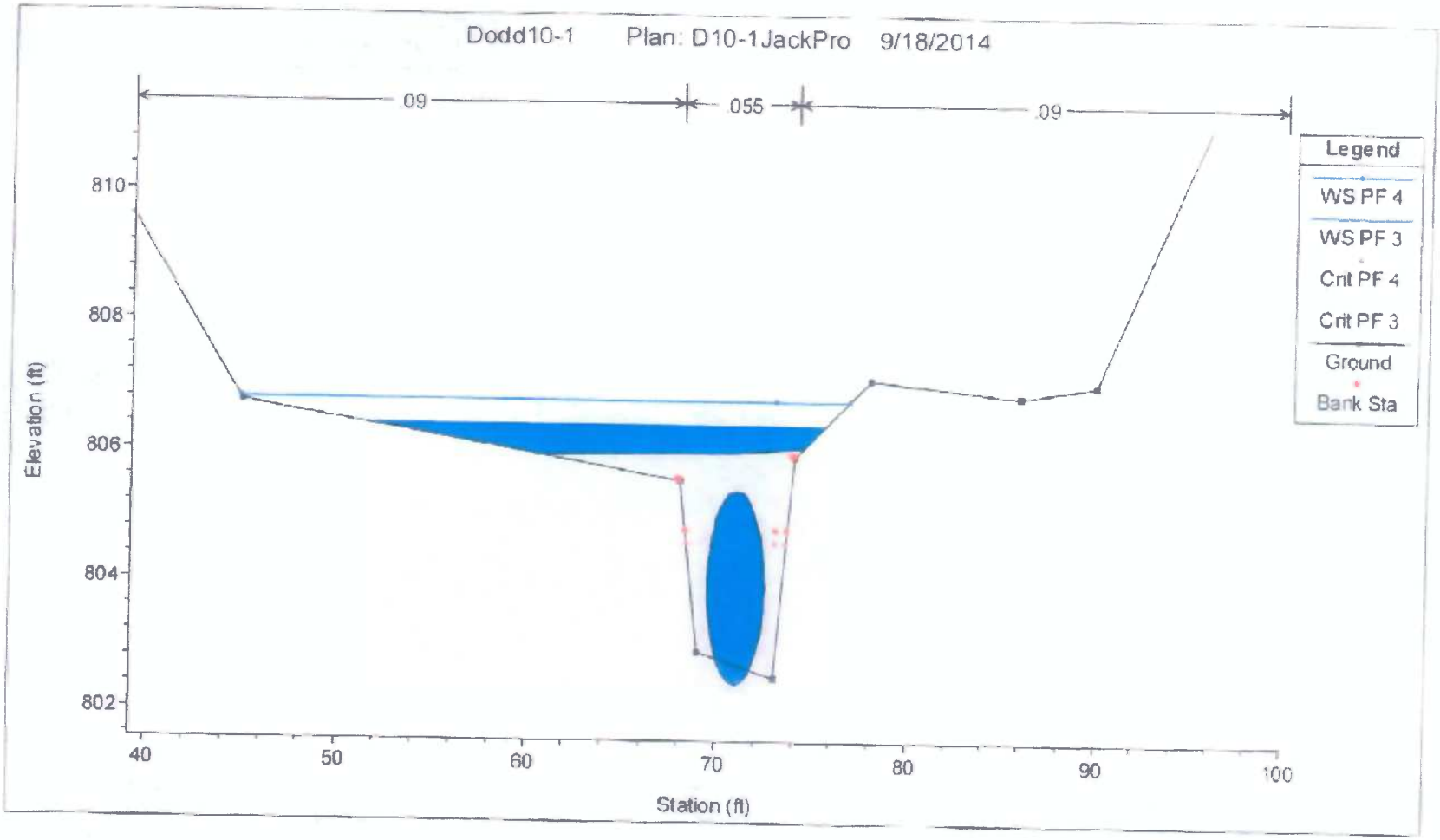
Equation	Standard error of the model, in percent	Average standard error of sampling, in percent	Average prediction error, in percent	Equivalent years of record, unitless
Eastern Panhandle Region (Range in DRNAREA from 0.21 to 1,461 for 57 streamgage stations)				
PK1_1(90% AOP) = 29.6 DRNAREA	43.4	10.3	44.6	3.4
PK1_5(67% AOP) = 46.4 DRNAREA	35.7	8.9	36.9	5.5
PK2(50% AOP) = 64.8 DRNAREA	32.1	9.6	33.4	4.1
PK5(20% AOP) = 104 DRNAREA	27.6	8.9	29.2	10.6
PK10(10% AOP) = 143 DRNAREA	27.5	9.5	28.5	19.1
PK25(4% AOP) = 204 DRNAREA	19.7	10.3	22.4	34.1
PK50(2% AOP) = 254 DRNAREA	18.6	10.1	21.7	46.1
PK100(1% AOP) = 307 DRNAREA	18.3	10.6	21.7	56.7
PK200(0.5% AOP) = 365 DRNAREA	18.4	12.4	22.4	64.7
PK500(0.2% AOP) = 447 DRNAREA	19.4	13.5	23.8	70.9
Central Mountains Region (Range in DRNAREA from 0.18 to 1,619 for 83 streamgage stations)				
PK1_1(90% AOP) = 33.4 DRNAREA	40.9	8.3	41.0	2.4
PK1_5(67% AOP) = 55.6 DRNAREA	34.6	7.3	35.4	2.0
PK2(50% AOP) = 69.4 DRNAREA	33.4	7.8	34.2	2.1
PK5(20% AOP) = 116 DRNAREA	34.1	8.0	35.1	3.2
PK10(10% AOP) = 155 DRNAREA	36.3	8.6	37.4	4.2
PK25(4% AOP) = 206 DRNAREA	39.9	9.5	41.2	4.8
PK50(2% AOP) = 250 DRNAREA	42.9	10.6	44.4	5.3
PK100(1% AOP) = 297 DRNAREA	46.2	11.8	47.9	5.6
PK200(0.5% AOP) = 347 DRNAREA	49.7	12.0	51.5	5.9
PK500(0.2% AOP) = 420 DRNAREA	54.5	13.1	56.5	6.1
Western Plateaus Region (Range in DRNAREA from 0.13 to 1,516 for 106 streamgage stations)				
PK1_1(90% AOP) = 56.9 DRNAREA	38.2	7.6	39.1	3.8
PK1_5(67% AOP) = 97.8 DRNAREA	33.4	6.7	34.1	2.6
PK2(50% AOP) = 129 DRNAREA	31.6	6.1	32.2	2.8
PK5(20% AOP) = 221 DRNAREA	29.5	6.5	30.0	4.4
PK10(10% AOP) = 292 DRNAREA	28.9	6.8	29.7	5.9
PK25(4% AOP) = 391 DRNAREA	29.4	7.3	30.3	7.9
PK50(2% AOP) = 472 DRNAREA	30.2	7.6	31.3	9.1
PK100(1% AOP) = 557 DRNAREA	31.4	8.0	32.5	10.1
PK200(0.5% AOP) = 647 DRNAREA	32.7	8.3	33.9	10.8
PK500(0.2% AOP) = 775 DRNAREA	34.8	8.9	36.1	11.4

Appendix C
HEC RAS Model Outputs

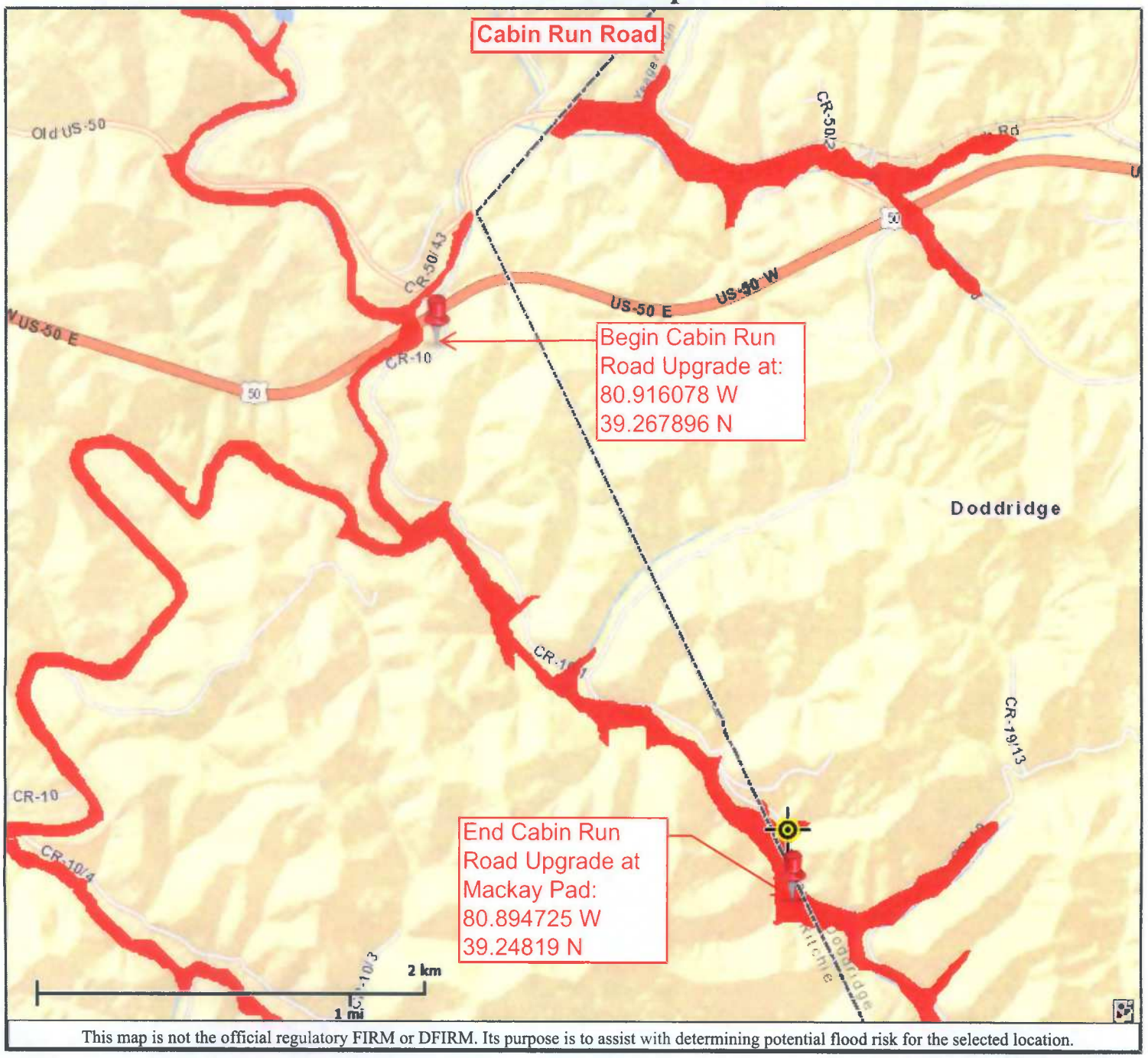
Proposed Culvert - Upstream Cross Section for 10-Year and Base Flood Events



Existing Bridge - Upstream Cross Section for 10-Year and Base Flood Events



WV Flood Map



This map is not the official regulatory FIRM or DFIRM. Its purpose is to assist with determining potential flood risk for the selected location.

Map Created on 11/20/2014

Location of the mouse click

Flood Hazard Zone
(1% annual chance floodplain)

User Notes:

Disclaimer:

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

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

Flood Hazard Area: Selected site is **WITHIN** the FEMA 100-year floodplain.

Elevation: About 806 feet

Location (long, lat): 80.895075 W, 39.245125 N

Location (UTM 17N): (509054, 4343984)

FEMA Issued Flood Map: 54017C0200C

Contacts: Doddridge County

CRS Information: N/A

Parcel Number:

STATE OF WEST VIRGINIA,
COUNTY OF DODDRIDGE, TO WIT

I, Virginia Nicholson, Editor of THE HERALD RECORD, a weekly newspaper published regularly, in Doddridge County, West Virginia, Do Hereby Certify That the Accompanying Legal Notice Entitled:

Floodplain Permit
D 14-324

was published in said paper for 2

successive weeks beginning with the issue of January 6th 2014 and ending with the issue of January 13th 2014 and that said notice contains

WORD SPACE at 115 .cents a word

amounts to the sum of $ 21.74

FOR FIRST PUBLICATION, SECOND PUBLICATION IS 75% OF THE FIRST PUBLICATION

$ 16.31

and each publication thereafter

$ 38.05 TOTAL

EDITOR

Virginia Nicholson

SWORN TO AND SUBSCRIBED

BEFORE ME THIS THE 13th DAY

OF January 2014

NOTARY PUBLIC

Laura J Stickel

OFFICIAL SEAL
Notary Public, State Of West Virginia
LAURA J STICKEL
212 Edmond Street
West Union, WV 26456
My Commission Expires June 14, 2023

LEGAL ADVERTISEMENT:
Doddridge County
Floodplain Permit Application

Please take notice that on the 19th day of December, 2014 Antero Resources filed an application for a Floodplain Permit to develop land located at or about: Central District 39.267896N/80.916078W to 39.242819N/80.894725W Permit#14-324 Cabin Run Road 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 January 26, 2015.

Delivered to the:
Clerk of the County Court
118 E. Court Street, West Union, WV 26456
Beth A. Rogers, Doddridge County Clerk
Edwin L. "Bo" Wriston, Doddridge County Flood Plain Manager

1-6-2xb

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:

Please take notice that on the 19th day of December, 2014
Antero Resources
filed an application for a Floodplain Permit to develop land located at or about:
Central District
39.267896N/80.916078W to 39.242819N/80.894725W
Permit #14-324 Cabin Run Road

was published in The Doddridge Independent
2 times commencing on Friday, December 12, 2014 and
Ending on Friday, December 19, 2014 at the request of:

Edwin Wriston, Doddridge County Floodplain Manager& Doddridge County Commission

Given under my hand this Tuesday, January 27, 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: 27 / JAN / 2015

Robert E Burnside

Notary Public in and for Doddridge County
My Commission expires on
The 16 day of MAY 20 2019

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA
ROBERT E. BURNSIDE
100 SCHOOL ST.
WEST UNION, WV 26456
My commission expires May 16, 2019

Legal Advertisement: 1/9-1/16
Doddridge County
Floodplain Permit Application

Please take notice that on the 19th day of December, 2014
Antero Resources
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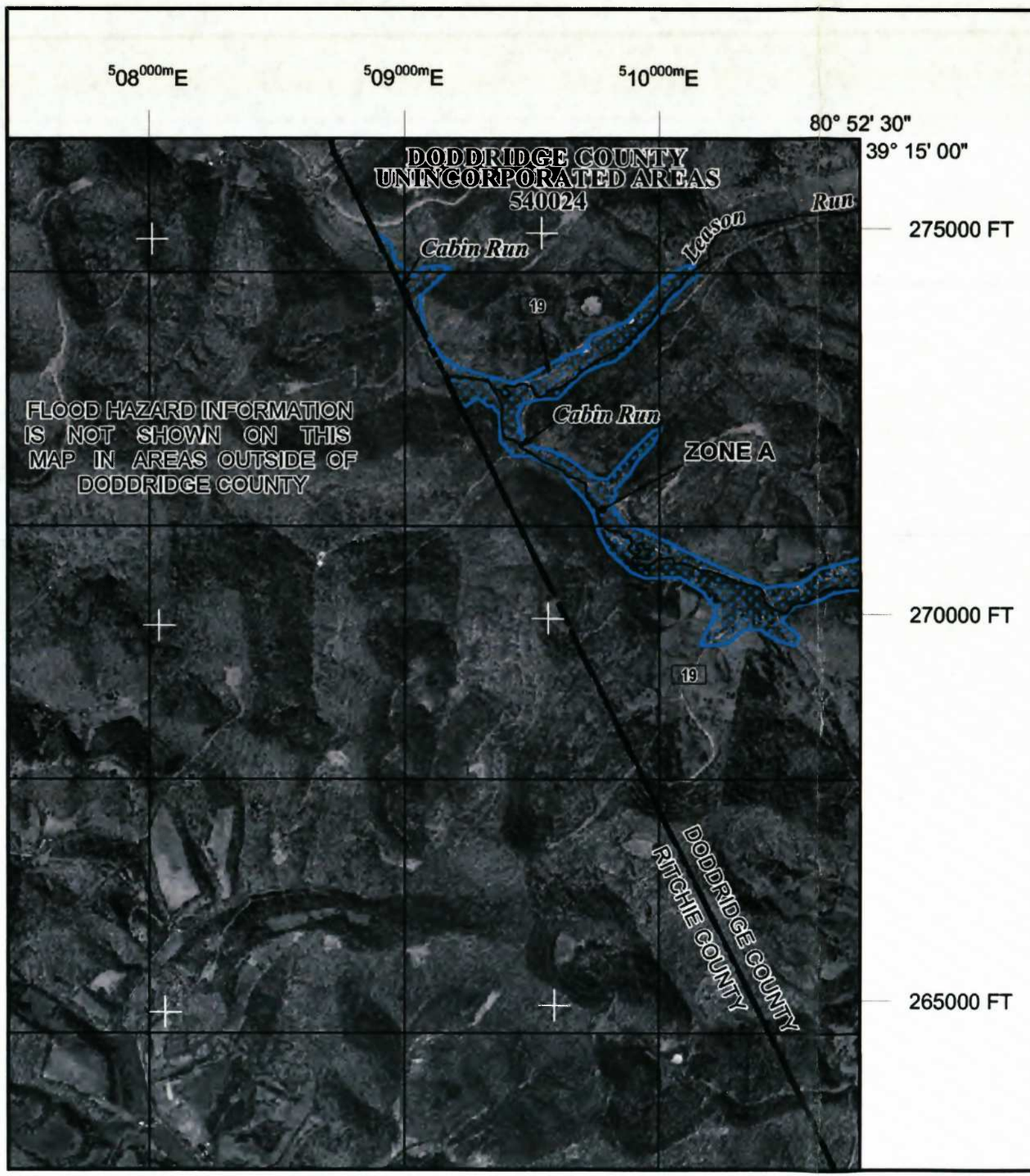
118 E. Court Street, West Union, WV 26456
Beth A Rogers, Doddridge County Clerk
Edwin L. "Bo" Wriston. Doddridge County Flood Plain Manager



MAP SCALE 1" = 2000'

1000 0 2000 4000

FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0200C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 200 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0200	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
54017C0200C

MAP REVISED
OCTOBER 4, 2011

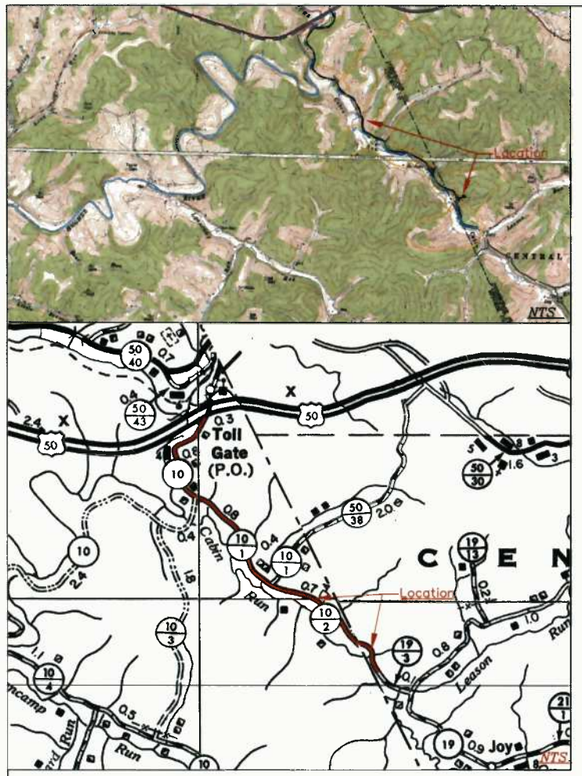
Federal Emergency Management Agency

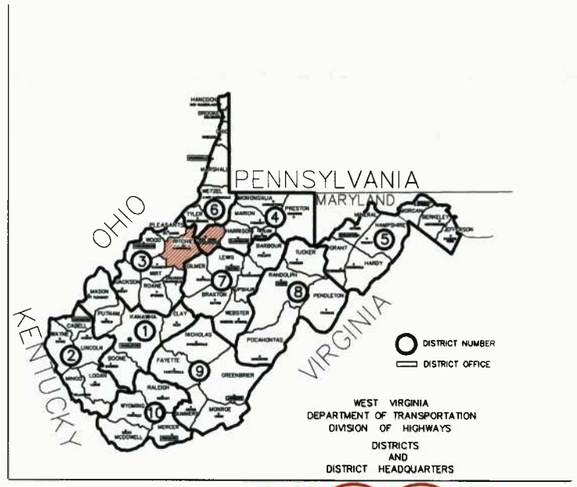
West Virginia Department of Transportation Division of Highways

Upgrade For WV. Sec. Rte. 10, 10/1 and 10/2 (Clay District Ritchie County)
WV. Sec Rte. 19/3 (Central District Doddridge County)

ANTERO RESOURCES – MACKAY PAD

September 17, 2014





Project Length: STA. 0+00 to STA. 141+28.4 (2.7 Miles)

NOTE: Upgrade will consist of culvert extension/replacement, new culverts, bank excavation, road widening, temporary bridges, shoulder stabilization and road surface improvement.

ENGINEERING NOTES:

It is always the goal of Antero Resources to upgrade the state highways to allow construction and drilling equipment to safely enter and exit the work site while providing access to residences with a limited amount of disruption to their schedules. **Safety is always the governing consideration when making construction upgrade decisions.** When designing upgrades of this nature, it is difficult to anticipate all of the work which may be required to meet this goal. Each section of the roadway is examined daily by the project engineer, the contractor, a representative from Antero Resources and the DOH inspector assigned to the project. Together, this construction management team assesses the roadway condition and makes decisions for the best way to proceed with the upgrade. Generally, the upgrade will be to improve drainage and increase the road surface width. Drainage will be maintained on whichever side of the road it is presently located. Ditches will be cleaned, graded and maintained at their present location and capacity. Occasionally a ditch will be moved somewhat to accommodate the required road width. Any stone placed in a ditch will be temporary and will be removed upon completion. Areas of width expansion will be undercut and 12" of coarse aggregate applied over a geo-grid. The entire roadway width will then be covered with 6" of course aggregate & 4" of crusher run. If the construction team determines that full depth reclamation (FDR) is required, then that section will be scarified to a depth of 14" and cement applied at a rate determined by the geo-technical engineer. Erosion and sediment control will be maintained through the use of check dams, silt socks and concurrent seedling and mulching. Traffic control will be used during working hours and appropriate signage used throughout the project area. Dust control will be used as needed.

Revision:	
General Revisions	11-05-14
General Revisions	11-11-14
Deed Book References	11-14-14
Shortened Step Block Wall	12-03-14

All Property Boundaries are based on current deeds and field evidence collected with Sub-Meter GPS

NOTE: Stream & Wetland information from report prepared by AllStar Ecology, LLC dated _____ and may not match field locations.

FLOOD PLAIN INFORMATION FROM FEMA MAP PANEL:
#54085C0125C: Dated 2-2-2012
#54085C0225C: Dated 2-2-2012
#54017C0200C: Dated 10-4-2011
#54017C0225C: Dated 10-4-2011

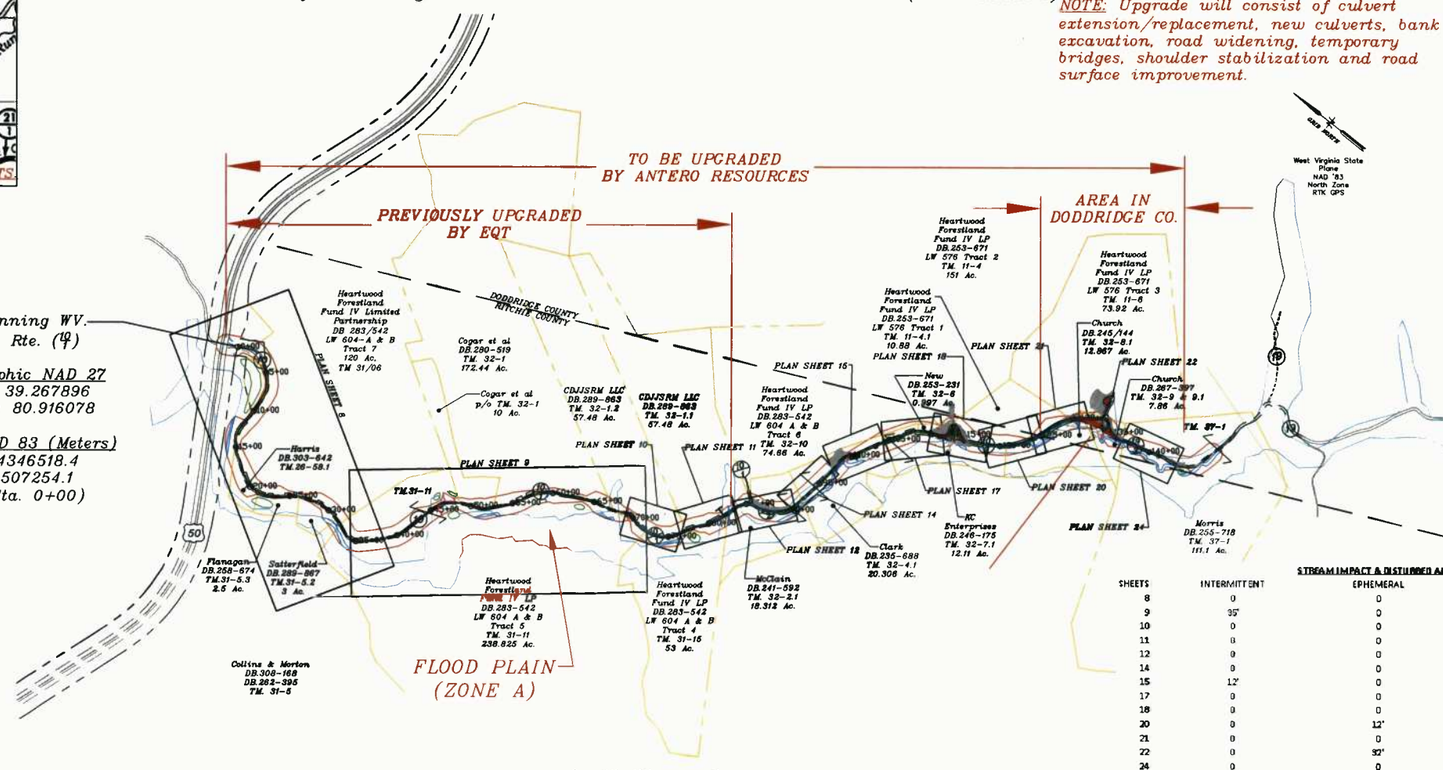
FLOOD PLAIN AREA

AREA of INTEREST

Beginning WV. Sec. Rte. (19)

Geographic NAD 27
Lat.: 39.267896
Long.: 80.916078

UTM NAD 83 (Meters)
N: 4346518.4
E: 507254.1
(@ Sta. 0+00)



STREAM IMPACT & DISTURBED AREA

SHEETS	INTERMITTENT	EPHEMERAL	PERENNIAL	DISTURBED
8	0	0	0	0.11Ac.
9	35'	0	0	0.04Ac.
10	0	0	0	0.03Ac.
11	0	0	0	0.05Ac.
12	0	0	0	0.42Ac.
14	0	0	0	0.14Ac.
15	12'	0	83'	0.29Ac.
17	0	0	0	0.12Ac.
18	0	0	0	0.47Ac.
20	0	12'	0	0.17Ac.
21	0	0	0	0.11Ac.
22	0	32'	0	0.87Ac.
24	0	0	0	0.08Ac.
TOTAL:	47'	42'	83'	2.91Ac.

ANTERO RESOURCES

WEST VIRGINIA 811
CALL BEFORE YOU DIG! Dial 811 or 800.245.4848
www.WV811.com

DENNIS L. FISHER REGISTERED No. 8884 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

Dennis L. Fisher RPE 8884: _____ 12-05-2014 Date:

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677 W. Main St.
Clarksburg, Wv 26301
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Cover
Road Upgrade
Sheet 1 of 24

Ritchie Co., WV Sec. Routes 10, 19 & 19/2
Doddridge Co. WV Sec. Route 19/3

General Construction Notes:

1. Best Management Practices shall be utilized for erosion and sediment control. The most effective method is concurrent seeding and mulching. Compost Filter Sock (preferable) or filter fence shall be installed in areas down slope of construction where adequate brush filter strips cannot be maintained. Rock check dams or sumps shall be installed at culvert inlets.

2. The contractor shall contact West Virginia 811 prior to any disturbance..

3. The attached drawings show existing and proposed grades and dimensions on which the estimated quantities are based. These grades and dimensions may need to be adjusted during construction to meet field conditions. If any adjustment is needed beyond a reasonable conformance with the drawings, the contractor shall contact the engineer.

4. Clearing and grubbing shall be in conformance with Section 201 of the current WVDOH Specifications. All other earthwork shall be in conformance with Section 207 of the current WVDOH Specifications. All brush and non marketable timber shall be chipped.

5. Stockpile topsoil and protect for use in regrading the disturbed areas prior to seeding and mulching.

6. If subgrade is unsuitable, the exposed surface shall be compacted until a relatively unyielding surface is achieved.

7. Surface water and subsurface water shall be prevented from flowing into the disturbed areas during construction

8. Fill shall be placed in uniform twelve (8) inch lifts and compacted with appropriate equipment to a proctor density of 95%.

9. Any imported fill shall be approved by engineer prior to placement.

10. Prevent surfaced water and subsurface water from flowing into excavations and flooding the work. Remove water from excavations to prevent softening of foundation soils and creating soil changes detrimental to the stability of subgrades. Provide and maintain pumps, sumps, sustain and discharge lines and other dewatering system components necessary to convey water away from the site Convey water removed from excavations to collections or to runoff areas. During periods of inclimate weather, temporary slope drains may be utilized as necessary.

11. In areas to receive fill and at the final cut subgrade, proof roll and compact the exposed ground surface following clearing and grubbing and any required excavation with a minimum of four passes of an approved compactor and obtain at least the density required for a suitable impoundment pit foundation and as indicated below. Proof rolling shall be under the observation of the Engineer as described herein. Immediately following the completion of excavation to proposed subgrades in cut areas, proof rolling shall be performed as specified. Any areas which deflect, rut or pump under the loaded dump truck shall be undercut and replaced with compacted fill material or stone base course as directed by the Engineer. Proof rolling methods shall be as follow:

a. After the subgrade has been completed the subgrade shall then be proof rolled. The coverage areas and methods will be identified by the Engineer;

b. The equipment shall be operated at a speed that the Engineer can comfortably and slowly walk along side the equipment.;

c. If it becomes necessary to take corrective action, such as but not limited to underdrain installation, undercut, and backfill of an unsuitable material, and aeration of excessive wet material in areas that have been proof rolled. These areas shall be proof rolled again following the the completion of the necessary corrections.

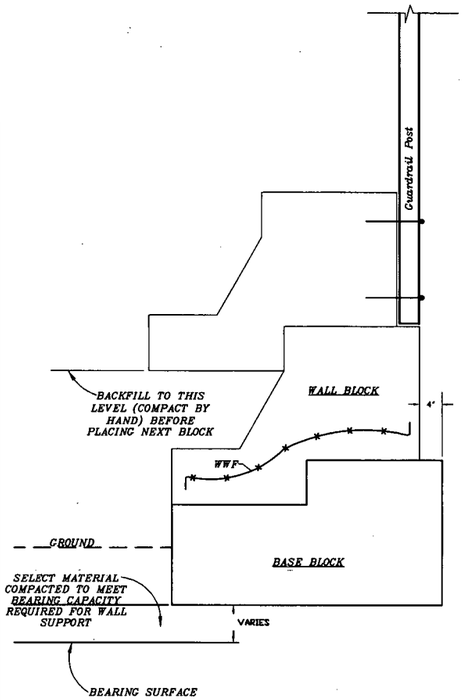
12. Photographic documentation shall include DAILY photos of before, during and after conditions of all constructions activities.

13. Existing and proposed culverts shall have adequate cover of ½ diameter (12" minimum). Adequate cover shall consist of select fill & asphalt overlay. If adequate cover is not possible, contractor shall protect culvert with timber mats or steel plates.

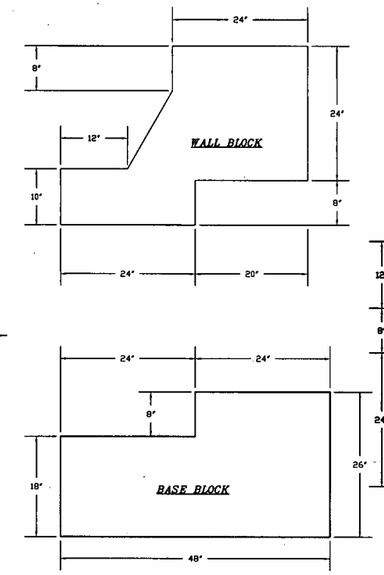
14. There is no average daily traffic information for this road. The AOT is estimated to be between 20-30 vehicles/day exclusive of proposed gas utility traffic during drilling operations.

NOTE: ALL WORK (PERFORMED WITHIN THE EXISTING DOH RIGHT OF WAY OR WITHIN THE PROPOSED DOH RIGHT OF WAY) AS SHOWN ON THESE DRAWINGS SHALL CONFORM TO THE WV DOH STANDARD SPECIFICATION FOR ROADS AND BRIDGES AND ANY UPDATED SUPPLEMENTAL SPECIFICATIONS PER TABLE BELOW:

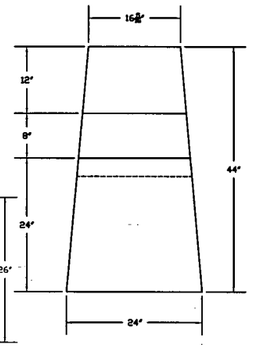
WV DOH Section	Description
201	Clearing & Grubbing
207	Excavation & Embankment
211	Borrow Excavation
212	Structure, Rock, & Wet Excavation
217	Special Rock Fill
218	Slope & Foundation Protection
228	Subgrade Preparation
229	Shoulders & Ditches
240	Cleaning Culverts, Inlets & Manholes
307	Crushed Aggregate Base Course
311	Open Graded Free Draining Base Course
401	Hot-Mix Asphalt Base, Wearing, & Patching & Leveling Courses
402	Hot-Mix Asphalt Skid Resistant Pavement
405	Surface Treatments
408	Tack Coat
412	Winter Grade Asphalt Patching Mixture
415	Removing Existing Pavement Surface
501	Portland Cement Concrete Pavement
502	Approach Slabs
503	Sealing Joints & Cracks In Concrete Pavement
504	Bituminous Underseal For Concrete Pavement
506	Concrete Pavement Repair
507	Crack & Pothole Repair
508	Diamond Grinding
509	Re-Sawing & Sealing Longitudinal Concrete Pavement Joints
510	Re-Sealing Transverse Concrete Pavement Joints
512	Concrete Slab Stabilization
601	Structural Concrete
602	Reinforced Steel
603	Prestressed Concrete Members
604	Pipe Culverts
606	Underdrains
607	Guardrail
623	Pneumatically Applied Mortar
624	Preformed Elastomeric Joint Sealer
626	Retaining Wall Systems
633	Concrete Gutter, Invert Pipe Gutter, or Dumped Rock Gutter
634	Concrete Cribbing
636	Maintaining Traffic
642	Temporary Pollution Control
645	Reinforcing Slopes
651	Furnishing & Placing Topsoil
652	Seeding & Mulching
655	Matting for Erosion Control
663	Pavement Markings
701	Hydraulic Cement
702	Fine Aggregate
703	Course Aggregate
704	Stone & Crushed Aggregate
705	Asphalt Materials
707	Concrete Admixtures, Curing & Coating Materials
708	Joint Materials
709	Metals
710	Wood Materials
712	Guardrail & Fence
713	Metal Pipe
714	Concrete, Clay, Fiber & Plastic Pipe
715	Miscellaneous Materials
716	Embankment & Subgrade Material
717	Compaction Control of Base Course Material



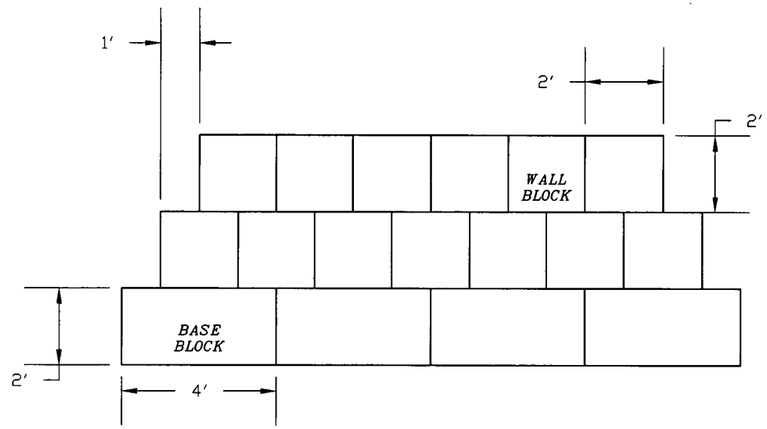
STEP BLOCK WALL SECTION
(NTS. TYP.)



BASE & WALL BLOCK DETAIL
(NTS. TYP.)



WALL BLOCK SECTION



STEP BLOCK WALL PROFILE
(NTS)

SHOULDER STABILIZATION STA. 98+05 TO 98+80

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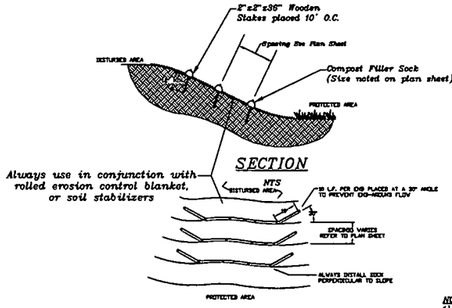
Notes & Details
Road Upgrade
Sheet 2 of 24
Ritchie Co., WV Sec. Routes (10) (19/1) & (19/2)
Doddridge Co. WV Sec. Route (19/4)

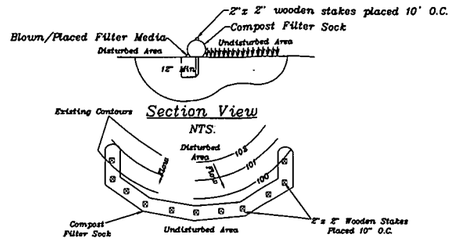


Always use in conjunction with rolled erosion control blanket, or soil stabilizers

PLAN
NTS

Slope Drainage Break Detail
(Not to Scale)

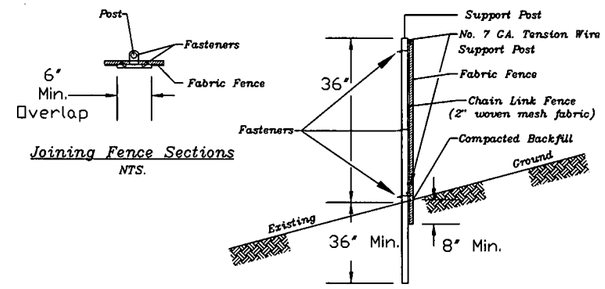
NOTES:
1) Remove sediment from the upslope side of the sock when accumulation has reached ½ of effective height.
2) Loose filter media may be backfilled on the upslope side of the Sock to enhance performance



Compost Filter Sock

Compost shall meet the following standards:

Organic Matter Content	80%-100% (dry weight basis)
Organic Portion	Fibrous & Elongated
pH	5.5-8.0
Moisture Content	35% - 55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS Maximum



Standard Construction Detail
Super Filter Fabric Fence

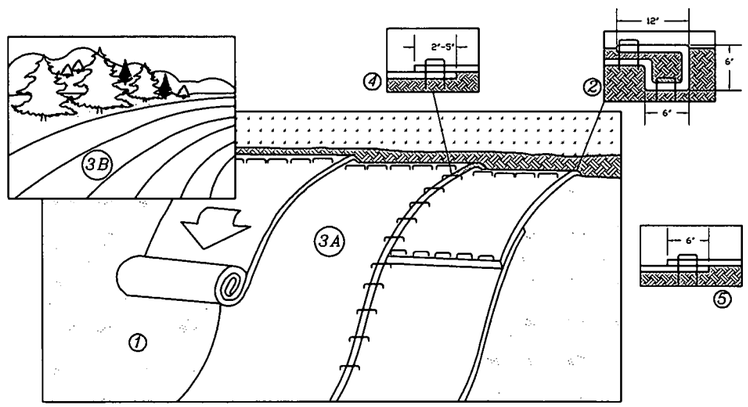
*Post spaced @ 10' max. Use 2.5"dia. galvanized or aluminum post.

**Chain Link to Post Fasteners spaced @ 14" max. Use No. 6 Ga. aluminum wire or No. 9 galvanized steel pre-formed clips. Chain Link to Tension Wire Fasteners spaced @ 60" max. Use No. 10 Ga. galvanized steel wire. Fabric to Chain Fasteners spaced @ 24" max. ℄ to ℄

No. 7 Ga. Tension Wire installed horizontally at top and bottom of chain link fence.

Filter Fabric Fence must be placed at existing level grade. Both ends of the barrier must be extended at least 8 feet upslope at 45 degrees to the main barrier alignment.

Sediment must be removed when accumulations reach ½ the above ground height of the fence.



NOTES:
1. Prepare soil before installing rolled erosion control products (RECP's), including any necessary application of lime, fertilizer, and seed.
NOTE: When using Cell-O-Seed, DO NOT seed prepared area. Cell-O-Seed must be installed with paper side down.

2. Begin at the top of the slope by anchoring the RECP's in a 6" Deep X 6" Wide Trench with approximately 12" of RECP's extended beyond the Up-Slope portion of the trench. Anchor the RECP's with a row of staples/stakes approximately 12" apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining 12" portion of RECP's back over seed and compacted soil. Secure RECP's over compacted soil with a row of staples/stakes spaced approximately 12" apart across the the width of the RECP's.

3. Roll the RECP's (A.) down or (B.) horizontally across the slope. RECP's will unroll with appropriate side against the soil suface. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staples pattern guide. When using the DOT system, staples/stakes should be placed through each of the colored dots corresponding to the appropriate staple pattern.

4. The edge of parallel RECP's must be stapled with approximately 2"-5" overlap depending on RECP's type.

5. Consecutive RECP's spiced down the slope must be placed end over end (shingle style) with an approximate 6" overlap. Staple through overlapped area, approximately 12" apart across entire RECP's width.

NOTE:
* In loose soil conditions, the use of staple or stake lengths greater than 6" may be necessary to property secure the ECP's.

Erosion Control Blanket-Slope Installation
Scale: NTS.

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage Preference	pH Range
KY Bluegrass/	20		
Redtop/	3	Well - Mod. Well	5.5 - 7.5
Ladino Clover or Birdsfoot Trefoil	2 /10		
Timothy/	5		
Alfalfa	12	Well - Mod. Well	6.5 - 8.0
Timothy/	5		
Birdsfoot Trefoil	8	Well - Poorly	5.5 - 7.5 8
Orchardgrass/	*10*		
Ladino Clover/	*2*	*Well - Mod. Well*	*5.5 - 7.5*
Redtop	*3*		
Orchardgrass/	*10*		
Ladino Clover	*2*	*Well - Mod. Well*	*5.5 - 7.5*
Orchardgrass/	*20*		
Perennial Ryegrass	*10*	*Well - Mod. Well*	*5.5 - 7.5*
Creeping Red Fescue/	**30**		
Perennial Ryegra	**10**	**Well - Mod. Well**	**5.5 - 7.5**
Orchardgrass or Kentucky Bluegrass	20	Well - Mod. Well	6.0 - 7.5
Birdsfoot Trefoil/	10		
Redtop/	5	Well - Mod. Well	5.5 - 7.5
Orchardgrass	20		
Lathco Flat Pea/	30		
Perennial Ryegrass	**20**	**Well - Mod. Well**	**6.5 - 7.5**
Lathco Flat Pea/	30		
Orchardgrass	20	Well - Mod. Well	5.5 - 7.5

Table IV-6 Lime and Fertilizer Application Table

pH of Soil	Lime in Tons Per Acre	Fertilizer Lbs. per Acre 10-20-20- or Equivalent
Above 6.0	2	500
5.0 to 6.0	3	500
Below 5.0	4	500

The pH can be determined with a portable pH testing kit or by sending the soil samples to a soil testing laboratory. When 4 tons of lime per acre are applied it must be incorporated into the soil by disking, backblading or tracking up and down the slope.

Table IV-8 Mulch Materials Rates and Uses

Material	Minimum Rates Per Acre	Coverage	Remarks
Hay or Straw	2 to 3 Tons	Cover 75% to	Subject to Wind blowing
	100 to 150 Bales	90% of Surface	or washing unless tied down
Wood Fiber	1000 to 1500 lbs	Cover all	For Hydroseeding
Pulp Fiber		Disturbed Areas	
Wood-Cellulose			
Recirculated Paper			

Table IV-1 Recommended seeding dates for permanent and temporary cover unless otherwise specified.

Planting Dates	Suitability
March 1 – April 15 and August 1 – October 1	Best seeding periods
April 15 – August 1	HIGH RISK -moisture stress likely
October 1 – Dec. 1	HIGH RISK - Freeze damage to young seedlings
Dec. 1 – March 1	Good seeding period. Dormant seeding.

Table 2. Acceptable fertilization recommendation in absence of a soil test.

Species	N (lbs/ac)	P2O5 (lbs/ac)	K2O(lbs/ac)	Example Rec. (per acre)
Cool Season Grass	40	80	80	400 lbs. 10-20-20
CS Grass & Legume	30	60	60	300 lbs. 10-20-20
Temporary Cover	40	40	40	200 lbs. 19-19-19

Table 3. Temporary cover suitable for establishment in West Virginia.

Species	Seeding Rate (lbs/acre)	Optimum Seeding Dates	Drainage	pH Range
Annual Ryegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Poorly	5.5 - 7.5
Field Bromegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well – Mod. Well	6.0 - 7.0
Spring Oats	96	3/1 - 6/15	Well - Poorly	5.5 - 7.0
Sudangrass	40	5/15 - 8/15	Well - Poorly	5.5 - 7.5
Winter Rye	168	8/15 - 10/15	Well - Poorly	5.5 - 7.5
Winter Wheat	180	8/15 - 11/15	Well – Mod. Well	5.5 - 7.0
Japanese Millet	30	6/15 - 8/15	Well	4.6 - 7.0
Redtop	5	3/1 - 6/15	Well	4.0 - 7.5
Annual Ryegrass	28	3/1 - 6/15	Well – Poorly	5.5 - 7.5
Spring Oats	64	3/1 - 6/15	Well – Poorly	5.5 - 7.5

NOTE: These rates should be increased by 50% if planted April 15 – August 1 and October 1 – March 1.

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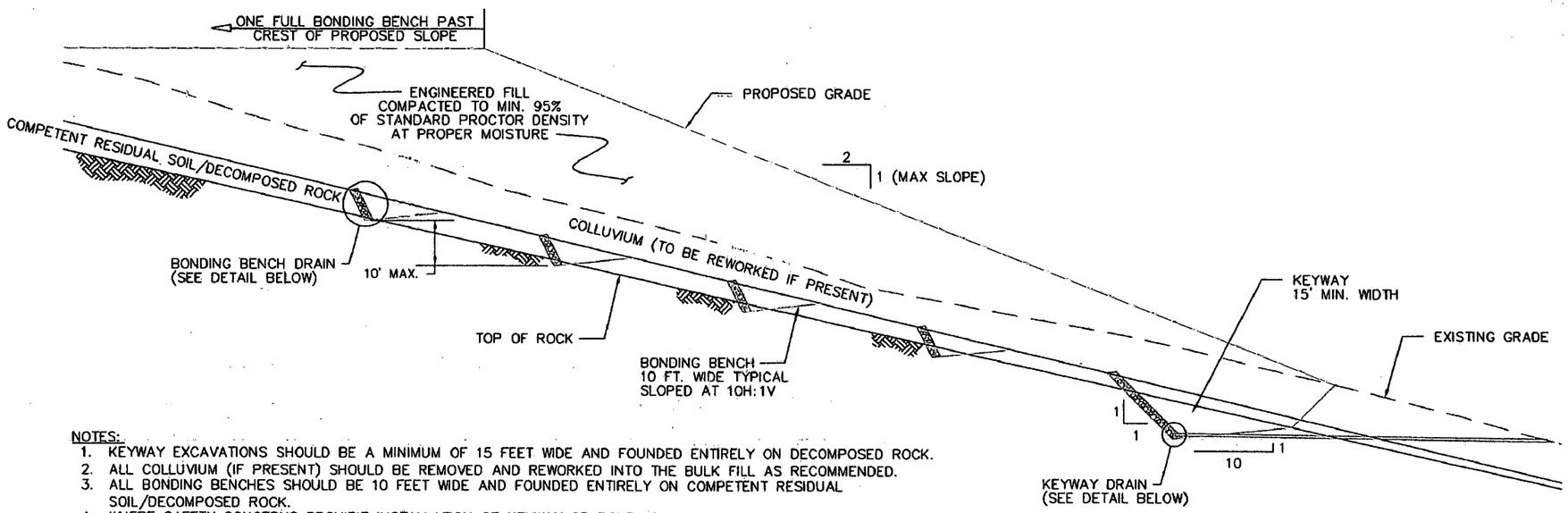
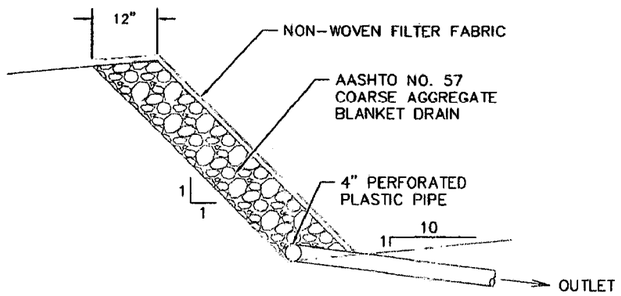


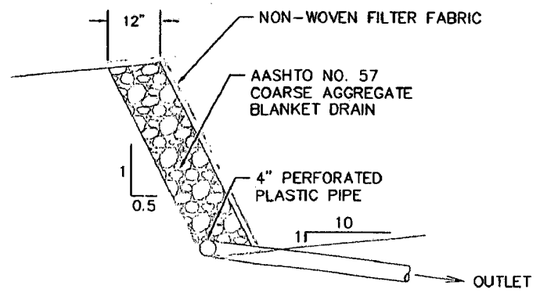
NOTES:
1. KEYWAY EXCAVATIONS SHOULD BE A MINIMUM OF 15 FEET WIDE AND FOUNDED ENTIRELY ON DECOMPOSED ROCK.
2. ALL COLLUVIUM (IF PRESENT) SHOULD BE REMOVED AND REWORKED INTO THE BULK FILL AS RECOMMENDED.
3. ALL BONDING BENCHES SHOULD BE 10 FEET WIDE AND FOUNDED ENTIRELY ON COMPETENT RESIDUAL SOIL/DECOMPOSED ROCK.
4. WHERE SAFETY CONCERNS PROHIBIT INSTALLATION OF KEYWAY OR BONDING BENCH DRAINS AS SHOWN, SUBSTITUTE ALTERNATE DRAIN DETAIL.

KEYWAY AND BENCH PROFILE
N.T.S.



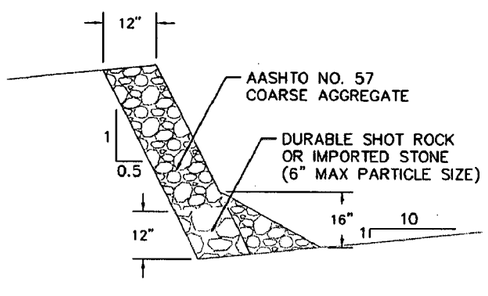
*OUTLETS AT 100 FT. CENTERS MAX. OR AS DEEMED NECESSARY

KEYWAY DRAIN DETAIL
N.T.S.



*SLOPE OUTLET TO PROVIDE POSITIVE DRAINAGE TO SLOPE FACE
*OUTLETS AT 250 FT. CENTERS MAX. OR AS DEEMED NECESSARY

BONDING BENCH DRAIN DETAIL
N.T.S.



ALTERNATE KEYWAY/BONDING BENCH DRAIN DETAIL
N.T.S.

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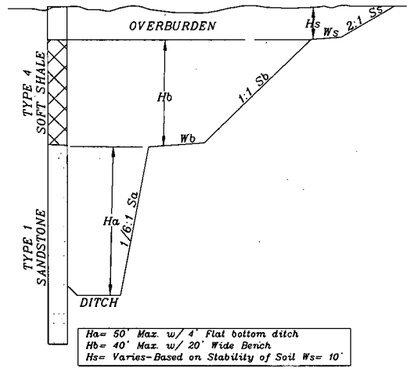
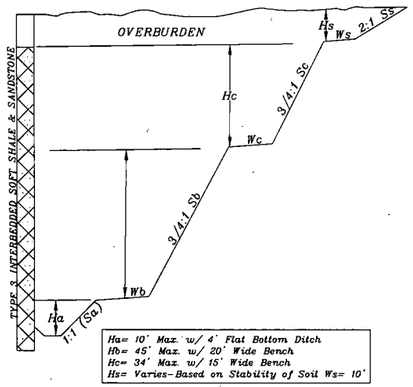
Details
Road Upgrade
Sheet 4 of 24
Ritchie Co., WV Sec. Routes (10) (47) & (47)
Doddridge Co. WV Sec. Route (19)





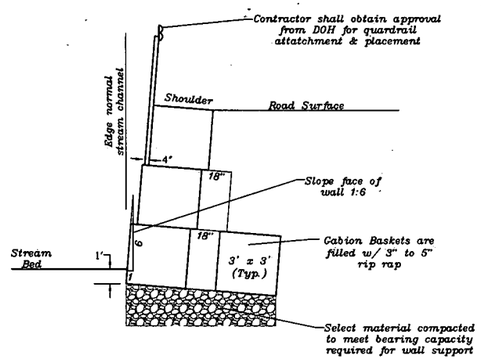
CUT SECTIONS FOR BEDROCK

TABLE FOR DESIGN OF CUT SECTIONS THROUGH BEDROCK AND OVERBURDEN

TYPE OF BEDROCK	HEIGHT OF CUT IN FEET	HEIGHT BETWEEN BENCHES IN FEET		WIDTH OF BENCHES IN FEET		BACKSLOPE RATIO HORZ./VERT.	
		Ha[1]	Hb Hc etc.	Ws (min.)	Wb Wc etc[2]	Sa	Sb Sc etc.[4]
1. Medium hard to hard sandstone and limestone, and hard shale	over 50	5-50	50±	10	10-20	1/6:1	1/6:1
	under 50	----	----	10	----	1/6:1	----
2. Soft sandstone, medium hard shale, soft limestone, siltstone or en interbedded combination	over 50	5-25	50±	10	10-20	3/4:1	½:1
	25-50	5-25	20-45	10	10-20	3/4:1	½:1
	under 25	----	----	10	----	1:1	½:1
3. Soft shale interbedded with siltstone, sandstone, or limestone	over 50	5	45±[3]	10	10-20	1:1	½:1
	25-50	5	20-45	10	10-20	1:1	½:1
	under 25	----	----	10	----	1 ½:1	----
4. Soft shale[5]	over 45	5	40±[3]	10	----	1 ½:1	1:1
	25-45	5	20-40	10	10-20	1 ½:1	1:1
	under 25	----	----	10	----	2:1	----

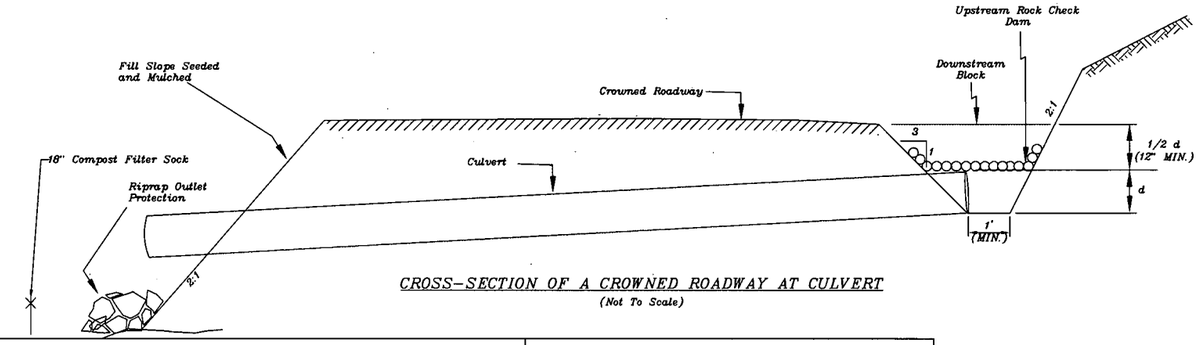
NOTE: SEE NARRATIVE AND FIGURES FOR DETAILS.

1. For Types 3 and 4, five feet may be added to Ha when a 4-foot wide roadway ditch is used. Use a minimum 4-foot roadway ditch for Type 1 when Ha is over 25 feet.
2. Roads classified as arterial should have benches designed as follows: When the backslope above the bench is 25 feet or less, use a minimum 15-foot wide bench. When the backslope above the bench is greater than 25 feet, use a minimum 20-foot wide bench. Lower standards may be used on individually determined cases.

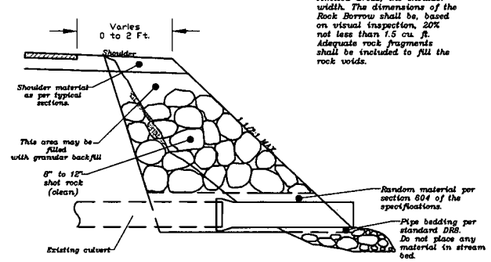


Gabion Retaining Wall
Shoulder Stabilization Detail

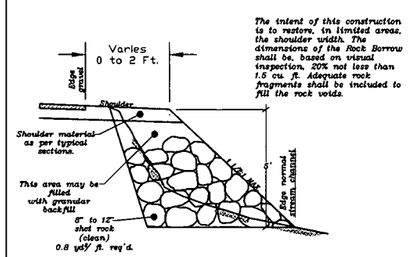
SHOULDER STABILIZATION STA. 98+05 TO 98+80



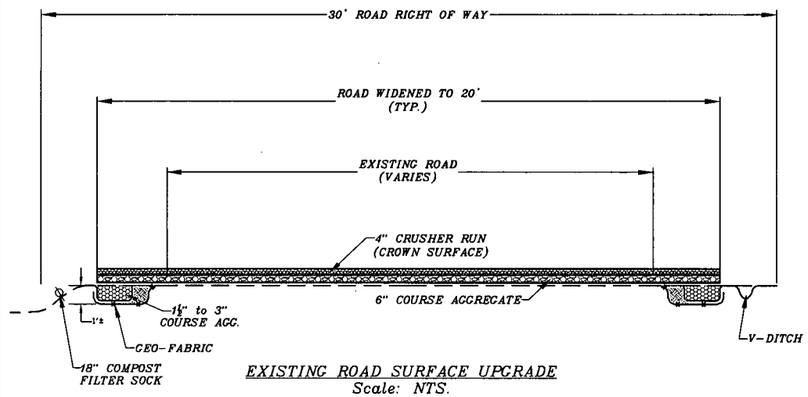
CROSS-SECTION OF A CROWNED ROADWAY AT CULVERT
(Not To Scale)



Shoulder Stabilization at Culvert
(TYP.)



Shoulder Stabilization
(Typ.)



EXISTING ROAD SURFACE UPGRADE
Scale: NTS.

NOTE: FOR FULL DEPTH RECLAMATION, THE ROAD SURFACE WILL BE SCARIFIED TO A DEPTH OF 14", CEMENT APPLIED AT A RATE DETERMINED BY THE GEO-TECHNICAL ENGINEER & 6" OF CRUSHER RUN CAPPED AS THE CROWNED FINAL SURFACE.

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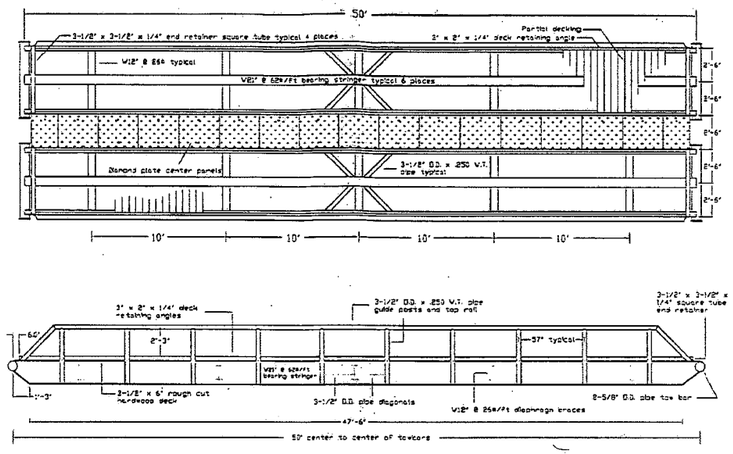
Details
Road Upgrade
Sheet 5 of 24
Ritchie Co., WV Sec. Routes (10) (19/7) & (19/2)
Doddridge Co. WV Sec. Route (19/4)

ADM Welding & Fabrication
37 Broadhead Street Warren, PA 16365
Phone: 814-723-7227 Fax: 814-723-7326
www.admwelding.com admwelding@verizon.net

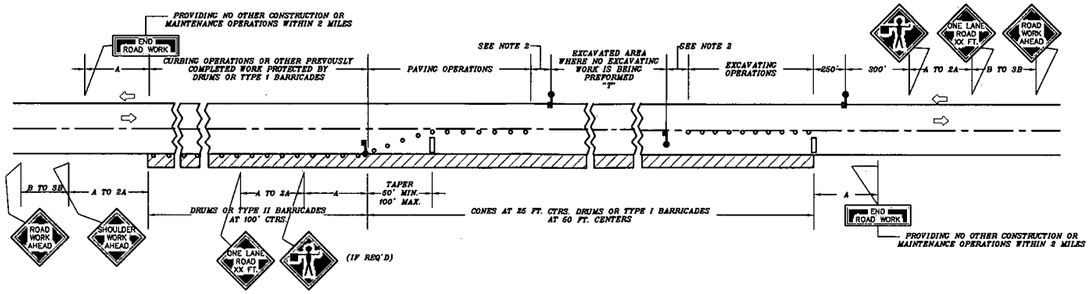
50' Portable Bridge
Assembled Framing Plan



Notes
- Railing and full sheer deck not shown for framing clarity
- W21" @ 62#/ft bearing stringers located on 2'6" centers
- W12" @ 26#/ft diaphragms typical 20 locations
- 3-1/2" O.D. pipe diagonals typical 8 locations
- 3-1/2" square tube end retainers typical 4 locations
- 3" x 2" x 5/16" retainer angles typical 4 locations - full length of bridge
- 3-1/2" x 6" white oak hardwood decking typical

50' BRIDGE (3 REQ'D) SHEET 18
30' BRIDGE (1 REQ'D) SHEET 18
50' BRIDGE (1 REQ'D) SHEET 22

TRAFFIC CONTROL



GENERAL NOTES

1. WHERE DISTANCE "I" EXCEEDS 1,500 FT. ADDITIONAL ONE LANE ROAD 1,000 FT., AND FLAGGER SIGNS (AS NECESSARY) SHALL BE INSTALLED. TRUCK CONES, DRUMS, OR BARRICADES MAY BE REMOVED THROUGH THE "I" AREA. AN ADDITIONAL TAPER SHALL BE FORMED BY CONES OR DRUMS IN ADVANCE OF THE EXCAVATING OPERATIONS. ADDITIONAL FLAGGERS WILL BE REQUIRED AND THE EXCAVATED AREA SHALL BE PROTECTED BY DRUMS OR TYPE II BARRICADES AT 50 FT. CENTERS.
2. MINIMUM DISTANCE IS 100 FT. WHEN "I" EXCEEDS 1,000 FT. DISTANCE SHALL BE 250 FT.
3. NO PAVING OR EXCAVATING OPERATIONS SHALL BE PERFORMED AT NIGHT UNLESS AUTHORIZED BY THE ENGINEER. WHEN THESE OPERATIONS ARE SUSPENDED ALL VEHICLES AND EQUIPMENT INCLUDING APPROPRIATE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE PAVEMENT AND THE EXCAVATED AREA SHALL BE PROTECTED BY DRUMS OR TYPE II BARRICADES AT 50-FOOT CENTERS. ROAD WORK AHEAD AND SHOULDER WORK AHEAD SIGNS SHALL BE INSTALLED AS SHOWN TO PROTECT THE CURING OPERATIONS. ROAD WORK AHEAD AND ROAD WORK 1,000 FT. SIGNS SHALL BE INSTALLED FOR TRAFFIC IN THE OPPOSITE DIRECTION.
4. CONSTRUCTION OPERATIONS SHALL BE CONFINED TO ONE TRAFFIC LANE AT A TIME LEAVING THE OPPOSITE LANE OPEN TO TRAFFIC. AT LEAST 20 FT. OF BOTH TRAFFIC LANES SHALL BE MAINTAINED FREE FROM OBSTRUCTIONS AT INTERVALS NOT LARGER THAN 2,000 FT. ONE-WAY TRAFFIC CONTROL SHALL NOT BE USED AT APPROVED FOR ANY PROJECT EXPECTED TO EXCEED 5,000 FT. IN LENGTH INCLUDING BOTH TAPER AND ROAD WORK AREA.
5. THE FLAGGERS SHALL BE IN SIGHT OF EACH OTHER OR IN DIRECT COMMUNICATION AT ALL TIMES.
6. ALL SIGNS SHALL BE POST MOUNTED IF THE CLOSURE TIME EXCEEDS THREE DAYS.
7. WHEN A SIDE ROAD INTERSECTS THE HIGHWAY ON WHICH WORK IS BEING PERFORMED ADDITIONAL TRAFFIC CONTROL DEVICES SHALL BE ERECTED AS DIRECTED BY THE ENGINEER.

FLASHING WARNING LIGHTS AND/OR FLAGS MAY BE USED TO CALL ATTENTION TO THE ABOVE WARNING SIGNS, AS NEEDED OR THE PLANS , AND/OR AS DIRECTED BY THE ENGINEER.

SYMBOLS

- WORK AREA
- SIGN
- CONES OR DRUMS (TYPE II BARRICADES OPTIONAL) AS APPLICABLE
- SIGN ON PORTABLE OR PERMANENT SUPPORT
- FLAGGER WITH PADDLE (IF REQ'D)
- TYPE II BARRICADE
- CHANNELIZATION DEVICES (DRUMS OR CONES)

SUGGESTED ADVANCE WARNING SIGN SPACING

	ROAD TYPE	DISTANCE BETWEEN SIGNS (FEET) A	B	C
(WV RTE 23)	URBAN (LOW SPEED)*	100	100	100
WV SEC. RTE 9 WV SEC. RTE 24	URBAN (HIGH SPEED)*	350	350	350
	RURAL	500	500	500
	EXPRESSWAY/FREEWAY	1,000	1,000	2,640

* SPEED CATEGORY TO BE DETERMINED BY WV DOH

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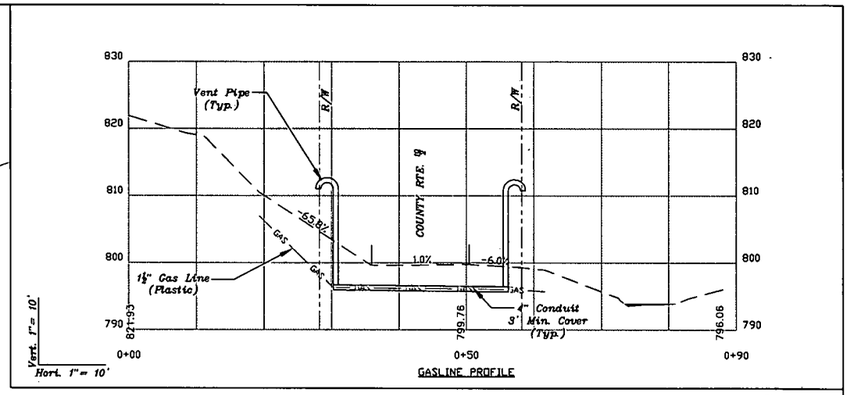
Details
Road Upgrade
Sheet 6 of 24
Ritchie Co., WV Sec. Routes 10 47 & 47
Doddridge Co. WV Sec. Route 47



GASLINE PROFILE

Notes: The surface of Rte. 50 is gravel. The casing will be installed by open cut method. Install sediment fence downslope of all disturbed areas. Seed and mulch as soon as practical.

SEE SHEET 18

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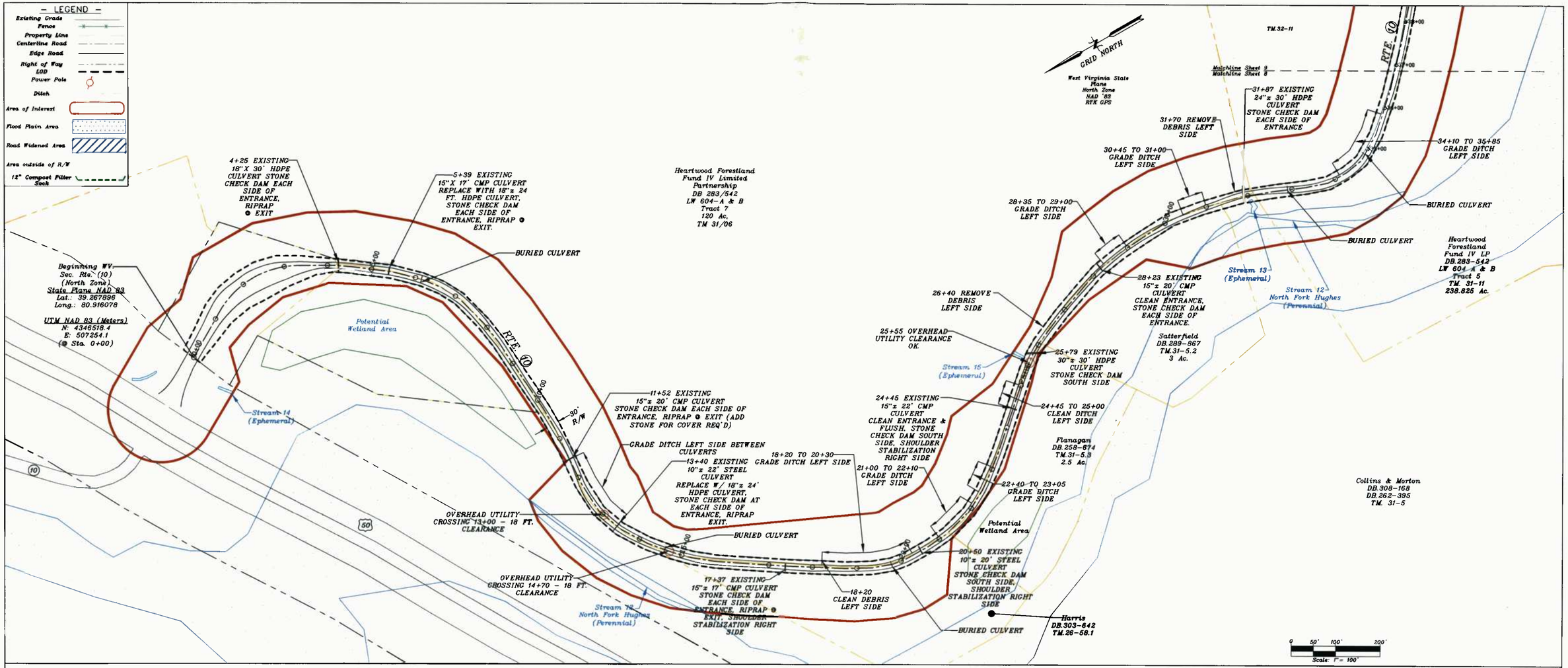
Jackson Surveying Inc.

Gasline Detail
Road Upgrade

Sheet 7 of 24

Ritchie Co., WV Sec. Routes (10) (47) & (47/2)
Doddridge Co. WV Sec. Route (47)



NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
4+25	18"X 30' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
5+39	18"X 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
11+52	15"X 18' CMP	STONE CHECK DAM	RIP RAP	DITCH	0	136
11+52	GRADE DITCH	N/A	N/A	DITCH	0	712
13+40	18"X 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
17+37	15"X 22' CMP	STONE CHECK DAM	RIP RAP	DITCH	0	136
18+20	GRADE DITCH	N/A	N/A	DITCH	0	800
20+50	10"X 18' STEEL	STONE CHECK DAM	N/A	DITCH	0	136
21+00	GRADE DITCH	N/A	N/A	DITCH	0	440
22+40	GRADE DITCH	N/A	N/A	DITCH	0	260
24+45	GRADE DITCH	N/A	N/A	DITCH	0	220
24+45	15"X 20' CMP	STONE CHECK DAM	RIP RAP	DITCH	0	136
24+45	Shoulder Stabilization	N/A	N/A	DITCH	0	24
25+79	30"X 30' HDPE	STONE CHECK DAM	N/A	EPHEMERAL	0	136
28+23	15"X 20' CMP	STONE CHECK DAM	N/A	DITCH	0	136
28+35	GRADE DITCH	N/A	N/A	DITCH	0	260
30+45	GRADE DITCH	N/A	N/A	DITCH	0	220
31+87	24"X 30' HDPE	STONE CHECK DAM	N/A	EPHEMERAL	0	136
34+10	GRADE DITCH	N/A	N/A	DITCH	0	300

Total Sheet 8 Disturbed Area=	4596 sq ft
	0.11 Ac

NOTE:
CONTRACTOR SHALL INSTALL "CAUTION OVERHEAD UTILITY" SIGNS APPROXIMATELY 50 FEET EACH SIDE OF UTILITY (OR GROUPS OF UTILITIES) FACING THE TRAFFIC FLOW DIRECTION.

CONTRACTOR SHALL INSTALL "SLOW-15 MPH" SIGNS AT EACH END OF PROJECT & APPROXIMATELY 2000 FEET INTERVALS THROUGH THE PROJECT AREA.

0+00 to 82+00 will be crusher run overlay.

82+00 to 141+00 will be FDR.

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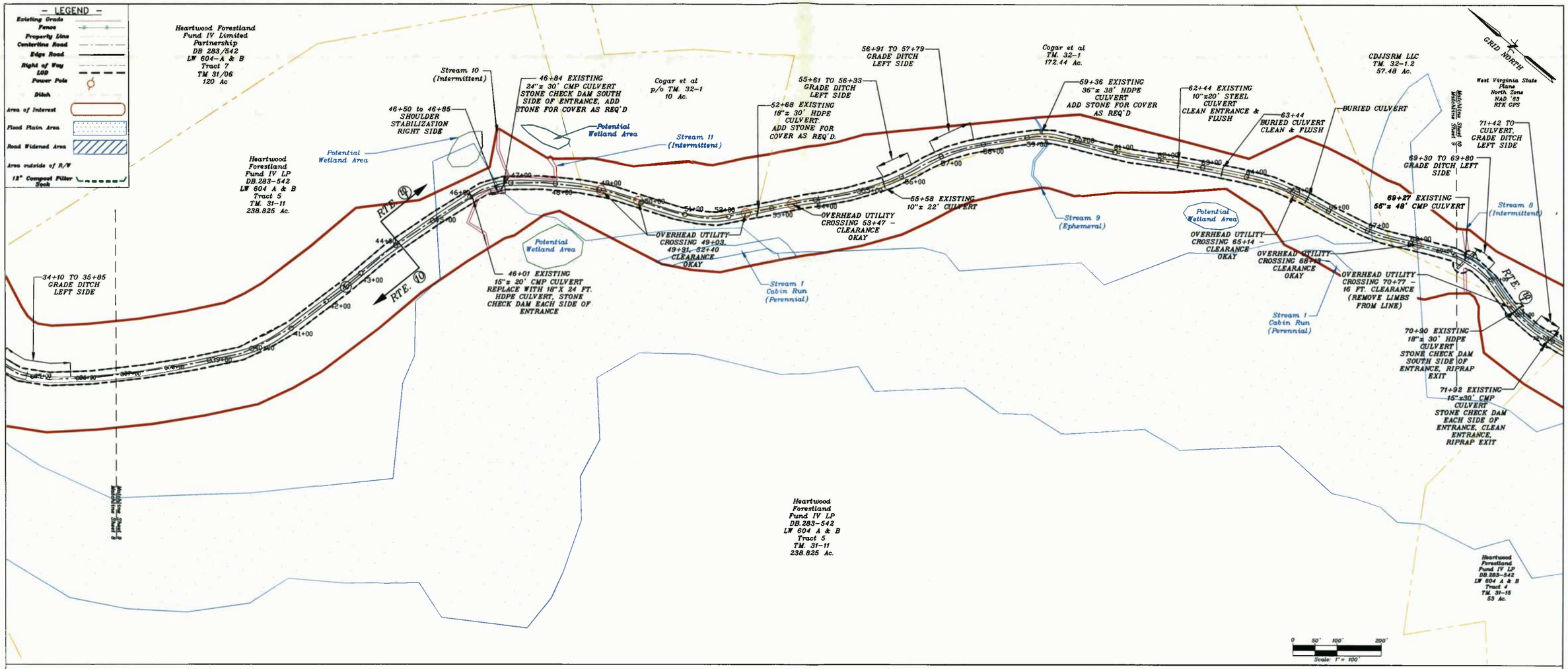
Plan
Road Upgrade
Sheet 8 of 24
Ritchie Co., WV Sec. Routes (10) (19/7) & (19/2)
Doddridge Co. WV Sec. Route (19/4)



NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
46+01	18"x 24' HDPE	STONE CHECK DAM	N/A	DITCH	0	136
46+50	SHOULDER STABILIZATION	N/A	N/A	INTERMITTENT	35'	210
46+84	24"X 30' CMP	STONE CHECK DAM	N/A	INTERMITTENT	0	136
52+68	18"X 30' HDPE	N/A	N/A	DITCH	0	136
55+58	10"X 21'	STONE CHECK DAM	N/A	DITCH	0	136
55+61	GRADE DITCH	N/A	N/A	DITCH	0	288
56+91	GRADE DITCH	N/A	N/A	DITCH	0	352
59+36	36"X 38' HDPE	N/A	N/A	EPHEMERAL	0	152
62+44	10" STEEL	N/A	N/A	DITCH	0	136
63+44	CULVERT	N/A	N/A	DITCH	0	136

Total Sheet 9 Disturbed Area=	1,818 sq ft
	0.04 Ac

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Plan
Road Upgrade
Sheet 9 of 24
Ritchie Co., WV Sec. Routes 10 (9) & (9/2)
Doddridge Co. WV Sec. Route (9/8)

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
69+27	55"x 64"X 48' CMP	STONE CHECK DAM	N/A	INTERMITTENT	0	288
69+30	GRADE DITCH	N/A	N/A	DITCH	0	200
70+90	18"x 30' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
71+42	GRADE DITCH	N/A	N/A	DITCH	0	200
71+92	15"x 30' CMP	STONE CHECK DAM	RIP RAP	DITCH	0	136
75+09	15"x 20' CMP	STONE CHECK DAM	RIP RAP	DITCH	0	136
					Total Sheet 10 Disturbed Area=	1096 sq ft
						0.03 Ac

— LEGEND —

Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

GRID NORTH

West Virginia State Plane North Zone NAD '83 RTK GPS

Stream B (Intermittent)

69+30 TO 69+80 GRADE DITCH LEFT SIDE

69+27 EXISTING 55"x 64"x 48' CMP CULVERT

RTE. 47

70+00

90' R/W

OVERHEAD UTILITY CROSSING 70+77 – 16 FT. CLEARANCE (REMOVE LIMBS FROM LINE)

71+00

70+90 EXISTING 18"x 30' HDPE CULVERT STONE CHECK DAM SOUTH SIDE OF ENTRANCE, RIPRAP EXIT

71+42 TO CULVERT. GRADE DITCH LEFT SIDE

72+00

71+92 EXISTING 15"x30' CMP CULVERT STONE CHECK DAM EACH SIDE OF ENTRANCE, CLEAN ENTRANCE, RIPRAP EXIT

CDJJSRM LLC DB.289–863 TM. 32–1.2 57.48 Ac.

73+00

74+00

OVERHEAD UTILITY CROSSING 74+25 CLEARANCE OKAY

75+09 EXISTING 15"x 20' CMP CULVERT CLEAN ENTRANCE RIPRAP EXIT

75+00

OVERHEAD UTILITY CROSSING 76+13 CLEARANCE OKAY

RTE. 47

76+00

CDJJSRM LLC DB.289–863 TM. 32–1.1 57.48 Ac.

Heartwood Forestland Fund IV LP DB.283–542 LW 604 A & B Tract 4 TM. 31–15 53 Ac.

Stream 1 Cabin Run (Perennial)

Heartwood Forestland Fund IV LP DB.283–542 LW 604 A & B Tract 5 TM. 31–11 238.825 Ac.

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 10 of 24
Ritchie Co., WV Sec. Routes 10 10/1 & 10/2
Doddridge Co. WV Sec. Route 10/4

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
77+37	CLEAN DITCH	N/A	N/A	DITCH	0	360
79+87	GRADE DITCH	N/A	N/A	DITCH	0	668
82+82	42"x 54"x 30' CMP	N/A	N/A	PERENNIAL	0	228
83+20	18"x 30' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
N/A	ROAD WIDENING	N/A	N/A	N/A	N/A	600
					Total Sheet 11 Disturbed Area	1992 sq ft
						0.05 Ac

= LEGEND =

Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

CDJJSRM LLC
DB.289-863
TM. 32-1.2
57.48 Ac.

CDJJSRM LLC
DB.289-863
TM. 32-1.1
57.48 Ac.

77+37 TO 78+27
CLEAN DITCH LEFT SIDE

79+87 TO 81+54
CLEAN DITCH LEFT SIDE

0+00 TO 82+00
WILL BE 4" CRUSHER RUN OVERLAY

82+00 TO 141+00
WILL BE FDR

83+29 EXISTING
12"x63' HDPE CULVERT
STONE CHECK DAM EACH SIDE OF ENTRANCE

83+20 EXISTING
12"x24.5' CMP CULVERT
REPLACE W/ 18"X 30' HDPE CULVERT
STONE CHECK DAM SOUTHSIDE, RIPRAP EXIT

82+82 EXISTING
42"x 54"x 30' CMP CULVERT
ADD STONE FOR COVER AS REQ'D

83+21 TO 83+42
STONE DRIVEWAY APPROACH
RIGHT SIDE

GRID NORTH
West Virginia State Plane
North Zone
NAD '83
RTK GPS

RTE. 19
77+00
78+00
79+00
80+00
81+00
82+00
83+00

OVERHEAD UTILITY CROSSING 78+93
CLEARANCE OKAY

OVERHEAD UTILITY CROSSING 81+05
CLEAR ANCE OKAY

Entrance to EXT Pad

Potential Wetland Area

Stream 7 (Perennial)

McCain
DB.241-592
TM. 32-2.1
18.312 Ac.

Heartwood Forestland Fund IV LP
DB.283-542
LW 604 A & B
Tract 4
TM. 31-15
53 Ac.

__ Ft. Emphemeral Stream Impact

NOTE: Stream Delineation may not match field locations due to GPS inconsistencies.

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 11 of 24
Ritchie Co., WV Sec. Routes 10 10/1 & 10/2
Doddridge Co. WV Sec. Route 19

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
84+15	15"x 15' HDPE	N/A	N/A	DITCH	0	76
85+50	18"x 40' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	176
86+00	ROAD WIDENING	N/A	N/A	N/A	0	18197
					Total Sheet 12 Disturbed Area	18449
						0.42 Ac

GRID NORTH
West Virginia State Plane North Zone NAD '83 RTK GPS

- LEGEND -
- Existing Grade
- Fence
- Property Line
- Centerline Road
- Edge Road
- Right of Way LOD
- Power Pole
- Ditch
- Area of Interest
- Flood Plain Area
- Road Widened Area
- Area outside of R/W
- 12" Compost Filter Sock

Heartwood Forestland Fund IV LP DB.283-542 LW 604 A & B Tract 6 TM. 32-10 74.66 Ac.

CDJJSRM LLC DB.289-863 TM. 32-1.1 57.48 Ac.

84+15 EXISTING 6"±8.5' CULVERT REPLACE W/ 15"X 15' HDPE CULVERT, STONE DRIVE ENTRANCE, REPLACE MAILBOX

Stump

6" Walnut

RTE. 10

84+00

85+00

8" Walnut

12" Walnut

OVERHEAD UTILITY CROSSING 85+20 CLEARANCE OKAY

85+50 EXISTING 12"±40' CMP CULVERT REPLACE W/ 18"X 40' HDPE, STONE CHECK DAM SOUTHSIDE

30' R/W

86+00

RTE. 10

83+29 EXISTING 12"± 63' HDPE CULVERT STONE CHECK DAM EACH SIDE OF ENTRANCE

McClain DB.241-592 TM. 32-2.1 18.312 Ac.

SHAVE ROCK FACE BACK TO R/W 85+80 TO GAS LINE & FROM GAS LINE TO 90+70

EXISTING GASLINE

90+55 REMOVE 10" ASH
90+67 REMOVE 24" HICKORY

87+00

GUARDRAIL (TYP.)

MOVE 4-STRAND BARB WIRE FENCE BACK TO R/W LINE FROM 85+50 TO 96+85

88+00

89+00

90+00

RTE. 10

87+13 TO 88+38 INSTALL GUARDRAIL RIGHT SIDE

Use caution when grading around gasline

88+86 REMOVE 28" WALNUT
89+07 REMOVE 12" WALNUT

McClain DB.241-592 TM. 32-2.1 18.312 Ac.

Stream 1 Cabin Run (Perennial)

91+07 TO 91+43 INSTALL GUARDRAIL RIGHT SIDE

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 12 of 24
Ritchie Co., WV Sec. Routes 10 19 & 19/2
Doddridge Co. WV Sec. Route 19/7

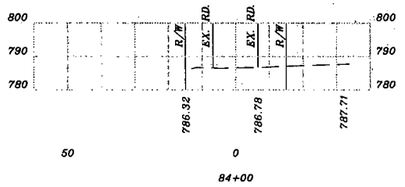
— LEGEND —

Existing Grade

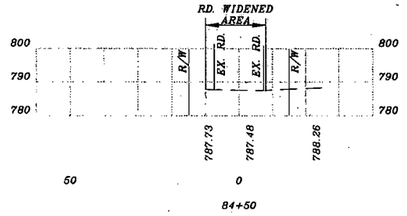
Proposed Grade

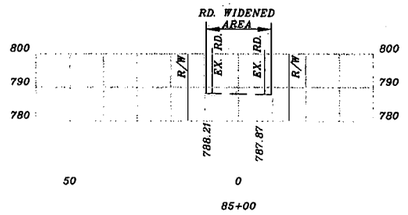
Proposed Cut

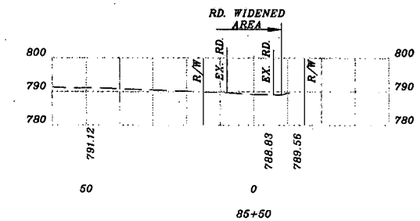
Proposed Fill

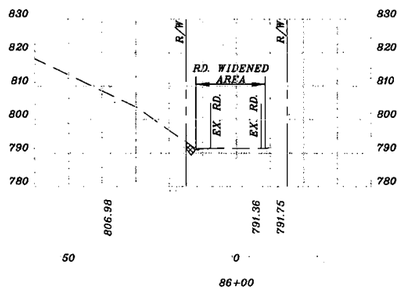


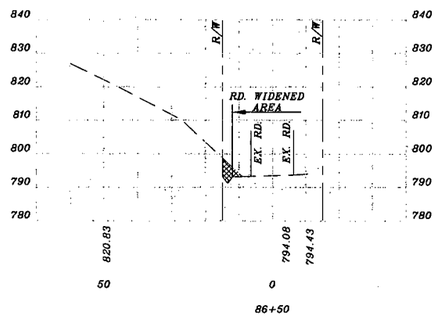
Vert. 1" = 20'
Horiz. 1" = 20' (Typ.)

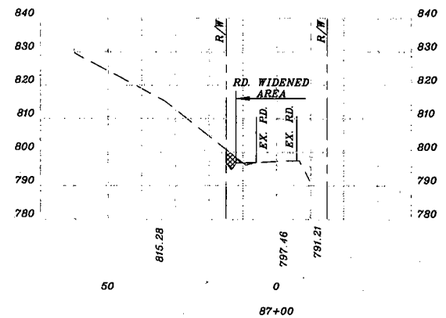


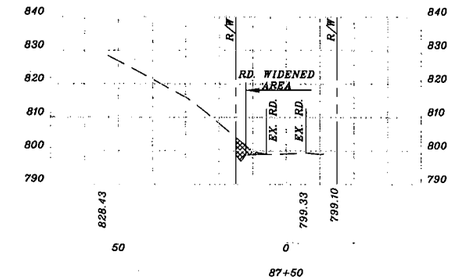


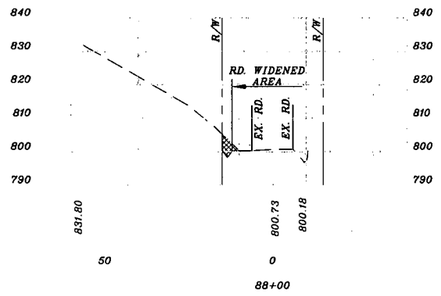


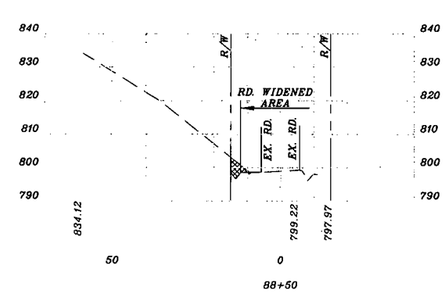


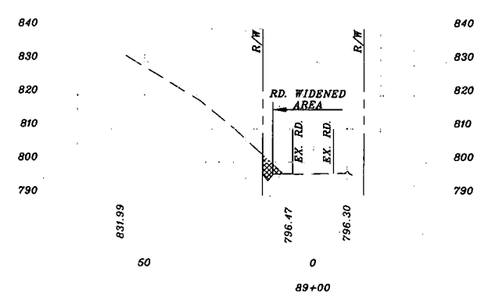


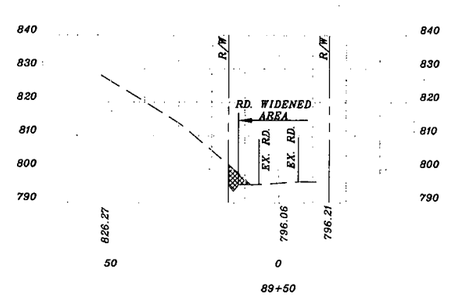


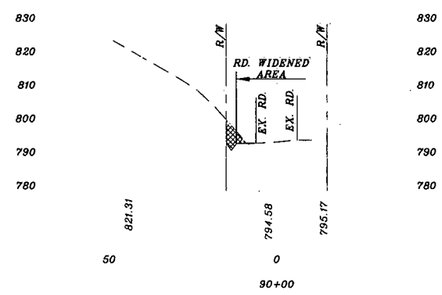


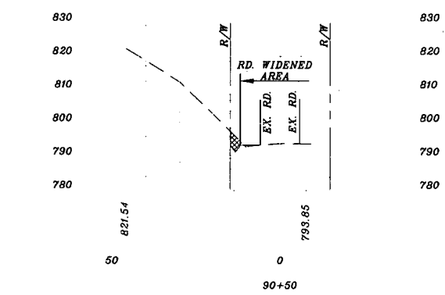


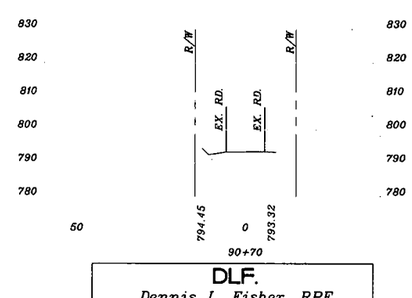












NOTE: Shave rock face back to Right of Way from 85+80 to gas line and from gas line to 90+70.

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N
W — JACKSON SURVEYING INC. — E
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Jackson Surveying Inc.

Cross Sections
Road Upgrade

Sheet 13 of 24

Ritchie Co., WV Sec. Routes 10 (10/7) & (10/2)

Doddridge Co. WV Sec. Route (12/4)

GRID NORTH

West Virginia State Plane
North Zone
NAD '83
RTK GPS

McClain
DB.241-592
TM. 32-2.1
18.312 Ac.

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
92+42	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
94+31	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
96+87	18"x 24' HDPE	STONE CHECK DAM	N/A	N/A	0	136
N/A	ROAD WIDENING	N/A	N/A	N/A	0	5600
					Total Sheet 14 Disturbed Area=	6008 sq ft
						0.14 Ac

- LEGEND -

- Existing Grade
- Fence
- Property Line
- Centerline Road
- Edge Road
- Right of Way LOD
- Power Pole
- Ditch
- Area of Interest
- Flood Plain Area
- Road Widened Area
- Area outside of R/W
- 12" Compost Filter Sock

Clark
DB.235-688
TM. 32-4.1
20.306 Ac.

94+31 TO 95+81
CLEAN DITCH
LEFT SIDE

96+87 EXISTING
12"±21' CULVERT
REPLACE W/ 18"± 24"
HDPE. STONE CHECK
DAM EACH SIDE OF
ENTRANCE

90+67
REMOVE 24" HICKORY

93+58 REMOVE 18" HICKORY

RTE. 19/2

91+00 92+00 93+00 94+00 95+00 96+00 97+00

89+07 TO 91+43
INSTALL GUARDRAIL
RIGHT SIDE

92+42 EXISTING
10"±19' CULVERT
REPLACE W/-18"X 24' FT. HDPE
STONE CHECK DAM EACH
SIDE ENTRANCE. RIPRAP EXIT

Stream 1
Cabin Run
(Perennial)

Clark
DB.235-688
TM. 32-4.1
20.306 Ac.

94+31 EXISTING
12"±17' CULVERT.
REPLACE W/ 18"X 24' HDPE.
STONE CHECK DAM
EACH SIDE ENTRANCE.
RIPRAP EXIT

95+19 REMOVE
14" DOUBLE ASH

95+85 REMOVE
STUMP

McClain
DB.241-592
TM. 32-2.1
18.312 Ac.

Clark
TM. 32-4.1
20.306 Ac.

Vert. 1" = 10'
Horiz. 1" = 10'

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 14 of 24
Ritchie Co., WV Sec. Routes 10 19/1 & 19/2
Doddridge Co. WV Sec. Route 19

GRID NORTH

West Virginia State Plane
North Zone
NAD '83
RTK GPS

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
98+00	ROAD WIDENING	N/A	N/A	N/A	0	6392
97+34	STEP BLOCK WALL	N/A	N/A	PERENNIAL	83'	900
99+11	CULVERT	N/A	N/A	DITCH	0	136
99+82	24"x 40' HDPE	N/A	N/A	INTERMITTENT	12'	176
99+84	STAGING AREA	N/A	N/A	N/A	0	1896
101+20	CULVERT	N/A	N/A	DITCH	0	136
N/A	ROAD WIDENING	N/A	N/A	N/A	0	3200
					Total Sheet 15 Disturbed Area:	12836 sq ft
						0.29 Ac

– LEGEND –

- Existing Grade
- Fence
- Property Line
- Centerline Road
- Edge Road
- Right of Way LOD
- Power Pole
- Ditch
- Area of Interest
- Flood Plain Area
- Road Widened Area
- Area outside of R/W
- 12" Compost Filter Sock

99+11 BURIED CULVERT CLEAN ENTRANCE & FLUSH

Heartwood Forestland Fund IV LP DB.283-542 LW 604 A & B Tract 6 TM. 32-10 74.66 Ac.

98+84 TO 99+60 MOVE 3 STRANDS OF BARB WIRE BACK TO R/W LINE

Stream 6 (Intermittent)

99+82 EXISTING 24"x30' HDPE CULVERT - EXTEND 10'

98+86 TO 99+08 REMOVE 12" SYCAMORE, 10" ASH, 24" SYCAMORE

Clark DB.235-688 TM. 32-4.1 20.306 Ac.

STA. 101+20 BURIED CULVERT CLEAN ENTRANCE & FLUSH

NOTE: Shave rock face back to R/W 97+00 to 99+82

99+00

100+00

101+00

102+00

103+00

90' R/W

RTE. 19 104+00

98+00

CABIN RUN

TOP 89'
BOTTOM 75'

Edge Water (Typ.)

Stream 1 Cabin Run (Perennial)

WELL & PUMP JACK

101+00 TO 102+96 MOVE 3 STRANDS OF BARB WIRE BACK TO R/W LINE

102+98 TO 103+35 STONE DRIVE APPROACH RIGHT SIDE

104+12 TO 106+46 MOVE 3 STRANDS OF BARB WIRE BACK TO R/W

99+84 TO 101+00 INSTALL STAGING AREA RIGHT SIDE

98+05 TO 98+80 INSTALL STEP BLOCK WALL (see detail sheet 2 & note below)

Clark DB.235-688 TM. 32-4.1 20.306 Ac.

97+34 TO 98+80 INSTALL STANDARD GUARDRAIL

Gas Line To Be Relocated

NOTE: Cabion baskets or crib blocks may be substituted for the step block wall on all wall sections shown. If an alternate wall is used, contractor shall obtain approval from DOH for guardrail attachment & placement. (see details on sheet 5)

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 15 of 24
Ritchie Co., WV Sec. Routes 10 19 & 19/2
Doddridge Co. WV Sec. Route 19/2

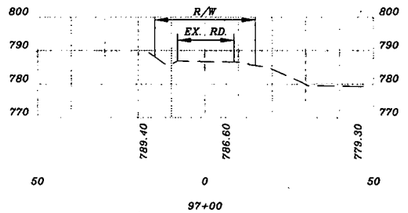
— LEGEND —

Existing Grade

Proposed Grade

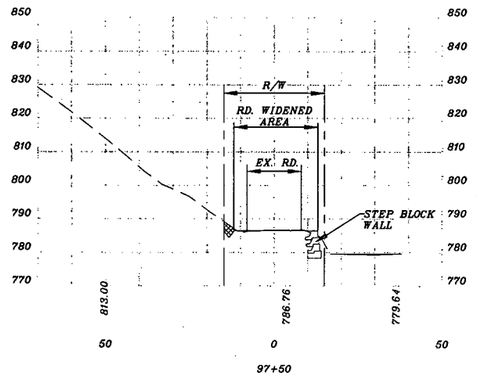
Proposed Cut

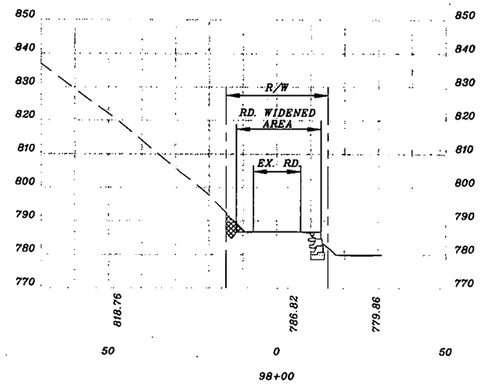
Proposed Fill

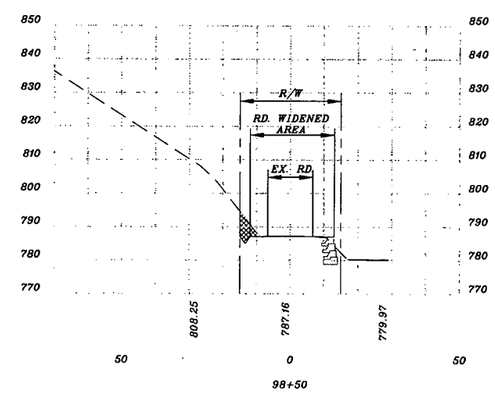


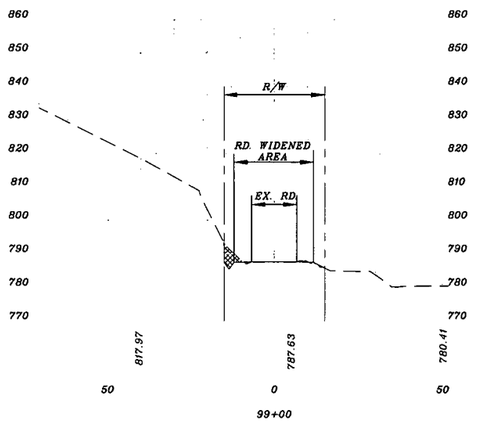
Vert. 1" = 20'

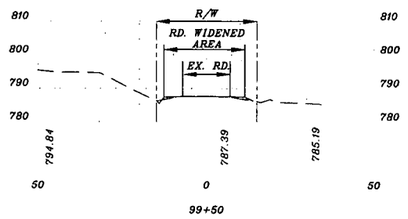
Horiz. 1" = 20' (Typ.)

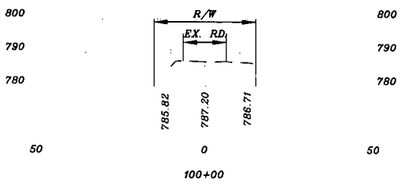












0 10' 20' 40'

Scale: 1" = 20'

NOTE: Shave rock face back to R/W 97+00 to 99+82.

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Jackson Surveying Inc.

Cross Sections

Road Upgrade

Sheet 16 of 24

Ritchie Co., WV Sec. Routes 10 (10/1) & (10/2)

Doddridge Co. WV Sec. Route (10/1)

GRID NORTH

West Virginia State Plane North Zone NAD '83 RTK GPS

- LEGEND -
Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way LSD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

107+07 TO 108+12
SHAVE BANK BACK TO R/W

KC Enterprises DB.246-175 TM. 32-7.1 12.11 Ac.

105+82
REMOVE 12" BUTTERNUT

108+58 & 108+73
REMOVE 12" ASH

New DB.253-231 TM. 32-6 0.997 Ac.

Clark DB.235-688 TM. 32-4.1 20.306 Ac.

104+62 INSTALL 18"X 24' HDPE, STONE CHECK DAM SOUTH SIDE, RIPRAP EXIT.

104+83
REMOVE 12" BUTTERNUT

Clark DB.235-688 TM. 32-4.1 20.306 Ac.

RTE. 19

0106+00

0107+90

0109+70

0110+00

Buried Culvert clean & flush

106+46
REMOVE 18" ASH

104+12 TO 106+46
MOVE 3 STRANDS OF BARB WIRE BACK TO R/W

KC Enterprises DB.246-175 TM. 32-7.1 12.11 Ac.

108+12 TO 110+40
DAYLIGHT ROAD EDGE
RIGHT SIDE & MOVE FENCE

110+40
REMOVE 8" BUTTERNUT

110+50

111+00

110+95 INSTALL 18"X 26' HDPE W/ STONE CHECK DAM @ EACH SIDE OF ENTRANCE & RIPRAP EXIT

830

820

810

Clark DB.235-688 TM. 32-4.1 20.306 Ac.

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
104+62	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
107+07	SHAVE BANK	N/A	N/A	N/A	0	1260
N/A	ROAD WIDENING	N/A	N/A	N/A	0	4000
					Total Sheet 17 Disturbed Area=	5396 sq ft
						0.12 Ac

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 17 of 24
Ritchie Co., WV Sec. Routes 10 19/7 & 19/2
Doddridge Co. WV Sec. Route 19/8

– LEGEND –

Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

GRID NORTH

West Virginia State Plane
North Zone
NAD '83
RTK GPS

Stream 5 (Intermittent)

113+58 EXISTING 4'x 41' CMP CULVERT

Heartwood Forestland Fund IV LP
DB.253-671
LW 576 Tract 2
TM. 11-4
151 Ac.

Upgrade this portion of the road for general public use.

1½" Gas Line w/ 4" Casing To Be Installed (See Detail Sheet 7)

114+67 REMOVE 40" WHITE OAK

114+61 EXISTING 18"x 31' CMP CULVERT

(3) 12.5'x 50' BRIDGE (TEMPORARY) WITH GABION BASKET OR BIN BLOCKS SUPPORTS

Gate (each side)

CABIN

New
DB.253-231
TM. 32-6
0.997 Ac.

CABIN

STAGING AREA (GRAVEL)

Shave rock face for road widen area 110+50 to 112+10

ACCESS ROAD

12.5'x 30' BRIDGE

LAYDOWN AREA (GRAVEL)

Gabion Basket or Bin Blocks Support (Typ.)

Edge Water (Typ.)

STREAM

110+95 INSTALL 18"X 26' HDPE W/ STONE CHECK DAM @ EACH SIDE OF ENTRANCE & RIPRAP EXIT

EXISTING GAS LINE TO BE RELOCATED

OIL WELL & TANKS

1-½" Gas Line

Stream 1 Cabin Run (Perennial)

NOTE: SHAVE ROCK FACE BACK TO R/W 115+00 TO 116+00

Heartwood Forestland Fund IV LP
DB.253-671
LW 576 Tract 1
TM. 11-4.1
10.88 Ac.

30' R/W

116+00 TO 118+00 DAYLIGHT ROAD EDGE RIGHT SIDE TO R/W, SLOPE ROAD SURFACE TO LEFT SIDE.

NOTE: The portion of the road across the bridge will be gated and is not for public use. During drilling operations, Antero personnel will control traffic. After completion, the structure will be removed.

RTE. 19

– LEGEND –

Existing Grade
Proposed Grade
Proposed Cut
Proposed Fill

50' Temporary Bridge

Gabion Baskets or Bin Blocks (Typ.)

PROFILE

Vert. 1"= 30'
Horiz. 1"= 30'

820 / 810 / 800 / 790

-0.7% -0.2% 0.2% 1.5% 1.7% 0.5% 1.4% 0.8% -1.5% 0.0% 0.4% 2.9% 3.4% 11.8% 12.0% 10.6% 13.6% 15.4% 15.6% 15.3% 13.0% 9.9% 10.7% 0.5%
-0.9% -0.5% 1.8% 2.2% 0.1% 0.6% 10.1%

798.52 798.52 | 798.29 798.29 | 798.90 798.90 | 799.12 799.11 | 797.20 797.20 | 793.99 800.69 | 803.16 803.90 | 809.79 811.08 | 815.80 817.38

110+50 | 111+00 | 111+50 | 112+00 | 2+00 | 2+50 | 3+00 | 3+50 | 4+00

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
110+95	18"x 26' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
111+00	ROAD WIDENING	N/A	N/A	N/A	0	1768
112+00	LAYDOWN, STAGING & BRIDGE APPROACH	N/A	N/A	INTERMITTENT	0	16,210
115+00	ROAD WIDENING	N/A	N/A	N/A	0	677
N/A	ROAD WIDENING	N/A	N/A	N/A	0	2200
					Total Sheet 18 Disturbed Area=	20381 sq ft
						0.47 Ac

0 10' 20' 40'
Scale: 1" = 20'

KC Enterprises
DB.246-175
TM. 32-7.1
12.11 Ac.

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Plan & Profile
Road Upgrade
Sheet 18 of 24
Ritchie Co., WV Sec. Routes 10 19 & 19/2
Doddridge Co. WV Sec. Route 19

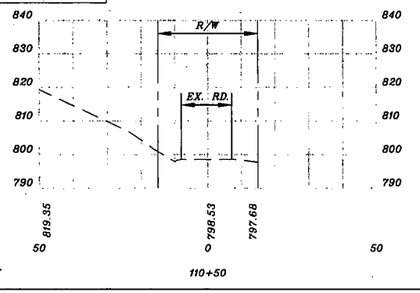
— LEGEND —

Existing Grade

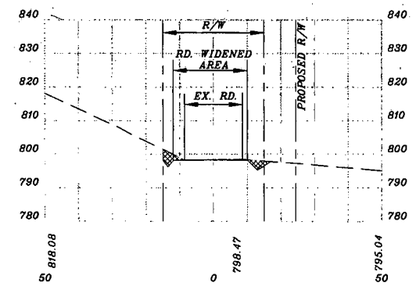
Proposed Grade

Proposed Cut

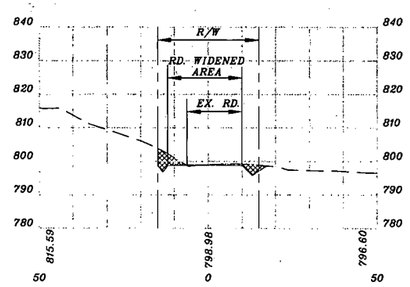
Proposed Fill



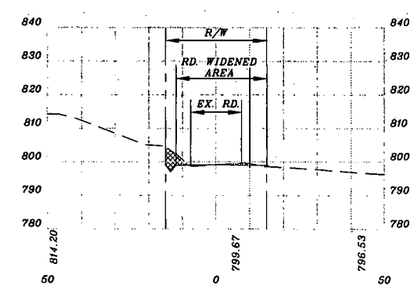
110+50



111+00

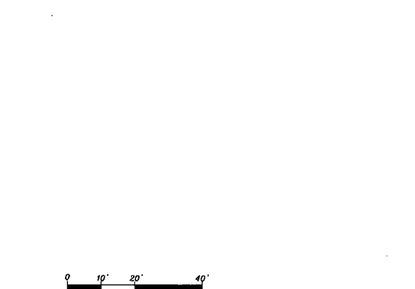


111+50



112+00

115+31



116+00

NOTE: Shave rock face back to R/W 115+00 to 116+00.

0 10' 20' 40'

Scale: 1" = 20'

DLF.

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Jackson Surveying Inc.

Cross Sections

Road Upgrade

Sheet 19 of 24

Ritchie Co., WV Sec. Routes (10) (10/1) & (10/2)

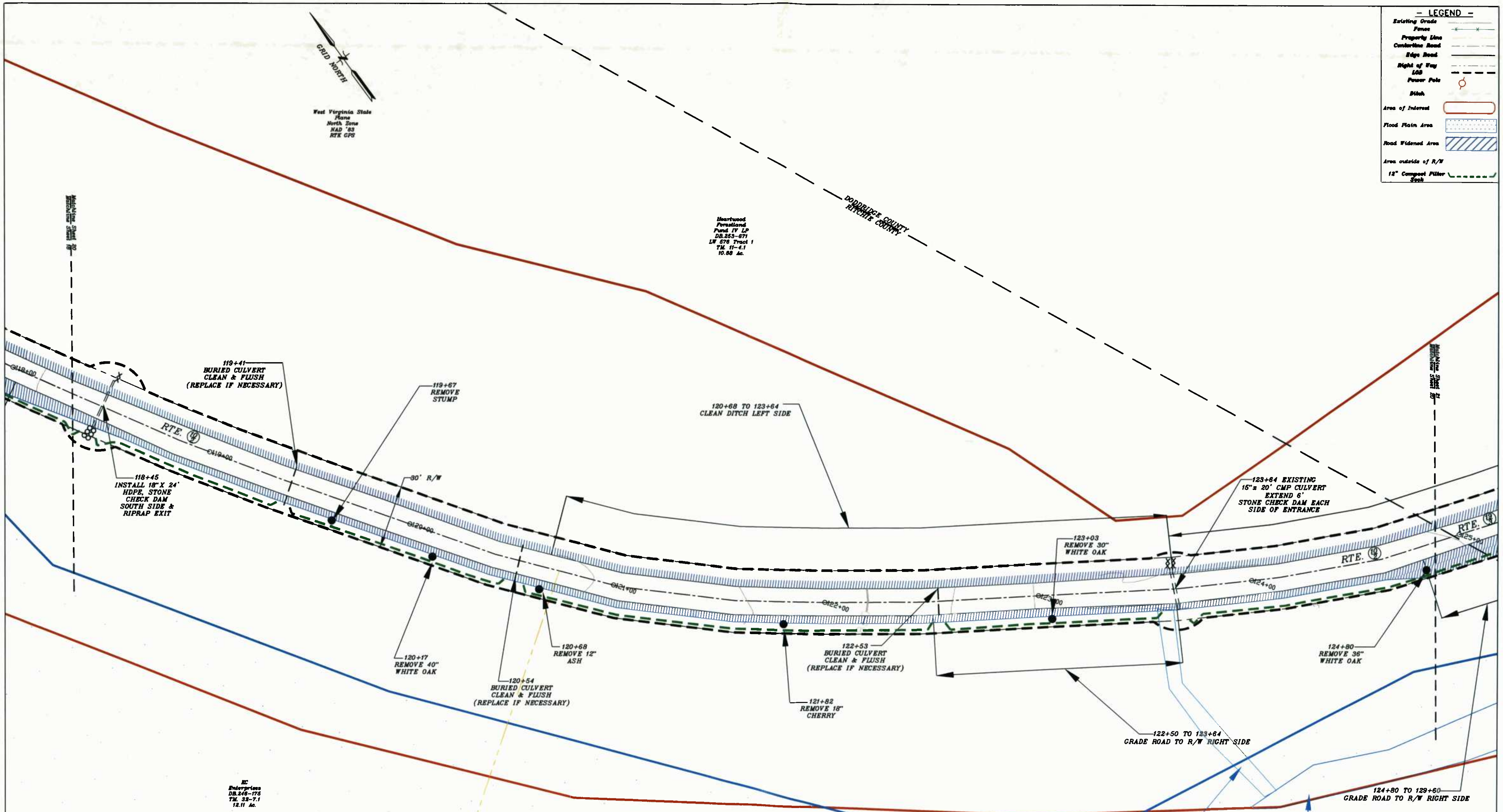
Doddridge Co. WV Sec. Route (19/4)

Jackson Survey, Inc. Professional Surveyors

677 W. Main St.

Clarksburg, WV 26301

304-623-5851



GRID NORTH
West Virginia State Plane North Zone NAD '83 RTK GPS
- LEGEND -
Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock
DODDRIDGE COUNTY
RITCHIE COUNTY
Heartwood Forestland Fund IV LP DB.253-671 LW 676 Tract 1 TM. 11-4.1 10.88 Ac.
119+41 BURIED CULVERT CLEAN & FLUSH (REPLACE IF NECESSARY)
119+67 REMOVE STUMP
120+68 TO 123+64 CLEAN DITCH LEFT SIDE
118+45 INSTALL 18" X 24' HDPE, STONE CHECK DAM SOUTH SIDE & RIPRAP EXIT
30' R/W
123+64 EXISTING 15"x 20' CMP CULVERT EXTEND 6' STONE CHECK DAM EACH SIDE OF ENTRANCE
123+03 REMOVE 30" WHITE OAK
120+17 REMOVE 40" WHITE OAK
120+68 REMOVE 12" ASH
120+54 BURIED CULVERT CLEAN & FLUSH (REPLACE IF NECESSARY)
122+53 BURIED CULVERT CLEAN & FLUSH (REPLACE IF NECESSARY)
121+82 REMOVE 18" CHERRY
124+80 REMOVE 36" WHITE OAK
122+50 TO 123+64 GRADE ROAD TO R/W RIGHT SIDE
124+80 TO 129+60 GRADE ROAD TO R/W RIGHT SIDE
EC Enterprises DB.246-175 TM. 32-7.1 12.11 Ac.
Church DB.245-144 TM. 32-8.1 12.86 Ac.
Stream 4 (Ephemeral)
Stream 1 Cabin Run (Perennial)

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
118+45	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
119+41	CULVERT	STONE CHECK DAM	RIP RAP	DITCH	0	136
120+54	CULVERT	STONE CHECK DAM	RIP RAP	DITCH	0	136
120+68	GRADE DITCH	N/A	N/A	DITCH	0	1184
122+53	CULVERT	STONE CHECK DAM	RIP RAP	DITCH	0	136
123+64	15"x 20' CMP	STONE CHECK DAM	N/A	EPHEMERAL	12'	136
N/A	ROAD WIDENING	N/A	N/A	N/A	0	5600
					Total Sheet 20 Disturbed Area	7464_sq ft
						0.17 Ac

0 10' 20' 40'
Scale: 1" = 20'

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Plan
Road Upgrade
Sheet 20 of 24
Ritchie Co., WV Sec. Routes 10, 10/1 & 10/2
Doddridge Co. WV Sec. Route 19/3

GRID NORTH

West Virginia State Plane
North Zone
NAD '83
RTK GPS

— LEGEND —
Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

Heartwood Forestland Fund IV LP
DB.253-671
LW 576 Tract 3
TM. 11-6
73.92 Ac.

Heartwood Forestland Fund IV LP
DB.253-671
LW 576 Tract 1
TM. 11-4.1
10.88 Ac.

123+64 TO 129+77
GRADE DITCH LEFT SIDE

Slip AREA

Stream 3
(Ephemeral)

TM. 32-8.1

129+27 EXISTING
14"x 20' CMP CULVERT
REPLACE W/ 18"X 24' HDPE,
STONE CHECK DAM EACH SIDE
ENTRANCE. (RELOCATE CAS LINE IN
EXISTING CULVERT)

Church
DB.267-397
TM. 32-9 & 9.1
7.86 Ac.

30' R/W

125+56
BURIED CULVERT
REPLACE W/ 18"X 24' HDPE,
STONE CHECK DAM EACH
SIDE OF ENTRANCE

RTE. 19

RTE. 19

RTE. 19

124+80 TO 129+60
GRADE ROAD TO R/W RIGHT SIDE

124+80
REMOVE 36"
WHITE OAK

Stream 1
Cabin Run
(Perennial)

TM. 32-9 & 9.1

Church
DB.245-144
TM. 32-8.1
12.867 Ac.

DODDRIDGE COUNTY
RITCHIE COUNTY

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
125+56	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	DITCH	0	136
N/A	GRADE DITCH	N/A	N/A	N/A	0	1600
N/A	ROAD WIDENING	N/A	N/A	N/A	0	3200
					Total Sheet 21 Disturbed Area	4936 sq ft
						0.11 Ac

0 10' 20' 40'
Scale: 1" = 20'

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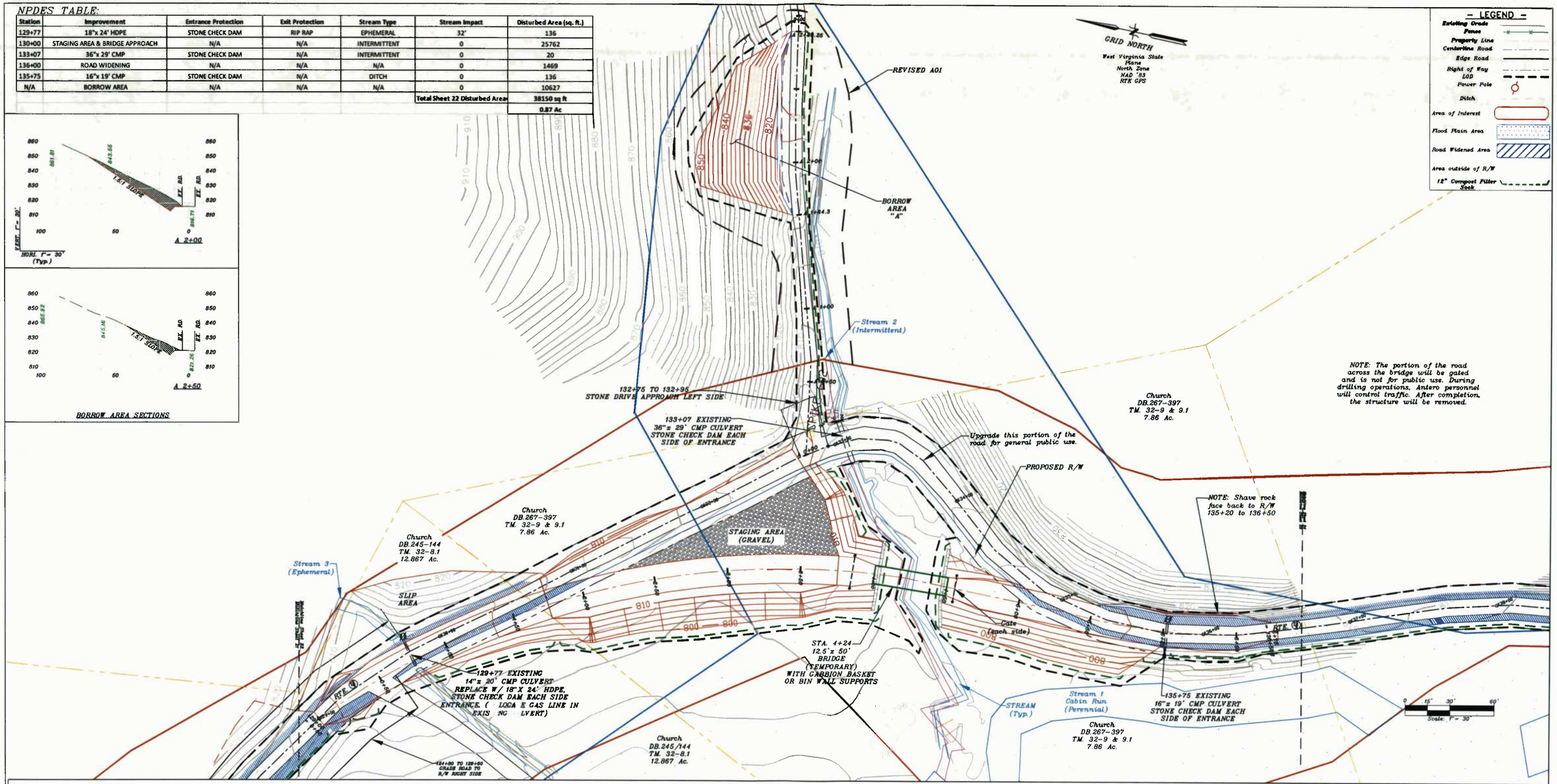
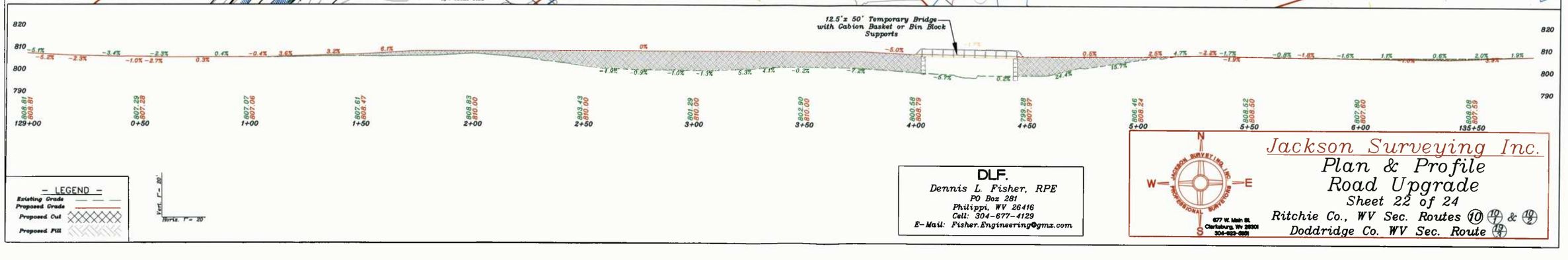
Plan
Road Upgrade
Sheet 21 of 24
Ritchie Co., WV Sec. Routes 10 49 & 49/2
Doddridge Co. WV Sec. Route 19

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
129+77	18"x 24' HDPE	STONE CHECK DAM	RIP RAP	EPHEMERAL	32'	136
130+00	STAGING AREA & BRIDGE APPROACH	N/A	N/A	INTERMITTENT	0	25762
133+07	36"x 29' CMP	STONE CHECK DAM	N/A	INTERMITTENT	0	20
136+00	ROAD WIDENING	N/A	N/A	N/A	0	1469
135+75	16"x 19' CMP	STONE CHECK DAM	N/A	DITCH	0	136
N/A	BORROW AREA	N/A	N/A	N/A	0	10627
					Total Sheet 22 Disturbed Area=	38150 sq ft
						0.87 Ac

BORROW AREA SECTIONS





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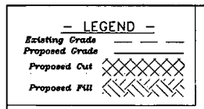
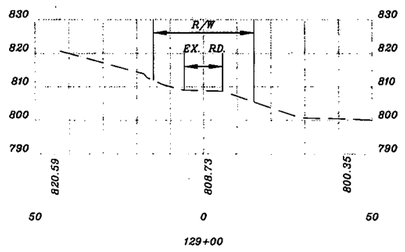
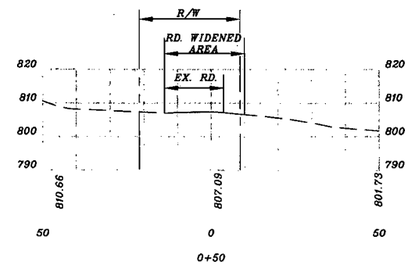
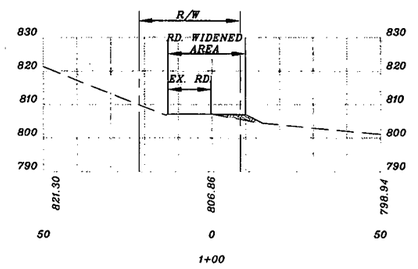
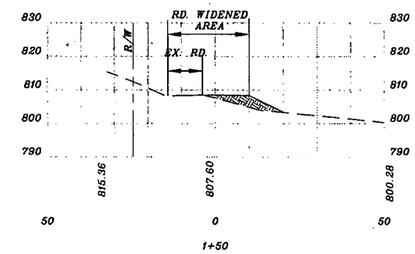
Plan & Profile
Road Upgrade
Sheet 22 of 24
Ritchie Co., WV Sec. Routes 10 (19/7) & (19/2)
Doddridge Co. WV Sec. Route 19

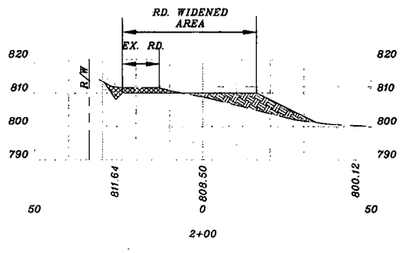


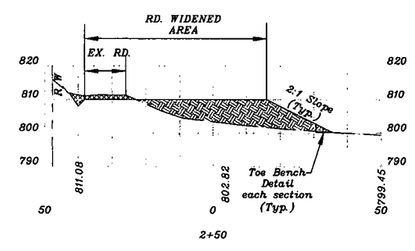


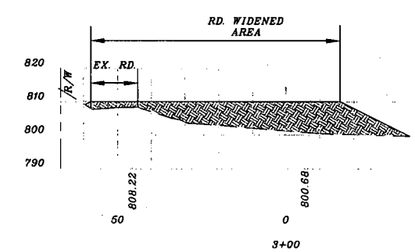


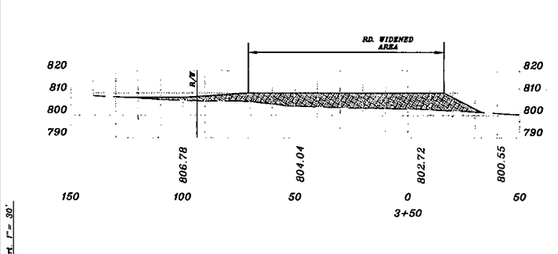


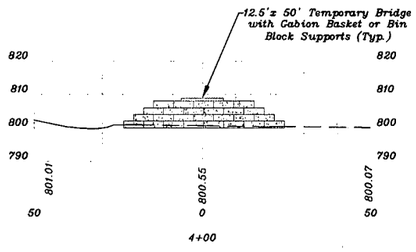


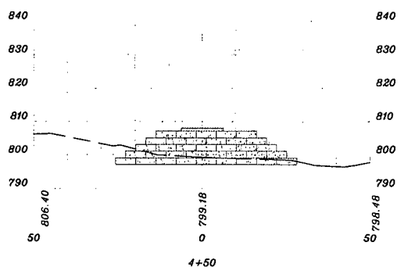


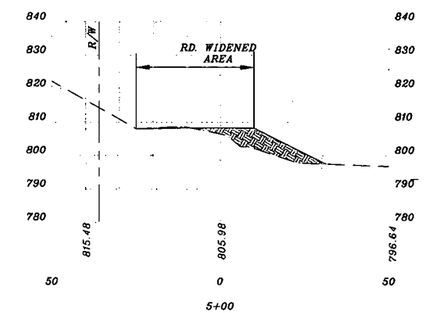


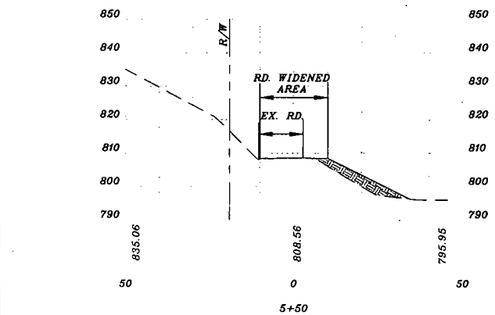


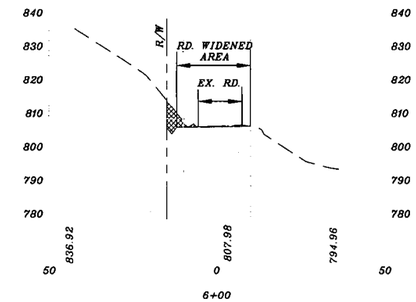


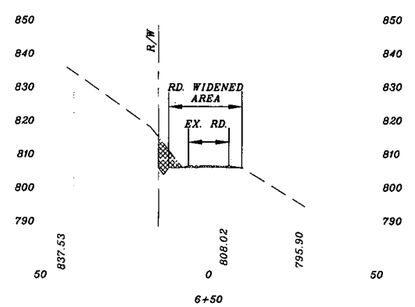


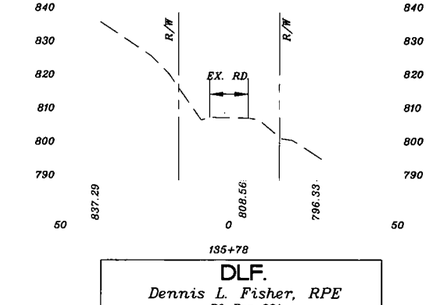












NOTE: Shave rock face back to R/W 135+20 to 136+50.

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304-623-5851

Jackson Surveying Inc.

Cross Sections
Road Upgrade

Sheet 23 of 24

Ritchie Co., WV Sec. Routes 10, 19 & 19/2

Doddridge Co. WV Sec. Route 19/31

GRID NORTH

West Virginia State Plane North Zone NAD '83 RTK GPS

— LEGEND —

Existing Grade
Fence
Property Line
Centerline Road
Edge Road
Right of Way
LOD
Power Pole
Ditch
Area of Interest
Flood Plain Area
Road Widened Area
Area outside of R/W
12" Compost Filter Sock

Morris
DB.255-718
TM. 37-1
111.1 Ac.

Matching Sheet 23

140+72 EXISTING
18"x 26' CMP CULVERT
STONE CHECK DAM EACH
SIDE OF ENTRANCE

RTE. 19

CL37+00

CL38+00

CL39+00

CL40+00

CL41+00

141+28.1

30' R/W

ENTRANCE TO HACKAY PAD

RTE. 19

Stream 1
Cabin Run
(Perennial)

Morris
DB.255-718
TM. 37-1
111.1 Ac.

DODDRIDGE COUNTY
RITCHIE COUNTY

Church
DB.267-397
TM. 32-9 & 9.1
7.86 Ac.

NPDES TABLE:

Station	Improvement	Entrance Protection	Exit Protection	Stream Type	Stream Impact	Disturbed Area (sq. ft.)
140+72	18"x 26' CMP	STONE CHECK DAM	N/A	DITCH	0	136
N/A	ROAD WIDENING	N/A	N/A	N/A	0	3200
					Total Sheet 24 Disturbed Area	3336 sq ft
						0.08 Ac

0 10' 20' 40'
Scale: 1" = 20'

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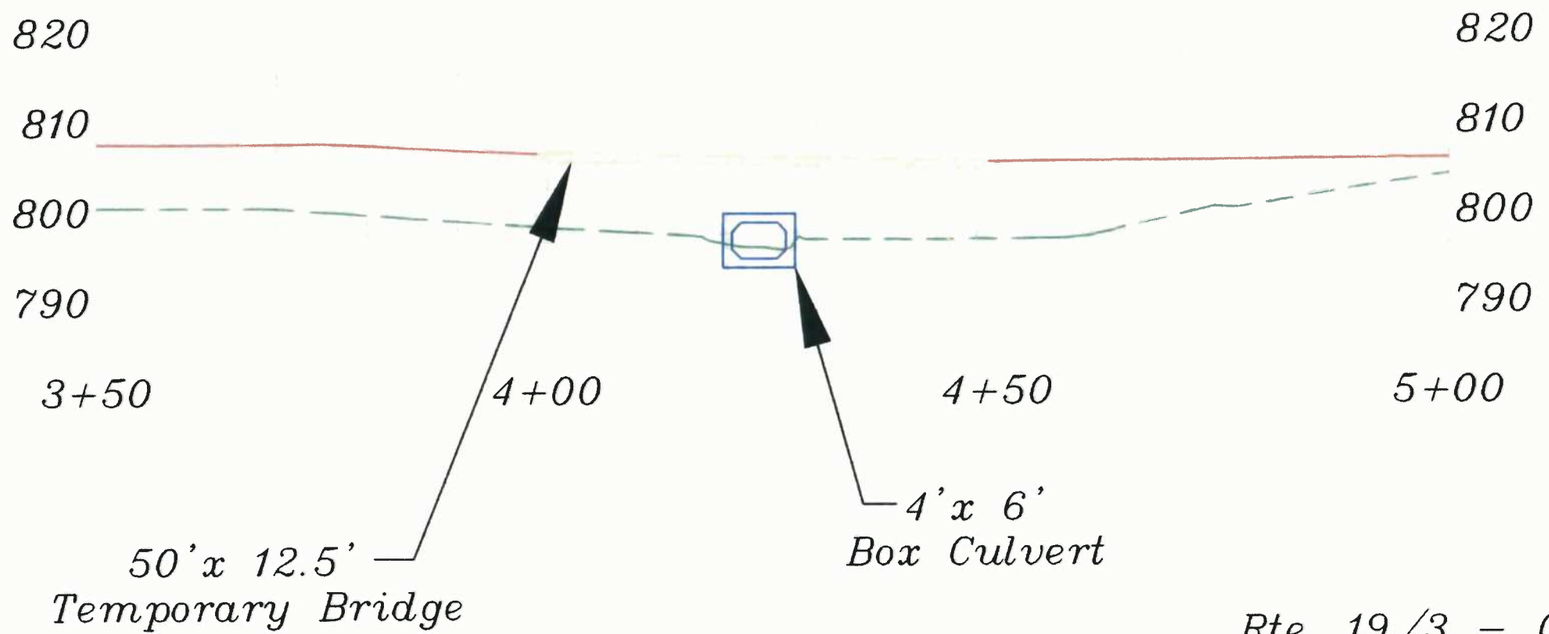
Plan & Profile
Road Upgrade

Sheet 24 of 24

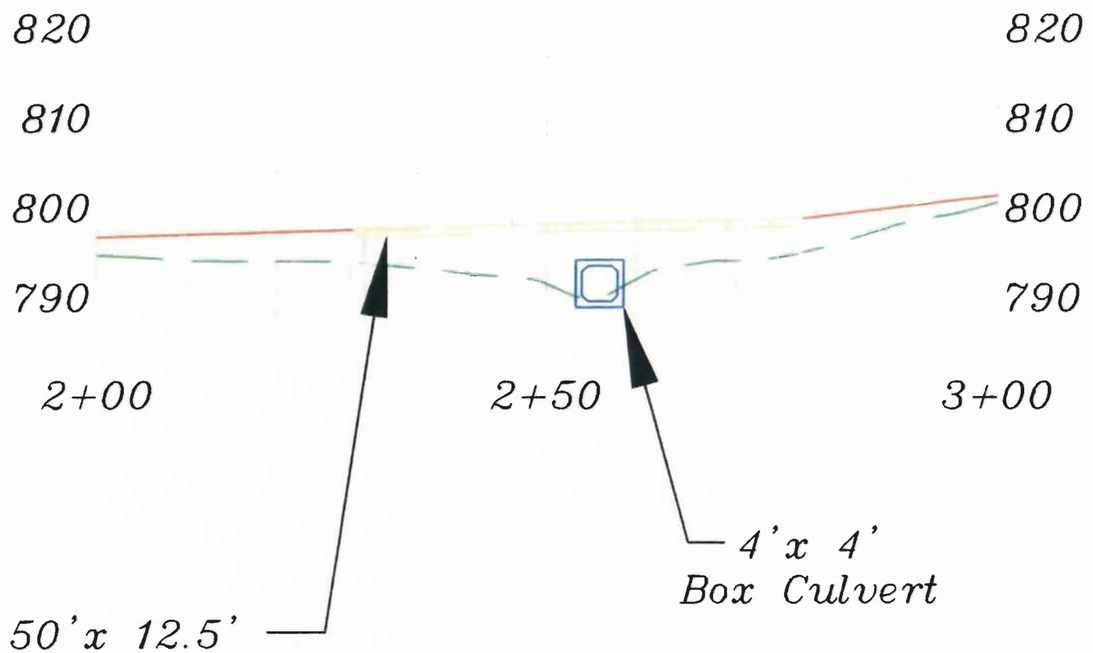
Ritchie Co., WV Sec. Routes 10 19 & 19/2
Doddridge Co. WV Sec. Route 19/4

Doddridge County Bridge



Rte. 19/3 – Cabin Run
Doddridge County
Mackay Pad

Ritchie County Bridge



Rte. 10/2 – Cabin Run
Ritchie County
Mackay Pad