SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: 14-177
Heartwood Forest land Fun
3001 Emerson Ave
Parkersburg WV 26104

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Paula Snyder ☐ Agent ☒ Addressee

B. Received by (Printed Name) Paula Snyder C. Date of Delivery 3-17

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

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7013 2250 0001 6914 8278

PS Form 3811, July 2013 Domestic Return Receipt

UNITED STATES POSTAL SERVICE

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

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

Ralph Sandora, Jr.
Doddridge Co. Flood Plain MGT
118 East Court St, Room 102
West Union, WV 26456

FILED
2014 MAR 18 AM 11:36
A. BOGGESS
COUNTY CLERK
DODDRIDGE COUNTY

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: 14-177

IL Morris
P.O. Box 397
Glenville, WV 26351

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Jackie Swiger ☒ Agent ☐ ~~Addressee~~

B. Received by *(Printed Name)* Jackie Swiger
C. Date of Delivery 3/18/14

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

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7013 2250 0001 6914 8285

PS Form 3811, July 2013 Domestic Return Receipt

UNITED STATES POSTAL SERVICE

WV 263

18 MAR '14

PM 1 L

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

FILED

2014 MAR 19 AM 10:58

BETH [illegible]
COUNTY CLERK
DODDRIDGE COUNTY, WV

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

[illegible]ph Sandora, Jr.
Doddridge Co. Flood Plain MGT
116 East Court St, Room 102
West Union, WV 26456

PERMIT NO. 14-127

DODDRIDGE COUNTY

FLOODPLAIN DEVELOPMENT

PERMIT

PURPOSE FOR PERMIT: WELL PAD ACCESS RD.

ISSUED TO ANTERO RESOURCES CORP.

ADDRESS: 1625 17 ST. DENVER ~~COLO~~, 80202

PROJECT ADDRESS: CABIN RUN - LESON RUN

ISSUED BY: Ralph Sander

DATE: 3-31-14

CONSTRUCTION MUST START WITHIN 180 DAYS FROM ISSUED DATE. PERMIT EXPIRES IN 12 MONTHS FROM ISSUED DATE. IF EXTENTION IS NEEDED A REQUEST MUST BE MADE IN WRITING STATING A REASON FOR THE EXTENTION.

THIS PERMIT MUST BE POSTED ON THE PREMISES IN A CONSPICUOUS PLACE SO AS TO BE CLEARLY VISIBLE FROM THE STREET.

ANTERO RESOURCES CORPORATION
1625 17th STREET, SUITE 300
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Mar-06-2014	50778	$9,438.56

VOUCHER	VENDOR INV #	INV DATE	TOTAL AMOUNT	PRIOR PMTS & DISCOUNTS	NET AMOUNT
03-AP-3775	MACKAYPAD	03/06/14	9,438.56	0.00	9,438.56
MACKAY PAD - FLOOD PLAIN PERMIT					
TOTAL INVOICES PAID					9,438.56

#14-177 Antero - Mackey Well Pad Access Road

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County, West Virginia

RECEIPT NO: 1661 DATE: 2014/03/13

FROM: ANTERO **AMOUNT:** $ 9,438.56

NINE THOUSAND FOUR HUNDRED THIRTY EIGHT DOLLARS AND 56 CENTS

FOR: #14-177 ANTERO-MACKEY WELL PAD ACCESS ROAD

00000050778 FP-BUILDING PERMITS 020-318 **TOTAL:** $9,438.56

MICHAEL HEADLEY
SHERIFF &TREASURER

MEC
CLERK

Customer Copy

Legal Advertisement:

Doddridge County

Floodplain Permit Application

Please take notice that on the 12th day of March, 2014

ANTERO RESOURCES

MACKAY WELL PAD ACCESS ROAD #14-177

filed an

application for a Floodplain Permit to develop land located at or about: **SURFACE OWNERS: I L MORRIS AND HEARTWOOD FORESTLAND FUN CLAY AND CENTRAL DISTRICT, D/B 255/718,230/307,& 253/671. TAX MAP 37/1, 11/08, 06,& 04.1.**

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 **MARCH 31, 2014**

Delivered to the:

Clerk of the County Court

118 E. Court Street, West Union, WV 26456.

Beth A Rogers, Doddridge County Clerk

Ralph Sandora, Jr., Doddridge County Flood Plain Manager

P. 01

TRANSACTION REPORT

MAR-12-2014 WED 04:41 PM

FOR: DODDRIDGE CO. CLERK 304 873 1840

SEND

DATE	START	RECEIVER	TX TIME	PAGES	TYPE	NOTE	M#	DP
MAR-12	04:40 PM	3048731600	1'20"	5	FAX TX	OK	923	

TOTAL : 1M 20S PAGES: 5

Legal Advertisement:

Doddridge County

Floodplain Permit Application

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ANTERO RESOURCES

MACKAY WELL PAD ACCESS ROAD #14-177

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CLAY AND CENTRAL DISTRICT, D/B 255/718,230/307,& 253/671.

TAX MAP 37/1, 11/08, 06,& 04.1.

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Any interested persons who desire to comment shall present

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Clerk of the County Court

118 E. Court Street, West Union, WV 26456.

Beth A Rogers, Doddridge County Clerk

Ralph Sandora, Jr., Doddridge County Flood Plain Manager

#14-177

FILED

2014 MAR 10 PM 1:04

BETH A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

March 7, 2014

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

Doddridge County Floodplain Manager:

Antero Resources Corporation (Antero) would like to submit a Doddridge County Floodplain permit application for our Mackay Well Pad Access Road. Our project is located in Doddridge County, Clay and Central Districts. Per FEMA FIRM Maps 54085C0225C and 54017C0200C, a portion of the proposed access road crosses the floodplain. A HEC-RAS study was prepared by Kleinfelder and concluded there will be minimal changes in the 100 year base flood elevation and no impacts to upstream and downstream adjacent properties along Cabin Run.

Attached you will find the following:

- Doddridge County Floodplain Permit Application and Permit Fee
- Surface and Adjacent Land Owner Information
- Bid Sheet
- WV Flood Tool Map
- HEC-RAS Floodplain Study
- Site Design

If you have any questions please feel free to contact me at (303) 357-6412. Thank you in advance.

Sincerely,

Shaye Marshall

Shaye Marshall
Permit Representative
Antero Resources Corporation

Enclosures

Mackay Well Pad
Access Road
14477

FILED
2014 MAR 10 PM 1:04
BETH A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

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 3/6/14

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: Antero Resources Corporation

ADDRESS: 1625 17th Street, Denver, CO 80202

TELEPHONE NUMBER: Contact Shauna DeMattee: 303-357-6820

BUILDER'S NAME: Antero Resources Corporation
ADDRESS: 1625 17th Street, Denver, CO 80202
TELEPHONE NUMBER: (303) 357-7310

ENGINEER'S NAME: Kleinfelder
ADDRESS: 230 Executive Dr., Suite 122, Cranberry Township, PA 16066
TELEHONE 724-772-7072

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see Landowner Table attached

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) Please see Landowner Table attached

DISTRICT: Clay and Central
DATE/FROM WHOM PROPERTY PURCHASED: N/A
LAND BOOK DESCRIPTION: Please see Landowner Table attached
DEED BOOK REFERENCE: Please see Landowner Table attached
TAX MAP REFERENCE:
EXISTING BUILDINGS/USES OF PROPERTY: None
NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY
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	
[]	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:

X Fill [] Mining X Drilling [] Pipelining

X Grading

[] Excavation (except for STRUCTURAL DEVELOPMENT checked above)

[] Watercourse Altercation (including dredging and channel modification)

X Drainage Improvements (including culvert work)

X Road, Street, or Bridge Construction

[] Subdivision (including new expansion)

[] Individual Water or Sewer System

[] Other (please specify)

* See attached Site Design for proposed construction

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 $ 1,787,711.39

*See attached Bid Sheet

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 Landowner Table attached
ADDRESS:_____

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 Landowner Table attached
ADDRESS:_____

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.

(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): Kevin Kilstrom - VP of Production

SIGNATURE: _____ **DATE:** 3/6/14

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: 225C and 200C

Dated: 10-4-11

[] 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 Ralph Sanders DATE 3-31-14

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).

MACKAY SURFACE OWNER TABLE					
OWNER	**TAX MAP #**	**PARCEL #**	**DEED BOOK #**	**PAGE #**	**ADDRESS**
I.L (IKE) MORRIS	37	1	255	718	PO BOX 397 GLENVILLE, WV 26351

MACKAY ADJACENT LANDOWNER TABLE					
OWNER	**TAX MAP #**	**PARCEL #**	**DEED BOOK #**	**PAGE #**	**ADDRESS**
I.L (IKE) MORRIS	11	08	230	307	PO BOX 397 GLENVILLE, WV 26351
HEARTWOOD FORESTLAND FUN	11	06	253	671	3001 EMRERSON AVE, PARKERSBURG, WV 26104
HEARTWOOD FORESTLAND FUN	11	04.1	253	671	3001 EMRERSON AVE, PARKERSBURG, WV 26104

[] 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_____

KLEINFELDER
Bright People. Right Solutions.

March 13, 2014

Doddridge County Commission
118 East Court Street
West Union, WV 26456
Attn: Dan Wellings, Doddridge County Floodplain Administrator

Subject: **Mackay Well Pad Access Road Double Barrel Box Culvert Stream Crossing Floodplain Analysis**
Antero Resources Corporation

Dear Mr. Wellings:

Kleinfelder has completed a floodplain analysis of the proposed Mackay Well Pad Access Road stream crossing over Cabin Fork located northeast of Pullman, along County Route 19/3 in Ritchie and Doddridge County, West Virginia. This site is located within a FEMA Flood Zone "A", as shown on the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (NFIP), Map Numbers 54085C0225C effective February 2, 2012 and 54017C0200C effective October 4, 2011. Being that the site is located in a Flood Zone "A", base flood elevations for this area have not been established and a detailed study has not been made.

In order to establish base flood elevations for this site, a hydrologic and hydraulic analysis was performed as outlined in the current Doddridge County Floodplain Ordinance, enacted May 21st, 2013. Using LiDAR topography by Blue Mountain Aerial Mapping, cross-section survey data by Triple H Enterprises, and 10-foot interval topography converted from 3 meter West Virginia GIS Technical Center DEM data, a drainage analysis was performed for the Cabin Run drainage shed. Upon establishing the peak flow drainage calculations for the 100-year storm event, a HEC-RAS river analysis was conducted for a section of Cabin Run adjacent to the Mackay Well Pad Access Road and the Base Flood Elevations (BFE) were established. The resulting BFEs were used to establish adjusted floodplain boundaries for the segment of Cabin Run being studied. These boundaries are shown on the attached Existing Conditions Plan (Exhibit C of the analysis). In addition to establishing BFEs, a proposed conditions analysis was performed to determine the impacts of the proposed entrance road and stream crossing over Cabin Run. The proposed grading and double barrel box culvert were added into the cross sections and the manning's "n" values were adjusted where necessary. The model was run with these changes to determine the impacts of the proposed access road and double barrel box culvert. The results of this analysis indicate that the proposed improvement will cause a maximum increase of 0.88' in the BFEs in this area and no upstream or downstream properties will be adversely impacted. The maximum increase in the BFE occurs at River Station 7+68. The cross section at River Station 7+68 has an existing BFE of 799.01 and a proposed BFE of 799.89. The Mackay Well Pad Access Road Site Plan (Exhibit B of the analysis) depicts the proposed access road site with the existing FEMA flood zone area. This map also contains approximate property lines and owner information.

230 Executive Drive, Suite 122, Cranberry Township, PA 16066 p | 724.772.7072 f | 724.772.7079

KLEINFELDER
Bright People. Right Solutions.

Attached are the following documents associated with this submission:

- A Floodplain Analysis of Cabin Run documenting the methods used for the analysis, drainage computations, cross sections, and a narrative to describe the analysis.

- Included with this analysis are the following exhibits:
  - The 54085C0225C & 54017C0200C FIRM Panels
  - The Mackay Well Pad Access Road Site Plan, prepared by Kleinfelder which includes additional site design and construction specifications.
  - The Mackay Well Pad Existing Conditions Plan, prepared by Kleinfelder which depicts the existing floodplain modeled with HEC-RAS.
  - The Mackay Well Pad Proposed Conditions Plan, prepared by Kleinfelder which depicts the proposed floodplain modeled with HEC-RAS.

- Project Cost Estimate
- Floodplain Permit Application Fee
- Doddridge County Improvement Location Permit Application

Should any questions or comments arise during the review, please let us know and we will work to address them. Copies of all permits required for this site will be provided by the operator. Please let me know if you should need additional information. You can reach me by phone 919-755-5011 ext. 136 or by email at jcrisp@kleinfelder.com

Sincerely,

KLEINFELDER EAST, INC.

Jeffery B. Crisp, P.E.
Program Manager

JEFFERY B. CRISP
REGISTERED
20354
3/13/14
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

Attachments

March 2014

Doddridge County Flood Plain Application Fee Calculator (if in Flood Plain)	
Mackay Pad	
Estimated Construction Costs	$1,787,711.39
Amount over $100,000	$1,687,711.39
Drilling Oil and Gas Well Fee	$1,000.00
$5 per $1,000 over $100,000	$8,438.56
Amount Due with application	$9,438.56

KLEINFELDER
Bright People. Right Solutions.

February 20, 2014

Doddridge County Commission
118 East Court Street
West Union, WV 26456
Attn: Dan Wellings, Doddridge County Floodplain Administrator

Subject: **Mackay Well Pad Access Road Double Barrel Box Culvert Stream Crossing Floodplain Analysis**
Antero Resources Corporation

Dear Mr. Wellings:

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230 Executive Drive, Suite 122, Cranberry Township, PA 16066 **p** | 724.772.7072 **f** | 724.772.7079

KLEINFELDER
Bright People. Right Solutions.

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  - The Mackay Well Pad Existing Conditions Plan, prepared by Kleinfelder which depicts the existing floodplain modeled with HEC-RAS.
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- Floodplain Permit Application Fee
- Doddridge County Improvement Location Permit Application

Should any questions or comments arise during the review, please let us know and we will work to address them. Copies of all permits required for this site will be provided by the operator. Please let me know if you should need additional information. You can reach me by phone 919-755-5011 ext. 136 or by email at jcrisp@kleinfelder.com

Sincerely,

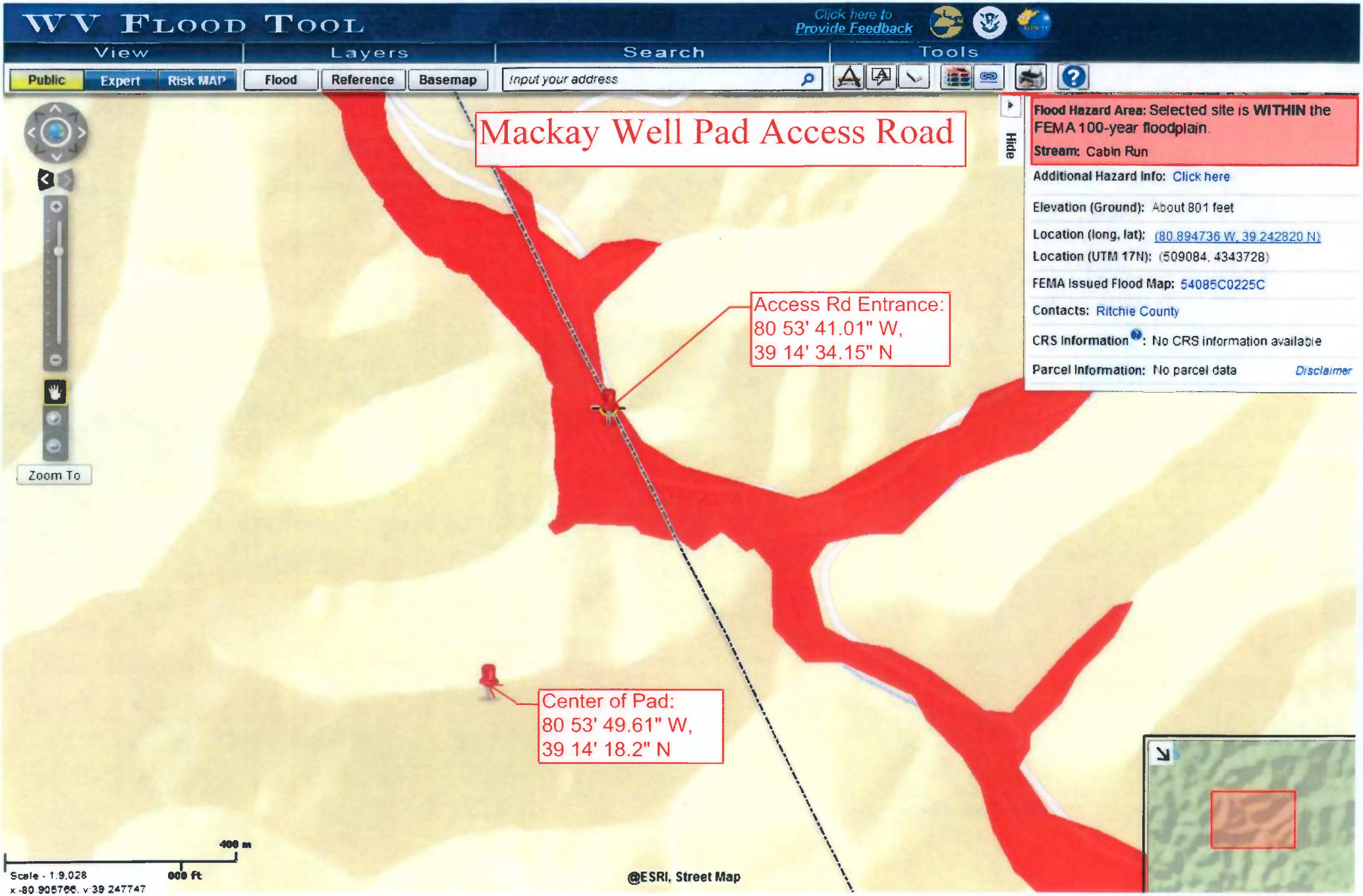
KLEINFELDER EAST, INC.

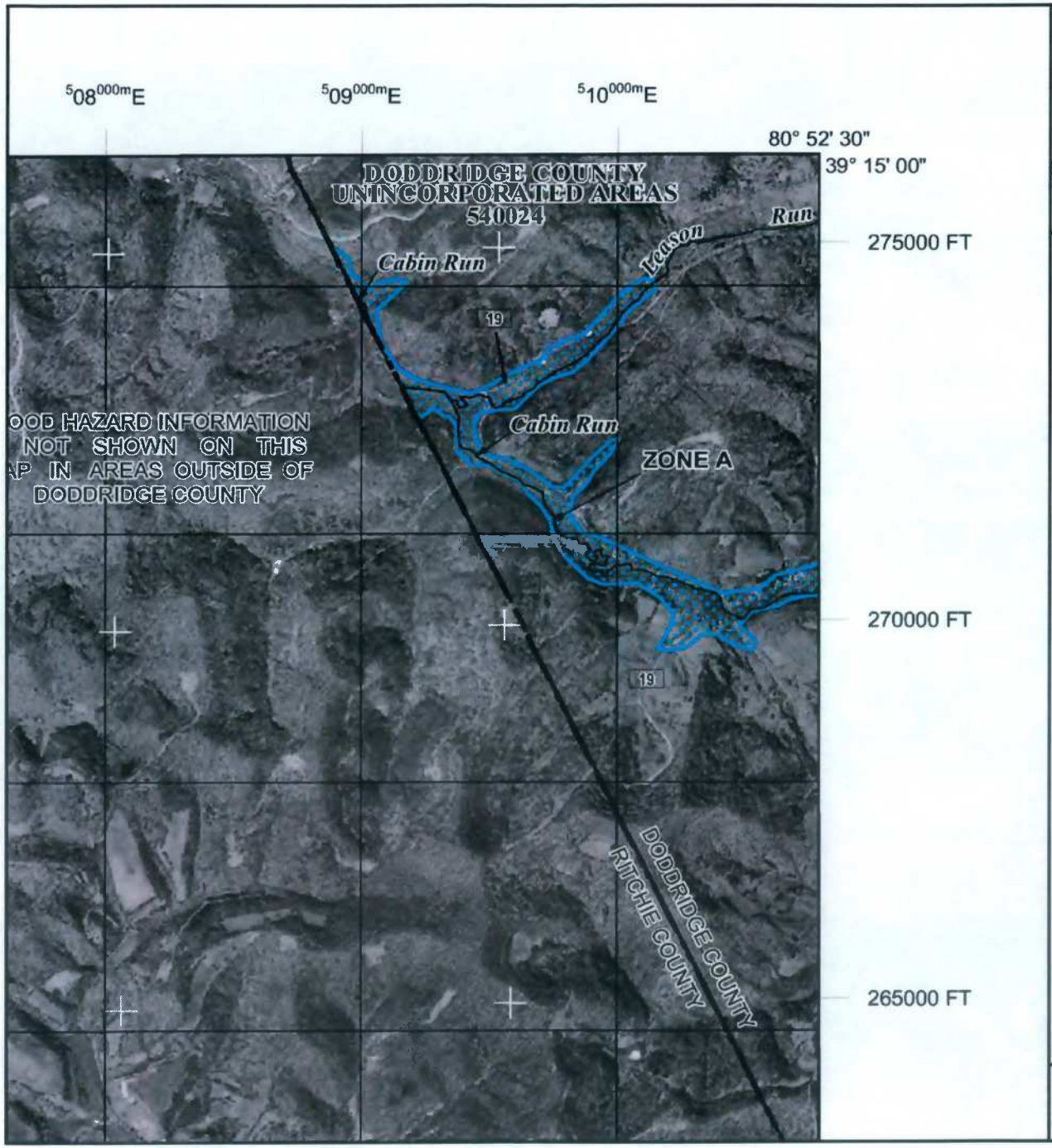
Jeffery B. Crisp, P.E.
Program Manager

Attachments

FILED
2014 MAR 10 PM 1:04
BETH A. ROGERS
COUNTY CLERK
DODDRIDGE COUNTY, WV

February 2014


WV Flood Tool
Click here to Provide Feedback
View
Layers
Search
Tools
Public
Expert
Risk MAP
Flood
Reference
Basemap
Input your address
Mackay Well Pad Access Road
Hide
Flood Hazard Area: Selected site is WITHIN the FEMA 100-year floodplain.
Stream: Cabin Run
Additional Hazard Info: Click here
Elevation (Ground): About 801 feet
Location (long, lat): (80.894736 W, 39.242820 N)
Location (UTM 17N): (509084, 4343728)
FEMA Issued Flood Map: 54085C0225C
Contacts: Ritchie County
CRS Information: No CRS information available
Parcel Information: No parcel data
Disclaimer
Access Rd Entrance:
80 53' 41.01" W,
39 14' 34.15" N
Center of Pad:
80 53' 49.61" W,
39 14' 18.2" N
Zoom To
400 m
Scale - 1:9,028
x -80.905766, y:39.247747
@ESRI, Street Map



MAP SCALE 1" = 2000'

1000 0 2000 4000

FEET

METE

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

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

0 0 600 1200 MET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0225C

FIRM

FLOOD INSURANCE RATE MAP

RITCHIE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 225 OF 375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RITCHIE COUNTY	540224	0225	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.

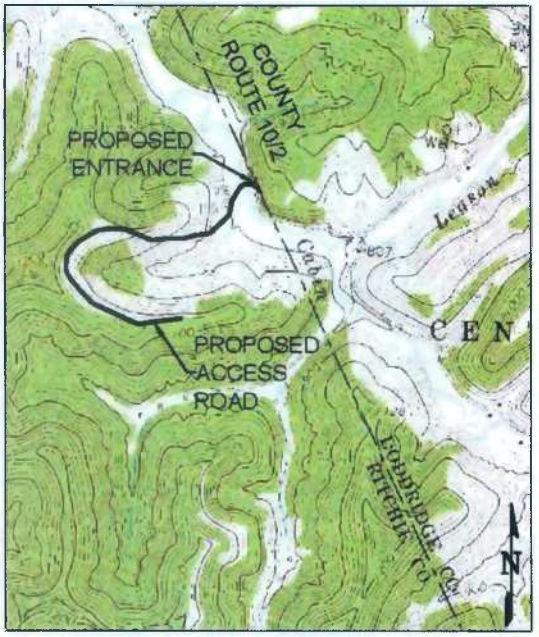
MAP NUMBER
54085C0225C

EFFECTIVE DATE
FEBRUARY 2, 2012

Federal Emergency Management Agency

FLOODPLAIN ANALYSIS OF
CABIN RUN
MACKAY WELL PAD
ACCESS ROAD WITH DOUBLE BARREL BOX CULVERT

RITCHIE & DODDRIDGE COUNTIES, WEST VIRGINIA



VICINITY MAP
1" = 2000'

Prepared for:
ANTERO RESOURCES CORPORATION
1625 17th Street
Denver, CO 80202

KLEINFELDER
Bright People. Right Solutions.

JEFFERY B. CRISP
REGISTERED
20354
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

Prepared by:
KLEINFELDER
230 Executive Drive, Suite 122
Cranberry Township, PA 16066
(KLF #133141)

ANTERO RESOURCES

Project Contact

Anthony Smith, Field Engineer
(304) 869-3404

1. Objective

The objective of this floodplain analysis is to establish boundaries for the existing and proposed conditions of the 100-year Base Flood Elevations (BFEs). The proposed condition includes the installation of a double barrel box culvert and an access road to provide access to a drill pad site where the entrance off of County Route 19/3 is within the Federal Emergency Management Agency (FEMA) Flood Zone "A".

2. Existing Conditions

2.1. Property Description

This site is located in Ritchie and Doddridge Counties, West Virginia, along Cabin Run and County Route 19/3 northeast of Pullman in the Central District. The proposed access road entrance is located on the west side of County Route 19/3.

2.2. Floodplain Delineation

The 100-year floodplain (a flood event that has a 1% chance of being equaled or exceeded in any given year) is shown on FEMA Flood Insurance Rate Map (FIRM) for Ritchie and Doddridge Counties on panels 54085C0225C effective February 2, 2012 and 54017C0200C effective October 4, 2011. This floodplain is located in flood zone designation "A" which FEMA defines as an "area subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply."

2.3. Floodplain Ordinance

This site is administered under both the Doddridge County Floodplain Ordinance, enacted May 31st, 2013 and the Ritchie County Floodplain Ordinance, revised October, 12th, 2011.

Per Section 4.4 of both the Doddridge and Ritchie County ordinances, when a site is located in FEMA Flood Zone designation "A" without Floodway Area, the Floodplain Administrator shall require the applicant to demonstrate that the cumulative effect of the proposed development. The Doddridge County ordinance further states that when combined with all other existing and anticipated development, will not increase the elevation of the 100-year flood more than one (1) foot at any point.

Per Section 4.5.A of both the Doddridge and Ritchie county ordinances, any developer shall notify in writing, by certified mail, Doddridge County's Floodplain Administrator, the State Coordinating Office, and adjacent communities and any adjacent property owners of all such intended activities prior to the alteration of the stream. Copies of all required notifications must be submitted to the Federal Insurance Administration. In addition prior

to issuing the local permit the Floodplain Administrator shall require copies of all necessary permits from those government agencies from which Federal or State Law requires approval.

Per Section 4.5.B, both the Doddridge and Ritchie county ordinances, a stream crossing analysis for the proposed permanent crossing of Cabin Run is provided within this document includes a cover letter signed by the responsible professional, a detailed report, hydraulic and hydrologic computations and a sitemap detailing the planned construction.

Per Section 4.5.C, both the Doddridge and Ritchie county ordinances, the stream crossing has been designed with "best practice" techniques in mind. A double barrel box culvert was selected to pass the base flow and 10-year storm events. The double barrel box culvert will be placed in the stream to allow for aquatic passage and preservation of the existing stream channel. The double barrel box culvert was designed to be a permanent stream crossing. All fill utilized will be 2-4 in. clean rock aggregate with a 4-6 in. large angular durable rock base to minimize erosion during storm events. Concrete abutments and wing walls will be utilized to minimize scour around the culvert. Sandbag cofferdams and a dewatering bag system will be utilized during construction to minimize erosion and allow for construction in the stream channel.

Per Section 4.5.D both the Doddridge and Ritchie county ordinances, the double barrel box culvert will be properly anchored as required.

Per Section 4.5.E both the Doddridge and Ritchie county ordinances, the Developer shall provide Doddridge County with all required legal agreements detailing inspections and maintenance.

Per Section 5.1 both the Doddridge and Ritchie county ordinances, Permits are required for the construction of the permanent stream crossing. The format of the permit will coincide with the requirements set forth in Section 5.2 of the ordinance.

Per Section 6.1E both the Doddridge and Ritchie county ordinances, the fill associated with this plan has been designed to not adversely affect adjacent properties. The access road and double barrel box culvert were located to minimize floodway constriction and the height above the existing grade was minimized to allow as much flow as possible to be unimpeded. Impacts to the 100-year Base Flood Elevations (BFE) are demonstrated later in this report; however, increases to the 100-year Base Flood Elevations (BFEs) were limited to approximately 550 feet upstream of the proposed crossing where the impact returned to 0.06 feet while increases were limited to approximately 50 feet downstream of the proposed crossing where the impact returned to 0.09 feet. Fill as stated above shall consist of 2-4 in. clean rock aggregate with a 4-6 in. large angular durable rock base. No less than 2H:1V slopes will be utilized in the construction of the proposed crossing.

Per Section 6.1F, the double barrel box culvert has been placed with the longitudinal axis parallel to the direction of flood flow and to maintain the same flood-flow lines of the adjoining structures.

Per Section 6.1.I both the Doddridge and Ritchie county ordinances, no material or equipment storage shall be allowed within the vicinity of the entrance. The storage of all material and equipment shall be onsite and away from the entrance.

Per Section 6.1.K both the Doddridge and Ritchie county ordinances, a flow line is proposed adjacent to County Route 19/3 along the entrance to allow adequate drainage across the proposed entrance. All other specific requirements covered in Section 6.1 of this ordinance are not applicable to this design (Sections 6.1.A, 6.1.B, 6.1.C, 6.1.D, 6.1.F, 6.1.G, 6.1.H, 6.1.J, and 6.1.L). The developer shall conform with all administrative procedures as outlined in Article 7 of this ordinance.

2.4. Cabin Run Characteristics

Cabin Run is located in the Central District of Ritchie and Doddridge Counties and flows in a northern direction. The drainage area flowing to Cabin Run at the stream crossing is approximately 7.343 square miles of forested and agricultural land with an average basin slope of 1.7%.

3. Analysis Information

3.1. HEC-RAS

Utilizing the Hydrologic Engineering Centers River Analysis System software version 4.1.0 (HEC-RAS), a hydraulic analysis was performed for the portion of the Cabin Run that has an impact on the Base Flood Elevations (BFEs) across the property. HEC-RAS is designed to perform one dimensional hydraulic calculations for a full network of natural and constructed channels. The steady-flow system is designed for applications in floodplain management and flood insurance studies.

3.2. Analysis Limits

The analysis information is based upon two-foot interval aerial shot topography by Blue Mountain Aerial Mapping, and supplemented with cross section survey data by Triple H Enterprises. The upstream analysis limit for Cabin Run is located approximately 550 feet upstream from the proposed stream crossing and is represented by the STA 11+33 cross-section line on Exhibit B. The downstream analysis limit for Cabin Run is located approximately 500 feet downstream of the proposed stream crossing is represented by the STA 0+00 cross-section. These limits were selected so that the HEC-RAS model would accurately determine the Base Flood Elevations (BFEs) on site and off site.

3.3. Flow Data

The hydrologic analysis utilized the SCS methodology in order to approximate the 100-year peak discharge. The drainage area and time of concentration paths were determined using the using the 3-meter West Virginia GIS Technical Center DEM topography. Once the drainage area was delineated, the runoff coefficient was determined using a weighted average method where two separate sub-drainage areas, comprised of either forested area or pasture area were determined. Utilizing the United States Department of Agriculture (USDA) soil surveys data, hydrologic soil classification ratings of B, C and D were applied to the two separate sub-drainage areas in order to create six total areas, which were then averaged together to determine a weighted runoff coefficient. The time of concentration paths were calculated using the SCS lag method, which takes the average slope of the watershed over the longest flow path within that watershed.

The hydrologic computations for the drainage area were performed using the Hydraflow Hydrographs extension for AutoCAD Civil 3D 2011 by Autodesk. See the table below for a summary of the flow conditions, and see Supplement 1 for the complete hydrologic computations.

Stream	Drainage Area (Sq. Mi.)	Flow (cfs)	Note
Cabin Run	7.343	1932.89	Area to downstream property and first cross-section

3.4. Cross-Section Data

The cross-sections were employed at significant changes in site features. This includes major bends in the stream channel, areas of major contraction and expansion of the floodplain area, upstream and downstream of existing culverts, and at building obstructions (cross sections were compiled using Aerial Mapping by Blue Mountain Aerial Mapping and supplemented with cross section survey data by Triple H Enterprises).

3.5. Manning's n-value

The channel and overbank areas were assigned Manning's n-values based on field review, site photographs, and close inspection of existing aerial photography. The chart below describes the Manning's n values used in this study.

Manning's n value	Description	Portion Used
0.035	Clean, straight, full, no rifts or deep pools, stones and weeds	Main Channel
0.1	Heavy stand of timber, few down trees, little undergrowth, flow below branches	Floodplains (Normal)
0.013	Asphalt	Floodplains
0.035	High grass Floodplains	Floodplains
0.033	Rip Rap Dry Rubble	Floodplains
0.06	Light Brush and trees, in summer	Floodplains
0.08	Heavy stand of timber, few down trees, little undergrowth, flow below branches	Floodplains (Minimum)

4. Results

4.1. Existing Conditions

Since the site is in a Zone "A" floodplain area as shown on the Flood Insurance Rate Maps (FIRM), a detailed study analysis of the base flood elevations established within Ritchie and Doddridge Counties has not been performed. An existing conditions model was prepared based upon aerial topography and compiled using LiDAR topography by Blue Mountain Aerial Mapping and supplemented with cross-section survey data by Triple H Enterprises. This information was processed in HEC-RAS to determine the existing conditions of the Base Flood Elevations (BFEs).

14-177

4.2. Proposed Conditions

The proposed conditions model was based on the proposed topography for the site access road and a proposed double barrel box culvert in the stream. This information was added into the existing conditions cross sections and then was processed in HEC-RAS to determine the proposed conditions of the Base Flood Elevations (BFEs). A summary of elevation changes existing and proposed BFEs at the various cross sections has been provided below. As shown in the table, the proposed development will not increase the existing BFEs more than 0.88' throughout the project area and return to 0.06' at the upstream and 0.00' downstream termini of the study area.

Mackay Drill Pad Access Road
Floodplain Study
Summary of Computed Elevations

Cross-Section Station	100-Year Base Flood Elevation (Ft)		
	Existing Conditions	Proposed Conditions	Proposed Difference
11+33	800.50	800.56	+ 0.06
9+48	799.40	799.86	+ 0.46
7+68	799.01	799.89	+ 0.88
6+62	799.11	799.92	+ 0.81
5+58	798.95	799.70	+ 0.75
5+06	798.87	Double Barrel Box Culvert	
4+55	798.76	798.85	+ 0.09
3+68	798.70	798.70	0.00
2+32	798.61	798.61	0.00
1+25	798.45	798.45	0.00
0+00	797.12	797.12	0.00

5. Conclusion

The results of this floodplain analysis indicate that there will be minimal changes in the 100-year Base Flood Elevation (BFE) and no impacts to upstream and downstream adjacent properties along Cabin Run. The largest increase in base flood elevation is 0.88' and is located on site upstream of the stream crossing due to the fill of the proposed access road.

LIST OF APPENDICES

Exhibit A	FIRM Panels 54085C0225C & 54017C0200C
Exhibit B	Access Road Plan
Exhibit C	Existing Conditions Plan
Exhibit D	Proposed Conditions Plan
Supplement 1	Hydrologic Computations
Supplement 2	HEC-RAS Analysis

Exhibit A

FIRM Panels
54085C0225C & 54017C0200C

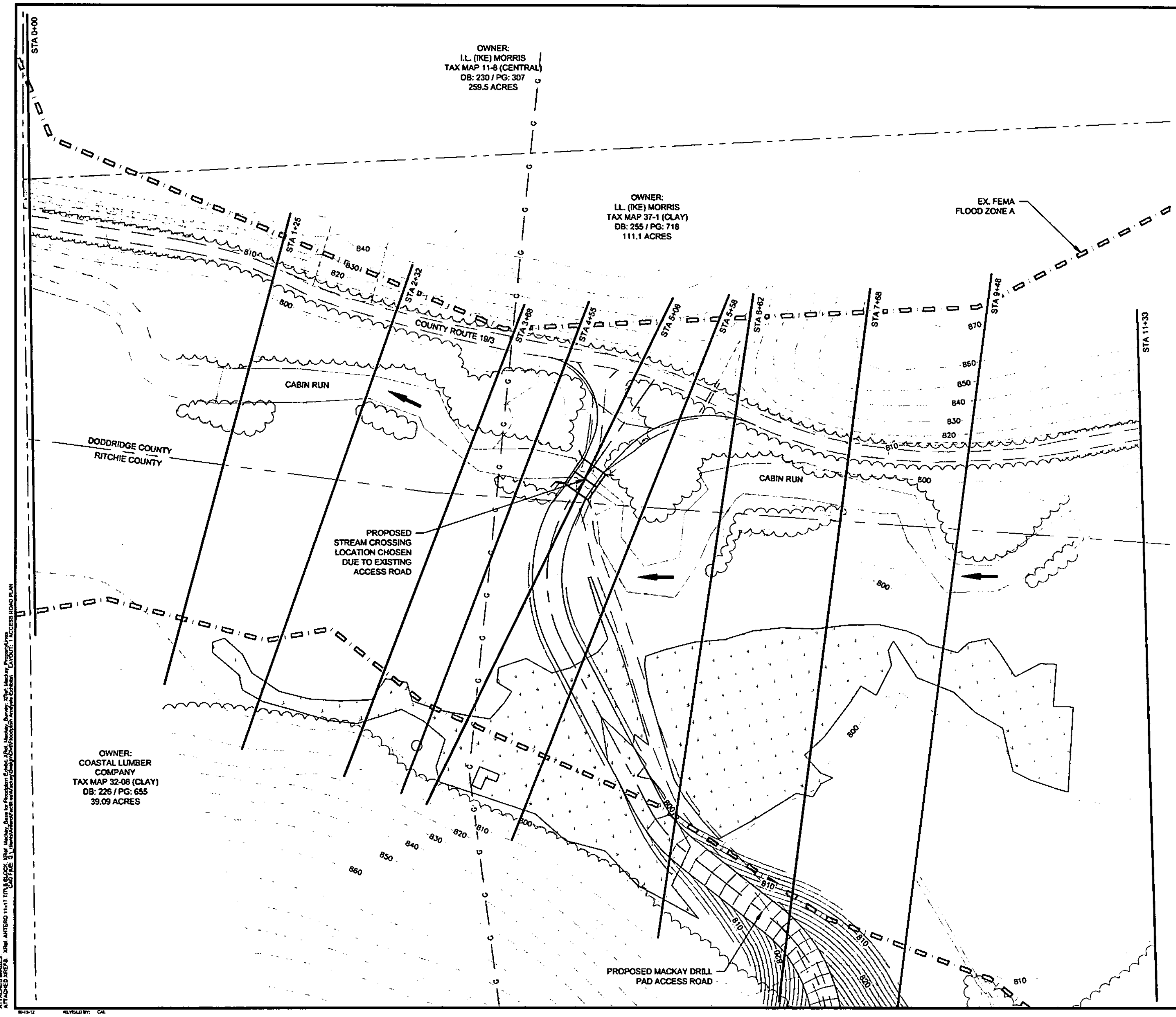
Antero Resources Corporation

SCHEDULE OF QUANTITIES				
MACKAY WELL PAD SITE				
CLEARING & GRUBBING; EROSION & SEDIMENT CONTROLS				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
MOBILIZATION	1.0	EA	$19,256.61	$19,256.61
CONSTRUCTION ENTRANCE	1.0	EA	$3,169.69	$3,169.69
CLEARING & GRUBBING	35.1	AC	$3,688.09	$129,488.84
TREE REMOVAL	29.6	AC	$4,460.37	$132,071.56
12" COMPOST FILTER SOCK	368.0	LF	$3.92	$1,442.56
18" COMPOST FILTER SOCK	973.0	LF	$7.89	$7,676.97
SUPER SILT FENCE	6526.0	LF	$8.80	$57,428.80
R-3 RIP RAP (ROCK FILTER OUTLETS)	10.0	TON	$20.00	$200.00
AASHTO #57 STONE (ROCK FILTER OUTLETS)	5.0	TON	$8.00	$40.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN SC250 SLOPE MATTING	41391.0	SY	$4.00	$165,564.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN SC150BN SLOPE MATTING	14876.0	SY	$1.50	$22,314.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN C350 SLOPE MATTING	1447.0	SY	$5.50	$7,958.50
TOTAL				**$546,611.53**
RETAINING STRUCTURES				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
CONCRETE BIN BLOCKS (2' x 2' x 6')	0.0	EA		$0.00
GABION CAGES WITH STONE (3' X 3' X 6')	0.0	EA		$0.00
HORIZONTAL REINFORCEMENT (INSTALL TENSAR TX190 GEOGRID or EQUIVALENT)	0.0	SY		$0.00
TOTAL				**$0.00**
SITE - UNCLASSIFIED EXCAVATION				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
WELL PAD EXCAVATION (CUT TO FILL)	121.0	CY	$3.81	$461.01
WELL PAD EXCAVATION (EXPORT TO SPOIL AREA)	92143.0	CY	$4.19	$386,079.17
WATER CONTAINMENT PAD EXCAVATION (CUT TO FILL)	13417.0	CY	$3.81	$51,118.77
WATER CONTAINMENT PAD EXCAVATION (IMPORT FROM SPOIL AREA)	9789.0	CY	$3.81	$37,296.09
PRIMARY ACCESS ROAD EXCAVATION (CUT TO FILL)	43769.0	CY	$5.47	$239,416.43
PRIMARY ACCESS ROAD EXCAVATION (IMPORT FROM SPOIL AREA)	44049.0	CY	$5.47	$240,948.03
SECONDARY ACCESS ROAD EXCAVATION (CUT TO FILL)	3.0	CY	$5.47	$16.41
SECONDARY ACCESS ROAD EXCAVATION (EXPORT TO SPOIL AREA)	1469.0	CY	$4.19	$6,155.11
TOPSOIL	11679.0	CY	$3.87	$45,197.73
ROADSIDE DITCH	3581.0	LF	$4.01	$14,359.81
TOTAL				**$1,021,048.56**
SUMP(S) PER ANTERO RESOURCES STANDARD DETAIL				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
INSTALL 102" x 78" x 44" PRE CAST SUMP	6.0	EA	$675.25	$4,051.50
4" PVC CONNECTIVE PIPE (ANTERO SUMP DRAIN DETAIL)	217.0	LF	$11.75	$2,549.75
TOTAL				**$6,601.25**
AGGREGATE SURFACING - SPREADING, COMPACTION, and/or INSTALLATION				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
WELL PAD 6" OR 4" MINUS CRUSHER RUN AGGREGATE (6" THICK)	1811.0	TON	$2.72	$4,925.92
WELL PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	994.0	TON	$3.02	$3,001.88
WELL PAD GEOTEXTILE FABRIC (US 200)	9465.6	SY	$0.62	$5,868.66
WATER CONTAINMENT PAD 6" OR 4" MINUS CRUSHER RUN AGGREGATE (6" THICK)	1320.0	TON	$2.72	$3,590.40
WATER CONTAINMENT PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	725.0	TON	$3.02	$2,189.50
WATER CONTAINMENT PAD GEOTEXTILE FABRIC (US 200)	6897.7	SY	$0.62	$4,276.59
ACCESS ROADS 6" OR 4" MINUS CRUSHER RUN AGGREGATE (8" THICK)	3579.0	TON	$2.88	$10,307.52
ACCESS ROAD 1 1/2" OR 3/4" CRUSHER RUN STONE (2" THICK)	1474.0	TON	$3.22	$4,746.28
ACCESS ROADS GEOTEXTILE FABRIC (US 200)	6897.7	SY	$0.61	$4,207.61
TOTAL				**$43,114.36**
ROAD CULVERTS				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
15" HDPE	80.0	LF	$18.34	$1,467.20
18" HDPE	130.0	LF	$18.25	$2,372.50
FLARED END SECTION	4.0	EA	$250.00	$1,000.00
R-3 RIP RAP (INLETS/OUTLETS)	19.7	TON	$20.00	$394.09
AASHTO #57 STONE (INLETS)	52.0	TON	$8.00	$416.00
R-4 RIP RAP (DITCH CHECKS)	80.9	TON	$20.00	$1,617.18
DITCH/CHANNEL LINING - R-4 RIP RAP (ACCESS ROAD)	122.6	TON	$24.69	$3,025.98
DITCH/CHANNEL LINING - R-5 RIP RAP (ACCESS ROAD)	148.5	TON	$2.00	$297.08
DITCH/CHANNEL LINING - STRAW WITH NET	0.0	SY	$2.00	$0.00
DITCH/CHANNEL LINING - NORTH AMERICAN GREEN SC250 MATTING	2442.8	SY	$4.00	$9,771.27
ACCESS ROAD BERMS, JERSEY BARRIERS, LARGE STONE, OR GUARD RAILS	3856.0	LF	$5.00	$19,280.00
TOTAL				**$39,641.30**
FENCING/GATES				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
8 FT CHAINLINK FENCE w/ 3 STRAND BARB WIRE	0.0	LF	$19.00	$0.00
16 FT DOUBLE GATE	0.0	EA	$937.50	$0.00
PHASE 3 FENCING - ORANGE SAFETY FENCE w/"T" POST (10FT CENTERS) - WETLAND PROTECTION	321.0	LF	$3.33	$1,068.93
TOTAL				**$1,068.93**
MOBILE WATER CORRAL				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
22,000 BBL MOBILE WATER CORRAL	1.0	EA		$0.00
TOTAL				**$0.00**
BOX CULVERT				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
DOUBLE BARREL BOX CULVERT (6 - 12'x4'x8' SECTIONS)	1.0	EA	$36,000.00	$36,000.00
TOTAL				**$36,000.00**
SEEDING				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
SITE SEEDING (LIME, FERTILIZER, SEEDING, AND HYDRO-MULCH w/TACK (HYC-2 OR EQUAL))	28.8	AC	$3,136.22	$90,416.44
RECLAMATION SEEDING (LIME, FERTILIZER, SEEDING, AND HYDRO-MULCH w/TACK (HYC-2 OR EQUAL))	0.0	AC	$3,136.22	$0.00
TOTAL				**$90,416.44**
LINER SYSTEM				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
60 MIL TEXTURED PRIMARY LINER	0.0	SY		$0.00
16 OZ. NON-WOVEN GEOTEXTILE FABRIC CUSHION	0.0	SY		$0.00
TOTAL				**$0.00**
***THE SQUARE YARDAGE FOR THE LINER SYSTEM DOES NOT ACCOUNT FOR MATERIAL OVERLAP AND WASTE.**				
FRENCH DRAINS o				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
4" PERFORATED PIPE	281.0	LF	$11.42	$3,209.02
FRENCH DRAIN GEOTEXTILE FABRIC (MIRAFI 140N)	1,686.0	SY		$0.00
FRENCH DRAIN #57 STONE	26.0	TON		$0.00
TOTAL				**$3,209.02**

UNFORESEEN SITE CONDITIONS				
	QUANTITY	**UNIT**	**UNIT PRICE**	**FINAL PRICE**
ROCK CLAUSE - HOE RAMMING	0.0	CY	$9.84	$0.00
PHASE 1 FENCING - STEEL CORRUGATED PANELS w/"T" POST (10 FT CENTERS) - WETLAND PROTECTION	0.0	LF	$9.72	$0.00
PHASE 2 FENCING - FILTER SOCK OUTSIDE OF PHASE 3 FENCING - WETLAND PROTECTION	0.0	LF	$6.67	$0.00
SILT FENCE	0.0	LF	$3.13	$0.00
TEMPORARY SEEDING	0.0	AC	$1,475.00	$0.00
CONSTRUCTION STAKEOUT	0.0	HOUR	$85.88	$0.00
JUTE MATTING - SLOPE MATTING	0.0	SY	$2.13	$0.00
4 FT FARM FENCE (WOOD CORNER AND PULL POST & "T" POST - 10 FT SPACING)	0.0	LF		$0.00
5 STRAND BARB WIRE FENCE (WOOD CORNER AND PULL POST & "T" POST - 10 FT SPACING)	0.0	LF	$13.50	$0.00
TOTAL				**$0.00**
	GRAND TOTAL			**$1,787,711.39**
**ANTERO RESOURCES WILL PROVIDE THE FOLLOWING:				
102" x 78" x 44" PRE CAST SUMP				
VALVE FOR SUMP DISCHARGE				
TX 190 GEOGRID OR EQUIVALENT				
GEOTEXTILE FABRIC (US 200) OR EQUIVALENT				
15" & 18" HDPE				

Exhibit B

Access Road Plan



LEGEND

- EXISTING CULVERT
- EXISTING TREE LINE
- EXISTING PROPERTY LINE
- EXISTING ROAD
- EXISTING DELINEATED STREAM
- EXISTING INTERPOLATED STREAM
- EXISTING DELINEATED DRAINAGE FEATURE
- EXISTING DELINEATED WETLAND
- EXISTING GAS LINE
- CENTERLINE PROPOSED ACCESS ROAD
- EDGE OF PROPOSED GRAVEL ACCESS ROAD
- FEMA FLOOD ZONE "A" PER FIRM #54085C0225C & #54017C0200C
- HEC-RAS STUDY CROSS SECTION
- EXISTING FLOW DIRECTION

NOTE:

EXISTING LIDAR TOPOGRAPHY HAS BEEN SUPPLEMENTED WITH CROSS SECTION SURVEY DATA.

EXISTING EXISTING LIDAR PROVIDED BY:

BLUE MOUNTAIN AERIAL MAPPING
CONTACT: CRAIG FRY
11023 MASON DIXON HIGHWAY,
BURTON, WV 26562
304.662.2626

CROSS SECTION SURVEY DATA PROVIDED BY:

TRIPLE H ENTERPRISES
CONTACT: DARRELL BOICE, PS
204 NEELY AVE.
WEST UNION, WV 26456
304.873.3360

SEAL

NO.	REVISION	BY	DATE
1		-	-
2		-	-
3		-	-
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5		-	-

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PROJ. NO. 133141
ACAD FILE: OVERALL PLAN.dwg

MACKAY WELL & W.C. PAD ACCESS ROAD PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: CAL
CHECKED BY: JBC
DATE: 02-18-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

FLOOD PLAIN EXHIBITS

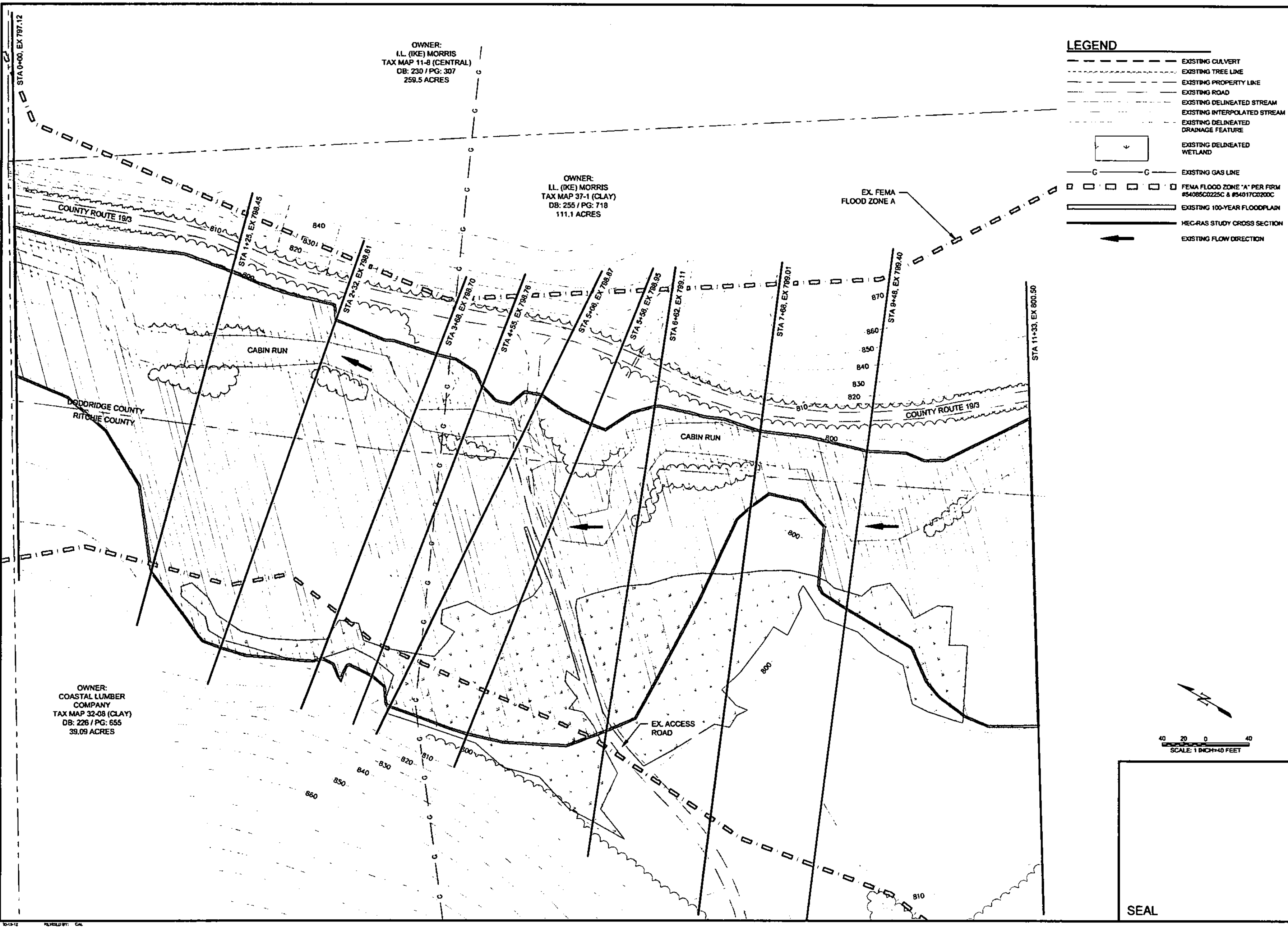
1

1 of 3 sheets

PLOTTED: 28 Feb 2014, 4:25pm, CLewis

Exhibit C

Existing Conditions Plan



NO.	REVISION	BY	DATE
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5	-	-	-

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PROJ. NO. 133141
ACAD FILE: OVERALL PLAN.dwg

MACKAY WELL & W.C. PAD EXISTING CONDITIONS PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

SEAL

DESIGNED BY: RAP
MODIFIED BY: CAL
CHECKED BY: JBC
DATE: 02-18-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 0.5 1.0 1.5 2.0

FLOOD PLAIN EXHIBITS

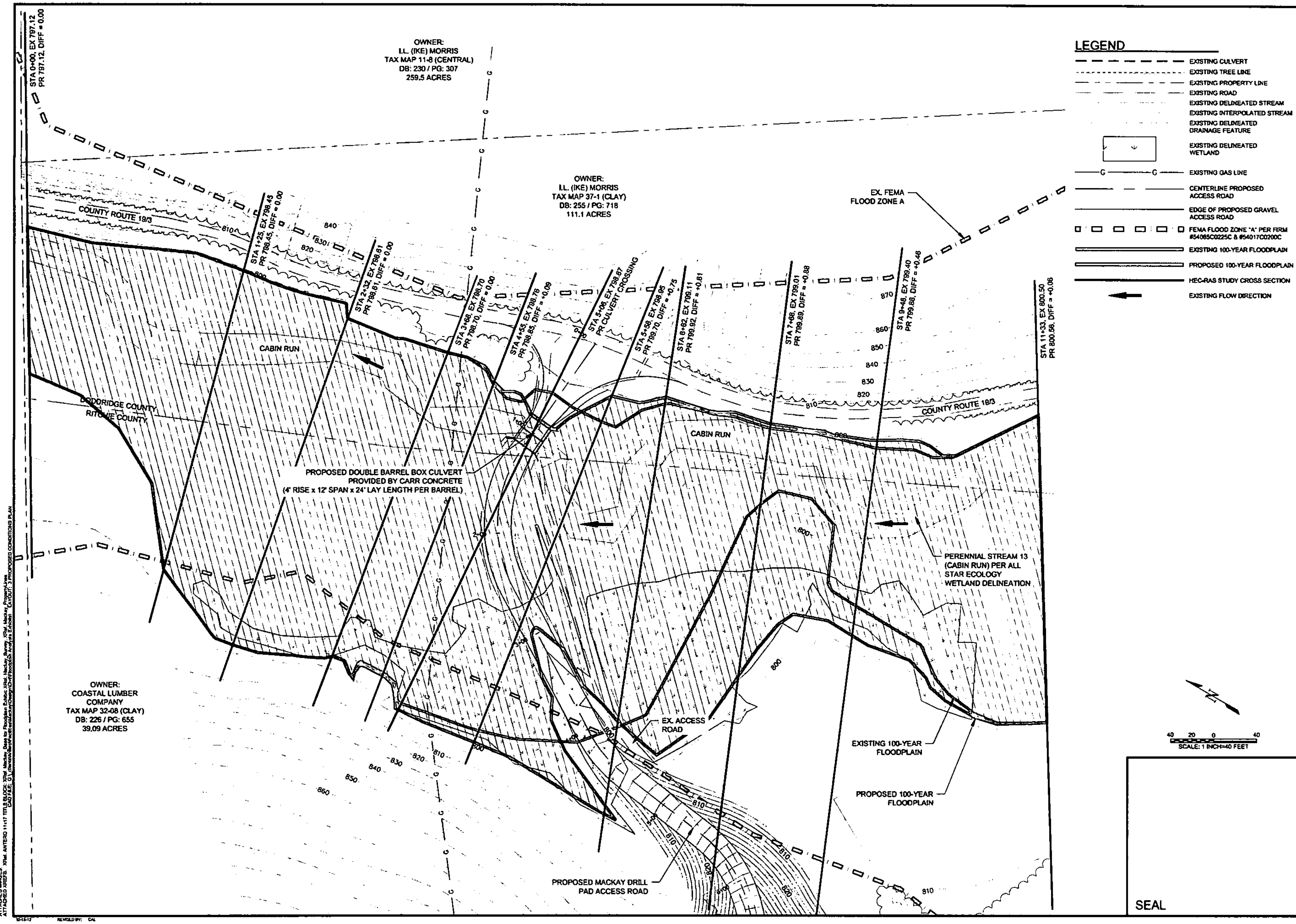
2

2 of 3 sheets

PLOTTED: 28 Feb 2014, 4:28pm, CLewis

Exhibit D

Proposed Conditions Plan



NO.	REVISION	BY	DATE
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4		-	-
5		-	-

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PROJ. NO. 133141
ACAD FILE: OVERALL PLAN.dwg

MACKAY WELL & W.C. PAD PROPOSED CONDITIONS PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

SEAL

DESIGNED BY: RAP
MODIFIED BY: CAL
CHECKED BY: JBC
DATE: 02-18-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

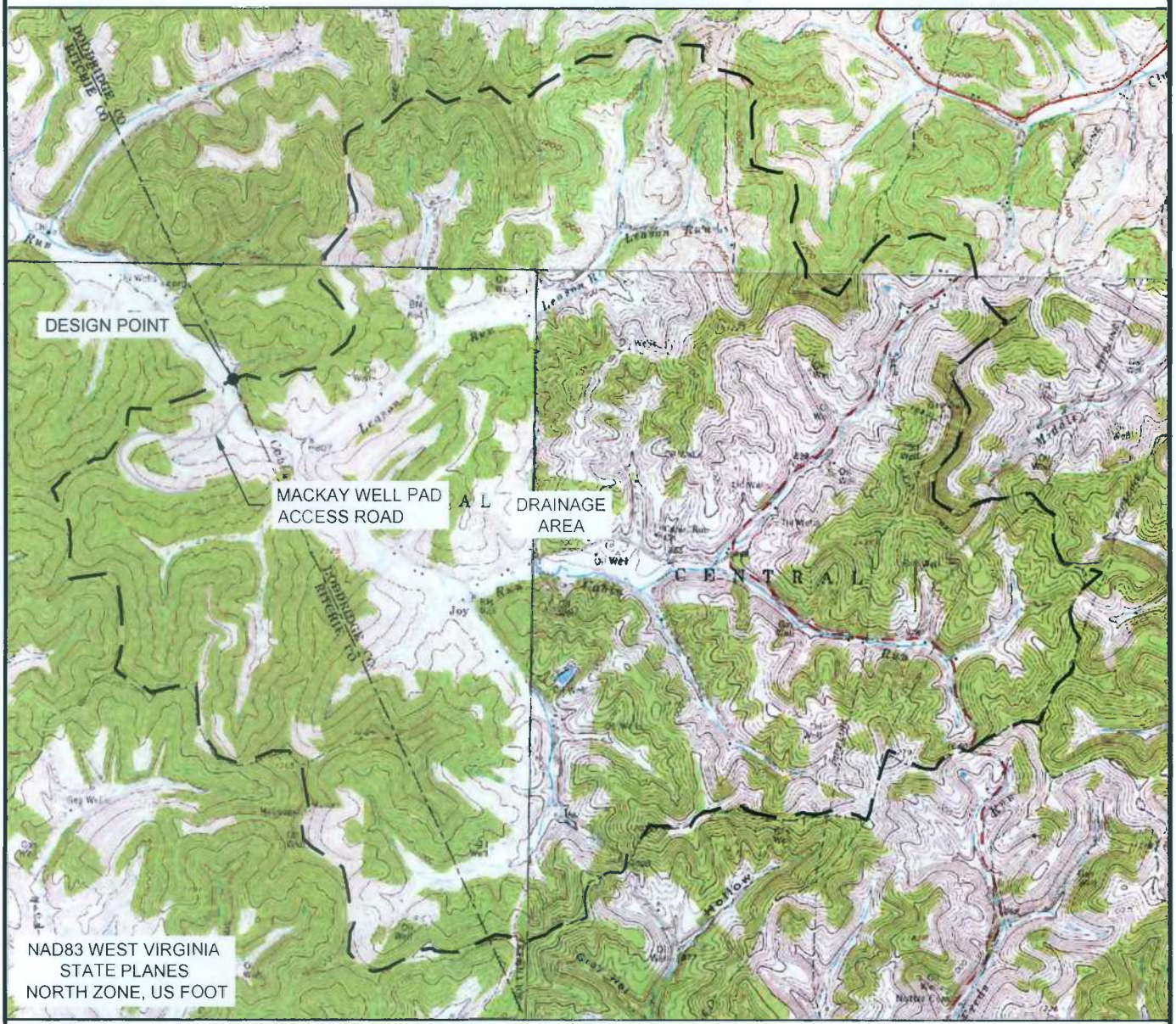
FLOOD PLAIN EXHIBITS
3
3 of 3 sheets

PLOTTED: 28 Feb 2014, 4:25pm, CLewis

Supplement 1

Drainage Computations

DRAINAGE AREA EXHIBIT



DRAINAGE AREA (SQ. MI.)	100-YEAR PEAK FLOW, Q (CFS)
7.343	1932.89

NOTES:

1. USGS 7.5 OXFORD, PULLMAN, PENNSBORO, AND WEST UNION QUAD

N

3000 1500 0

SCALE: 1 INCH = 3000 FEET

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PROJECT NO.	133141
DRAWN:	08-30-2013
DRAWN BY:	RAP
CHECKED BY:	CAL
FILE NAME:	Drainage Area Exhibit.dwg

MACKAY DRILL PAD
DRAINAGE AREA EXHIBIT

ANTERO RESOURCES CORPORATION

RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DETAIL

A

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1932.89	2	900	44,068,680	------	------	------	Mackay Drainage Area

Hydrograph Report

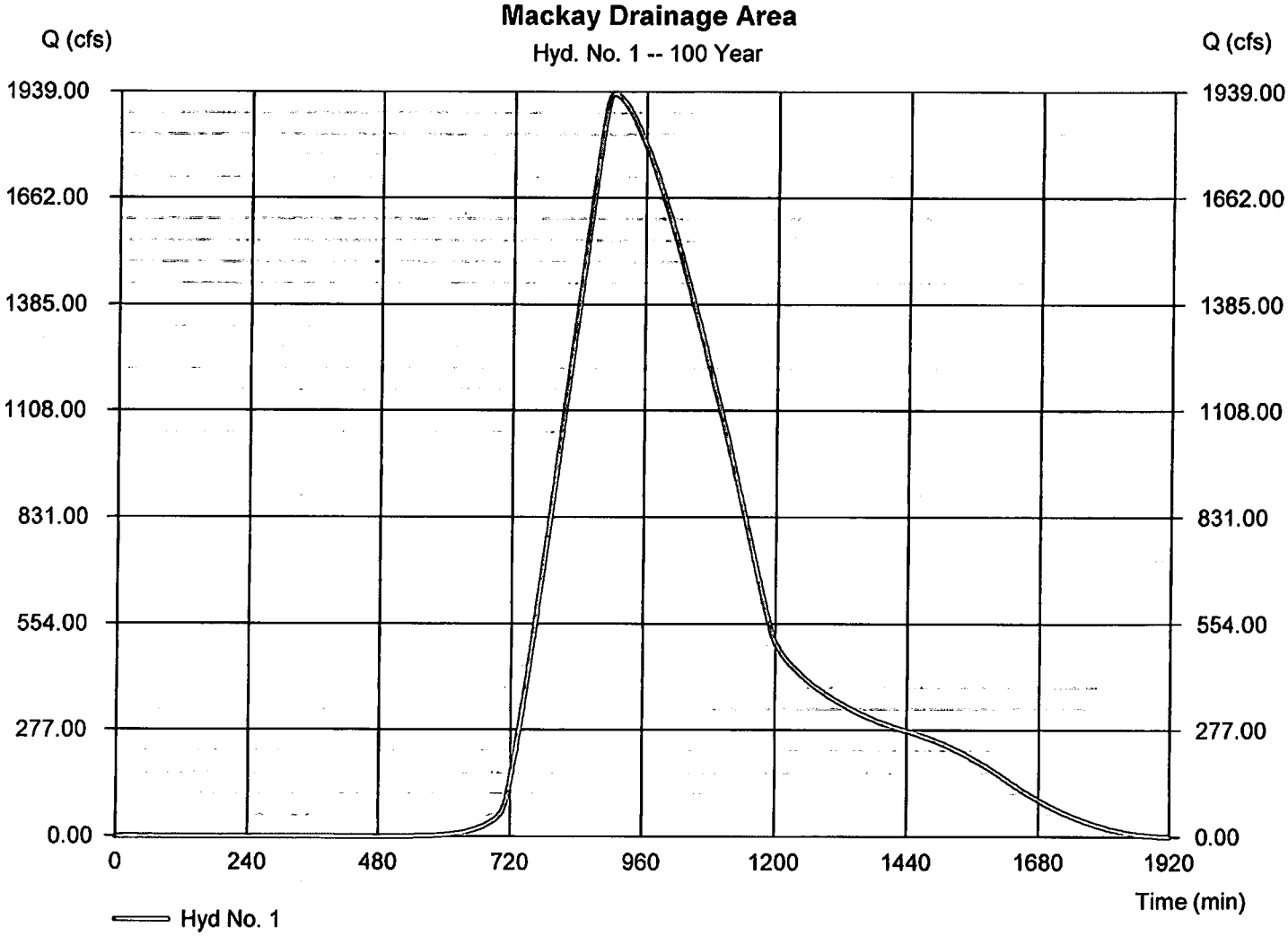
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Friday, Aug 30, 2013

Hyd. No. 1

Mackay Drainage Area

Hydrograph type	= SCS Runoff	Peak discharge	= 1932.89 cfs
Storm frequency	= 100 yrs	Time to peak	= 900 min
Time interval	= 2 min	Hyd. volume	= 44,068,680 cuft
Drainage area	= 4699.670 ac	Curve number	= 75*
Basin Slope	= 1.7 %	Hydraulic length	= 20011 ft
Tc method	= LAG	Time of conc. (Tc)	= 307.26 min
Total precip.	= 5.16 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(94.100 x 58) + (732.970 x 71) + (181.040 x 78) + (344.600 x 65) + (2684.000 x 76) + (662.960 x 82)] / 4699.670



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Friday, Aug 30, 2013

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

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

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.55	0.00	3.30	3.53	4.15	6.80	5.16
SCS 6-Hr	0.00	1.83	0.00	0.00	2.61	3.10	0.00	3.91
Huff-1st	0.00	0.00	0.00	2.75	0.00	0.00	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	0.00	6.00	0.00

Supplement 2

HEC-RAS Analysis

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 1133 Profile: PF 1

E.G. Elev (ft)	800.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	800.50	Reach Len. (ft)	222.30	180.10	130.70
Crit W.S. (ft)		Flow Area (sq ft)	682.48	222.46	29.10
E.G. Slope (ft/ft)	0.000399	Area (sq ft)	682.48	222.46	29.10
Q Total (cfs)	1932.89	Flow (cfs)	1284.05	632.28	16.56
Top Width (ft)	251.52	Top Width (ft)	206.39	35.67	9.45
Vel Total (ft/s)	2.07	Avg. Vel. (ft/s)	1.88	2.84	0.57
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	3.31	6.24	3.08
Conv. Total (cfs)	96772.6	Conv. (cfs)	64287.5	31656.1	829.0
Length Wtd. (ft)	195.52	Wetted Per. (ft)	206.50	36.25	10.96
Min Ch El (ft)	794.13	Shear (lb/sq ft)	0.08	0.15	0.07
Alpha	1.17	Stream Power (lb/ft s)	518.60	0.00	0.00
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	9.00	5.24	1.16
C & E Loss (ft)	0.08	Cum SA (acres)	4.83	0.94	0.85

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 948 Profile: PF 1

E.G. Elev (ft)	800.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.40	Reach Len. (ft)	113.20	108.40	105.30
Crit W.S. (ft)	799.35	Flow Area (sq ft)	107.46	160.38	111.69
E.G. Slope (ft/ft)	0.005425	Area (sq ft)	107.46	160.38	111.69
Q Total (cfs)	1932.89	Flow (cfs)	351.52	1407.04	174.33
Top Width (ft)	195.13	Top Width (ft)	100.36	29.93	64.84
Vel Total (ft/s)	5.09	Avg. Vel. (ft/s)	3.27	8.77	1.56

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 948 Profile: PF 1 (Continued)

Max Chl Dpth (ft)	5.80	Hydr. Depth (ft)	1.07	5.36	1.72
Conv. Total (cfs)	26243.5	Conv. (cfs)	4772.7	19103.8	2366.9
Length Wtd. (ft)	109.70	Wetted Per. (ft)	100.43	34.13	65.58
Min Ch El (ft)	793.59	Shear (lb/sq ft)	0.36	1.59	0.58
Alpha	2.24	Stream Power (lb/ft s)	628.69	0.00	0.00
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	6.98	4.45	0.95
C & E Loss (ft)	0.08	Cum SA (acres)	4.05	0.80	0.74

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 768 Profile: PF 1

E.G. Elev (ft)	799.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.01	Reach Len. (ft)	115.10	100.30	99.60
Crit W.S. (ft)	799.01	Flow Area (sq ft)	258.71	140.57	0.27
E.G. Slope (ft/ft)	0.004916	Area (sq ft)	258.71	140.57	0.27
Q Total (cfs)	1932.89	Flow (cfs)	811.26	1121.51	0.12
Top Width (ft)	269.11	Top Width (ft)	239.06	29.35	0.70
Vel Total (ft/s)	4.84	Avg. Vel. (ft/s)	3.14	7.98	0.42
Max Chl Dpth (ft)	5.69	Hydr. Depth (ft)	1.08	4.79	0.39
Conv. Total (cfs)	27568.1	Conv. (cfs)	11570.7	15995.8	1.6
Length Wtd. (ft)	105.57	Wetted Per. (ft)	239.26	32.04	1.05
Min Ch El (ft)	793.32	Shear (lb/sq ft)	0.33	1.35	0.08
Alpha	1.75	Stream Power (lb/ft s)	600.87	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	6.50	4.07	0.82
C & E Loss (ft)	0.17	Cum SA (acres)	3.61	0.73	0.66

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 662 Profile: PF 1

E.G. Elev (ft)	799.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.11	Reach Len. (ft)	146.80	95.30	19.40
Crit W.S. (ft)		Flow Area (sq ft)	436.72	506.79	13.10
E.G. Slope (ft/ft)	0.000417	Area (sq ft)	436.72	506.79	13.10
Q Total (cfs)	1932.89	Flow (cfs)	565.14	1364.97	2.78
Top Width (ft)	350.08	Top Width (ft)	239.41	88.34	22.33
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)	1.29	2.69	0.21
Max Chl Dpth (ft)	6.10	Hydr. Depth (ft)	1.82	5.74	0.59
Conv. Total (cfs)	94638.4	Conv. (cfs)	27670.5	66831.7	136.2
Length Wtd. (ft)	113.41	Wetted Per. (ft)	239.54	92.57	22.36
Min Ch El (ft)	793.01	Shear (lb/sq ft)	0.05	0.14	0.02
Alpha	1.37	Stream Power (lb/ft s)	544.82	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	5.59	3.33	0.80
C & E Loss (ft)	0.01	Cum SA (acres)	2.98	0.59	0.64

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 558 Profile: PF 1

E.G. Elev (ft)	799.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.95	Reach Len. (ft)	76.50	68.20	43.70
Crit W.S. (ft)		Flow Area (sq ft)	435.08	172.14	197.51
E.G. Slope (ft/ft)	0.001210	Area (sq ft)	435.08	172.14	197.51
Q Total (cfs)	1932.89	Flow (cfs)	1026.67	751.19	155.03
Top Width (ft)	350.76	Top Width (ft)	215.04	30.24	105.47
Vel Total (ft/s)	2.40	Avg. Vel. (ft/s)	2.36	4.36	0.78

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 558 Profile: PF 1 (Continued)

Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)	2.02	5.69	1.87
Conv. Total (cfs)	55561.9	Conv. (cfs)	29512.2	21593.5	4456.3
Length Wtd. (ft)	71.21	Wetted Per. (ft)	215.43	33.89	105.56
Min Ch El (ft)	792.72	Shear (lb/sq ft)	0.15	0.38	0.14
Alpha	1.80	Stream Power (lb/ft s)	492.58	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	4.12	2.58	0.75
C & E Loss (ft)	0.00	Cum SA (acres)	2.21	0.46	0.61

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 506 Profile: PF 1

E.G. Elev (ft)	799.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.87	Reach Len. (ft)	24.40	51.20	70.70
Crit W.S. (ft)		Flow Area (sq ft)	455.32	223.04	66.57
E.G. Slope (ft/ft)	0.001123	Area (sq ft)	455.32	223.04	66.57
Q Total (cfs)	1932.89	Flow (cfs)	966.08	922.44	44.37
Top Width (ft)	335.40	Top Width (ft)	249.22	43.48	42.70
Vel Total (ft/s)	2.59	Avg. Vel. (ft/s)	2.12	4.14	0.67
Max Chl Dpth (ft)	6.34	Hydr. Depth (ft)	1.83	5.13	1.56
Conv. Total (cfs)	57678.1	Conv. (cfs)	28828.2	27525.8	1324.1
Length Wtd. (ft)	38.23	Wetted Per. (ft)	250.00	45.00	42.99
Min Ch El (ft)	792.53	Shear (lb/sq ft)	0.13	0.35	0.11
Alpha	1.55	Stream Power (lb/ft s)	472.23	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	3.33	2.28	0.62
C & E Loss (ft)	0.01	Cum SA (acres)	1.80	0.40	0.53

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 455 Profile: PF 1

E.G. Elev (ft)	798.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.76	Reach Len. (ft)	53.86	51.09	53.10
Crit W.S. (ft)		Flow Area (sq ft)	414.05	194.17	58.81
E.G. Slope (ft/ft)	0.001544	Area (sq ft)	414.05	194.17	58.81
Q Total (cfs)	1932.89	Flow (cfs)	962.21	935.16	35.52
Top Width (ft)	341.23	Top Width (ft)	250.25	35.28	55.70
Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)	2.32	4.82	0.60
Max Chl Dpth (ft)	6.41	Hydr. Depth (ft)	1.65	5.50	1.06
Conv. Total (cfs)	49196.3	Conv. (cfs)	24490.3	23801.9	904.1
Length Wtd. (ft)	52.54	Wetted Per. (ft)	251.78	39.58	55.88
Min Ch El (ft)	792.35	Shear (lb/sq ft)	0.16	0.47	0.10
Alpha	1.66	Stream Power (lb/ft s)	441.38	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	3.09	2.03	0.52
C & E Loss (ft)	0.01	Cum SA (acres)	1.66	0.36	0.45

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 368 Profile: PF 1

E.G. Elev (ft)	798.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.70	Reach Len. (ft)	88.60	98.30	100.70
Crit W.S. (ft)		Flow Area (sq ft)	450.60	193.40	69.35
E.G. Slope (ft/ft)	0.001271	Area (sq ft)	450.60	193.40	69.35
Q Total (cfs)	1932.89	Flow (cfs)	1004.16	879.54	49.19
Top Width (ft)	328.25	Top Width (ft)	251.97	31.60	44.68
Vel Total (ft/s)	2.71	Avg. Vel. (ft/s)	2.23	4.55	0.71

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 368 Profile: PF 1 (Continued)

Max Chl Dpth (ft)	6.48	Hydr. Depth (ft)	1.79	6.12	1.55
Conv. Total (cfs)	54209.2	Conv. (cfs)	28162.4	24667.3	1379.5
Length Wtd. (ft)	92.91	Wetted Per. (ft)	252.27	37.14	44.77
Min Ch El (ft)	792.22	Shear (lb/sq ft)	0.14	0.41	0.12
Alpha	1.63	Stream Power (lb/ft s)	423.47	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	2.56	1.80	0.44
C & E Loss (ft)	0.01	Cum SA (acres)	1.35	0.32	0.39

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 232 Profile: PF 1

E.G. Elev (ft)	798.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.61	Reach Len. (ft)	82.90	104.26	107.98
Crit W.S. (ft)		Flow Area (sq ft)	499.27	177.45	33.49
E.G. Slope (ft/ft)	0.001175	Area (sq ft)	499.27	177.45	33.49
Q Total (cfs)	1932.89	Flow (cfs)	1161.89	751.15	19.85
Top Width (ft)	304.34	Top Width (ft)	246.64	31.28	26.42
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)	2.33	4.23	0.59
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)	2.02	5.67	1.27
Conv. Total (cfs)	56376.4	Conv. (cfs)	33888.8	21908.7	578.9
Length Wtd. (ft)	92.14	Wetted Per. (ft)	246.97	35.78	26.69
Min Ch El (ft)	791.94	Shear (lb/sq ft)	0.15	0.36	0.09
Alpha	1.38	Stream Power (lb/ft s)	429.79	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	1.59	1.38	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.84	0.25	0.31

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 125 Profile: PF 1

E.G. Elev (ft)	798.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.45	Reach Len. (ft)	119.20	222.60	276.10
Crit W.S. (ft)		Flow Area (sq ft)	424.68	182.41	61.44
E.G. Slope (ft/ft)	0.001185	Area (sq ft)	424.68	182.41	61.44
Q Total (cfs)	1932.89	Flow (cfs)	1040.74	860.37	31.78
Top Width (ft)	285.13	Top Width (ft)	195.32	29.80	60.01
Vel Total (ft/s)	2.89	Avg. Vel. (ft/s)	2.45	4.72	0.52
Max Chl Dpth (ft)	6.83	Hydr. Depth (ft)	2.17	6.12	1.02
Conv. Total (cfs)	56151.7	Conv. (cfs)	30234.3	24994.2	923.2
Length Wtd. (ft)	188.19	Wetted Per. (ft)	195.56	31.46	60.41
Min Ch El (ft)	791.62	Shear (lb/sq ft)	0.16	0.43	0.08
Alpha	1.57	Stream Power (lb/ft s)	408.30	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	0.71	0.95	0.21
C & E Loss (ft)	0.08	Cum SA (acres)	0.42	0.17	0.20

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 0 Profile: PF 1

E.G. Elev (ft)	798.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	797.12	Reach Len. (ft)			
Crit W.S. (ft)	797.12	Flow Area (sq ft)	95.48	190.82	3.54
E.G. Slope (ft/ft)	0.005396	Area (sq ft)	95.48	190.82	3.54
Q Total (cfs)	1932.89	Flow (cfs)	264.02	1665.64	3.23
Top Width (ft)	157.17	Top Width (ft)	114.34	38.49	4.34
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)	2.77	8.73	0.91

Existing Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 0 Profile: PF 1 (Continued)

Max Chl Dpth (ft)	6.15	Hydr. Depth (ft)	0.84	4.96	0.82
Conv. Total (cfs)	26312.1	Conv. (cfs)	3594.0	22674.0	44.0
Length Wtd. (ft)		Wetted Per. (ft)	114.37	40.75	4.64
Min Ch El (ft)	790.97	Shear (lb/sq ft)	0.28	1.58	0.26
Alpha	1.50	Stream Power (lb/ft s)	518.60	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 1133 Profile: 100

E.G. Elev (ft)	800.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	800.56	Reach Len. (ft)	222.30	180.10	130.70
Crit W.S. (ft)		Flow Area (sq ft)	695.90	224.83	29.67
E.G. Slope (ft/ft)	0.000379	Area (sq ft)	695.90	224.83	29.67
Q Total (cfs)	1932.89	Flow (cfs)	1289.05	627.25	16.58
Top Width (ft)	252.56	Top Width (ft)	207.37	35.68	9.51
Vel Total (ft/s)	2.03	Avg. Vel. (ft/s)	1.85	2.79	0.56
Max Chl Dpth (ft)	6.43	Hydr. Depth (ft)	3.36	6.30	3.12
Conv. Total (cfs)	99263.3	Conv. (cfs)	66199.0	32212.6	851.7
Length Wtd. (ft)	196.53	Wetted Per. (ft)	207.48	36.26	11.05
Min Ch El (ft)	794.13	Shear (lb/sq ft)	0.08	0.15	0.06
Alpha	1.16	Stream Power (lb/ft s)	518.60	0.00	0.00
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	9.05	7.03	1.06
C & E Loss (ft)	0.05	Cum SA (acres)	4.78	0.92	0.94

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 948 Profile: 100

E.G. Elev (ft)	800.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.85	Reach Len. (ft)	113.20	108.40	105.30
Crit W.S. (ft)		Flow Area (sq ft)	156.15	173.96	141.27
E.G. Slope (ft/ft)	0.003330	Area (sq ft)	156.15	173.96	141.27
Q Total (cfs)	1932.89	Flow (cfs)	470.27	1262.27	200.35
Top Width (ft)	209.95	Top Width (ft)	114.48	29.93	65.54
Vel Total (ft/s)	4.10	Avg. Vel. (ft/s)	3.01	7.26	1.42

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 948 Profile: 100 (Continued)

Max Chl Dpth (ft)	6.26	Hydr. Depth (ft)	1.36	5.81	2.16
Conv. Total (cfs)	33497.1	Conv. (cfs)	8149.8	21875.3	3472.0
Length Wtd. (ft)	110.24	Wetted Per. (ft)	114.55	34.13	66.41
Min Ch El (ft)	793.59	Shear (lb/sq ft)	0.28	1.06	0.44
Alpha	2.19	Stream Power (lb/ft s)	628.69	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	6.88	6.20	0.81
C & E Loss (ft)	0.11	Cum SA (acres)	3.96	0.79	0.83

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 768 Profile: 100

E.G. Elev (ft)	800.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.88	Reach Len. (ft)	115.10	100.30	99.60
Crit W.S. (ft)		Flow Area (sq ft)	470.20	166.04	1.22
E.G. Slope (ft/ft)	0.001396	Area (sq ft)	470.20	166.04	1.22
Q Total (cfs)	1932.89	Flow (cfs)	1143.81	788.62	0.46
Top Width (ft)	278.12	Top Width (ft)	247.28	29.35	1.49
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)	2.43	4.75	0.37
Max Chl Dpth (ft)	6.56	Hydr. Depth (ft)	1.90	5.66	0.82
Conv. Total (cfs)	51741.9	Conv. (cfs)	30618.9	21110.7	12.2
Length Wtd. (ft)	106.89	Wetted Per. (ft)	247.52	32.04	2.22
Min Ch El (ft)	793.32	Shear (lb/sq ft)	0.17	0.45	0.05
Alpha	1.38	Stream Power (lb/ft s)	600.87	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	6.06	5.78	0.64
C & E Loss (ft)	0.04	Cum SA (acres)	3.49	0.71	0.75

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 662 Profile: 100

E.G. Elev (ft)	799.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.92	Reach Len. (ft)	146.80	95.30	19.40
Crit W.S. (ft)		Flow Area (sq ft)	434.60	578.51	34.77
E.G. Slope (ft/ft)	0.000260	Area (sq ft)	475.66	578.51	34.77
Q Total (cfs)	1932.89	Flow (cfs)	578.82	1344.51	9.56
Top Width (ft)	311.14	Top Width (ft)	194.67	88.34	28.13
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	1.33	2.32	0.27
Max Chl Dpth (ft)	6.91	Hydr. Depth (ft)	2.72	6.55	1.24
Conv. Total (cfs)	119793.4	Conv. (cfs)	35873.2	83328.0	592.3
Length Wtd. (ft)	108.24	Wetted Per. (ft)	160.31	92.57	28.32
Min Ch El (ft)	793.01	Shear (lb/sq ft)	0.04	0.10	0.02
Alpha	1.26	Stream Power (lb/ft s)	544.82	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	4.81	4.92	0.59
C & E Loss (ft)	0.02	Cum SA (acres)	2.90	0.58	0.71

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 558 Profile: 100

E.G. Elev (ft)	799.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	799.70	Reach Len. (ft)	100.90	119.40	114.40
Crit W.S. (ft)	798.70	Flow Area (sq ft)	349.95	194.70	249.42
E.G. Slope (ft/ft)	0.001332	Area (sq ft)	536.31	194.70	279.95
Q Total (cfs)	1932.89	Flow (cfs)	739.48	967.59	225.82
Top Width (ft)	364.73	Top Width (ft)	218.99	30.24	115.50
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	2.11	4.97	0.91

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 558 Profile: 100 (Continued)

Max Chl Dpth (ft)	6.98	Hydr. Depth (ft)	1.60	6.44	2.16
Conv. Total (cfs)	52963.7	Conv. (cfs)	20262.8	26513.2	6187.7
Length Wtd. (ft)	119.40	Wetted Per. (ft)	219.71	33.89	115.62
Min Ch El (ft)	792.72	Shear (lb/sq ft)	0.13	0.48	0.18
Alpha	2.39	Stream Power (lb/ft s)	492.58	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	3.11	4.08	0.52
C & E Loss (ft)		Cum SA (acres)	2.21	0.45	0.68

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 455 Profile: 100

E.G. Elev (ft)	799.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.85	Reach Len. (ft)	53.86	51.09	53.10
Crit W.S. (ft)	798.85	Flow Area (sq ft)	197.76	197.62	63.03
E.G. Slope (ft/ft)	0.003501	Area (sq ft)	438.50	197.62	64.26
Q Total (cfs)	1932.89	Flow (cfs)	422.79	1450.24	59.86
Top Width (ft)	341.49	Top Width (ft)	250.25	35.28	55.96
Vel Total (ft/s)	4.22	Avg. Vel. (ft/s)	2.14	7.34	0.95
Max Chl Dpth (ft)	6.50	Hydr. Depth (ft)	0.79	5.60	1.13
Conv. Total (cfs)	32667.6	Conv. (cfs)	7145.5	24510.4	1011.7
Length Wtd. (ft)	52.17	Wetted Per. (ft)	251.88	39.58	56.15
Min Ch El (ft)	792.35	Shear (lb/sq ft)	0.17	1.09	0.25
Alpha	2.33	Stream Power (lb/ft s)	441.38	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	3.11	2.03	0.52
C & E Loss (ft)	0.23	Cum SA (acres)	1.66	0.36	0.45

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 368 Profile: 100

E.G. Elev (ft)	798.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.70	Reach Len. (ft)	88.60	98.30	100.70
Crit W.S. (ft)		Flow Area (sq ft)	450.60	193.40	69.35
E.G. Slope (ft/ft)	0.001271	Area (sq ft)	450.60	193.40	69.35
Q Total (cfs)	1932.89	Flow (cfs)	1004.16	879.54	49.19
Top Width (ft)	328.25	Top Width (ft)	251.97	31.60	44.68
Vel Total (ft/s)	2.71	Avg. Vel. (ft/s)	2.23	4.55	0.71
Max Chl Dpth (ft)	6.48	Hydr. Depth (ft)	1.79	6.12	1.55
Conv. Total (cfs)	54209.2	Conv. (cfs)	28162.4	24667.3	1379.5
Length Wtd. (ft)	92.91	Wetted Per. (ft)	252.27	37.14	44.77
Min Ch El (ft)	792.22	Shear (lb/sq ft)	0.14	0.41	0.12
Alpha	1.63	Stream Power (lb/ft s)	423.47	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	2.56	1.80	0.44
C & E Loss (ft)	0.01	Cum SA (acres)	1.35	0.32	0.39

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 232 Profile: 100

E.G. Elev (ft)	798.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.61	Reach Len. (ft)	82.90	104.26	107.98
Crit W.S. (ft)		Flow Area (sq ft)	499.27	177.45	33.49
E.G. Slope (ft/ft)	0.001175	Area (sq ft)	499.27	177.45	33.49
Q Total (cfs)	1932.89	Flow (cfs)	1161.89	751.15	19.85
Top Width (ft)	304.34	Top Width (ft)	246.64	31.28	26.42
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)	2.33	4.23	0.59

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 232 Profile: 100 (Continued)

Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)	2.02	5.67	1.27
Conv. Total (cfs)	56376.4	Conv. (cfs)	33888.8	21908.7	578.9
Length Wtd. (ft)	92.14	Wetted Per. (ft)	246.97	35.78	26.69
Min Ch El (ft)	791.94	Shear (lb/sq ft)	0.15	0.36	0.09
Alpha	1.38	Stream Power (lb/ft s)	429.79	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	1.59	1.38	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.84	0.25	0.31

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 125 Profile: 100

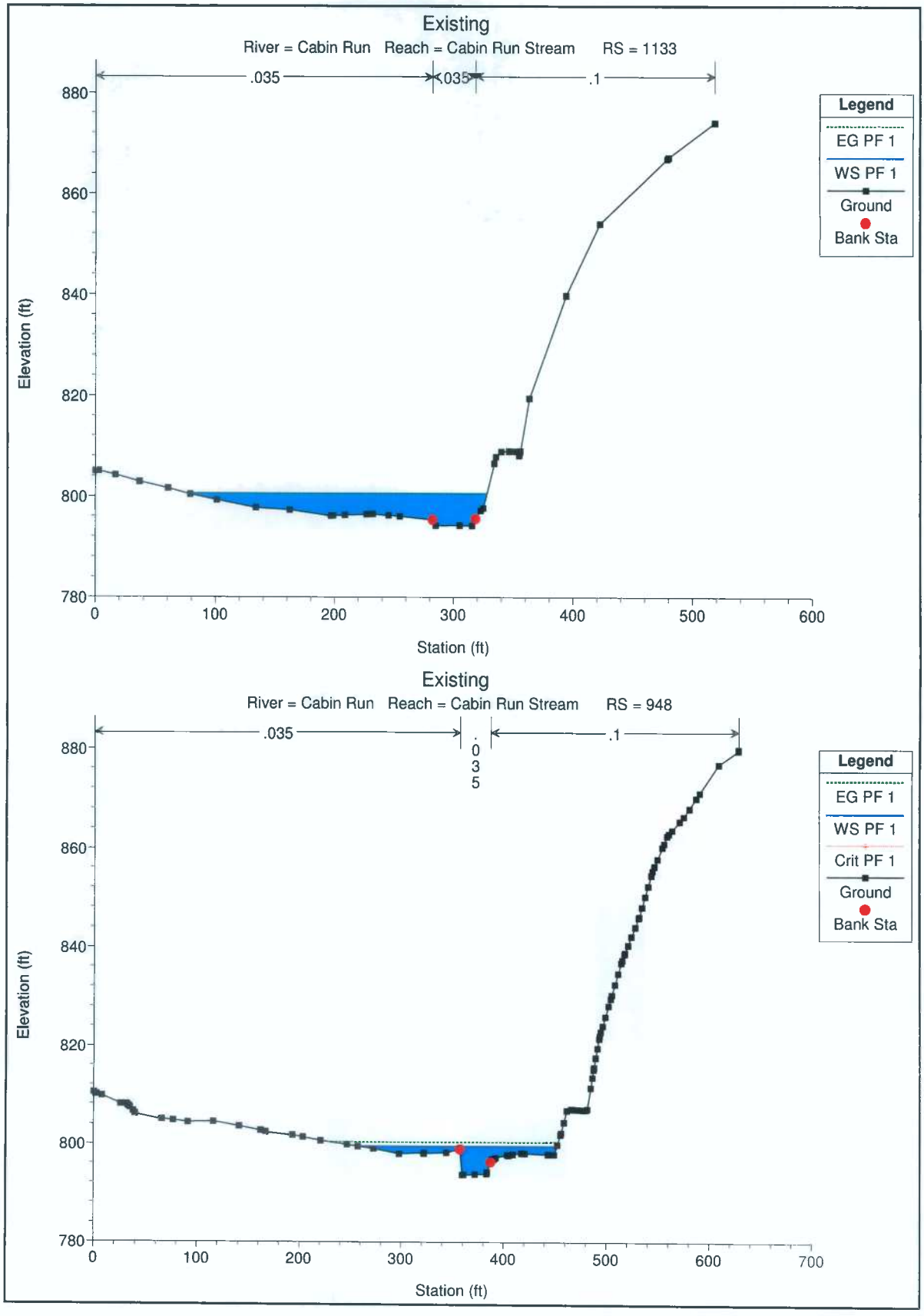
E.G. Elev (ft)	798.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	798.45	Reach Len. (ft)	119.20	222.60	276.10
Crit W.S. (ft)		Flow Area (sq ft)	424.68	182.41	61.44
E.G. Slope (ft/ft)	0.001185	Area (sq ft)	424.68	182.41	61.44
Q Total (cfs)	1932.89	Flow (cfs)	1040.74	860.37	31.78
Top Width (ft)	285.13	Top Width (ft)	195.32	29.80	60.01
Vel Total (ft/s)	2.89	Avg. Vel. (ft/s)	2.45	4.72	0.52
Max Chl Dpth (ft)	6.83	Hydr. Depth (ft)	2.17	6.12	1.02
Conv. Total (cfs)	56151.7	Conv. (cfs)	30234.3	24994.2	923.2
Length Wtd. (ft)	188.19	Wetted Per. (ft)	195.56	31.46	60.41
Min Ch El (ft)	791.62	Shear (lb/sq ft)	0.16	0.43	0.08
Alpha	1.57	Stream Power (lb/ft s)	408.30	0.00	0.00
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	0.71	0.95	0.21
C & E Loss (ft)	0.08	Cum SA (acres)	0.42	0.17	0.20

Proposed Section Data

Plan: Plan 01 Cabin Run Cabin Run Stream RS: 0 Profile: 100

E.G. Elev (ft)	798.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.035	0.035	0.100
W.S. Elev (ft)	797.12	Reach Len. (ft)			
Crit W.S. (ft)	797.12	Flow Area (sq ft)	95.48	190.82	3.54
E.G. Slope (ft/ft)	0.005396	Area (sq ft)	95.48	190.82	3.54
Q Total (cfs)	1932.89	Flow (cfs)	264.02	1665.64	3.23
Top Width (ft)	157.17	Top Width (ft)	114.34	38.49	4.34
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)	2.77	8.73	0.91
Max Chl Dpth (ft)	6.15	Hydr. Depth (ft)	0.84	4.96	0.82
Conv. Total (cfs)	26312.1	Conv. (cfs)	3594.0	22674.0	44.0
Length Wtd. (ft)		Wetted Per. (ft)	114.37	40.75	4.64
Min Ch El (ft)	790.97	Shear (lb/sq ft)	0.28	1.58	0.26
Alpha	1.50	Stream Power (lb/ft s)	518.60	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Existing Cross-Sections



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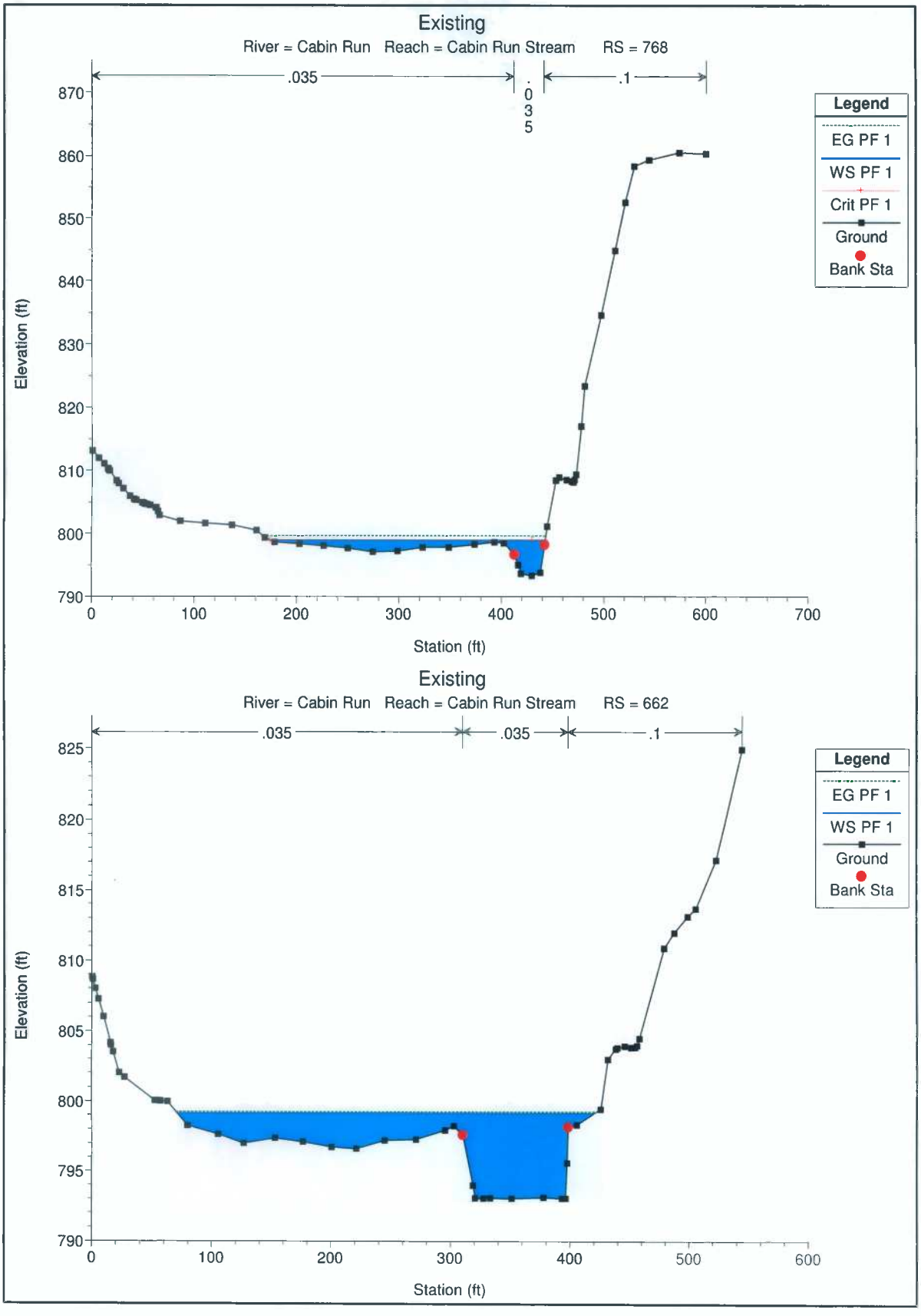

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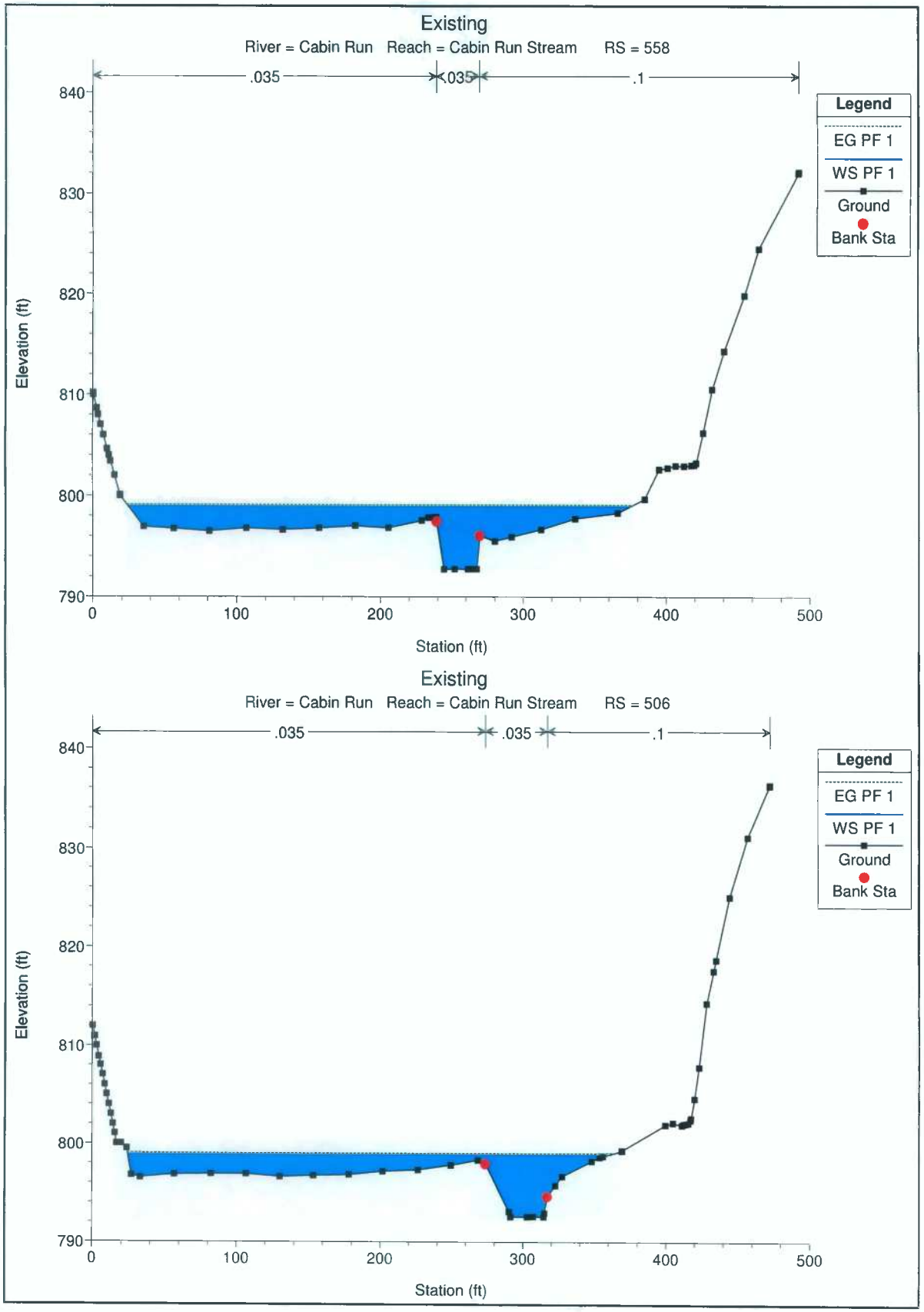

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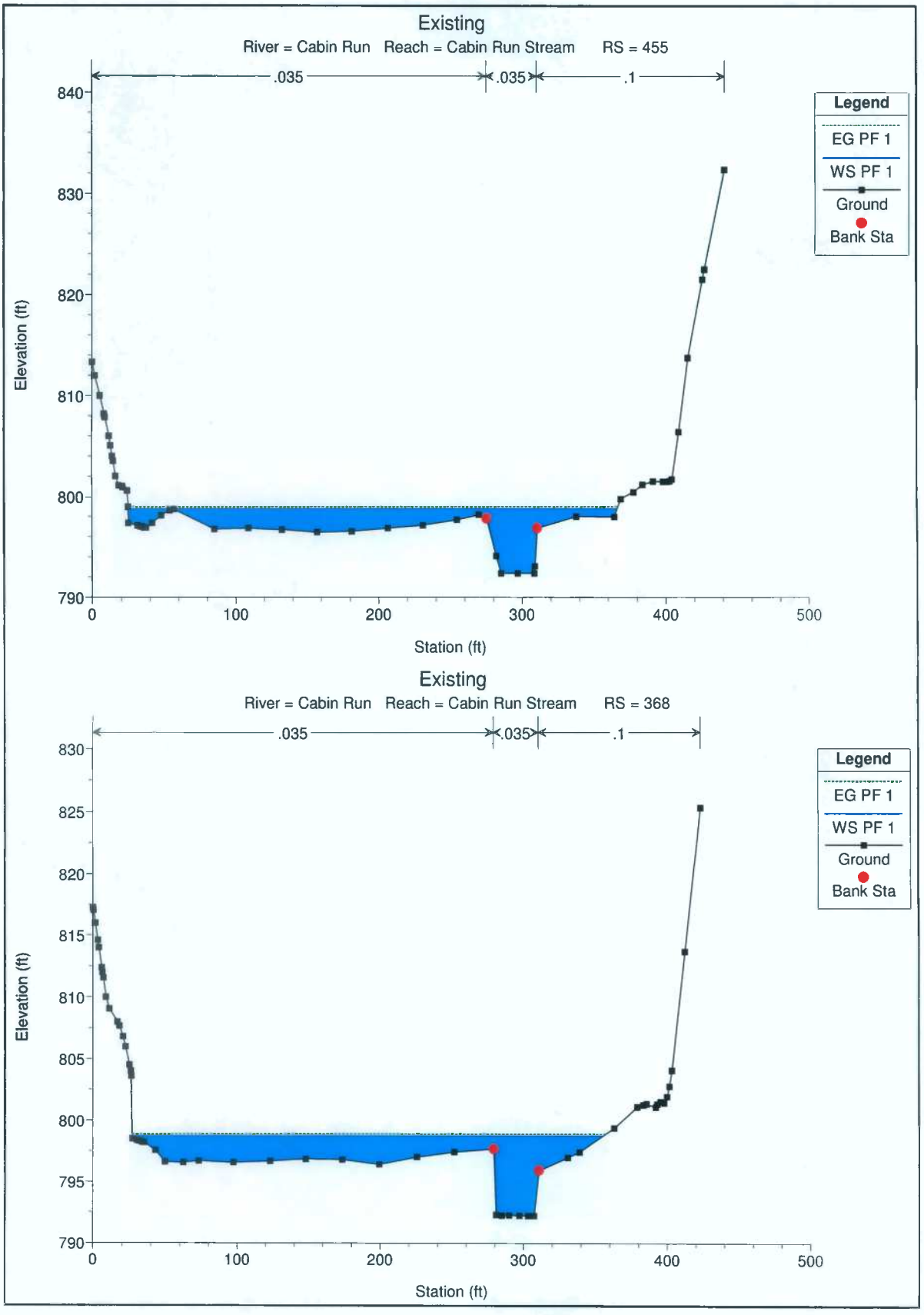

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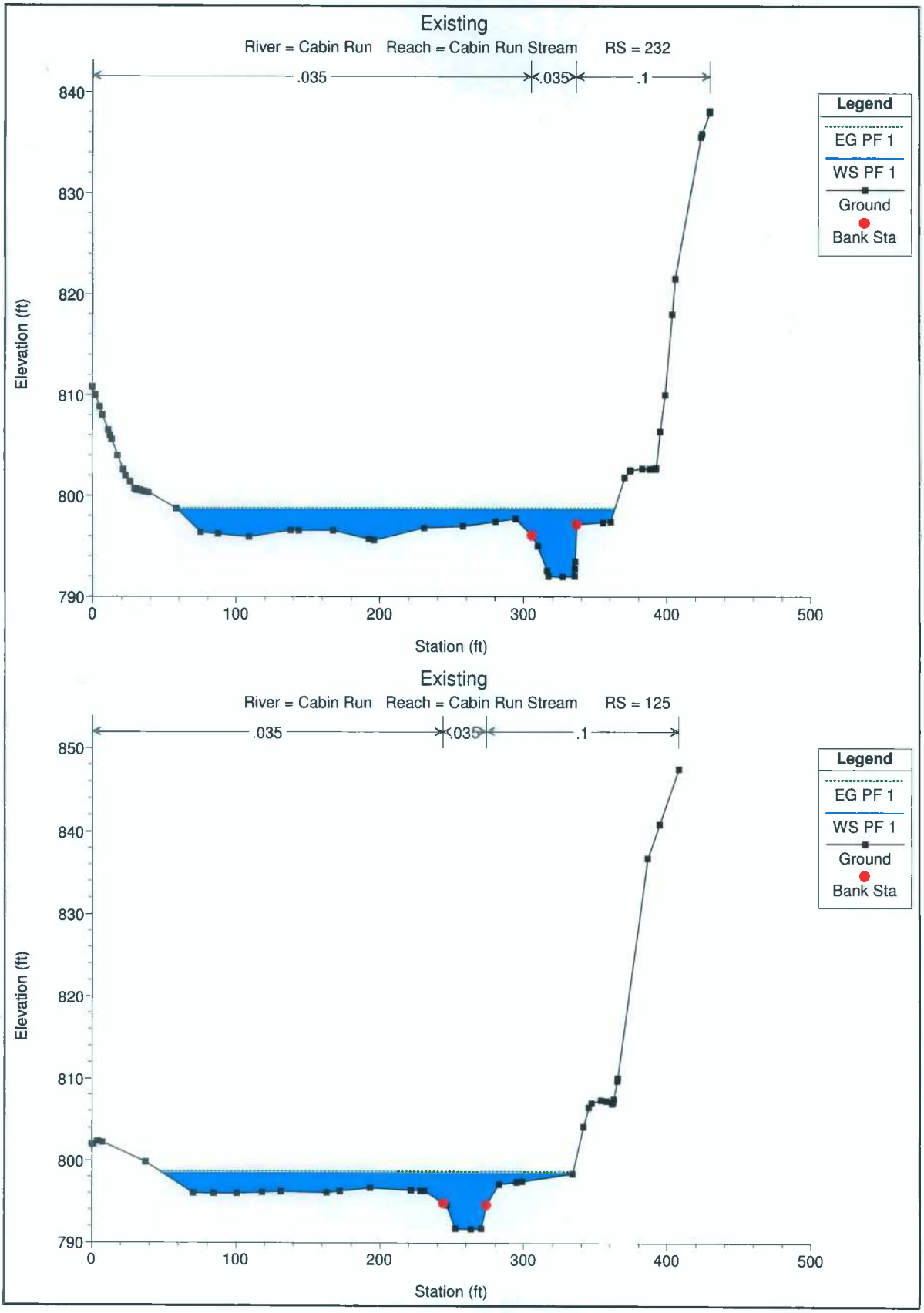

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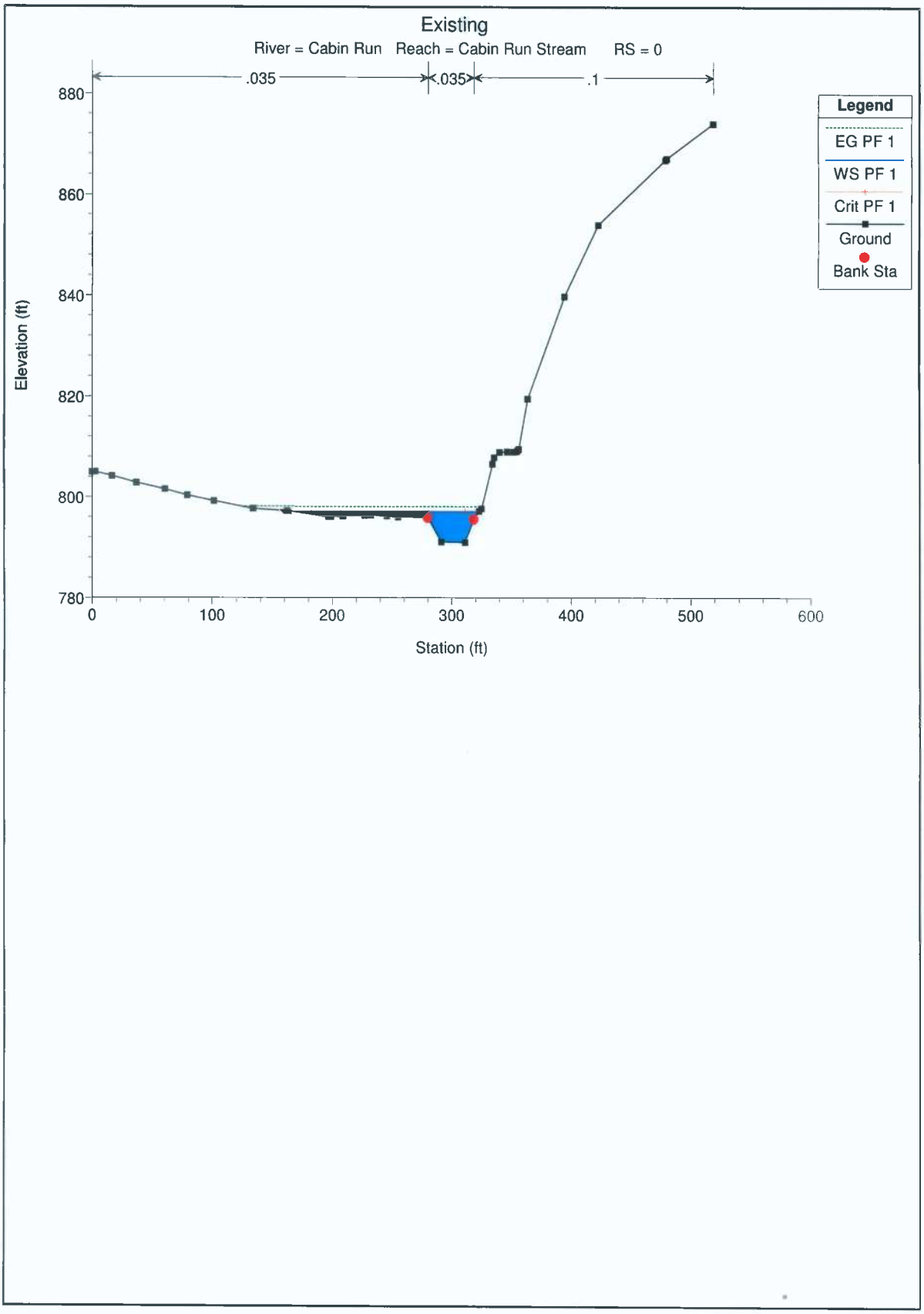
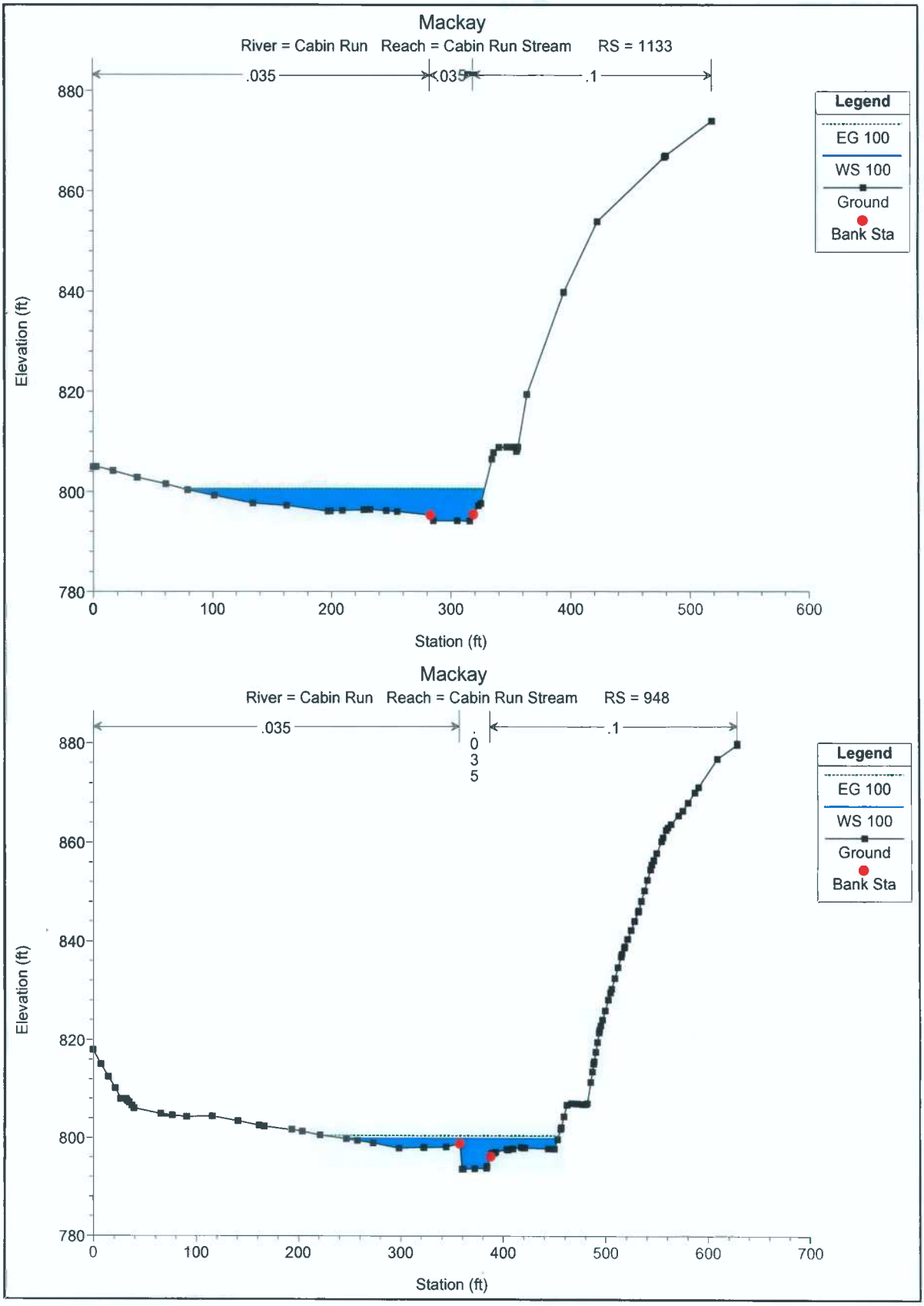


Proposed Cross-Sections



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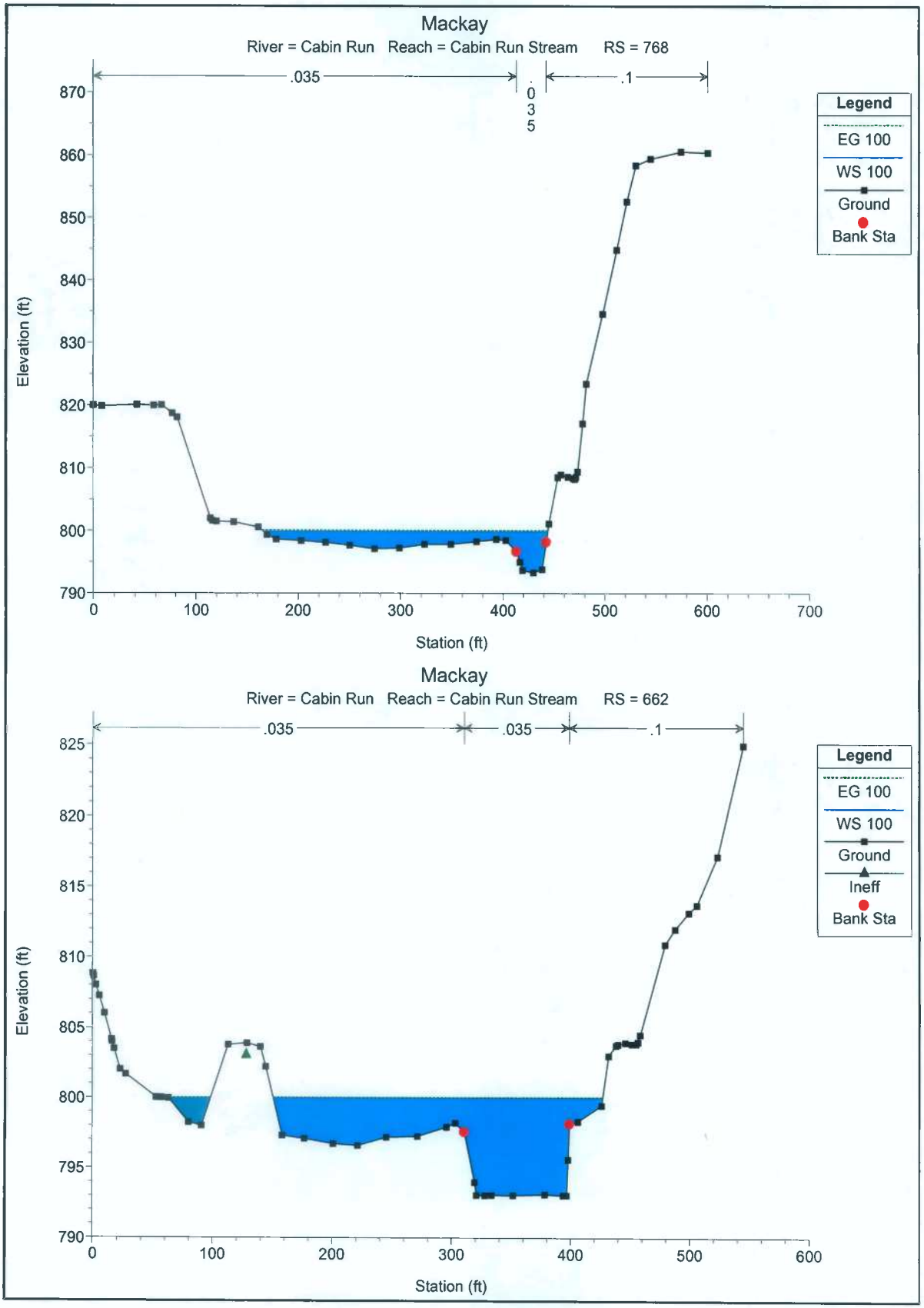

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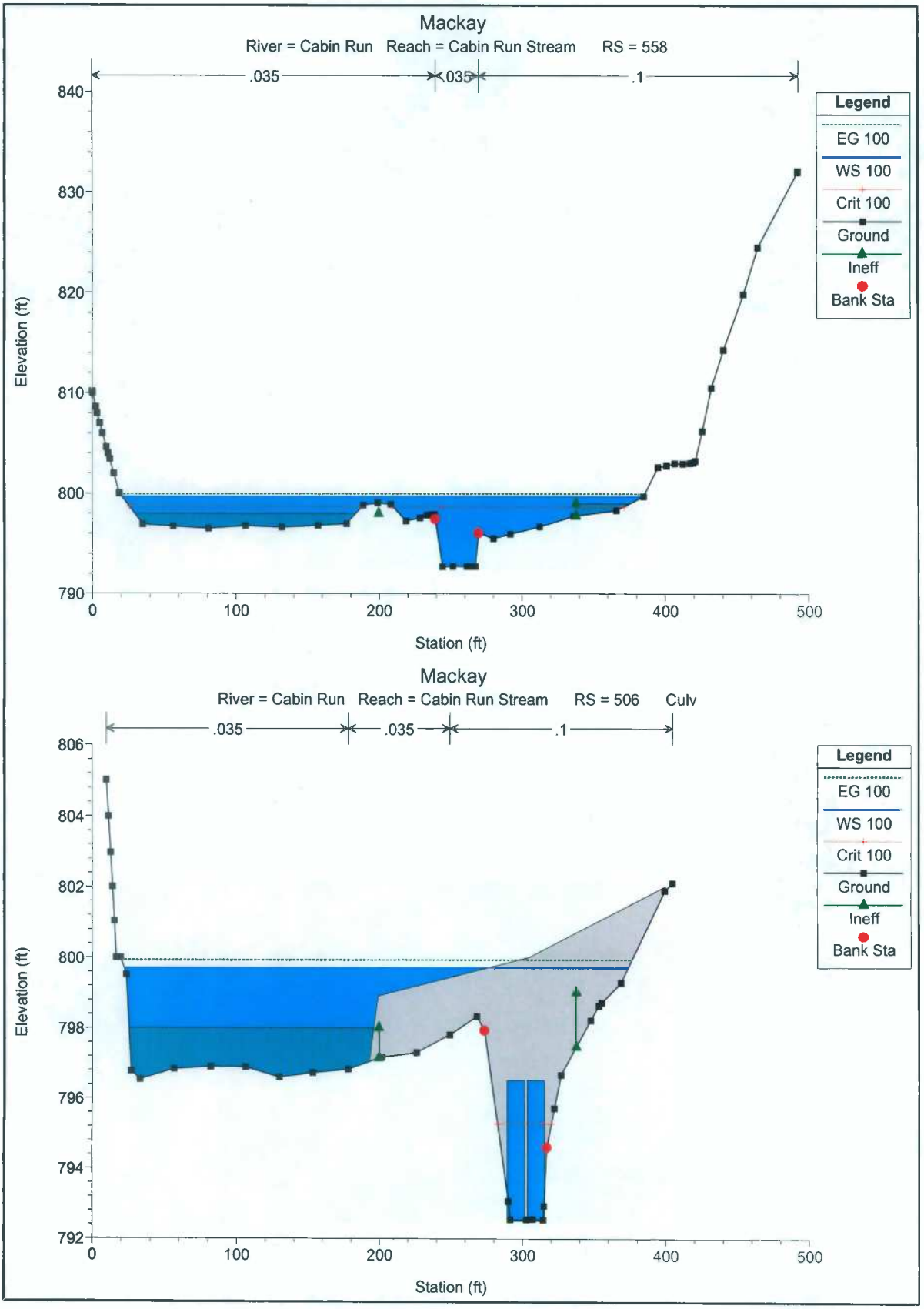

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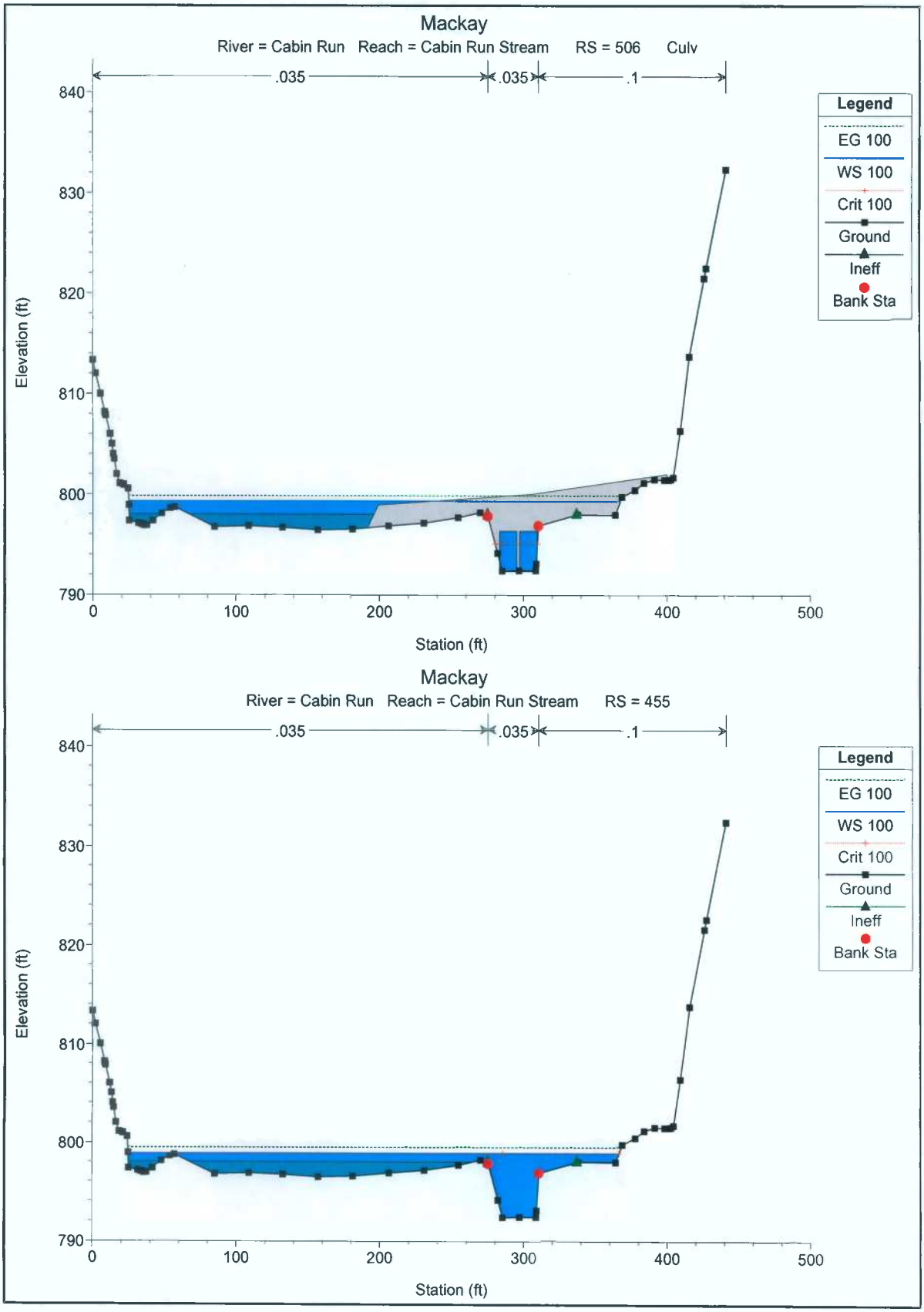

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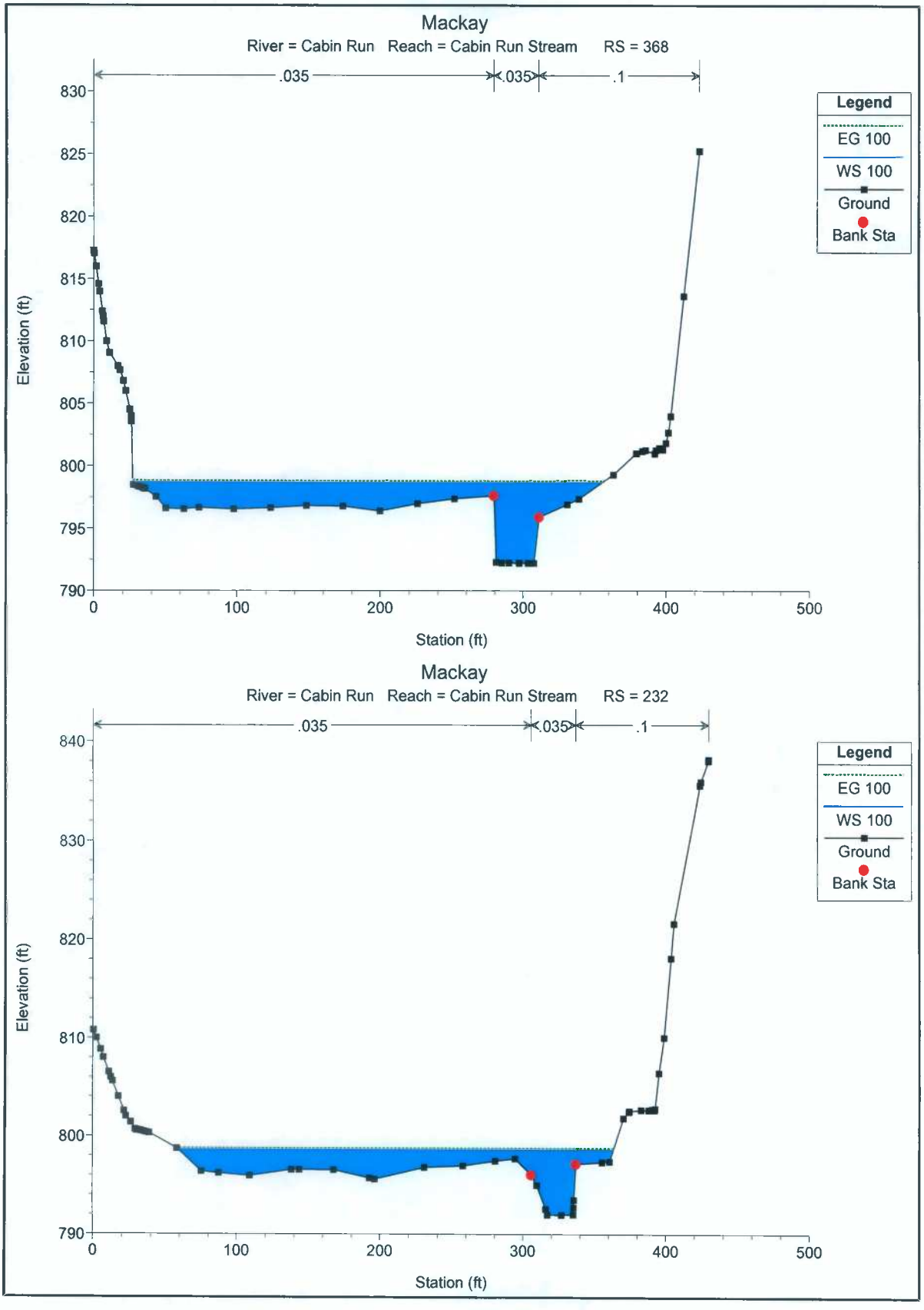

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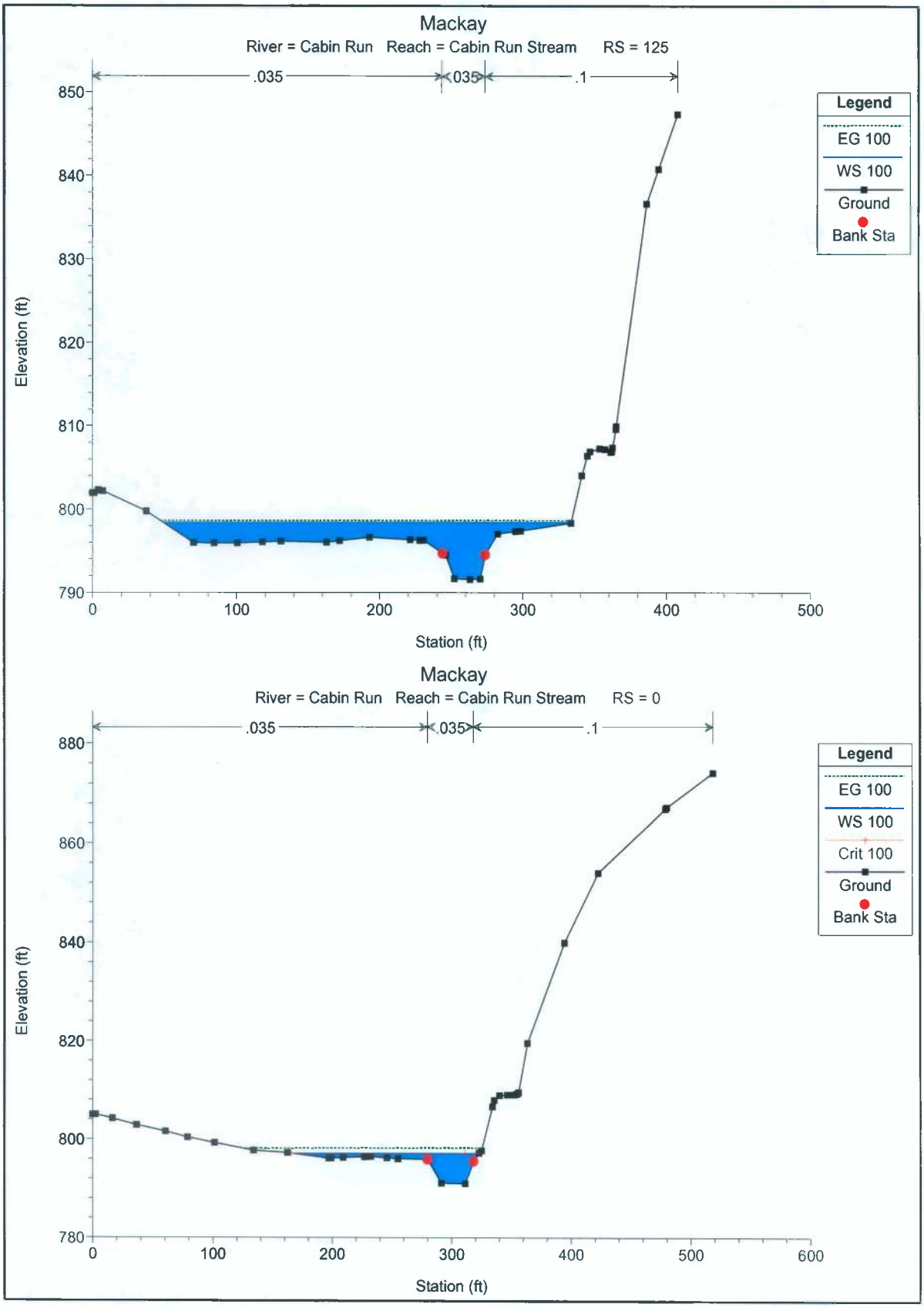
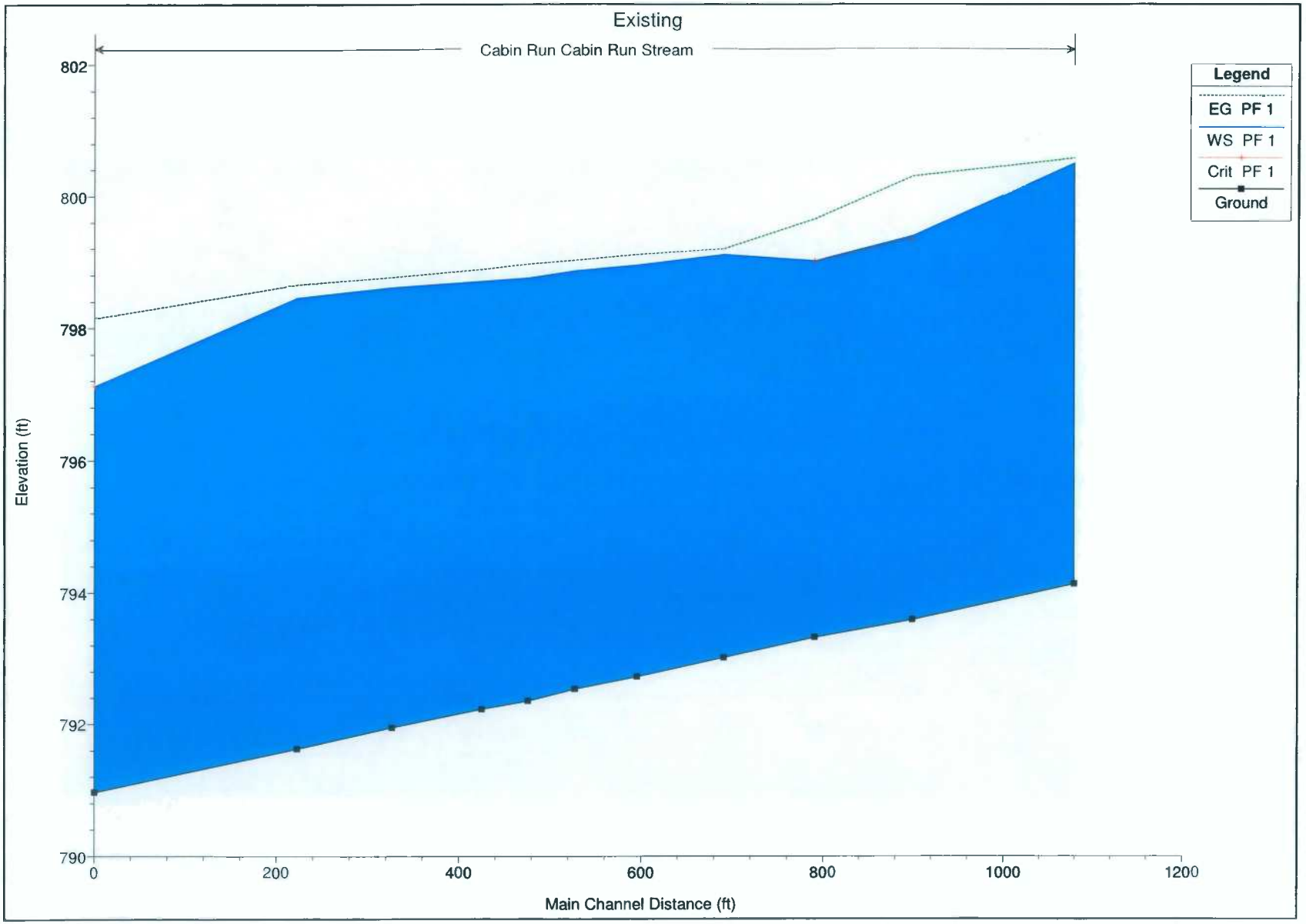
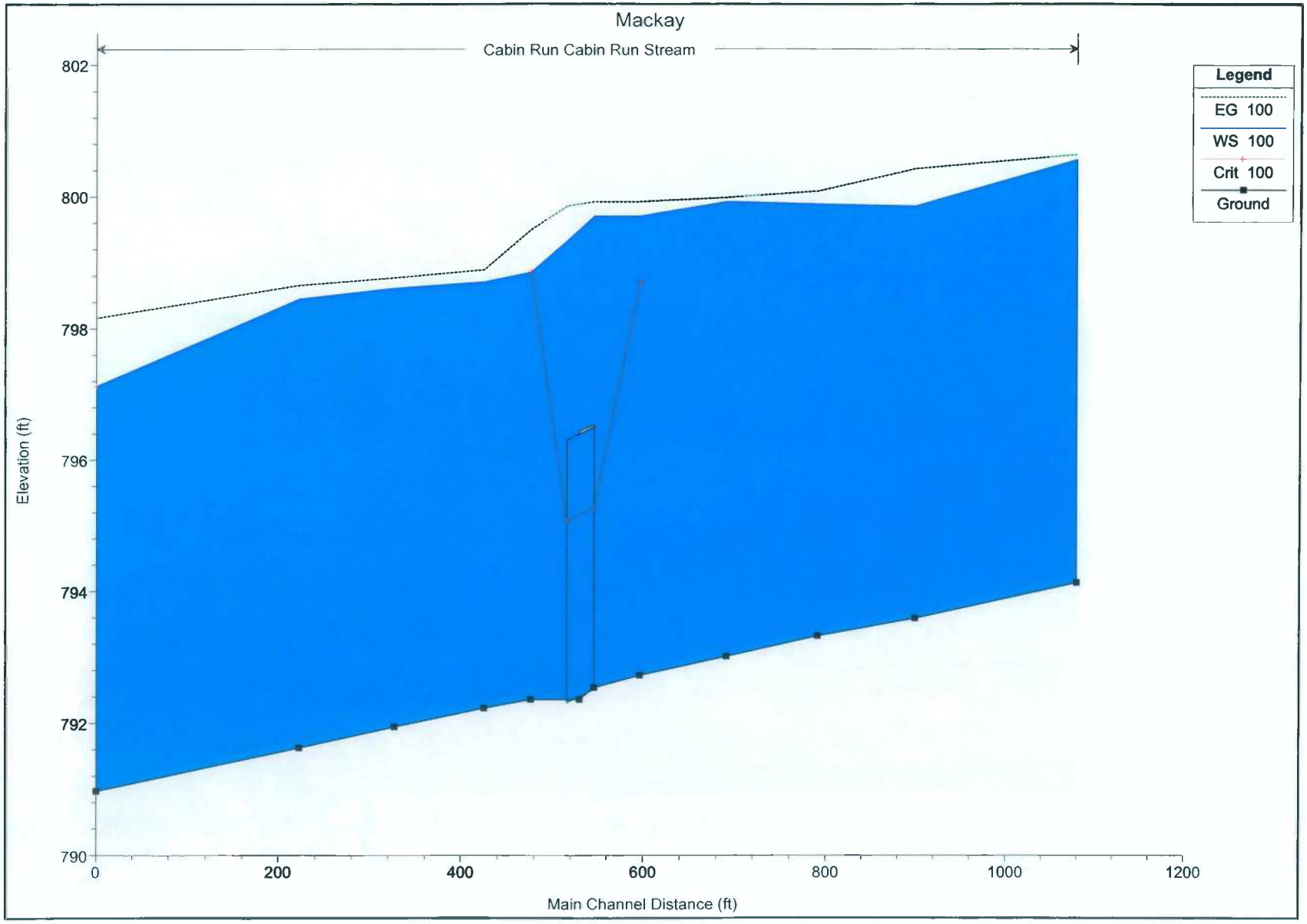


Existing Profile



Proposed Profile



Existing Summary Data

HEC-RAS Plan: Plan 01 River: Cabin Run Reach: Cabin Run Stream Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Cabin Run Stream	1133	PF 1	1932.89	794.13	800.50		800.57	0.000399	2.84	934.04	251.52	0.20
Cabin Run Stream	948	PF 1	1932.89	793.59	799.40	799.35	800.30	0.005425	8.77	379.53	195.13	0.67
Cabin Run Stream	768	PF 1	1932.89	793.32	799.01	799.01	799.65	0.004916	7.98	399.55	269.11	0.64
Cabin Run Stream	662	PF 1	1932.89	793.01	799.11		799.19	0.000417	2.69	956.60	350.08	0.20
Cabin Run Stream	558	PF 1	1932.89	792.72	798.95		799.11	0.001210	4.36	804.73	350.76	0.32
Cabin Run Stream	506	PF 1	1932.89	792.53	798.87		799.03	0.001123	4.14	744.93	335.40	0.32
Cabin Run Stream	455	PF 1	1932.89	792.35	798.76		798.97	0.001544	4.82	667.03	341.23	0.36
Cabin Run Stream	368	PF 1	1932.89	792.22	798.70		798.89	0.001271	4.55	713.35	328.25	0.32
Cabin Run Stream	232	PF 1	1932.89	791.94	798.61		798.77	0.001175	4.23	710.20	304.34	0.31
Cabin Run Stream	125	PF 1	1932.89	791.62	798.45		798.66	0.001185	4.72	668.52	285.13	0.34
Cabin Run Stream	0	PF 1	1932.89	790.97	797.12	797.12	798.16	0.005396	8.73	289.85	157.17	0.69

Proposed Summary Data

HEC-RAS Plan: Plan 11 River: Cabin Run Reach: Cabin Run Stream Profile: 100

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Cabin Run Stream	1133	100	1932.89	794.13	800.56		800.64	0.000379	2.79	950.95	252.60	0.20
Cabin Run Stream	948	100	1932.89	793.59	799.86		800.42	0.003308	7.24	472.74	210.17	0.53
Cabin Run Stream	768	100	1932.89	793.32	799.89		800.08	0.001384	4.73	639.34	278.17	0.35
Cabin Run Stream	662	100	1932.89	793.01	799.92		799.99	0.000259	2.32	1049.61	311.25	0.16
Cabin Run Stream	558	100	1932.89	792.72	799.70	798.70	799.92	0.001318	4.95	797.30	364.81	0.34
Cabin Run Stream	506		Culvert									
Cabin Run Stream	455	100	1932.89	792.35	798.85	798.85	799.50	0.003501	7.34	458.41	341.49	0.55
Cabin Run Stream	368	100	1932.89	792.22	798.70		798.89	0.001271	4.55	713.35	328.25	0.32
Cabin Run Stream	232	100	1932.89	791.94	798.61		798.77	0.001175	4.23	710.20	304.34	0.31
Cabin Run Stream	125	100	1932.89	791.62	798.45		798.66	0.001185	4.72	668.52	285.13	0.34
Cabin Run Stream	0	100	1932.89	790.97	797.12	797.12	798.16	0.005396	8.73	289.85	157.17	0.69

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 Upon Oath That the Accompanying Legal Notice Entitled:

Floodplain Permit
Mackay Well Pad
14-177

was published in said paper for 2

successive weeks beginning with the issue

of March 18th **2014 and**

ending with the issue of

March 25th **2014 and**

that said notice contains 210

WORD SPACE at .115 **cents a word**

amounts to the sum of $ 24.15

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

$ 18.11

and each publication thereafter

$ 42.26 **TOTAL**

EDITOR

Virginia Nicholson

SWORN TO AND SUBSCRIBED

BEFORE ME THIS THE 27th **DAY**

OF March **2014**

NOTARY PUBLIC

Laura J Adams

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

LEGAL ADVERTISEMENT

Doddridge County
Floodplain Permit Application

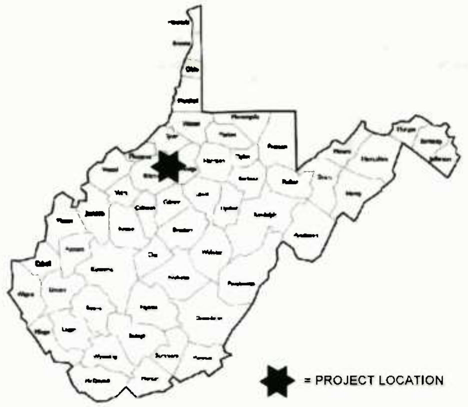
Please take notice that on the 12th day of March, 2014, ANTERO RESOURCES - MACKAY WELL PAD ACCESS ROAD #14-177 filed an application for a Floodplain Permit to develop land located at or about: SURFACE OWNERS: I L. MORRIS AND HEARTWOOD FORESTLAND FUND CLAY AND CENTRAL DISTRICT, D/B 255/718/230/307, & 253/671, TAX MAP 37/1, 11/08, 06, & 04.1.

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 March 31, 2014.

Delivered to the:
Clerk of the County Court
118 E. Court Street, West Union, WV 26456
Beth A. Rogers, Doddridge County Clerk
Ralph Sandora, Jr., Doddridge County Flood Plain Manager

3-18-2xb

MACKAY WELL AND WATER CONTAINMENT PAD
SITE DESIGN & CONSTRUCTION PLAN, EROSION & SEDIMENT CONTROL PLANS
ANTERO RESOURCES CORPORATION



PLAN REPRODUCTION WARNING

THE PLANS HAVE BEEN CREATED ON ANSI D (22"x34") SHEETS. FOR REDUCTIONS, REFER TO GRAPHIC SCALE.

THE PLANS HAVE BEEN CREATED FOR FULL COLOR PLOTTING. ANY SET OF THE PLANS THAT IS NOT PLOTTED IN FULL COLOR SHALL NOT BE CONSIDERED ADEQUATE FOR CONSTRUCTION PURPOSES.

WARNING: INFORMATION MAY BE LOST IN COPYING AND/OR GRAY SCALE PLOTTING.

PROJECT CONTACTS

PROJECT OWNER

ANTERO RESOURCES
981 E WASHINGTON AVE
PO BOX 309
ELLENBORO, WV 26346

CONTACT: ANTHONY SMITH
FIELD ENGINEER
304.869.3405 OFFICE
304.673.6196 CELL

CONTACT: JOHN KAWCAK
ENGINEER
817.368.1553

CONTACT: ELI WAGONER
ENVIRONMENTAL ENGINEER
304.622.3842, EXT 311 OFFICE

CONTACT: AARON KUNZLER
CONSTRUCTION SUPERVISOR
405.227.8344

LOCATION SURVEYOR

TRIPLE H ENTERPRISES
CONTACT: DARELL BOICE, PS
204 NEELEY AVE
WEST UNION, WV 26456
304.873.3360

ENGINEER OF RECORD

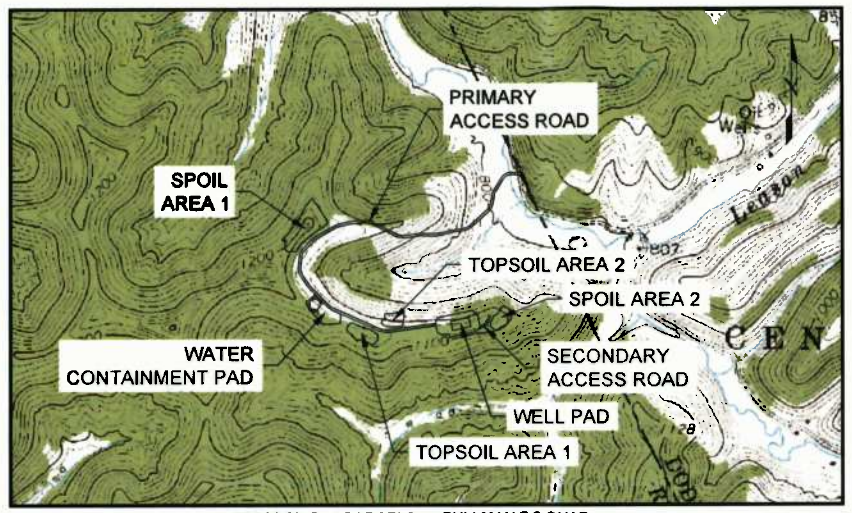
KLEINFELDER EAST, INC.
CONTACT: JEFFERY B. CRISP, PE
WV PE #20354
3500 GATEWAY CENTRE BLVD, SUITE 200
MORRISVILLE, NC 27560
919.755.5011 OFFICE
919.755.1414 FAX

ENVIRONMENTAL/ DELINEATION BOUNDARY

ALLSTAR ECOLOGY, LLC
CONTACT: TERRY BURHANS
1582 MEADOWDALE ROAD
FAIRMONT, WV 26554
304.816.3490 OFFICE
858.243.9900 CELL

TOPO SURVEYOR

BLUE MOUNTAIN AERIAL MAPPING
CONTACT: CRAIG FRY
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
304.662.2626 OFFICE
304.815.4890 CELL



NORTH MERIDIAN REFERENCED TO NAD83 WEST VIRGINIA STATE PLANE NORTH ZONE

AFFECTED TAX PARCELS: SEE SHEET 2

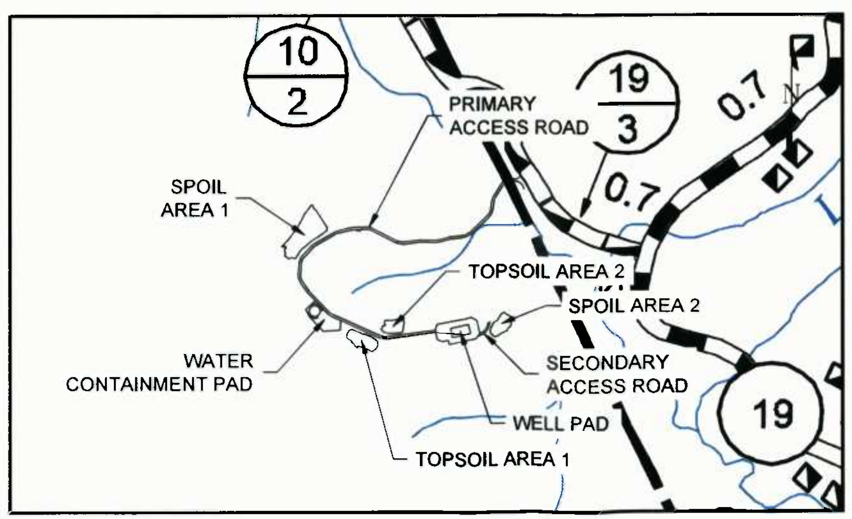
PULLMAN 7.5 QUAD

WELL HEAD LAYOUT				
WELL NAME	NAD 83 (WV NORTH ZONE)			
	NORTHING	EASTING	LATITUDE	LONGITUDE
CALDWELL UNIT 1H	272012.81	1572793.00	39° 14' 18.14"	-80° 53' 49.66"
CALDWELL UNIT 2H	272014.94	1572802.77	39° 14' 18.17"	-80° 53' 49.54"
GREENBACK 1H	272017.08	1572812.54	39° 14' 18.19"	-80° 53' 49.41"
GREENBACK 2H	272019.22	1572822.31	39° 14' 18.21"	-80° 53' 49.29"
PRINZ UNIT 1H	272021.35	1572832.08	39° 14' 18.23"	-80° 53' 49.16"
PRINZ UNIT 2H	272023.49	1572841.85	39° 14' 18.26"	-80° 53' 49.04"
MCNABB UNIT 1H	272025.63	1572851.62	39° 14' 18.28"	-80° 53' 48.92"
MCNABB UNIT 2H	272027.76	1572861.38	39° 14' 18.30"	-80° 53' 48.79"

WELL HEAD LAYOUT				
WELL NAME	NAD 27 (WV NORTH ZONE)		UTM ZONE 17 (METERS)	
	NORTHING	EASTING	NORTHING	EASTING
CALDWELL UNIT 1H	271978.38	1604234.05	4343234.67	508877.93
CALDWELL UNIT 2H	271980.52	1604243.84	4343235.37	508880.90
GREENBACK 1H	271982.65	1604253.59	4343236.07	508883.86
GREENBACK 2H	271984.78	1604263.37	4343236.77	508886.83
PRINZ UNIT 1H	271986.92	1604273.13	4343237.47	508889.79
PRINZ UNIT 2H	271989.05	1604282.91	4343238.17	508892.76
MCNABB UNIT 1H	271991.22	1604292.66	4343238.88	508895.72
MCNABB UNIT 2H	271993.32	1604302.45	4343239.57	508898.69

SHEET INDEX

SITE LOCATIONS				
DESCRIPTION	NAD 83 (WV NORTH ZONE)		UTM ZONE 17 (METERS)	
	LATITUDE	LONGITUDE	NORTHING	EASTING
CENTER OF WELL PAD	39° 14' 18.20"	-80° 53' 49.61"	4343236.56	508879.11
CENTER OF WATER CONTAINMENT PAD	39° 14' 19.32"	-80° 54' 08.03"	4343270.64	508437.36
PRIMARY ACCESS ROAD ENTRANCE	39° 14' 34.15"	-80° 53' 41.01"	4343728.47	509084.80



FLOODPLAIN CONDITIONS	
DO SITE CONSTRUCTION ACTIVITIES TAKE PLACE IN FLOODPLAIN:	YES
PERMIT NEEDED FROM COUNTY FLOODPLAIN COORDINATOR:	YES
HEC-RAS STUDY COMPLETED:	YES
FLOODPLAIN SHOWN ON DRAWINGS:	YES
FIRM MAP NUMBER(S) FOR SITE:	54085C0225C & 54017C0200C
ACREAGES OF CONSTRUCTION IN FLOODPLAIN:	0.33

ACCESS ROAD LENGTH (FEET)	
DESCRIPTION	FEET
PRIMARY ACCESS ROAD	4,757
SECONDARY ACCESS ROAD	188
TOTAL	4,945

ISSUED FOR CONSTRUCTION

811 Know what's below. Call before you dig.
MISS UTILITY OF WEST VIRGINIA
1-800-245-4848
WEST VIRGINIA STATE LAW REQUIRES THAT YOU CALL TWO BUSINESS DAYS BEFORE YOU DIG IN THE STATE OF WEST VIRGINIA. IT'S THE LAW!!

DESIGN CERTIFICATION

THE DRAWINGS, CONSTRUCTION NOTES, AND REFERENCE DIAGRAMS ATTACHED HERETO HAVE BEEN PREPARED IN ACCORDANCE WITH THE WEST VIRGINIA CODE OF STATE RULES, DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS §35-8.

MM-109 PERMIT

ANTERO RESOURCES WILL OBTAIN AN ENCROACHMENT PERMIT (MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

WELL LOCATION RESTRICTIONS

WELL PAD IS TO COMPLY WITH WELL LOCATION RESTRICTIONS OF WV CODE 22-6A-12. THE PADS COMPLY WITH THE FOLLOWING RESTRICTIONS:

- 250' FROM AN EXISTING WELL OR DEVELOPED SPRING USED FOR HUMAN OR DOMESTIC ANIMALS
- 625' FROM AN OCCUPIED DWELLING OR BARN GREATER THAN 2500 SF USED FOR POULTRY OR DAIRY MEASURED FROM THE CENTER OF THE PAD
- 100' FROM EDGE OF DISTURBANCE TO WETLANDS, PERENNIAL STREAMS, NATURAL OR ARTIFICIAL LAKE, POND OR RESERVOIR
- 300' FROM EDGE OF DISTURBANCE TO NATURALLY REPRODUCING TROUT STREAMS
- 1000' OF SURFACE OR GROUND WATER INTAKE TO A PUBLIC WATER SUPPLY

JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141
ACAD FILE: COVER.dwg

MACKAY WELL & W.C. PAD
COVER PAGE & LOCATION MAP

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

1

PLOTTED: 03 Mar 2014, 12:01pm, rparker

ATTACHED IMAGES: ... XREFS: ... CAD FILE: ... LAYOUT: 1 COVER PAGE & LOCATION MAP

SCHEDULE OF QUANTITIES
MACKAY WELL PAD SITE

CLEARING & GRUBBING; EROSION & SEDIMENT CONTROLS				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
MOBILIZATION	1.0	EA		$0.00
CONSTRUCTION ENTRANCE	1.0	EA		$0.00
CLEARING & GRUBBING	35.1	AC		$0.00
TREE REMOVAL	29.6	AC		$0.00
12" COMPOST FILTER SOCK	368.0	LF		$0.00
18" COMPOST FILTER SOCK	973.0	LF		$0.00
SUPER SILT FENCE	6526.0	LF		$0.00
R-3 RIP RAP (ROCK FILTER OUTLETS)	10.0	TON		$0.00
AASHTO #57 STONE (ROCK FILTER OUTLETS)	5.0	TON		$0.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN SC250 SLOPE MATTING	41391.0	SY		$0.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN SC150BN SLOPE MATTING	14876.0	SY		$0.00
EROSION CONTROL MATTING - NORTH AMERICAN GREEN C350 SLOPE MATTING	1447.0	SY		$0.00
TOTAL				$0.00

RETAINING STRUCTURES				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
CONCRETE BIN BLOCKS (2' x 2' x 6')	0.0	EA		$0.00
GABION CAGES WITH STONE (3' X 3' X 6')	0.0	EA		$0.00
HORIZONTAL REINFORCEMENT (INSTALL TENSAR TX190 GEOGRID or EQUIVALENT)	0.0	SY		$0.00
TOTAL				$0.00

SITE - UNCLASSIFIED EXCAVATION				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
WELL PAD EXCAVATION (CUT TO FILL)	121.0	CY		$0.00
WELL PAD EXCAVATION (EXPORT TO SPOIL AREA)	92143.0	CY		$0.00
WATER CONTAINMENT PAD EXCAVATION (CUT TO FILL)	13417.0	CY		$0.00
WATER CONTAINMENT PAD EXCAVATION (IMPORT FROM SPOIL AREA)	9789.0	CY		$0.00
PRIMARY ACCESS ROAD EXCAVATION (CUT TO FILL)	43769.0	CY		$0.00
PRIMARY ACCESS ROAD EXCAVATION (IMPORT FROM SPOIL AREA)	44049.0	CY		$0.00
SECONDARY ACCESS ROAD EXCAVATION (CUT TO FILL)	3.0	CY		$0.00
SECONDARY ACCESS ROAD EXCAVATION (EXPORT TO SPOIL AREA)	1469.0	CY		$0.00
TOPSOIL	11679.0	CY		$0.00
ROADSIDE DITCH	3581.0	LF		$0.00
TOTAL				$0.00

SUMP(S) PER ANTERO RESOURCES STANDARD DETAIL				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
INSTALL 102" x 78" x 44" PRE CAST SUMP	6.0	EA		$0.00
4" PVC CONNECTIVE PIPE (ANTERO SUMP DRAIN DETAIL)	217.0	LF		$0.00
TOTAL				$0.00

AGGREGATE SURFACING - SPREADING, COMPACTION, and/or INSTALLATION				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
WELL PAD 6" OR 4" MINUS CRUSHER RUN AGGREGATE (6" THICK)	1811.0	TON		$0.00
WELL PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	994.0	TON		$0.00
WELL PAD GEOTEXTILE FABRIC (US 200)	9465.6	SY		$0.00
WATER CONTAINMENT PAD 6" OR 4" MINUS CRUSHER RUN AGGREGATE (6" THICK)	1320.0	TON		$0.00
WATER CONTAINMENT PAD 1 1/2" or 3/4" CRUSHER RUN STONE (2" THICK)	725.0	TON		$0.00
WATER CONTAINMENT PAD GEOTEXTILE FABRIC (US 200)	6897.7	SY		$0.00
ACCESS ROADS 6" OR 4" MINUS CRUSHER RUN AGGREGATE (8" THICK)	3579.0	TON		$0.00
ACCESS ROAD 1 1/2" OR 3/4" CRUSHER RUN STONE (2" THICK)	1474.0	TON		$0.00
ACCESS ROADS GEOTEXTILE FABRIC (US 200)	6897.7	SY		$0.00
TOTAL				$0.00

ROAD CULVERTS				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
15" HDPE	80.0	LF		$0.00
18" HDPE	130.0	LF		$0.00
FLARED END SECTION	4.0	EA		$0.00
R-3 RIP RAP (INLETS/OUTLETS)	19.7	TON		$0.00
AASHTO #57 STONE (INLETS)	52.0	TON		$0.00
R-4 RIP RAP (DITCH CHECKS)	80.9	TON		$0.00
DITCH/CHANNEL LINING - R-4 RIP RAP (ACCESS ROAD)	122.6	TON		$0.00
DITCH/CHANNEL LINING - R-5 RIP RAP (ACCESS ROAD)	148.5	TON		$0.00
DITCH/CHANNEL LINING - STRAW WITH NET	0.0	SY		$0.00
DITCH/CHANNEL LINING - NORTH AMERICAN GREEN SC250 MATTING	2442.8	SY		$0.00
ACCESS ROAD BERMS, JERSEY BARRIERS, LARGE STONE, OR GUARD RAILS	3856.0	LF		$0.00
TOTAL				$0.00

*TOPSOIL QUANTITY FOR THIS SITE WAS ESTIMATED AT A UNIFORM THICKNESS OF 6" OVER THE ENTIRE EXCAVATED AREA. ACTUAL QUANTITY MAY VARY.

CONTINUED ON ADJACENT TABLE

SCHEDULE OF QUANTITIES
MACKAY WELL PAD SITE

FENCING/GATES				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
8 FT CHAINLINK FENCE w/ 3 STRAND BARB WIRE	0.0	LF		$0.00
16 FT DOUBLE GATE	0.0	EA		$0.00
PHASE 3 FENCING - ORANGE SAFETY FENCE w/"T" POST (10FT CENTERS) - WETLAND PROTECTION	321.0	LF		$0.00
TOTAL				$0.00

MOBILE WATER CORRAL				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
22,000 BBL MOBILE WATER CORRAL	1.0	EA		$0.00
TOTAL				$0.00

BOX CULVERT				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
DOUBLE BARREL BOX CULVERT (6 - 12'x4'x8' SECTIONS)	1.0	EA		$0.00
TOTAL				$0.00

SEEDING				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
SITE SEEDING (LIME, FERTILIZER, SEEDING, AND HYDRO-MULCH w/TACK (HYC-2 OR EQUAL))	28.8	AC		$0.00
RECLAMATION SEEDING (LIME, FERTILIZER, SEEDING, AND HYDRO-MULCH w/TACK (HYC-2 OR EQUAL))	0.0	AC		$0.00
TOTAL				$0.00

LINER SYSTEM				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
60 MIL TEXTURED PRIMARY LINER	0.0	SY		$0.00
16 OZ. NON-WOVEN GEOTEXTILE FABRIC CUSHION	0.0	SY		$0.00
TOTAL				$0.00
*THE SQUARE YARDAGE FOR THE LINER SYSTEM DOES NOT ACCOUNT FOR MATERIAL OVERLAP AND WASTE.				

FRENCH DRAINS				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
4" PERFORATED PIPE	281.0	LF		$0.00
FRENCH DRAIN GEOTEXTILE FABRIC (MIRAFI 140N)	1,686.0	SY		$0.00
FRENCH DRAIN #57 STONE	26.0	TON		$0.00
TOTAL				$0.00

UNFORESEEN SITE CONDITIONS				
	QUANTITY	UNIT	UNIT PRICE	FINAL PRICE
ROCK CLAUSE - HOE RAMMING	0.0	CY		$0.00
PHASE 1 FENCING - STEEL CORRUGATED PANELS w/"T" POST (10 FT CENTERS) - WETLAND PROTECTION	0.0	LF		$0.00
PHASE 2 FENCING - FILTER SOCK OUTSIDE OF PHASE 3 FENCING - WETLAND PROTECTION	0.0	LF		$0.00
SILT FENCE	0.0	LF		$0.00
TEMPORARY SEEDING	0.0	AC		$0.00
CONSTRUCTION STAKEOUT	0.0	HOUR		$0.00
JUTE MATTING - SLOPE MATTING	0.0	SY		$0.00
4 FT FARM FENCE (WOOD CORNER AND PULL POST & "T" POST - 10 FT SPACING)	0.0	LF		$0.00
5 STRAND BARB WIRE FENCE (WOOD CORNER AND PULL POST & "T" POST - 10 FT SPACING)	0.0	LF		$0.00
TOTAL				$0.00
GRAND TOTAL				$0.00

**ANTERO RESOURCES WILL PROVIDE THE FOLLOWING:
- 102" x 78" x 44" PRE CAST SUMP
- VALVE FOR SUMP DISCHARGE
- TX 190 GEOGRID OR EQUIVALENT
- GEOTEXTILE FABRIC (US 200) OR EQUIVALENT
- 15" & 18" HDPE

MACKAY QUANTITIES						
DESCRIPTION	*CUT (CY)	FILL (CY)	SPOIL (CY)	BORROW (CY)	MAX. SLOPE	LENGTH OF SLOPE
WELL PAD	92264	121	92143	N/A	N/A	N/A
WATER CONTAINMENT PAD	13417	23206	N/A	9789	N/A	N/A
PRIMARY ACCESS ROAD	43769	87819	N/A	44049	20.00%	1708'
SECONDARY ACCESS ROAD	1472	3	1469	N/A	18.68%	154'
SPOIL AREA 1	0	22058	N/A	22058	N/A	N/A
SPOIL AREA 2	0	9434	N/A	9434	N/A	N/A
TOPSOIL AREA 1	0	8248	N/A	8248	N/A	N/A
TOPSOIL AREA 2	0	3431	N/A	3431	N/A	N/A
TOTALS	150922	150889	93612	93579	N/A	N/A
	TOTAL EXPORT (CY)			33		

*INCLUDES 10% SWELL
THE QUANTITIES SHOWN MAY BE GREATER OR LESSER THAN ACTUALLY EXCAVATED. THE ENGINEER IS NOT RESPONSIBLE FOR VARIANCES FROM THE ESTIMATED QUANTITIES AND DOES NOT CERTIFY TO THEIR ACCURACY.

MACKAY LOD AREAS (ACRES)		
DESCRIPTION	AREA	AFFECTED TAX PARCELS
WELL PAD	1.68	I.L. (IKE) MORRIS TAX MAP # 37 PARCEL # 01 DB: 255 / PG: 718
WATER CONTAINMENT PAD	0.84	
PRIMARY ACCESS ROAD	15.83	
SECONDARY ACCESS ROAD	0.09	
TOPSOIL AREA 2	1.49	
SPOIL AREA 1	3.19	
SPOIL AREA 2	0.78	
WELL PAD	1.30	JACK D. MACKAY & ANITA G. PEALE TAX MAP # 37 PARCEL # 03.2 DB: 280 / PG: 972
SECONDARY ACCESS ROAD	0.31	
SPOIL AREA 2	0.88	
WELL PAD	0.97	JACK D. MACKAY & ANITA G. PEALE TAX MAP # 37 PARCEL # 03 DB: 280 / PG: 972
WATER CONTAINMENT PAD	2.61	
PRIMARY ACCESS ROAD	1.73	
TOPSOIL AREA 1	2.03	
SPOIL AREA 1	0.68	COASTAL FOREST RESOURCES COMPANY, DBA COASTAL TIMBERLANDS COMPANY TAX MAP # 32 PARCEL # 08 DB: 226 / PG: 655
SPOIL AREA 1	0.69	COASTAL FOREST RESOURCES COMPANY, DBA COASTAL TIMBERLANDS COMPANY TAX MAP # 32 PARCEL # 07 DB: 226 / PG: 655
TOTAL	35.10	
TOTAL WOODED ACRES DISTURBED	29.61	
TOTAL NON-WOODED ACRES DISTURBED	5.49	

EPHEMERAL STREAM IMPACTS (LINEAR FEET)				
DESCRIPTION	CULVERT (LF)	INLET/OUTLET STRUCTURES (LF)	CONST. DISTUB TO LOD (LF)	TOTAL IMPACT (LF)
STREAM 12	N/A	N/A	0	0
INTERMITTENT STREAM IMPACTS (LINEAR FEET)				
DESCRIPTION	CULVERT (LF)	INLET/OUTLET STRUCTURES (LF)	CONST. DISTUB TO LOD (LF)	TOTAL IMPACT (LF)
STREAM 12	N/A	N/A	0	0
PERENNIAL STREAM IMPACTS (LINEAR FEET)				
DESCRIPTION	CULVERT (LF)	INLET/OUTLET STRUCTURES (LF)	CONST. DISTUB TO LOD (LF)	TOTAL IMPACT (LF)
STREAM 13	24	N/A	34	58

WETLAND IMPACTS (SQUARE FEET)			
DESCRIPTION	FILL (SF)	CONST. DISTUB TO LOD (SF)	TOTAL IMPACT (SF)
WETLAND 13	5772	4142	9914
WETLAND 12	0	769	769
WETLAND 11	N/A	0	0
WETLAND 3	N/A	0	0
WETLAND 4	N/A	0	0
WETLAND 5	N/A	0	0
WETLAND 6	N/A	0	0
WETLAND 7	N/A	0	0
WETLAND 8	N/A	0	0

GRADING	
CUT SLOPE	2:1
FILL SLOPE	2:1
PAD CONTAINMENT BERM SLOPE	2:1
CUT SWELL FACTOR	10%
FILL SHRINK FACTOR	-
WELL PAD ELEVATION	1099'
WATER CONTAINMENT PAD ELEVATION	1174'

ISSUED FOR CONSTRUCTION

JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141

MACKAY WELL & W.C. PAD
SCHEDULE OF QUANTITIES

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

2

2 of 27 sheets

PLOTTED: 03 Mar 2014, 12:37pm, rparker

ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK
CAD FILE: G:\...clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 2 SCHEDULE OF QUANTITIES

10-15-12 REVISED BY: CAL

GENERAL NOTES

1. ANTERO RESOURCES WILL OBTAIN AN ENCROACHMENT PERMIT (FORM MM-109) FROM THE WEST VIRGINIA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
2. ANY DISCREPANCIES FOUND BETWEEN THE DRAWINGS AND SPECIFICATIONS AND SITE CONDITIONS OR ANY INCONSISTENCIES OR AMBIGUITIES IN DRAWINGS OR SPECIFICATIONS SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER, IN WRITING, WHO SHALL PROMPTLY ADDRESS SUCH PROBLEMS. WORK DONE BY THE CONTRACTOR AFTER THE DISCOVERY OF SUCH DISCREPANCIES, INCONSISTENCIES, OR AMBIGUITIES SHALL BE DONE AT THE CONTRACTOR'S RISK.
3. WORK ON THIS PROJECT SHALL CONFORM TO THE LATEST EDITIONS OF THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION (WVDEP) EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE HANDBOOK. IN THE EVENT OF CONFLICT BETWEEN THE DESIGN, SPECIFICATIONS, OR PLANS, THE MOST STRINGENT WILL GOVERN.
4. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL PUBLIC OR PRIVATE UTILITIES WHICH LIE IN OR ADJACENT TO THE CONSTRUCTION SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR, AT HIS OR HER EXPENSE, OF ALL EXISTING UTILITIES DAMAGED DURING CONSTRUCTION. FORTY-EIGHT HOURS PRIOR TO ANY EXCAVATION THE CONTRACTOR SHALL CALL MISS UTILITY AT 1-800-245-4848.
5. INSTALLATION OF CONCRETE, CORRUGATED METAL OR HDPE STORM PIPE SHALL BE IN CONFORMANCE WITH THESE DRAWINGS.
6. ALL MATERIALS USED FOR FILL OR BACK FILL SHALL BE FREE OF WOOD, ROOTS, ROCKS, BOULDERS OR ANY OTHER NON-COMPACTABLE SOIL TYPE MATERIALS. UNSATISFACTORY MATERIALS ALSO INCLUDE MAN MADE FILLS AND REFUSE DEBRIS DERIVED FROM ANY SOURCE.
7. MATERIALS USED TO FILL AROUND DRAINAGE STRUCTURES IN UTILITY TRENCHES OR ANY OTHER DEPRESSION REQUIRING FILL OR BACK FILL SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST AS SET FORTH IN ASTM STANDARD D-698. THE MOISTURE CONTENT WILL BE CONTROLLED IN ACCORDANCE WITH THE LIMITS OF THE STANDARD PROCTOR TEST RESULTS. SOME SOILS CANNOT BE COMPACTED TO 95% OF THE STANDARD PROCTOR AT PLUS OR MINUS 4% MOISTURE CONTENT. THE CONTRACTOR SHALL PRIOR TO ANY OPERATIONS INVOLVING FILLING OR BACK FILLING, SUBMIT THE RESULTS OF THE PROCTOR TEST TOGETHER WITH A CERTIFICATION THAT THE SOIL TESTED IS REPRESENTATIVE OF THE MATERIALS TO BE USED ON THE PROJECT. THE TESTS SHALL BE CONDUCTED BY A CERTIFIED MATERIALS TESTING LABORATORY AND THE CERTIFICATIONS MADE BY A LICENSED PROFESSIONAL ENGINEER REPRESENTING THE LABORATORY. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THESE TESTS AND THEIR SUBMITTALS.
8. FILL SHALL BE PLACED IN LIFTS AT A MAXIMUM UNCOMPACTED DEPTH OF 12" WITH SOIL FREE FROM AGGREGATES EXCEEDING 6".
9. ALL TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER. FAILURE TO CONDUCT DENSITY TESTS SHALL BE CAUSE FOR NON-ACCEPTANCE OF THE FACILITY. TESTS SHALL BE CONDUCTED AT THE SOLE COST OF THE CONTRACTOR OR HIS AGENT.
10. A PRE-CONSTRUCTION CONFERENCE SHALL BE HELD PRIOR TO THE START OF CONSTRUCTION.
11. SATISFACTORY MATERIALS FOR USE AS FILL FOR PAD AREAS INCLUDE MATERIALS CLASSIFIED IN ASTM D-2487 AS GW, GP, GM, GC, SW, SP, SM, SC, ML AND CL GROUPS. THE MOISTURE CONTENT SHALL BE CONTROLLED WITHIN PLUS OR MINUS 4% OF THE OPTIMUM TO FACILITATE COMPACTION. GENERALLY, UNSATISFACTORY MATERIALS INCLUDE MATERIALS CLASSIFIED IN ASTM D-2487 AS PT, CH, MH, OL, OH AND ANY SOIL TOO WET TO FACILITATE COMPACTION. CH AND MH SOILS MAY BE USED SUBJECT TO APPROVAL OF THE ENGINEER. SOILS SHALL HAVE A MINIMUM DRY DENSITY OF 92 LB/CF PER ASTM D-698 AND SHALL HAVE A PLASTICITY INDEX LESS THAN 17.
12. CONTRACTOR SHALL SUBMIT A GENERIC GROUNDWATER PROTECTION PLAN (GPP) TO THE WVDEP GROUND WATER PROGRAM. THE GROUNDWATER PROTECTION PLAN SHALL BE ADHERED TO DURING CONSTRUCTION.

EROSION & SEDIMENT CONTROL NARRATIVE

1. PROJECT DESCRIPTION: THE PURPOSE OF THIS PROJECT IS TO GRADE AND INSTALL EROSION AND SEDIMENT CONTROL MEASURES, IN PREPARATION FOR THE CONSTRUCTION OF A GAS WELL PAD NEAR PENNSBORO, WEST VIRGINIA, IN RITCHIE & DODDRIDGE COUNTY. THE CONSTRUCTION INCLUDES TWO ACCESS ROAD, ONE WATER CONTAINMENT PAD, ONE WELL PAD, STORM WATER CONTROLS, AND INCIDENTAL WORK.
2. EXISTING SITE CONDITIONS: THE EXISTING SITE IS PREDOMINATELY WOODS WITH MODERATELY STEEP TOPOGRAPHY WITH GREATER THAN 20% SLOPES. NO EROSION IS NOTICED ON SITE, OR IN ANY NATURAL DRAINAGE WAYS.
3. ADJACENT PROPERTY: THE SITE IS BORDERED ON THE EAST BY COUNTY ROADS AND ON THE NORTH, SOUTH, AND WEST BY WOODS.
4. SOILS: NO SOIL STUDIES OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS PROJECT.
5. OFF SITE AREAS: THERE SHALL BE NO BORROW AREA OUTSIDE OF THE PROPOSED GRADING AND CONSTRUCTION AREA.
6. CLEARING OF VEGETATION SHOULD BE KEPT TO THE MINIMUM NECESSARY FOR CONSTRUCTION PLUS THE INSTALLATION OF SEDIMENT CONTROLS.
7. CRITICAL EROSION AREAS MAINTENANCE: ALL 3:1 SLOPES AND STEEPER, DITCHES AND OTHER CONTROLS SHALL BE CONSIDERED CRITICAL EROSION AREAS. THESE AREAS SHALL BE MONITORED & MAINTAINED DAILY AND AFTER EACH RAIN FALL OF 0.5 INCH OR GREATER. THE LOCAL GOVERNING AUTHORITY WILL HAVE THE AUTHORITY TO RECOMMEND THE PLACEMENT OF ADDITIONAL EROSION CONTROL MEASURES IN THESE AREAS IF IT BECOMES EVIDENT DURING CONSTRUCTION THAT THE ONES IN PLACE ARE NOT FUNCTIONING SUFFICIENTLY.
8. EROSION AND SEDIMENT CONTROL MEASURES: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE CURRENT WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL. THE CONTRACTOR SHALL OBTAIN A COPY OF THIS MANUAL FROM THE WVDEP WEBSITE AND CONSTRUCT ALL DEVICES BASED ON THIS MANUAL OR A HANDBOOK THAT IS COMPARABLE OR EXCEEDS THE SPECIFICATIONS OF THE WEST VIRGINIA MANUAL. THE MINIMUM STANDARDS OF THIS MANUAL SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. SEE PLANS FOR ALL PROPOSED EROSION AND SEDIMENT CONTROL MEASURES.
9. STRUCTURAL PRACTICES:
   - DIVERSION DITCHES: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   - DIVERSION BERMS: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   - OUTLET PROTECTION: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
   - FILTER SOCK/SUPER SILT FENCE: WILL BE CONSTRUCTED AS SHOWN ON THE PLANS.
10. VEGETATIVE PRACTICE TOPSOILING: TOPSOIL WILL BE STRIPPED FROM THE SITE AND STOCKPILED AS SHOWN ON THE PLANS. UPON THE COMPLETION OF THE PROJECT, TOPSOIL WILL BE PLACED ON ALL DISTURBED AREAS AT A MINIMUM DEPTH OF 4 INCHES. TEMPORARY SEEDING: ALL DENUDED AREAS LEFT DORMANT FOR MORE THAN 21 DAYS SHALL BE SEEDED WITH A FAST GERMINATING SEED. THE TIME OF YEAR WILL BE THE BASIS FOR THE SEED MIXTURE. PERMANENT SEEDING: ALL SEEDED AREAS WILL BE RESEEDED, MULCHED AND FERTILIZED AS NEEDED TO OBTAIN AN ADEQUATE STAND OF GRASS. PERMANENT SEEDING SHALL BE PLACED WITHIN SEVEN DAYS UPON ACHIEVING FINAL GRADE. WATER, MULCH, AND RESEED AS NECESSARY TO OBTAIN AN ADEQUATE STAND OF VEGETATION.
11. MANAGEMENT STRATEGIES: CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS WILL BEGIN AND END AS SOON AS POSSIBLE. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL MEASURES. AFTER ACHIEVING ADEQUATE STABILIZATION THE TEMPORARY EROSION AND SEDIMENT CONTROLS SHALL BE REMOVED AND ANY AREAS DISTURBED DURING THIS PROCESS SHALL BE STABILIZED.
12. PERMANENT STABILIZATION: ALL AREAS LEFT UNCOVERED BY EITHER BUILDINGS OR PAVEMENT SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING AND WITHIN 7 DAYS. AT NO TIME SHALL LAND LAY DORMANT FOR LONGER THAN 21 DAYS.
13. MAINTENANCE AND OTHER CONSIDERATIONS AND GROUND WATER PROTECTION: ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AND AFTER EACH RAINFALL OF 0.5 INCH OR MORE. THEY WILL BE INSPECTED FOR UNDERMINING, DETERIORATION, EROSION AND EXCESS DEPOSITED MATERIAL. ALL DEFICIENCIES WILL BE CORRECTED IMMEDIATELY. EXCESS MATERIAL WILL BE SPREAD ON THE SITE IN A MANNER WHERE IT IS NOT LIKELY TO ERODE IN THE FUTURE. CLEANING PROCEDURES WILL BE COMPLETED AT REGULAR INTERVALS AND AT LEAST WHEN SEDIMENT REACHES 33% OF CAPACITY, OR AS SHOWN ON APPLICABLE DETAILS. RECORDS OF CLEANING AND CORRECTIONS WILL BE MAINTAINED BY THE CONTRACTOR. THE "GENERIC GROUNDWATER PROTECTION PLAN FOR CONSTRUCTION SITES" (GPP) WILL BE USED AND AVAILABLE ON SITE AT ALL TIMES. AN AREA WILL BE PROVIDED FOR VEHICLE AND EQUIPMENT MAINTENANCE. MOBILE FUEL TRUCKS WITH APPROVED TANKS WILL BE USED ON THE SITE. PORTABLE SANITARY FACILITIES WILL BE AVAILABLE FOR EMPLOYEES. IF CONCRETE IS USED, EXCESS CONCRETE WILL BE DISPOSED OF PROPERLY AND NOT ALLOWED TO REMAIN ON THIS SITE. MACHINERY WILL NOT BE ALLOWED IN LIVE STREAMS. FLUIDS SUCH AS DIESEL FUEL, GAS, OIL OR ANTIFREEZE WILL BE KEPT IN PROPER CONTAINERS AND ANY SPILLAGE WILL BE CLEANED AND TAKEN OFF SITE TO A PROPER FACILITY. SOLID OR HAZARDOUS WASTES WILL BE DISPOSED IN ACCORDANCE WITH APPROPRIATE STATE AND FEDERAL REGULATIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE CHANGES AND NOTIFY WVDEP ON ANY CHANGES TO GPP. A FINAL INSPECTION WILL BE MADE AT THE CONCLUSION OF THE PROJECT AND ALL CORRECTIONS MADE BEFORE SIGN-OFF OF THE PROJECT SITE.

GENERAL EROSION & SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL ARRANGE FOR A PRE-CONSTRUCTION CONFERENCE WITH THE APPROPRIATE EROSION AND SEDIMENT CONTROL INSPECTOR 48 HOURS PRIOR TO BEGINNING WORK.
2. ALL EROSION CONTROL DEVICES AS SHOWN OR AS REQUIRED, ARE TO BE CONSTRUCTED TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL AND ARE TO BE IN PLACE PRIOR TO ALL CONSTRUCTION.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED CONTINUOUSLY, RELOCATED WHEN AND AS NECESSARY AND SHALL BE CHECKED AFTER EVERY RAINFALL. SEEDED AREAS SHALL BE CHECKED REGULARLY AND SHALL BE WATERED, FERTILIZED, RESEEDED AND MULCHED AS NECESSARY TO OBTAIN A DENSE STAND OF GRASS.
4. ALL DRAIN INLETS SHALL BE PROTECTED FROM SILTATION. INEFFECTIVE PROTECTION DEVICES SHALL BE IMMEDIATELY REPLACED AND THE INLET CLEANED. FLUSHING IS NOT AN ACCEPTABLE METHOD OF CLEANING.
5. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 21 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
6. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING DEVICES.
7. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
8. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS IMPOUNDMENTS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
9. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
10. NO SEDIMENT TRACKING ON THE ROADWAY IS ALLOWED. IN THE EVENT THAT SEDIMENT IS INADVERTENTLY TRACKED ONTO THE ROAD, THE ROAD SHALL BE CLEANED THOROUGHLY BY THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA. STREET WASHING OF SEDIMENTS TO THE STORM DRAIN SYSTEM IS NOT ALLOWED. IF STREET WASH WASTEWATER CAN BE CONTROLLED FROM ENTERING THE STORM DRAINAGE SYSTEM, THEN IT SHALL BE PUMPED BACK ONTO THE SITE, CONTAINED AND DISPOSED OF PROPERLY.
11. ALL DISTURBED AREAS NOT PAVED OR BUILT UPON SHALL BE HYDRO-SEEDED AND FERTILIZED. PERFORM PERMANENT TOP SOILING, SEEDING AND FERTILIZING AS SOON AFTER FINISH GRADING AS POSSIBLE. SEEDING SHALL COMPLY WITH THE FOLLOWING:
    - TOPSOIL - 4 INCH MINIMUM FOR PERMANENT TURF.
    - FERTILIZER - 500 LBS. PER ACRE OF 10-20-10 FERTILIZER OR EQUIVALENT POUNDAGE OF DIFFERENT ANALYSIS. WORK INTO SOIL PRIOR TO SEEDING.
    - LIME (PERMANENT SEEDING) - AGRICULTURAL LIME SPREAD AT RATE OF 4 TONS PER ACRE. WORK INTO SOIL PRIOR TO SEEDING.
    - MULCH OR EROSION CONTROL BLANKET (ECB) - WOOD FIBER OR CHOPPED STRAW AT RATE OF 2 TONS PER ACRE. HYDRO-MULCH AT RATE OF 30 BALES PER ACRE. ECB SHALL BE PER PLANS.
    - SEED - 45 LBS. PER ACRE TALL FESCUE AND 20 LBS. PER ACRE PERENNIAL RYE GRASS. TO BE SEEDED WITH HYDRO-SEEDER

SEQUENCE OF BMP INSTALLATION AND REMOVAL

CONSTRUCTION MUST BE IN ACCORDANCE WITH THE FOLLOWING SEQUENCE. THIS SEQUENCE IS DESIGNED TO MINIMIZE SOIL EROSION AND SEDIMENTATION. THE CONTRACTOR MAY DEVIATE SLIGHTLY FROM THE STAGING OF PERMANENT SITE IMPROVEMENTS, BUT NO DEVIATION FROM THE RELATIVE ORDER OF EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE ALLOWED.

THE STAGING OF EARTHMOVING ACTIVITIES FOR THIS PROJECT IS A GENERAL DESCRIPTION OF THE WORK REQUIRED. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH COMPANY STANDARDS, THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION REGULATIONS AND ALL OTHER APPLICABLE FEDERAL, STATE OR LOCAL REQUIREMENTS.

THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN INCLUDING THE SOIL EROSION CONTROL DRAWINGS SHALL BE AVAILABLE ON SITE AT ALL TIMES DURING EARTH DISTURBANCE.

ALL BMPs SHALL BE INSPECTED AFTER EACH MEASURABLE RAINFALL RUNOFF EVENT. ANY NECESSARY REPAIRS MUST BE MADE IMMEDIATELY TO ENSURE EFFECTIVE AND EFFICIENT OPERATION.

1. A PRE-CONSTRUCTION CONFERENCE WILL BE HELD ON SITE WITH CONTRACTOR TO REVIEW THE CONSTRUCTION DRAWINGS AND PROVIDE ANY REQUESTED GUIDANCE.
2. STAKE/FLAG DISTURBED WORK AREA, CLEARLY IDENTIFYING WETLAND AND STREAM EDGES AND BUFFERS. INSTALL SIGNS TO DE SIGNATE THE AREA AND ORANGE SAFETY FENCE TO IDENTIFY IMPORTANT PROJECT ATTRIBUTES SUCH AS APPROVED ACCESS ROADS, NO REFUELING ZONES, WETLAND/STREAM BOUNDS, ETC.
3. CONSTRUCT THE CONSTRUCTION ENTRANCE.
4. CONSTRUCT ALL PROPOSED SEDIMENT CONTROL DEVICES AS SOON AS CLEARING AND GRUBBING OPERATIONS ALLOW. DIVERSIONS AND SEDIMENT BASINS SHALL BE SEEDED AND MULCHED IMMEDIATELY.
5. PRIOR TO GRADING OR OTHER EARTH DISTURBANCE ON THE PARCEL, PERMANENT DOWN SLOPE BMPs ARE TO BE INSTALLED.
6. CLEAR AND GRUB, REMOVE TOPSOIL AND PLACE AS SHOWN ON THE PLANS. TOPSOIL STOCKPILE TO BE SEEDED AND MULCHED. E&S BMPs SHALL BE CONSTRUCTED AROUND TOPSOIL STOCKPILES AS SHOWN.
7. GRADING OPERATIONS AS REQUIRED. CUT SLOPES AND ALL SLOPES SHALL BE TOPSOILED AS NEEDED. DITCH LINES SHALL BE CLEANED. ALL DITCHES WILL HAVE AT LEAST GRASS LINING PROTECTION OR AS SPECIFIED IN SITE CALCULATIONS ON SHEET 4.
8. THE ACCESS ROAD SHALL BE CONSTRUCTED UP TO THE PROPOSED PAD S. THE ACCESS ROAD SHALL RECEIVE A STONE SURFACE.
9. INSTALL PROPOSED EQUIPMENT PAD AND EQUIPMENT PAD BERMS.
10. CULVERT INLET AND OUTLET PROTECTION SHALL BE CONSTRUCTED IMMEDIATELY UPON PLACEMENT OF INLETS AND CULVERTS. INSTALLATION OF MATTING AND/OR RIP RAP TO OCCUR ONCE DITCHES ARE CONSTRUCTED.
11. SIDE SLOPE STABILIZATION MATTING AND STABILIZATION SHALL OCCUR AS SOON AS POSSIBLE.
12. AT THE END OF EACH WORK DAY, WHERE THE PARCEL HAS BEEN GRADED, INCLUDING ANY STRIPPING, STUMPING, LEVELING, 2:1 ON SIDE SLOPES, ETC. BMPs ARE TO BE INSTALLED. IN NO CASE IS THE CONTRACTOR TO LEAVE THE JOB SITE AT THE END OF THE WORK DAY WITHOUT TEMPORARY OR PERMANENT BMPs BEING INSTALLED. THE CONTRACTOR IS NOT REQUIRED TO MAINTAIN WATERBARS DURING THE WORK DAY UNLESS THE ENVIRONMENTAL INSPECTOR DETERMINES THAT THERE IS A RISK OF A RAIN EVENT THAT WARRANTS THEIR IMMEDIATE INSTALLATION.
13. WHEN FINAL GRADE IS ACHIEVED, TOPSOIL TO BE PLACED ON ALL DISTURBED AREAS NOT LINED. SEED ALL DISTURBED AREAS AS REQUIRED. A SOIL SAMPLE SHOULD BE TAKEN AND TESTED TO DETERMINE RECOMMENDED RATES. IF NO SOILS SAMPLE IS TAKEN THE FOLLOWING RATES SHOULD BE APPLIED AS A MINIMUM: LIME AT A RATE OF 4 TONS PER ACRE. FERTILIZE AT A RATE OF 500 LBS. OF 10-20-10 PER ACRE. SEED WITH 45 LBS. PER ACRE OF TALL FESCUE AND 20 LBS. PER ACRE OF PERENNIAL RYE GRASS.
14. LIME, FERTILIZER, AND SEED WILL BE APPLIED. HYDRO-MULCH PRODUCTS SHALL BE MIXED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, OR EROSION CONTROL BLANKET SHALL BE INSTALLED PER PLANS & SPECIFICATIONS.
15. FINAL SEEDING MUST OCCUR WITHIN 7 DAYS OF FINAL GRADING.
16. WHEN SITE IS STABILIZED, ALL EROSION AND SEDIMENT CONTROL MEASURES CAN BE REMOVED AND REPAIR/STABILIZE THOSE AREAS IN ACCORDANCE WITH STATE STANDARDS.
17. MAKE MODIFICATIONS FOR PERMANENT STORMWATER MANAGEMENT.
18. FINAL SITE INSPECTION. A NOTICE OF TERMINATION SHOULD BE FILED WITH DEP UPON FINAL STABILIZATION.

SEQUENCE OF BMP INSTALLATION AND REMOVAL

1. THE WELL PAD AND WATER CONTAINMENT PAD SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND THE SCOPE OF WORK AND SHALL CONFORM GENERALLY WITH THE GRADES, BERMS, AND DIMENSIONS SHOWN.
2. THE CONSTRUCTION DOCUMENTS SHOW THE EXISTING AND PROPOSED GRADES AND BERMS, ETC. THAT ALL CUT AND FILL ESTIMATES ARE BASED UPON THE ENGINEER'S ESTIMATES OF THE QUANTITIES ARE ONLY ESTIMATES AND MAY CHANGE BASED ON ACTUAL FIELD CONDITIONS.
3. THE GRADES, BERMS, DEPTHS, AND DIMENSIONS MAY CHANGE BASED ON ACTUAL FIELD CONDITIONS. THE ENGINEER RESERVES THE RIGHT TO CHANGE GRADES, BERMS, DEPTHS AND DIMENSIONS AS NECESSARY TO MEET FIELD CONDITIONS.
4. THE CONTRACTOR SHALL PROVIDE THE ENGINEER ALL REASONABLE FACILITIES AND PROVIDE INFORMATION AND SAMPLES AS REQUIRED BY THE ENGINEER FOR PROPER MONITORING AND TESTING OF MATERIAL WORKMANSHIP.
5. THE CONTRACTOR SHALL HAVE ON SITE AT ALL TIMES WHEN CONSTRUCTION IS IN PROGRESS A COMPETENT SUPERINTENDENT THOROUGHLY FAMILIAR WITH THE CONSTRUCTION OF EARTH BERMS AND EMBANKMENTS, THE COMPACTION OF SOILS AND PLACEMENTS OF LINERS.
6. THE CONTRACTOR SHALL INSTALL FILTER SOCK PRIOR TO CLEARING AND GRUBBING AS SHOWN ON THE DRAWINGS IN ACCORDANCE WITH WVDEP BEST MANAGEMENT PRACTICES MANUAL CHAPTER 3. SURFACE WATER SHALL BE DIVERTED AWAY FROM ALL EXCAVATIONS AND THE FACE OF ALL FILLS TO PREVENT FLOODING AND SOFTENING OF THE SUBGRADE OR COMPACTED MATERIALS.
7. CLEARING AND GRUBBING SHALL REMOVE ALL BRUSH, TREES, ROOTS, STUMPS, FENCES, SIGNS OR ANY OTHER MATERIAL THAT IS NOT TO BE REUSED FOR THE CONSTRUCTION. SOME STUMPS MAY REMAIN AT THE APPROVAL OF THE ENGINEER. NO CLEARING DEBRIS SHALL BE BURIED ON-SITE . FOR CLEARING WITHIN PERMITTED LOD, STUMPS AND ROOTS LARGER THAN 2 INCHES IN DIAMETER SHALL BE COMPLETELY GRUBBED AND PROPERLY DISPOSED OF OFF-SITE. ALL TIMBER, TREETOPS, BRANCHES, STUMPS LESS THAN 2 INCHES IN DIAMETER, ETC., WILL BE CHIPPED, GROUND, AND/OR MULCHED AND USED AS SITE BMP'S WITH THE REMAINDER BEING PROPERLY DISPOSED OF OFF-SITE. CLEARING TO BE COMPLETE ONLY AS NEED WITHIN THE LOD TO CONSTRUCT THE FACILITY AS DEPICTED.
8. TOP SOIL SHALL BE STRIPPED AND STOCKPILED WITH APPROPRIATE STABILIZATION TO PREVENT EROSION. THE TOP SOIL SHALL BE REUSED DURING THE RECLAMATION PROCESS AS NEEDED.
9. PRIOR TO PLACING ANY FILL, THE EXPOSED SUBGRADE SHALL BE COMPACTED AND PROOF ROLLED TO PRODUCE A STABLE AND UNYIELDING SITE.
10. RIPRAP USED AS OUTLET PROTECTION MUST BE HARD, ANGULAR AND OF A QUALITY RESISTANT TO WEATHERING AND DISINTEGRATION. RIPRAP SHOULD BE GROUTED ON STEEP OR LENGTHY FILL SLOPES WITH A MINIMUM THICKNESS TWO TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN SIX INCHES.
11. ALL FILL SHALL BE PLACED IN LOOSE LIFTS OF UP TO 12" AND SHALL BE COMPACTED TO AT LEAST 95% OF THE LABORATORY MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST METHOD (ASTM D 698). THE MOISTURE CONTENT WILL BE CONTROLLED IN ACCORDANCE WITH THE LIMITS OF THE STANDARD PROCTOR TEST RESULTS. SOME SOILS CANNOT BE COMPACTED TO 95% OF THE STANDARD PROCTOR AT PLUS OR MINUS 4% MOISTURE CONTENT. CONTRACTOR IS RESPONSIBLE FOR THE ORIGINAL SOIL TEST AND PROVIDING A COPY OF THE RESULTS WITH MOISTURE-DENSITY CURVE TO THE ENGINEER. THE CONTRACTOR SHALL DO IN-PLACE DENSITY TESTS EVERY THIRD LIFT OF SOIL. FIELD DENSITY TESTS FOR COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH ASTM D 2922 (NUCLEAR METHOD). RECORDS SHALL BE MAINTAINED OF TEST LOCATION AND RESULTS AND PROVIDED TO THE ENGINEER ON REQUEST. AREAS THAT FAIL FOR COMPACTION SHALL BE REMOVED, RE-COMPACTED AND RETESTED FOR COMPLIANCE. IN LIEU OF STANDARD PROCTOR TESTING, THE CONTRACTOR MAY PROOF-ROLL THE SOIL EVERY 24" OF SOIL LIFT WITH A LOADED 15 TON TANDEM DUMP TRUCK. SOIL THAT DEFLECTS UNDER THE REAR WHEELS GREATER THAN 1/2" SHALL BE REMOVED, RE-COMPACTED AND RETESTED. COMPACTION OF SOIL SHALL BE DONE WITH A 5 TON SMOOTH, SHEEPS FOOT, OR VIBRATORY ROLLER.
12. ON-SITE FILL SHALL BE USED TO THE MAXIMUM EXTENT POSSIBLE. ANY IMPORTED FILL SHALL BE CERTIFIED BY THE CONTRACTOR TO BE CLEAR OF ALL HAZARDOUS SUBSTANCES OR MATERIALS. IF MATERIAL IS ENCOUNTERED THAT CANNOT BE RIPPED BY A CAT D6 WITH A SINGLE TOOTH RIPPER, THEN THE CONTRACTOR SHALL CONTACT THE ENGINEER WHO WILL VISIT THE SITE AND DETERMINE IF THE MATERIAL MAY BE USED AS IS OR MUST BE REMOVED BY OTHER MEANS. IF UNSUITABLE SOILS IN THE SUBGRADE ARE FOUND THEY SHALL BE REMOVED AND REPLACED WITH APPROPRIATE FILL AT THE CONTRACTOR'S EXPENSE AND THE ENGINEER'S DIRECTION.
13. IF SPRINGS OR SEEPS ARE ENCOUNTERED, SUBSURFACE DRAINAGE FEATURES SHALL BE INSTALLED PRIOR TO FILL PLACEMENT. CONTACT ENGINEER FOR EVALUATION AND RECOMMENDATION OF CORRECTIVE MEASURES.
14. THE FILL TOE FOR ALL EMBANKMENTS SHALL BE BENCHED OR KEYED INTO THE NATURAL SOIL. ALL FILL TOES SHALL BE SUPPORTED BY COMPETENT BEDROCK OR SOIL MATERIAL.
15. FILL PLACED AGAINST EXISTING SLOPES SHALL BE BENCHED INTO THE EXISTING MATERIAL DURING ALL PLACEMENT TO REDUCE THE POTENTIAL FOR DEVELOPMENT OF A SMOOTH INTERFACE BETWEEN THE FILL AND EXISTING SLOPE.
16. ANY SOFT AREAS SHALL BE OVER-EXCAVATED TO A FIRM MATERIAL AND BACKFILLED WITH A WELL COMPACTED STRUCTURAL FILL.
17. FILL REQUIRED TO OBTAIN DESIGN GRADES SHALL BE PLACED AS CONTROLLED, COMPACTED. ALL THE FILL SHALL BE FREE OF TRASH, WOOD, TOPSOIL, ORGANICS, COAL, COAL MINE REFUSE, FROZEN MATERIAL AND PIECES OF ROCK GREATER THAN 6" IN ANY DIMENSION.
18. DURING PLACEMENT OF MATERIAL, MOISTEN OR AERATE EACH LAYER OF FILL, AS NECESSARY, TO OBTAIN THE REQUIRED COMPACTION. FILL SHOULD NOT BE PLACED ON SURFACES THAT ARE MUDDY OR FROZEN, OR HAVE NOT BEEN APPROVED BY PRIOR PROOF-ROLLING. FREE WATER SHALL BE PREVENTED FROM APPEARING ON THE SURFACE DURING OR SUBSEQUENT TO COMPACTION OPERATIONS.
19. SOIL MATERIAL WHICH IS REMOVED BECAUSE IT IS TOO WET TO PERMIT PROPER COMPACTION MAY BE SPREAD AND ALLOWED TO DRY. DRYING CAN BE FACILITATED BY DISCING OR HARROWING UNTIL THE MOISTURE CONTENT IS REDUCED TO AN ACCEPTABLE LEVEL. WHEN THE SOIL IS TOO DRY, WATER MAY BE UNIFORMLY APPLIED TO THE LAYER TO BE COMPACTED.
20. THE FILL OUTSLOPES SHALL BE OVERBUILT AND TRIMMED BACK TO DESIGN CONFIGURATIONS TO VERIFY PROPER COMPACTION.
21. GRANULAR MATERIALS, SUCH AS AASHTO NO. 57 STONE SHALL BE COMPACTED TO 85% OF ITS RELATIVE DENSITY, AS DETERMINED BY ASTM D 4253 AND D 4254 TEST METHODS.
22. PHOTOGRAPHIC DOCUMENTATION SHALL BE TAKEN BY THE CONTRACTOR AND PROVIDED TO THE ENGINEER OF THE FOLLOWING ACTIVITIES;
    - SITE AFTER CLEARING AND GRUBBING;
    - THE SITE AFTER TOPSOIL REMOVAL;
    - TOE KEY AND INSPECTION TRENCH CONSTRUCTION;
    - DAILY PHOTOS OF CUT AND FILL OPERATIONS;
    - PROOF-ROLLING TESTS.
23. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A COMPLETE BINDER THAT INCLUDES ALL PHOTO DOCUMENTATION, ALL COMPACTION TEST REPORTS, RESULTS AND MAPS, AND A REPORT OF ALL CUT AND FILL VOLUMES IN CUBIC YARDS.

ISSUED FOR CONSTRUCTION

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

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PROJ. NO. 133141
ACAD FILE: NOTES.dwg

MACKAY WELL & W.C. PAD
NOTES

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
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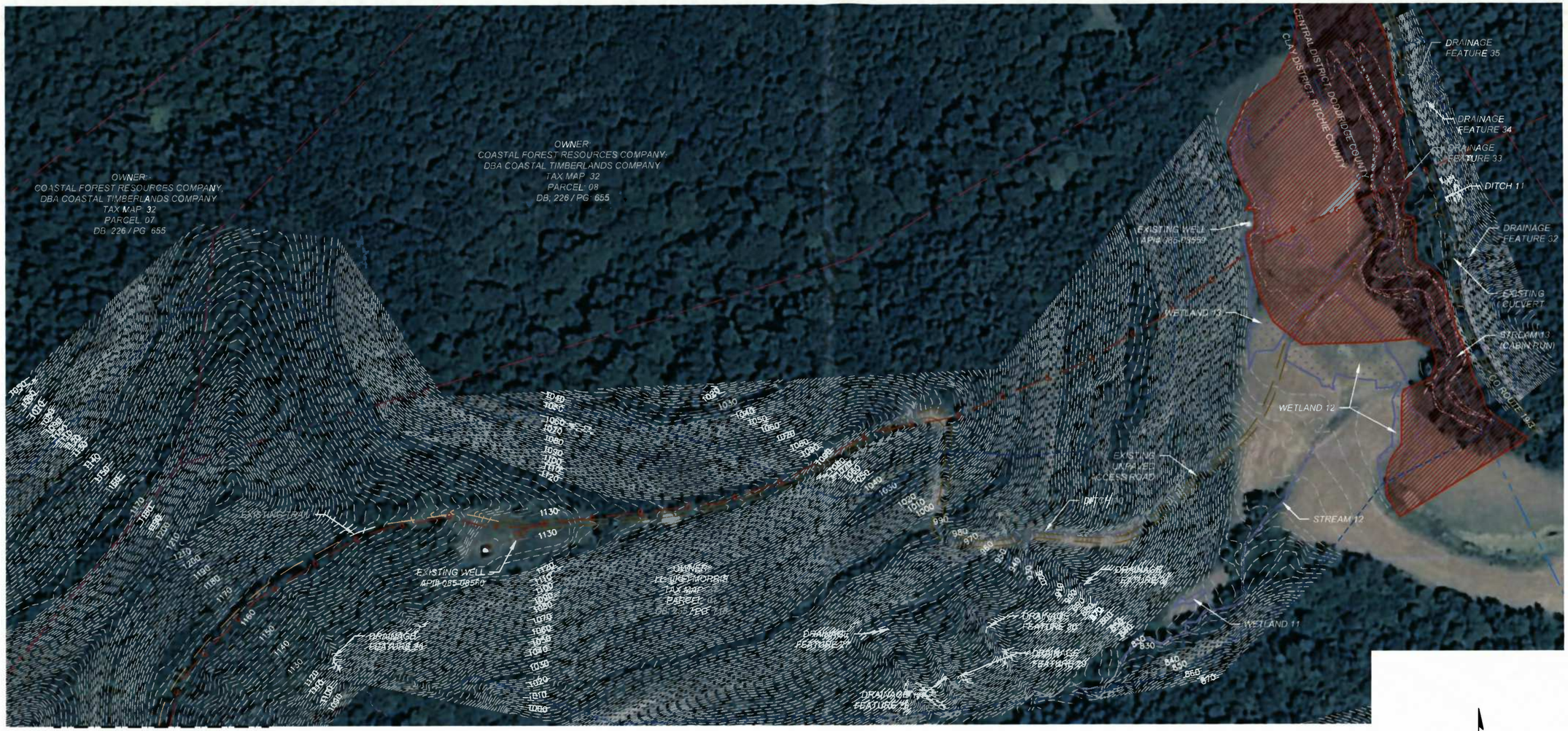
CONSTRUCTION
3
3 of 27 sheets

PLOTTED: 03 Mar 2014, 12:02pm, rparker

ATTACHED IMAGES:
ATTACHED XREFS: XRef: ANTERO 11x17 TITLE BLOCK
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 3 NOTES

10-15-12 REVISED BY: CAL



MATCHLINE SHEET 5

LEGEND

- 1360 — EX. INDEX CONTOUR
- EX. INTERMEDIATE CONTOUR
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- G — EX. GAS LINE
- EX. UTILITY POLE
- EX. ROAD
- EX. TRAIL
- X — EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- EX. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)

NOTES:

1. WETLANDS/STREAMS DELINEATED BY:
   ALLSTAR ECOLOGY, LLC
   1582 MEADOWDALE ROAD
   FAIRMONT, WV 26554
   304-816-3490
2. LOCATION SURVEY PROVIDED BY:
   TRIPLE H ENTERPRISES
   945 CABIN RUN ROAD
   WEST UNION, WV 26456
   304-266-6493
3. TOPOGRAPHIC SURVEY PROVIDED BY:
   BLUE MOUNTAIN AERIAL MAPPING
   11023 MASON DIXON HIGHWAY
   BURTON, WV 26562
   304-662-2626
4. BENCHMARK:
   HORIZONTAL - NAD 83 WV STATE PLANE, NORTH ZONE, US SURVEY FEET

   VERTICAL - NAVD 88 (GEOID03), US SURVEY FEET
5. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE (FIRM) PANELS 54085C0225C & 54017C0200C INDICATES FLOOD ZONE A IS WITHIN THE PROJECT AREA.

N

100 50 0 100
SCALE: 1 INCH=100 FEET

ISSUED FOR CONSTRUCTION

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3	-	---	---
4	-	---	---
5	-	---	---

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PROJ. NO. 133141
ACAD FILE: EX. CONDITIONS.dwg

MACKAY WELL & W.C. PAD
EXISTING CONDITIONS

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

4

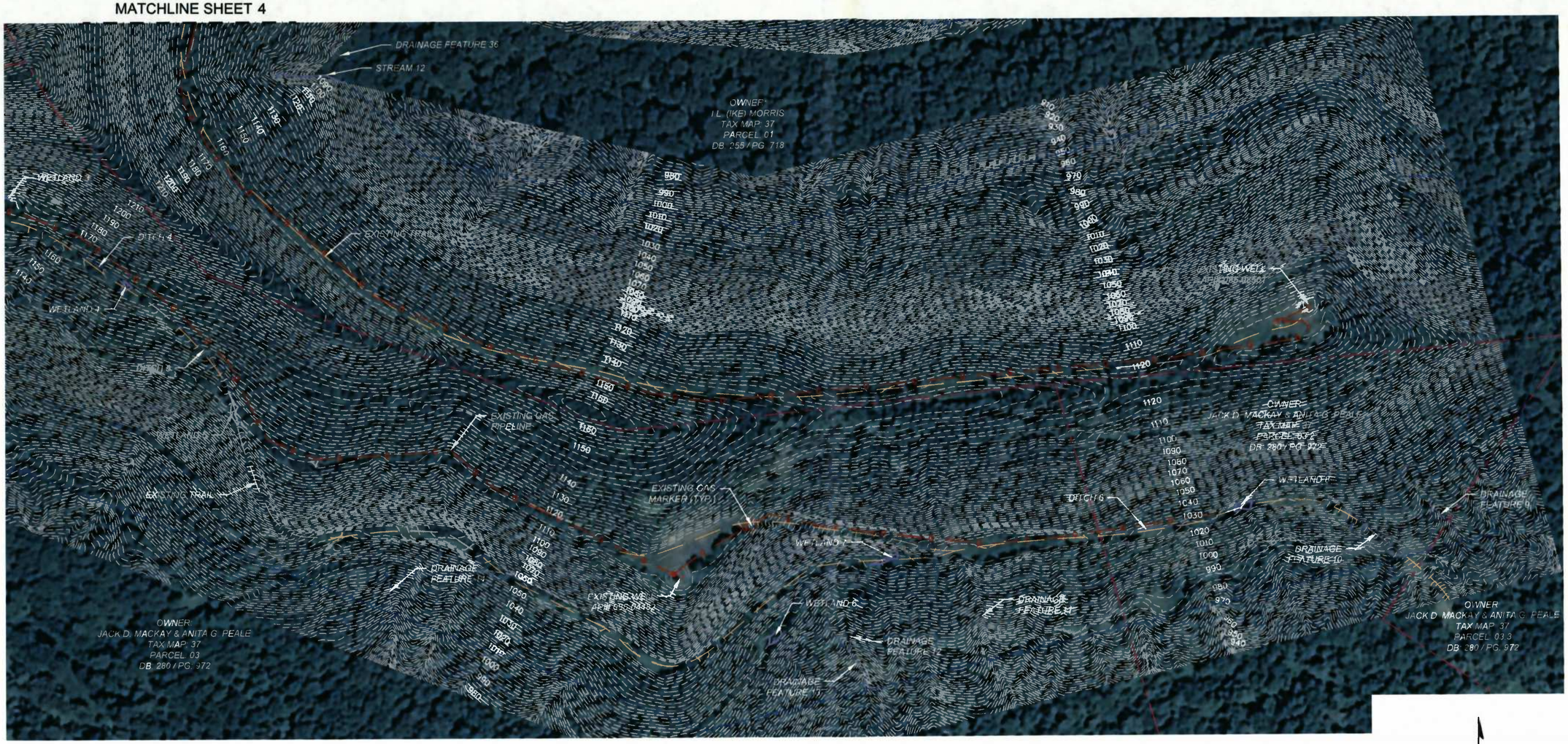
4 of 27 sheets

ATTACHED IMAGES: Image Pattern.tif
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Aerial; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:\Clients\Antero Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT 4 EXISTING CONDITIONS

10-15-13 REVISED BY CAL

PLOTTED: 03 Mar 2014, 12:04pm, rparker

MATCHLINE SHEET 4



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SCALE: 1 INCH=100 FEET

ISSUED FOR CONSTRUCTION

LEGEND

- 1360 — EX. INDEX CONTOUR
- EX. INTERMEDIATE CONTOUR
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- G — EX. GAS LINE
- EX. UTILITY POLE
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- EX. TRAIL
- X — EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST

NOTES:

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   304-662-2626
4. BENCHMARK:
   HORIZONTAL - NAD 83 WV STATE PLANE, NORTH ZONE, US SURVEY FEET

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5. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE (FIRM) PANELS 54085C0225C & 54017C0200C INDICATES FLOOD ZONE A IS WITHIN THE PROJECT AREA.

NO.	REVISION	BY	DATE
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MACKAY WELL & W.C. PAD
EXISTING CONDITIONS

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

SEAL

JEFFERY B. CRUSH
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

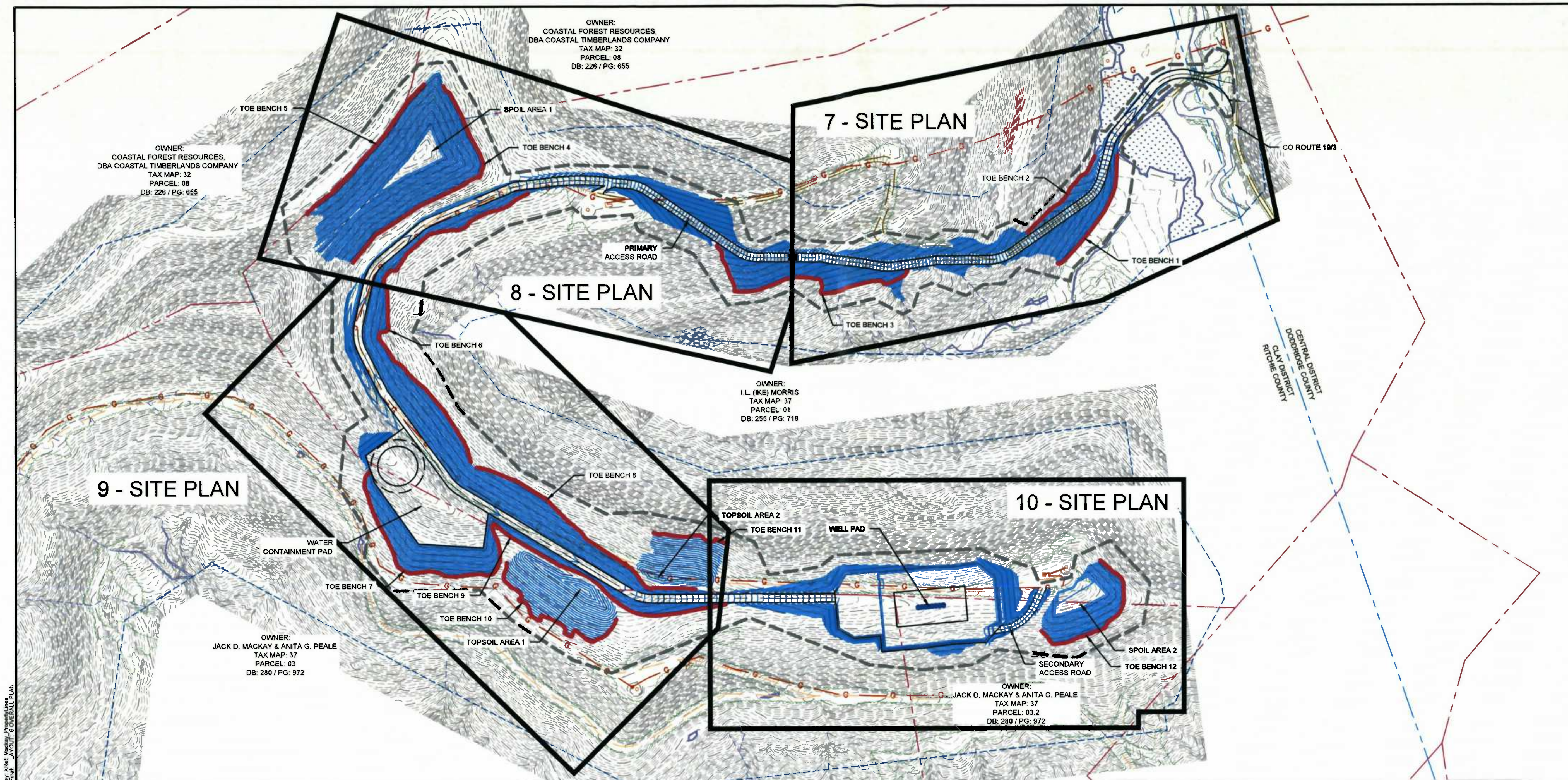
5

5 of 27 sheets

PLOTTED: 03 Mar 2014, 12:04pm, rparker

ATTACHED IMAGES: Images Pullman NE.sid
ATTACHED XREFS: XRef:ANTERO 11x17 TITLE BLOCK; XRef:MackayAerial; XRef:MackayBase; XRef:MackayCivil; XRef:MackaySurvey; XRef:MackayPropertyLines
CAD FILE: G:\Clients\AnteroFiles\Mackay\Design\Civil\Site Plans - Final\LAYOUT 5 EXISTING CONDITIONS

10-15-12 REVISED BY: CAL



TOE KEY EXCAVATION QUANTITIES						
Toe Bench No.	Location	Length of Slope (ft)	Anticipated Toe Key Depth - Downhill Side (ft)	Anticipated Toe Key Depth - Uphill Side (ft)	Width at Bottom of Toe Key (ft)	Total Overexcavation Volume (Toe Key) (CY)
1	S Side of Access Road	373	7.0	11.5	15	3,460
2	N Side of Access Road	297	5.0	14.0	15	3,446
3	S Side of Access Road	714	5.0	14.0	15	8,284
4	E Side Material Spoil Area 1	740	6.0	13.5	15	8,307
5	W Side Material Spoil Area 1	505	6.0	13.5	15	5,669
6	E Side of Access Road	1,144	7.0	12.3	15	11,518
7	SW Corner Water Containment Pad	728	10.0	15.8	15	11,272
8	E Side of Access Road	748	8.0	14.5	15	9,805
9	SW Side of Access Road	750	5.0	10.3	15	5,531
10	Topsoil Area 1	544	5.0	10.8	15	4,290
11	Topsoil Area 2	223	8.0	14.5	15	2,923
12	Material Spoil Area 2	455	4.0	13.0	15	4,571
	TOTAL					79,074

TOE KEY, BENCHING, DRAINAGE QUANTITIES							
Toe Bench No.	Location	Length (ft)	No. 57 Stone - Toe Key (TONS)	No. 57 Stone - Drainage Bond Benches (TONS)	No. 57 Stone - Outlet/Drain Pipes (TONS)	4-Inch Perforated Pipe (ft)	Non-Woven Geotextile (SF)
1	S Side of Access Road	373	311	430	18	2,216	1,402
2	N Side of Access Road	297	302	0	5	386	356
3	S Side of Access Road	714	726	822	35	4,241	2,685
4	E Side Material Spoil Area 1	740	725	0	11	962	888
5	W Side Material Spoil Area 1	505	495	0	8	657	606
6	E Side of Access Road	1,144	1,018	0	18	1,487	1,373
7	SW Corner Water Containment Pad	728	834	629	29	3,480	2,271
8	E Side of Access Road	748	788	0	12	972	898
9	SW Side of Access Road	750	558	0	12	975	900
10	Topsoil Area 1	544	426	0	8	707	653
11	Topsoil Area 2	223	235	0	3	290	268
12	Material Spoil Area 2	455	430	0	7	592	546
	TOTALS		6,848	1,881	165	16,964	12,846

N

150 75 0 150
SCALE: 1 INCH=150 FEET

LEGEND
EX. PROPERTY LINE
EX. COUNTY LINE
PROP. TOE BENCH

ISSUED FOR CONSTRUCTION

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STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

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PROJ. NO. 133141
ACAD FILE: KEY MAP.dwg

MACKAY WELL & W.C. PAD OVERALL PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0
CONSTRUCTION
6
6 of 27 sheets

PLOTTED: 03 Mar 2014, 12:05pm, rparker

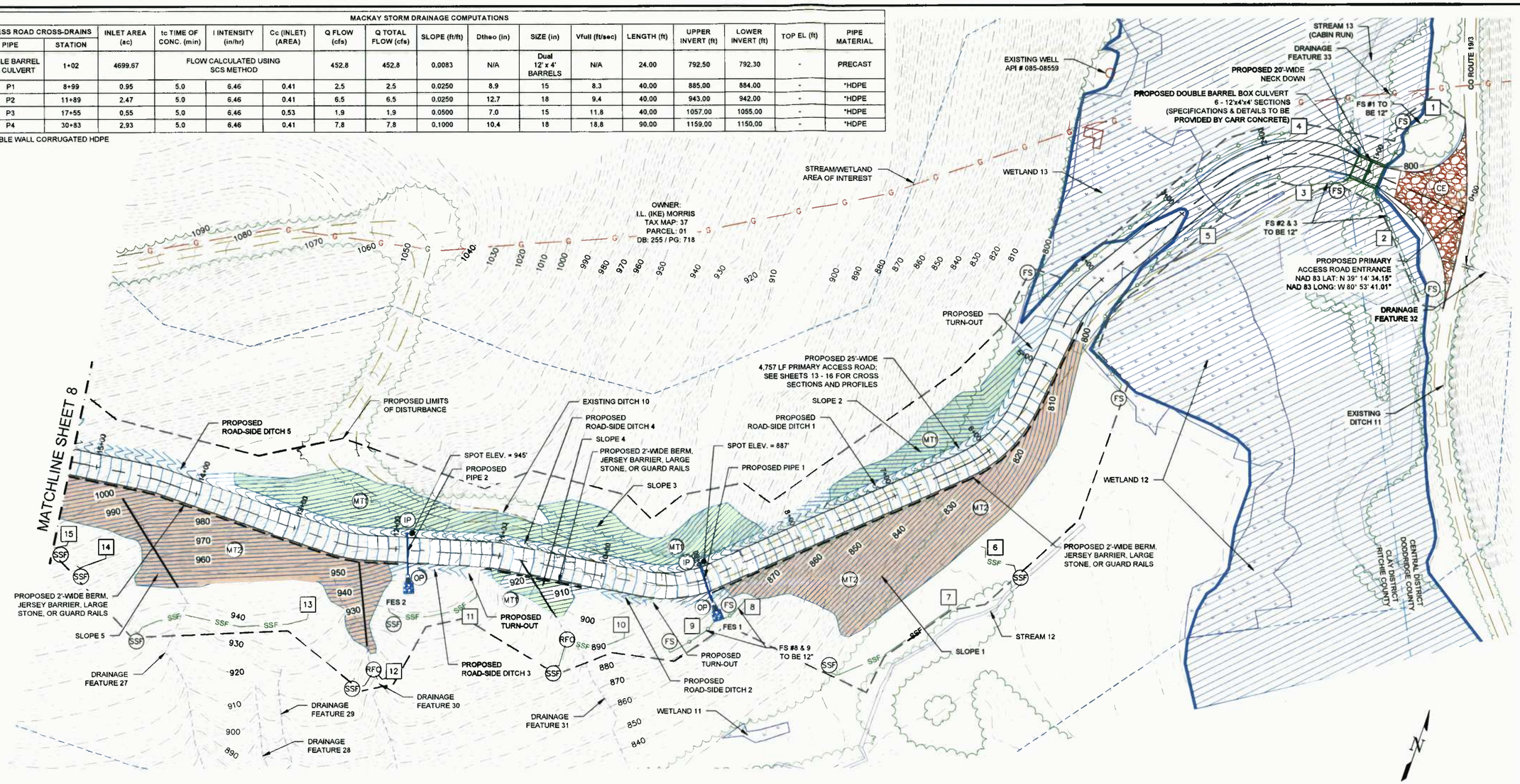
ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final LAYOUT: 6 OVERALL PLAN

10-15-12 REVISED BY CAL

MACKAY STORM DRAINAGE COMPUTATIONS

ACCESS ROAD CROSS-DRAINS		INLET AREA (ac)	tc TIME OF CONC. (min)	I INTENSITY (in/hr)	Cc (INLET) (AREA)	Q FLOW (cfs)	Q TOTAL FLOW (cfs)	SLOPE (ft/ft)	Dtheo (in)	SIZE (in)	Vfull (ft/sec)	LENGTH (ft)	UPPER INVERT (ft)	LOWER INVERT (ft)	TOP EL (ft)	PIPE MATERIAL
PIPE	STATION															
DOUBLE BARREL BOX CULVERT	1+02	4699.67	FLOW CALCULATED USING SCS METHOD			452.8	452.8	0.0083	N/A	Dual 12' x 4' BARRELS	N/A	24.00	792.50	792.30	-	PRECAST
P1	8+99	0.95	5.0	6.46	0.41	2.5	2.5	0.0250	8.9	15	8.3	40.00	885.00	884.00	-	*HDPE
P2	11+89	2.47	5.0	6.46	0.41	6.5	6.5	0.0250	12.7	18	9.4	40.00	943.00	942.00	-	*HDPE
P3	17+55	0.55	5.0	6.46	0.53	1.9	1.9	0.0500	7.0	15	11.8	40.00	1057.00	1055.00	-	*HDPE
P4	30+83	2.93	5.0	6.46	0.41	7.8	7.8	0.1000	10.4	18	18.8	90.00	1159.00	1150.00	-	*HDPE

*DOUBLE WALL CORRUPTED HDPE



LEGEND

- EX. INDEX CONTOUR (1360)
- EX. INTERMEDIATE CONTOUR
- EX. TREE LINE
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- EX. UTILITY POLE
- EX. ROAD
- EX. TRAIL
- EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- PROP. LIMITS OF DISTURBANCE
- PROP. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)
- PROP. FRENCH DRAIN
- PROP. INDEX CONTOUR (1360)
- PROP. INTERMEDIATE CONTOUR
- PROP. ROAD CENTERLINE
- PROP. PADS & ROAD EDGE
- PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
- SUPER SILT FENCE AND FILTER SOCK INDICATION (SEE SHEET 20 FOR SUPER SILT FENCE AND FILTER SOCK TABLE)
- PROP. FILTER SOCK
- PROP. SUPER SILT FENCE
- PROP. CONSTRUCTION ENTRANCE
- PROP. NAG S150BN EROSION CONTROL MATTING
- PROP. NAG SC250 EROSION CONTROL MATTING
- PROP. OUTLET PROTECTION
- PROP. INLET PROTECTION
- PROP. ROCK FILTER OUTLET

NOTES:

1. THE GRADES SHOWN REPRESENT FINISH GRADE ELEVATIONS.
2. PIPE MATERIALS SHALL BE AS NOTED ON THE PLAN AND IN THE STORM DRAINAGE COMPUTATION TABLE.
3. CUT AND FILL SLOPES SHALL BE AT 2H:1V UNLESS NOTED OTHERWISE.
4. FILL SHALL BE PLACED IN 12" LIFTS AND BE COMPACTED TO 95% STANDARD PROCTOR.
5. INTERMEDIATE TOE BENCHES SHALL BE INSTALLED ON FILL SLOPES AT INTERVALS OF 50' VERTICAL FEET OR LESS IF SOILS CONDITIONS WARRANT ADDITIONAL SLIP PRECAUTIONS.
6. ALL FILL SLOPES SHALL BE TOE KEYED PER THE DETAIL SHOWN ON SHEET 21.
7. POSITIVE FLOW FROM PAD TO SUMPS. SEDIMENTS AND MATERIAL REMOVED FROM THE PAD SUMPS SHALL BE PUMPED TO ON-SITE HOLDING/STORAGE TANKS AND SUBSEQUENTLY REMOVED FROM SITE BY AN APPROVED COMMERCIAL VENDOR.
8. ALL STORMWATER CONVEYANCES ON THE SITE HAVE BEEN DESIGNED TO ACCOMMODATE THE 10-YEAR STORM EVENT. A 10-YEAR STORM EVENT RAINFALL INTENSITY OF 6.46 IN/HR WAS USED FOR STORM SEWER AND ROAD-SIDE DITCH CALCULATIONS PER THE NOAA PRECIPITATION FREQUENCY DATA SERVER FOR PENNSBORO, WV.
9. SEE DETAIL 2, SHEET 19 FOR RIP RAP OUTLET PROTECTION SIZING AND DESIGN.
10. CONTRACTOR TO INSTALL ROCK CHECK DAMS WITHIN ROADSIDE DITCHES. SEE DETAIL ON PAGE 20 FOR SPACING REQUIREMENTS. ROCK CHECK DAMS WILL BE INSTALLED DURING CONSTRUCTION AS EROSION CONTROL MEASURES AND REMAIN IN PLACE AS PERMANENT CHECK DAMS AFTER CONSTRUCTION IS COMPLETE.
11. ALL FILTER SOCK TO BE 18" UNLESS OTHERWISE NOTED.
12. IN TOPSOIL PLACEMENT AREAS, CONTRACTOR TO INSTALL PROPER BMPS TO ENSURE NO OFFSITE EROSION & SEDIMENTATION RUNOFF.
13. INSTALL ROCK FILTER OUTLETS ALONG SEDIMENT BARRIERS AS SHOWN AND AT LOW POINTS AS IDENTIFIED IN THE FIELD.

SCALE: 1 INCH=50 FEET

STORM DRAINAGE LEGEND	
FES	FLARED END SECTION

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PROJ. NO. 133141
ACAD FILE: GRADING & STORM DRAINAGE.dwg

MACKAY WELL & W.C. PAD SITE PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
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RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

JEFFERY B. CROSS REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

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CONSTRUCTION

7

7 of 27 sheets

PLOTTED: 03 Mar 2014, 12:06pm, rparker

ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:\...\Alerts\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT 7 SITE PLAN

10-15-12 REVISED BY CAL

MACKAY STORM DRAINAGE COMPUTATIONS

ACCESS ROAD CROSS-DRAINS		INLET AREA (ac)	tc TIME OF CONC. (min)	I INTENSITY (in/hr)	Cc (INLET) (AREA)	Q FLOW (cfs)	Q TOTAL FLOW (cfs)	SLOPE (ft/ft)	Dtheo (in)	SIZE (in)	Vfull (ft/sec)	LENGTH (ft)	UPPER INVERT (ft)	LOWER INVERT (ft)	TOP EL (ft)	PIPE MATERIAL
PIPE	STATION															
DOUBLE BARREL BOX CULVERT	1+02	4699.67	FLOW CALCULATED USING SCS METHOD			452.8	452.8	0.0083	N/A	Dual 12' x 4' BARRELS	N/A	24.00	792.50	792.30	-	PRECAST
P1	8+99	0.95	5.0	6.46	0.41	2.5	2.5	0.0250	8.9	15	8.3	40.00	885.00	884.00	-	*HDPE
P2	11+89	2.47	5.0	6.46	0.41	6.5	6.5	0.0250	12.7	18	9.4	40.00	943.00	942.00	-	*HDPE
P3	17+55	0.55	5.0	6.46	0.53	1.9	1.9	0.0500	7.0	15	11.8	40.00	1057.00	1055.00	-	*HDPE
P4	30+83	2.93	5.0	6.46	0.41	7.8	7.8	0.1000	10.4	18	18.8	90.00	1159.00	1150.00	-	*HDPE

*DOUBLE WALL CORRUGATED HDPE

OWNER:
COASTAL FOREST RESOURCES COMPANY,
DBA COASTAL TIMBERLANDS COMPANY
TAX MAP: 32
PARCEL: 08
DB: 226 / PG: 655

OWNER:
COASTAL FOREST RESOURCES COMPANY,
DBA COASTAL TIMBERLANDS COMPANY
TAX MAP: 32
PARCEL: 07
DB: 226 / PG: 655

PROPOSED SPOIL AREA 1
ELEV. = 1224'
CAPACITY = 22,058 CY

PROPOSED LIMITS OF DISTURBANCE

PROPOSED 25'-WIDE 4,757 LF PRIMARY ACCESS ROAD; SEE SHEETS 13 - 16 FOR CROSS SECTIONS AND PROFILES

PROPOSED ROAD-SIDE DITCH 7

SLOPE 7

1.5:1 CUT SLOPE (UPPER 5' GRADED AT 2:1)

SPOT ELEV. = 1059'

PROPOSED ROAD-SIDE DITCH 5

SLOPE 6

SLOPE 10

SLOPE 8

FS # 21 TO BE 12"

EXISTING WELL API # 085-08560

PROPOSED ROAD-SIDE DITCH 6

PROPOSED PIPE 3

PROPOSED TURN-OUT

FES 3

PROPOSED 2'-WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS

SLOPE 9

SLOPE 5

OWNER:
I.L. (IKE) MORRIS
TAX MAP: 37
PARCEL: 01
DB: 255 / PG: 718

STREAM/WETLAND AREA OF INTEREST

DRAINAGE FEATURE 26

PROPOSED ROAD-SIDE DITCH 8

MATCHLINE SHEET 7

MATCHLINE SHEET 9

LEGEND

- EX. INDEX CONTOUR (1360)
- EX. INTERMEDIATE CONTOUR
- EX. TREE LINE
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- EX. ROAD
- EX. TRAIL
- EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- PROP. LIMITS OF DISTURBANCE
- PROP. FRENCH DRAIN
- PROP. INDEX CONTOUR (1360)
- PROP. INTERMEDIATE CONTOUR
- PROP. ROAD CENTERLINE
- PROP. PADS & ROAD EDGE
- PROP. CONSTRUCTION FENCE
- PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
- SUPER SILT FENCE AND FILTER SOCK INDICATION (SEE SHEET 20 FOR SUPER SILT FENCE AND FILTER SOCK TABLE (24)
- PROP. FILTER SOCK (FS)
- PROP. SUPER SILT FENCE (SSF)
- PROP. NAG S150BN EROSION CONTROL MATTING (MT1)
- PROP. NAG SC250 EROSION CONTROL MATTING (MT2)
- PROP. NAG C350 EROSION CONTROL MATTING (MT3)
- PROP. OUTLET PROTECTION (OP)
- PROP. INLET PROTECTION (IP)
- PROP. ROCK FILTER OUTLET (RFO)

NOTES:

1. THE GRADES SHOWN REPRESENT FINISH GRADE ELEVATIONS.
2. PIPE MATERIALS SHALL BE AS NOTED ON THE PLAN AND IN THE STORM DRAINAGE COMPUTATION TABLE.
3. CUT AND FILL SLOPES SHALL BE AT 2H:1V UNLESS NOTED OTHERWISE.
4. FILL SHALL BE PLACED IN 12" LIFTS AND BE COMPACTED TO 95% STANDARD PROCTOR.
5. INTERMEDIATE TOE BENCHES SHALL BE INSTALLED ON FILL SLOPES AT INTERVALS OF 50' VERTICAL FEET OR LESS IF SOILS CONDITIONS WARRANT ADDITIONAL SLIP PRECAUTIONS.
6. ALL FILL SLOPES SHALL BE TOE KEYED PER THE DETAIL SHOWN ON SHEET 21.
7. POSITIVE FLOW FROM PAD TO SUMPS. SEDIMENTS AND MATERIAL REMOVED FROM THE PAD SUMPS SHALL BE PUMPED TO ON-SITE HOLDING/STORAGE TANKS AND SUBSEQUENTLY REMOVED FROM SITE BY AN APPROVED COMMERCIAL VENDOR.
8. ALL STORMWATER CONVEYANCES ON THE SITE HAVE BEEN DESIGNED TO ACCOMMODATE THE 10-YEAR STORM EVENT. A 10-YEAR STORM EVENT RAINFALL INTENSITY OF 6.46 IN/HR WAS USED FOR STORM SEWER AND ROAD-SIDE DITCH CALCULATIONS PER THE NOAA PRECIPITATION FREQUENCY DATA SERVER FOR PENNSBORO, WV.
9. SEE DETAIL 2, SHEET 19 FOR RIP RAP OUTLET PROTECTION SIZING AND DESIGN.
10. CONTRACTOR TO INSTALL ROCK CHECK DAMS WITHIN ROADSIDE DITCHES. SEE DETAIL ON PAGE 20 FOR SPACING REQUIREMENTS. ROCK CHECK DAMS WILL BE INSTALLED DURING CONSTRUCTION AS EROSION CONTROL MEASURES AND REMAIN IN PLACE AS PERMANENT CHECK DAMS AFTER CONSTRUCTION IS COMPLETE.
11. ALL FILTER SOCK TO BE 18" UNLESS OTHERWISE NOTED.
12. IN TOPSOIL PLACEMENT AREAS, CONTRACTOR TO INSTALL PROPER BMPS TO ENSURE NO OFFSITE EROSION & SEDIMENTATION RUNOFF.

INSTALL ROCK FILTER OUTLETS ALONG SEDIMENT BARRIERS AS SHOWN AND AT LOW POINTS AS IDENTIFIED IN THE FIELD.

N

50 25 0 50
SCALE: 1 INCH=50 FEET

STORM DRAINAGE LEGEND	
FES	FLARED END SECTION

ISSUED FOR CONSTRUCTION

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141
ACAD. FILE: GRADING & STORM DRAINAGE.dwg

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

SEAL

MACKAY WELL & W.C. PAD SITE PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY:	RAP
MODIFIED BY:	-
CHECKED BY:	JBC
DATE:	03-03-2014
SCALE:	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

8

8 of 27 sheets

PLOTTED: 03 Mar 2014, 12:07pm, rparker

ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:\Users\Antero\Desktop\Mackay\Design\Civil\Site Plans - Final\ LAYOUT 8 SITE PLAN

10-15-12 REVISED BY CAL

MACKAY STORM DRAINAGE COMPUTATIONS

ACCESS ROAD CROSS-DRAINS		INLET AREA (ac)	tc TIME OF CONC. (min)	I INTENSITY (in/hr)	Cc (INLET) (AREA)	Q FLOW (cfs)	Q TOTAL FLOW (cfs)	SLOPE (ft/ft)	Dtheo (in)	SIZE (in)	Vfull (ft/sec)	LENGTH (ft)	UPPER INVERT (ft)	LOWER INVERT (ft)	TOP EL (ft)	PIPE MATERIAL
PIPE	STATION															
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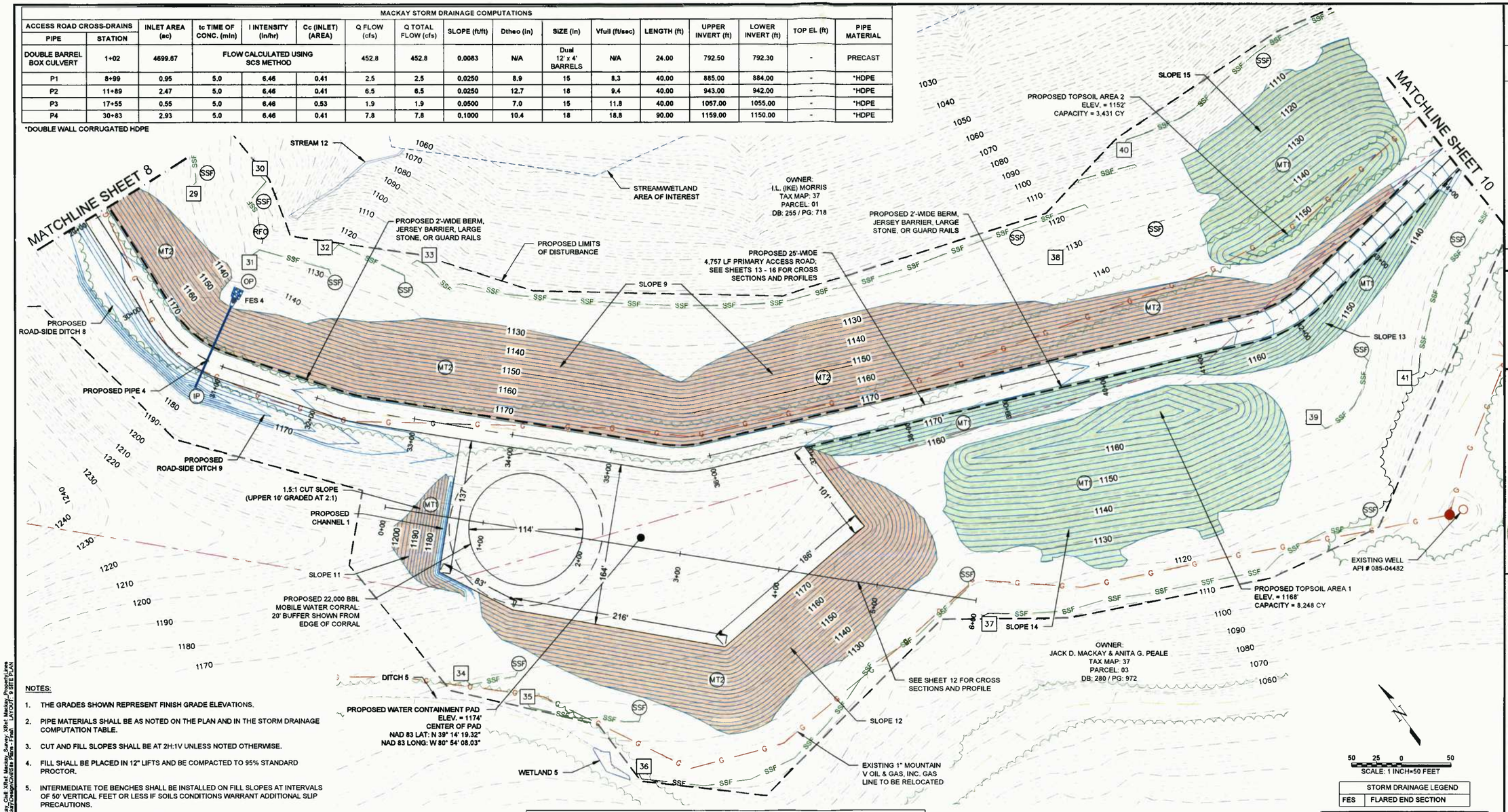
P2	11+89	2.47	5.0	6.46	0.41	6.5	6.5	0.0250	12.7	18	9.4	40.00	943.00	942.00	-	*HDPE
P3	17+55	0.55	5.0	6.46	0.53	1.9	1.9	0.0500	7.0	15	11.8	40.00	1057.00	1055.00	-	*HDPE
P4	30+83	2.93	5.0	6.46	0.41	7.8	7.8	0.1000	10.4	18	18.8	90.00	1159.00	1150.00	-	*HDPE

*DOUBLE WALL CORRUGATED HDPE



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LEGEND

- EX. INDEX CONTOUR (1360)
- EX. INTERMEDIATE CONTOUR
- EX. TREE LINE
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- EX. GAS LINE
- EX. ROAD
- EX. TRAIL
- EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- PROP. LIMITS OF DISTURBANCE
- PROP. FRENCH DRAIN
- PROP. INDEX CONTOUR (1360)
- PROP. INTERMEDIATE CONTOUR
- PROP. ROAD CENTERLINE
- PROP. PADS & ROAD EDGE
- PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
- 24 — SUPER SILT FENCE AND FILTER SOCK INDICATION (SEE SHEET 20 FOR SUPER SILT FENCE AND FILTER SOCK TABLE
- FS — PROP. FILTER SOCK
- SSF — PROP. SUPER SILT FENCE
- MT — PROP. NAG S150BN EROSION CONTROL MATTING
- MT2 — PROP. NAG SC250 EROSION CONTROL MATTING
- OP — PROP. OUTLET PROTECTION
- IP — PROP. INLET PROTECTION
- RFC — PROP. ROCK FILTER OUTLET

STORM DRAINAGE LEGEND	
FES	FLARED END SECTION

ISSUED FOR CONSTRUCTION

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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ACAD FILE: GRADING & STORM DRAINAGE.dwg

MACKAY WELL & W.C. PAD SITE PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY:	RAP
MODIFIED BY:	-
CHECKED BY:	JBC
DATE:	03-03-2014
SCALE:	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

9

9 of 27 sheets

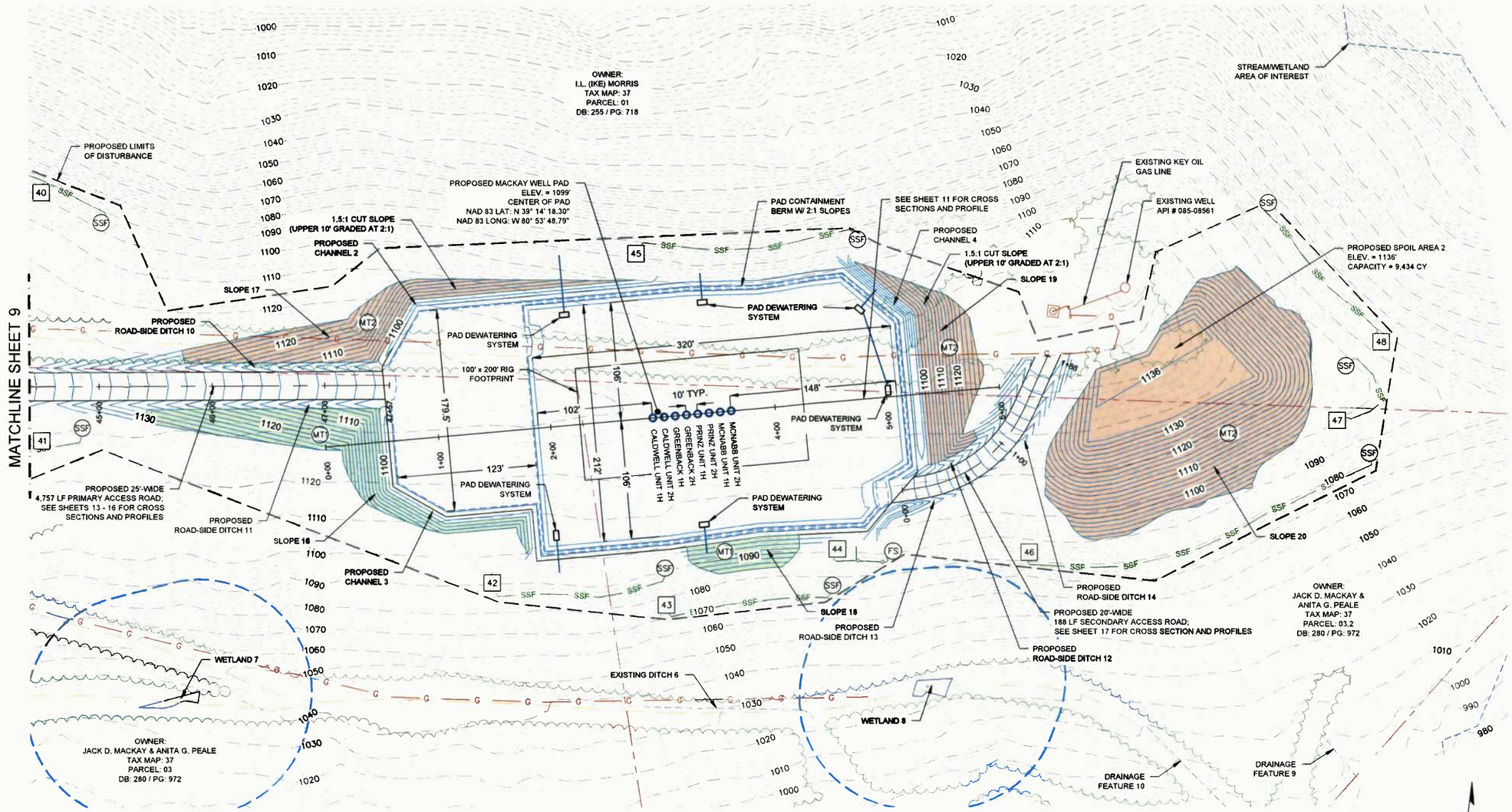
JEFFERY B. CRUSE REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL

ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK XRef Mackay_Base XRef Mackay_Civil XRef Mackay_Survey XRef Mackay_PropertyLines
CAD FILE: G:\Users\Antero\Desktop\Mackay\Design\Civil\Site Plans - Final\LAYOUT - 9 SITE PLAN

10-15-12 REVISED BY CAL

PLOTTED: 03 Mar 2014, 12:07pm, rparker



LEGEND

- EX. INDEX CONTOUR (1360)
- EX. INTERMEDIATE CONTOUR
- EX. TREE LINE
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- EX. GAS LINE
- EX. ROAD
- EX. TRAIL
- EX. FENCE
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- 100' WETLAND BUFFER
- PROP. LIMITS OF DISTURBANCE
- PROP. FRENCH DRAIN
- PROP. INDEX CONTOUR (1360)
- PROP. INTERMEDIATE CONTOUR
- PROP. ROAD CENTERLINE
- PROP. PAOS & ROAD EDGE
- PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
- PROP. PAD PERIMETER SUMP
- PROP. WELL HEAD
- PROP. 4" PVC PIPE FOR SUMP SYSTEM
- SUPER SILT FENCE AND FILTER SOCK INDICATION (SEE SHEET 20 FOR SUPER SILT FENCE AND FILTER SOCK TABLE (24)
- PROP. FILTER SOCK (FS)
- PROP. SUPER SILT FENCE (SSF)
- PROP. NAG S150BN EROSION CONTROL MATTING (MT1)
- PROP. NAG SC250 EROSION CONTROL MATTING (MT2)

NOTES:

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N

50 25 0 50
SCALE: 1 INCH=50 FEET

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
1	-	---	---
2	-	---	---
3	-	---	---
4	-	---	---
5	-	---	---
6	-	---	---

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ACAD FILE: GRADING & STORM DRAINAGE.dwg
PROJ. NO. 133141

MACKAY WELL & W.C. PAD SITE PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

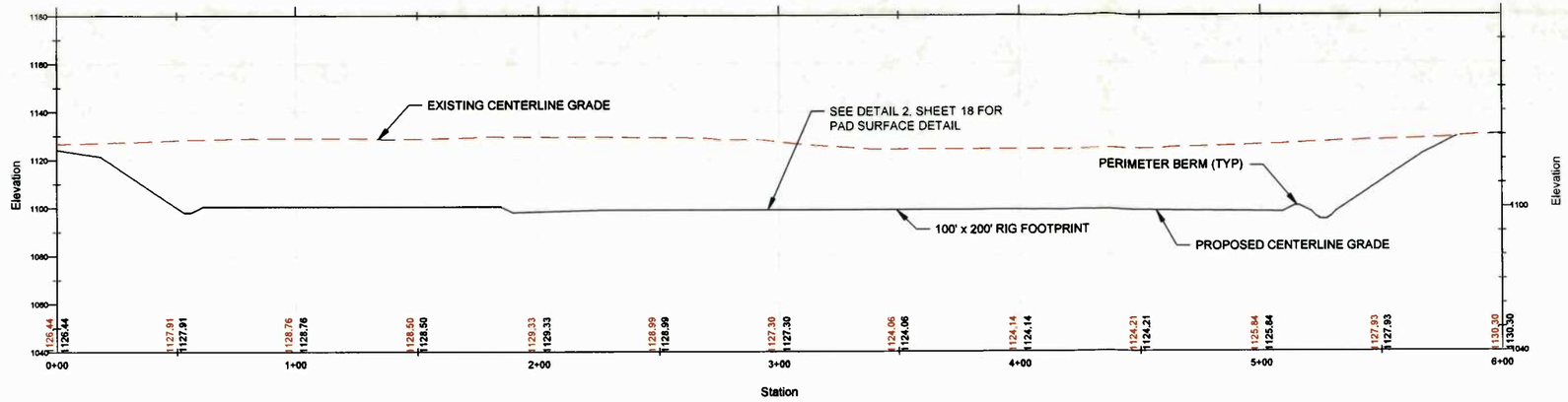
10

10 of **27** sheets

PLOTTED: 03 Mar 2014, 12:07pm, rparker

ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK, XRef Mackay_Base, XRef Mackay_Civil, XRef Mackay_Survey, XRef Mackay_PropertyLines
CAD FILE: G:\...sheets\Anero\Pad Sites\Mackay\Design\Civil\Site Plans - Final\ LAYOUT - 10 SITE PLAN

10-15-12 REVISED BY CAL



LEGEND

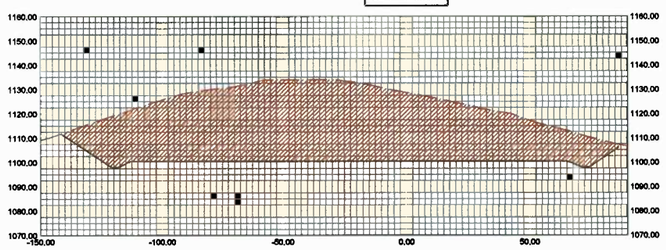
AREA IN FILL

AREA IN CUT

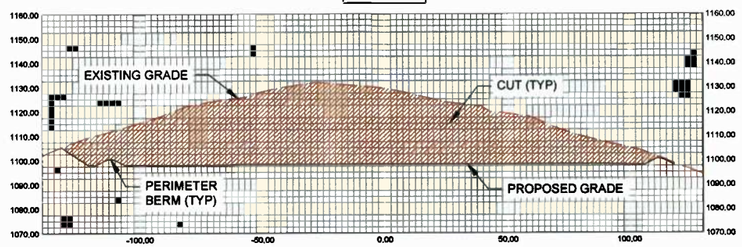
NOTES:

1. PAD SURFACE AS SHOWN IS SLOPED (0.5% GRADE). ALL GRADING AND MODIFICATIONS TO THE PAD SURFACE SHALL BE PERFORMED PER THE OWNER'S DIRECTION.

SL-1 - 1+00.00



SL-2 - 2+00.00



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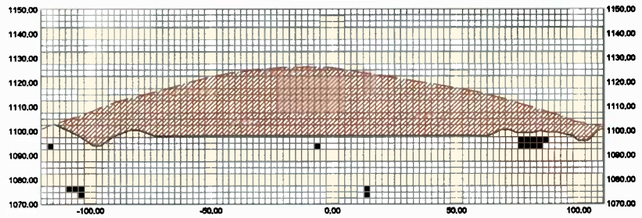
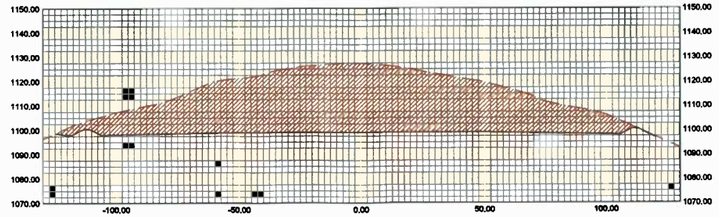
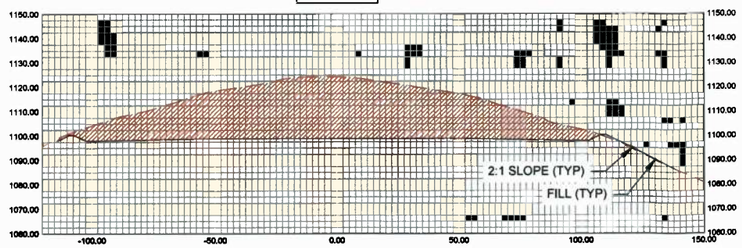


SL-3 - 3+00.00



SL-4 - 4+00.00



SCALE: 1 INCH=30 FEET
HORIZONTAL SCALE

SCALE: 1 INCH=30 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

NO.	REVISION	BY	DATE
1	-	---	---
2	-	---	---
3	-	---	---
4	-	---	---
5	-	---	---

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www.kleinfelder.com

PROJ. NO. 133141

ACAD FILE: CROSS SECTIONS & PROFILES.dwg

MACKAY WELL & W.C. PAD WELL PAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
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CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

SEAL

JEFFERY B. CROSS REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

11

11 of 27 sheets

PLOTTED: 03 Mar 2014, 12:09pm, rparker

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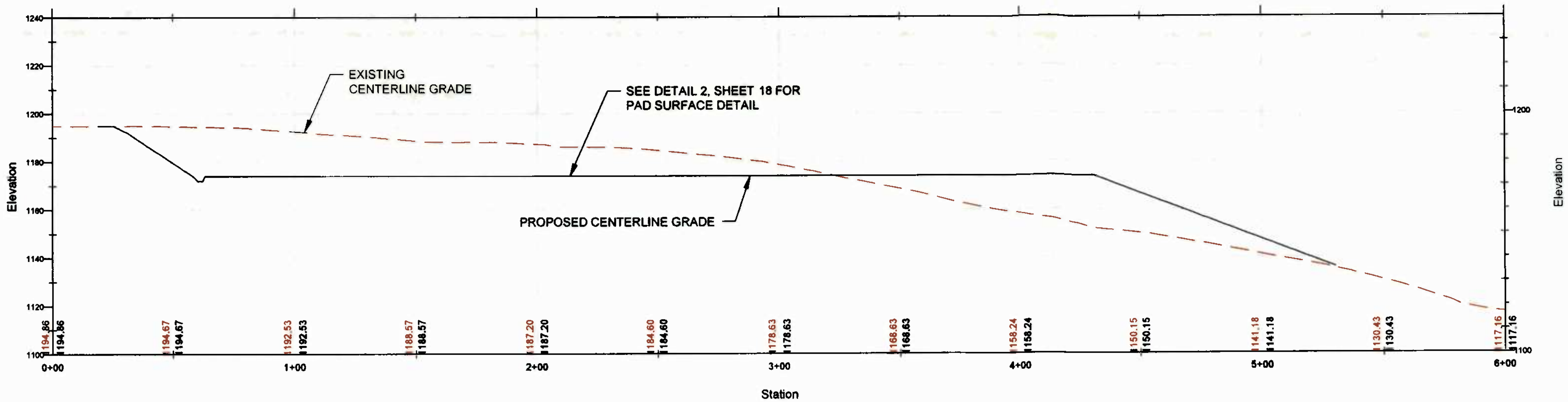
CAD FILE: G:\Clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT - 11 WELL PAD CROSS SECTION & PROFILE

10-15-12 REVISED BY: CAL



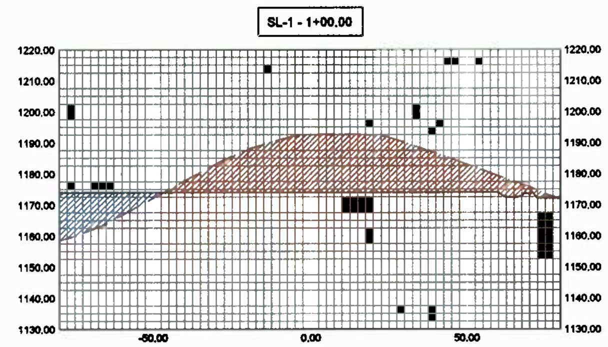
LEGEND

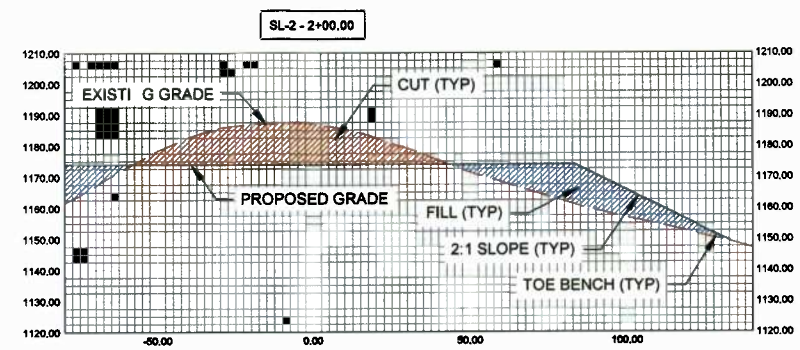
AREA IN FILL

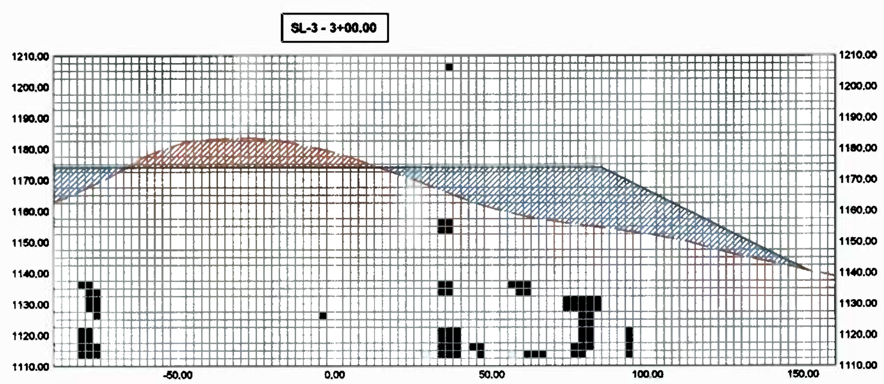
AREA IN CUT

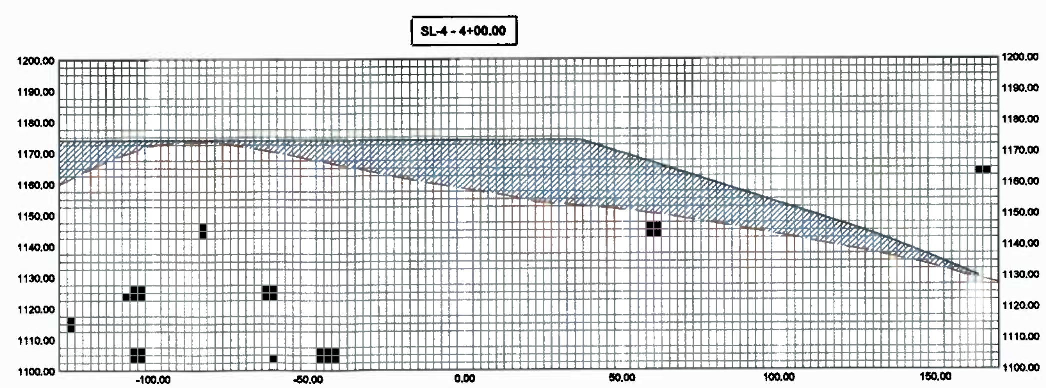
NOTES:

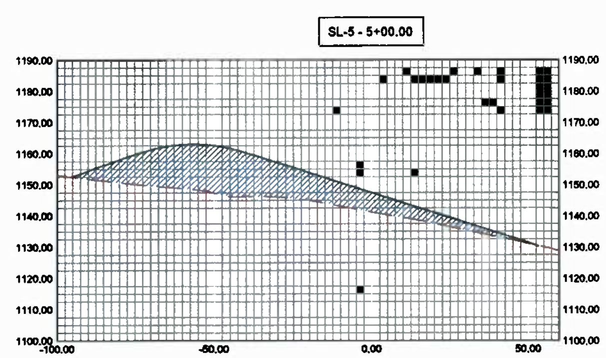
1. PAD SURFACE AS SHOWN IS SLOPED (0.5% GRADE). ALL GRADING AND MODIFICATIONS TO THE PAD SURFACE SHALL BE PERFORMED PER THE OWNER'S DIRECTION.











30 15 0 30
SCALE: 1 INCH=30 FEET
HORIZONTAL SCALE

30 15 0 30
SCALE: 1 INCH=30 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141

ACAD FILE: CROSS SECTIONS & PROFILES.dwg

MACKAY WELL & W.C. PAD WATER CONTAINMENT PAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

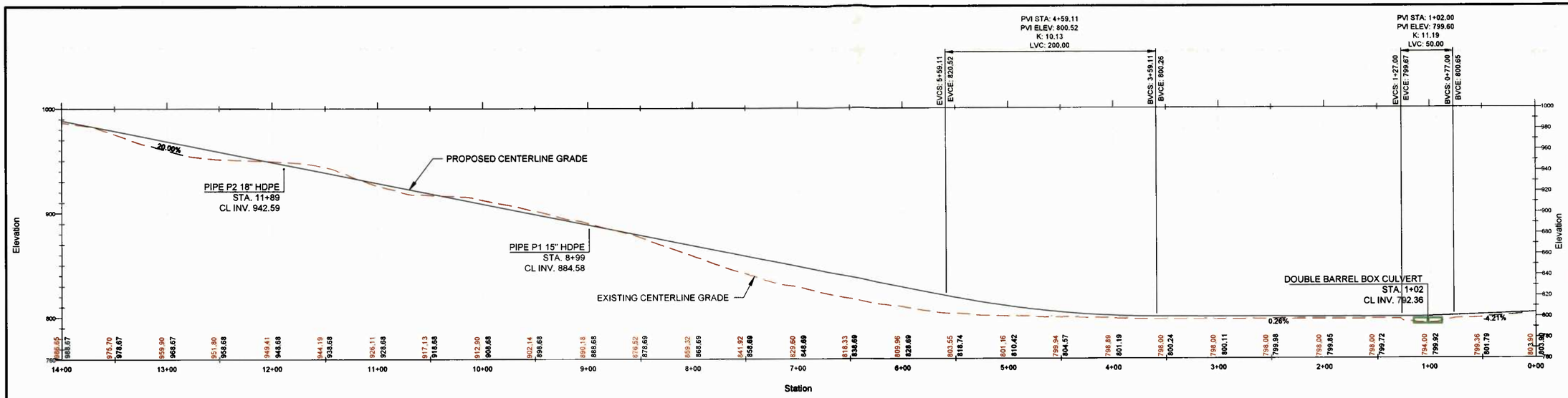
CONSTRUCTION

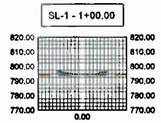
12

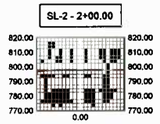
PLOTTED: 03 Mar 2014, 12:10pm, rparker

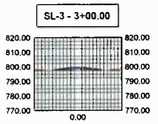
ATTACHED IMAGES:
ATTACHED XREFS: XRef: ANTERO 11x17 TITLE BLOCK; XRef: Mackay_Base; XRef: Mackay_Civil; XRef: Mackay_Survey; XRef: Mackay_PropertyLines
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 12 WATER CONTAINMENT PAD CROSS SECTION & PROFILE

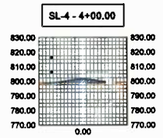
10-15-12 REVISED BY: CAL

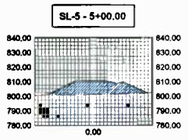


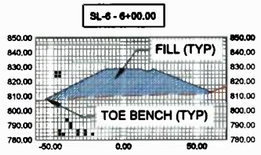


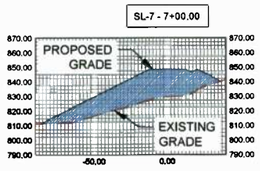


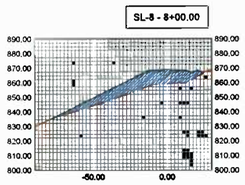


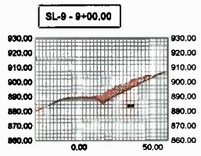


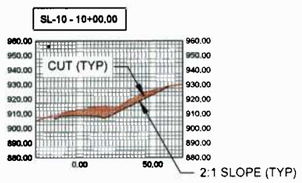


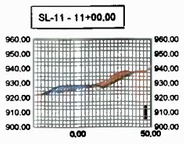


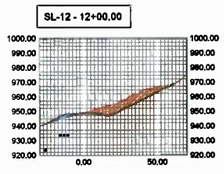


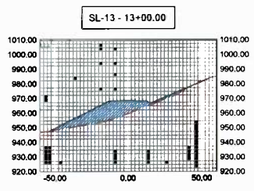


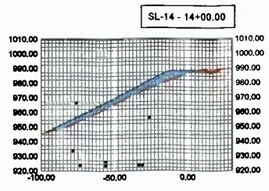












LEGEND

AREA IN FILL

AREA IN CUT

NOTES:

1. REFER TO SITE PLAN SHEET FOR ADDITIONAL ACCESS ROAD INFORMATION INCLUDING STORMWATER AND EROSION CONTROL MEASURES.

50 25 0 50
SCALE: 1 INCH=50 FEET
HORIZONTAL SCALE

50 25 0 50
SCALE: 1 INCH=50 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

NO.	REVISION	BY	DATE
1	-	—	—
2	-	—	—
3	-	—	—
4	-	—	—
5	-	—	—

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PROJ. NO. 133141

XCAD FILE: CROSS SECTIONS & PROFILE.dwg

MACKAY WELL & W.C. PAD
PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

JEFFERY B. CROSS
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

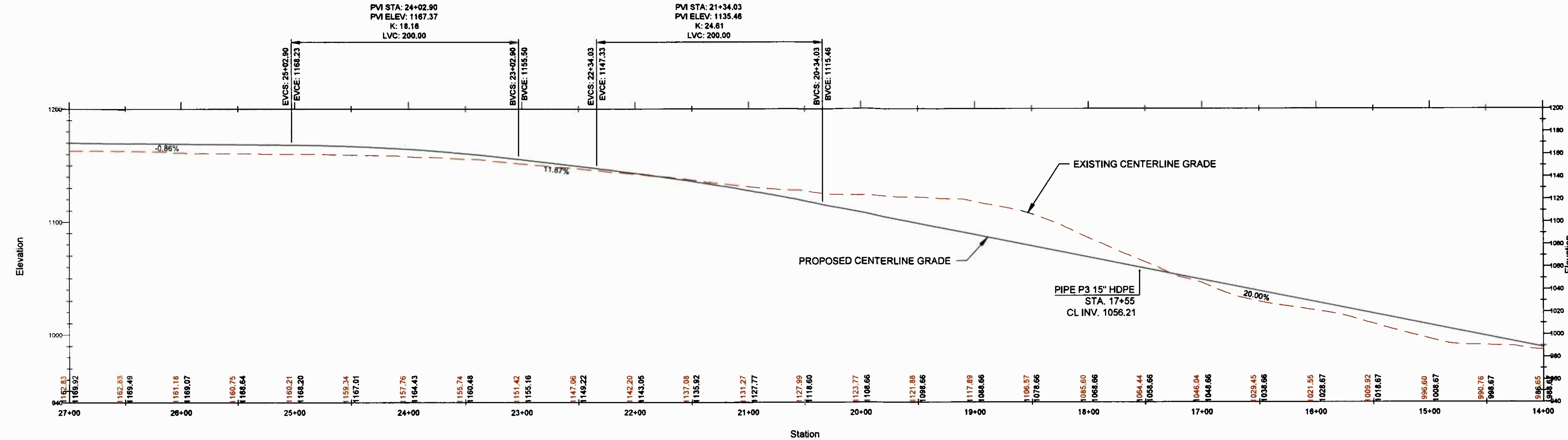
13

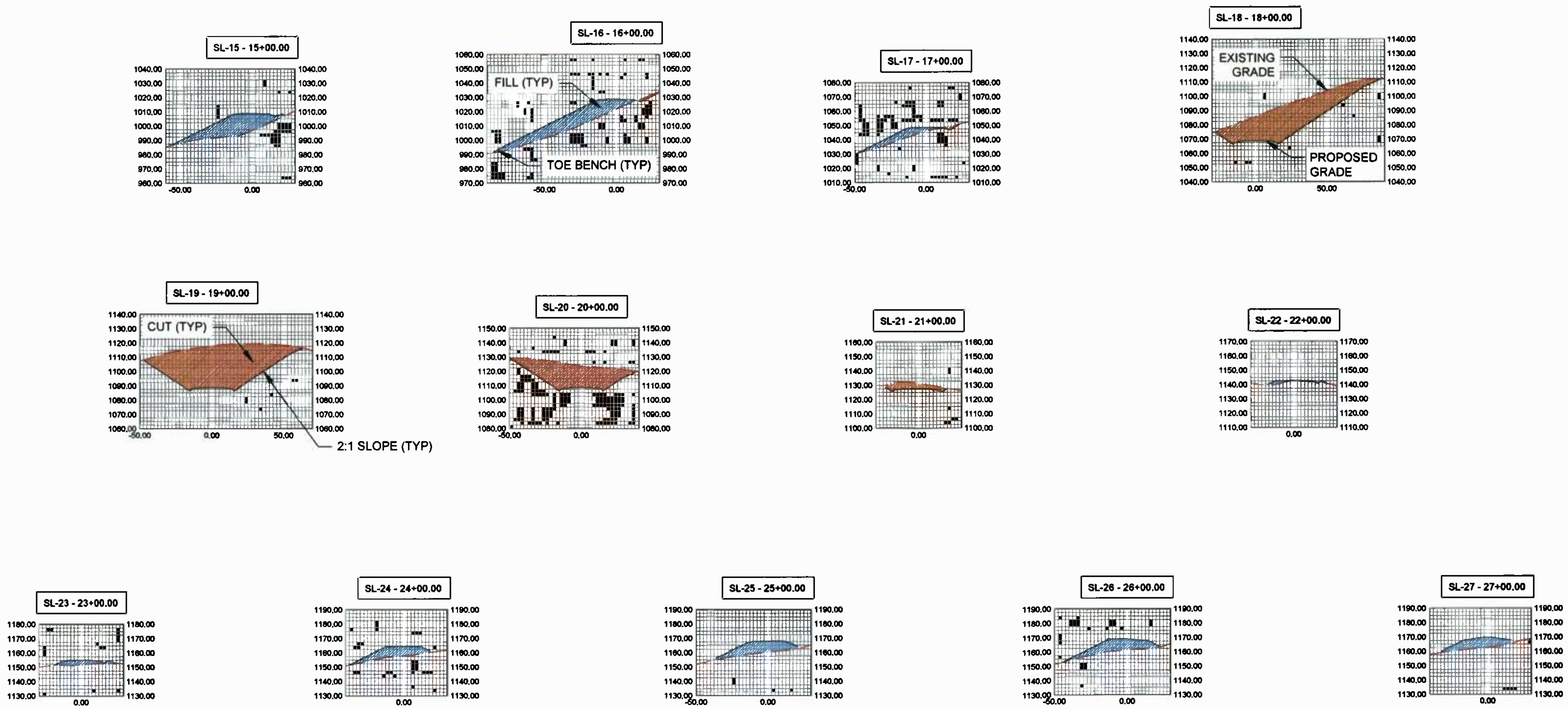
13 of **27** sheets

PLOTTED: 03 Mar 2014, 12:10pm, rparker

ATTACHED IMAGES
ATTACHED XREFS XRef: ANTERO 11x17 TITLE BLOCK; XRef: Mackay_Base; XRef: Mackay_Civil; XRef: Mackay_Survey; XRef: Mackay_PropertyLines
CAD FILE G:\Users\Active\Antero\Design\Civil\Site Plans - Final\ LAYOUT: 13 PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

10-15-12 REVISED BY CAL





LEGEND

AREA IN FILL

AREA IN CUT

NOTES:

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SCALE: 1 INCH=50 FEET
HORIZONTAL SCALE

SCALE: 1 INCH=50 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141

ACAD FILE: CROSS SECTIONS & PROFILES.dwg

MACKAY WELL & W.C. PAD PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

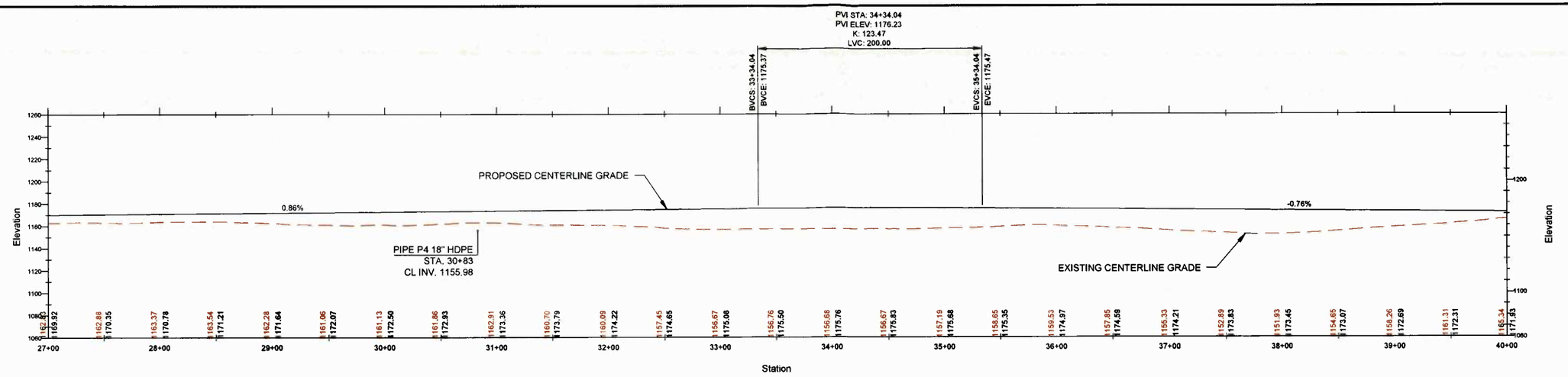
14

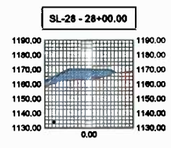
14 of 27 sheets

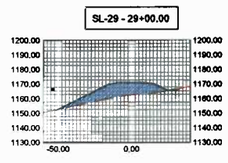
PLOTTED: 03 Mar 2014, 12:10pm, rparker

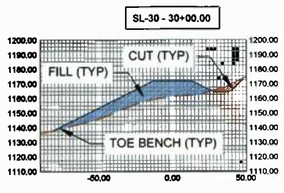
ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Cell; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil3d\Site Plans - Final\ LAYOUT: 14 PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

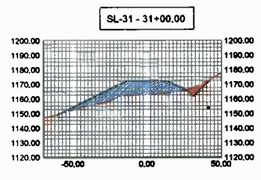
10-15-12 REVISED BY: CAL

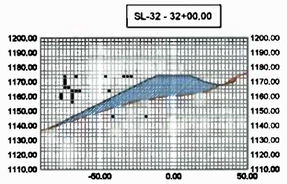


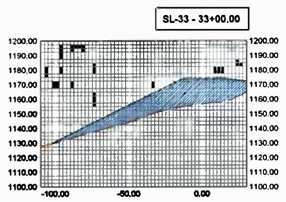


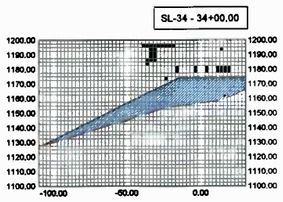


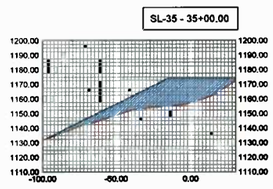


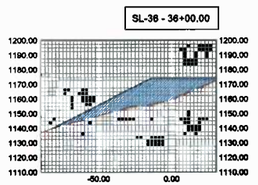


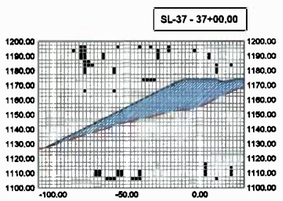


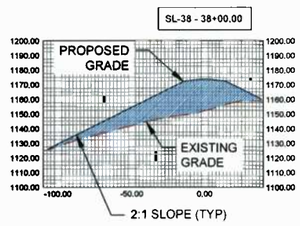


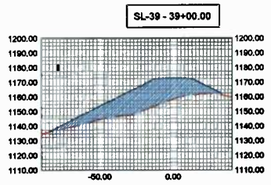


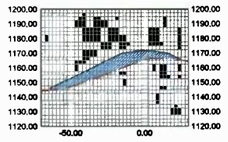












LEGEND

AREA IN FILL

AREA IN CUT

NOTES:

1. REFER TO SITE PLAN SHEET FOR ADDITIONAL ACCESS ROAD INFORMATION INCLUDING STORMWATER AND EROSION CONTROL MEASURES.

50 25 0 50
SCALE: 1 INCH=50 FEET
HORIZONTAL SCALE

50 25 0 50
SCALE: 1 INCH=50 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
1	-	---	---
2	-	---	---
3	-	---	---
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ACAD FILE: CROSS SECTIONS & PROFILES.dwg
PROJ. NO. 133141

MACKAY WELL & W.C. PAD PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY:	RAP
MODIFIED BY:	-
CHECKED BY:	JBC
DATE:	03-03-2014
SCALE:	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

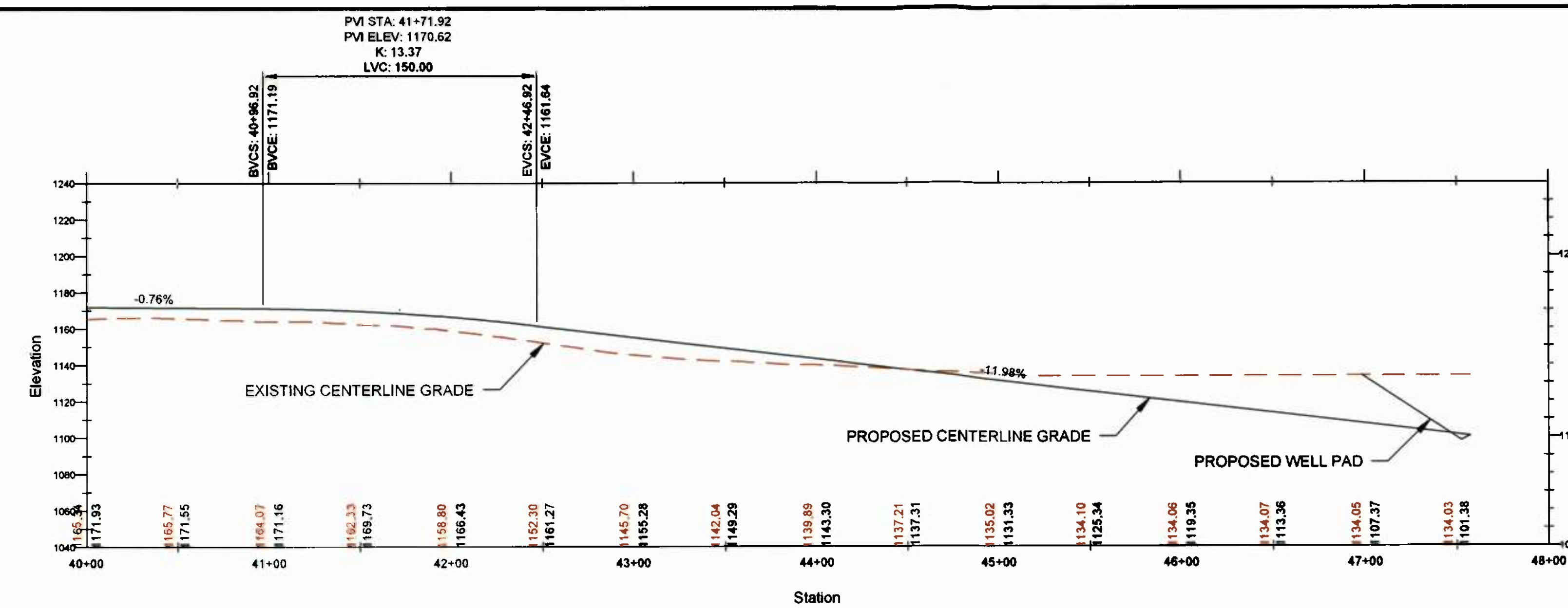
15

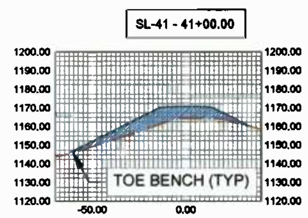
15 of **27** sheets

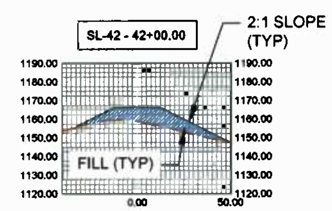
PLOTTED: 03 Mar 2014, 12:10pm, rparker

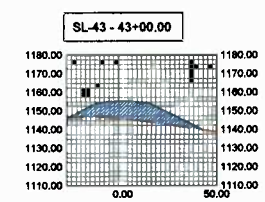
ATTACHED IMAGES:
ATTACHED XREFS: XRef: ANTERO 11x17 TITLE BLOCK; XRef: MacKay_Base; XRef: MacKay_Civil; XRef: MacKay_Survey; XRef: MacKay_PropertyLines
CAD FILE: G:_Users\Antero\Desktop\Files\MacKay\Design\CivilStar Files - Final\ - LAYOUT - 15 PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

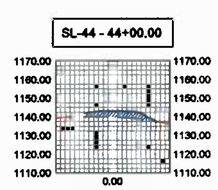
10-15-12 REVISED BY CAL

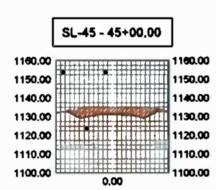


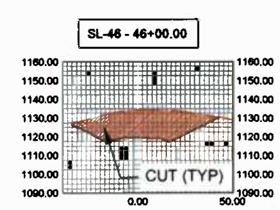


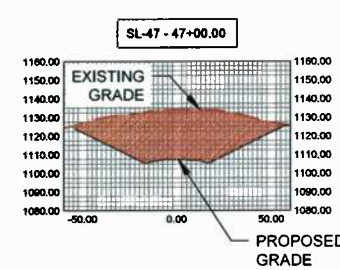












LEGEND

AREA IN FILL

AREA IN CUT

NOTES:

1. REFER TO SITE PLAN SHEET FOR ADDITIONAL ACCESS ROAD INFORMATION INCLUDING STORMWATER AND EROSION CONTROL MEASURES.

SCALE: 1 INCH=50 FEET
HORIZONTAL SCALE

SCALE: 1 INCH=50 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP
REGISTERED
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PROFESSIONAL ENGINEER

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RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

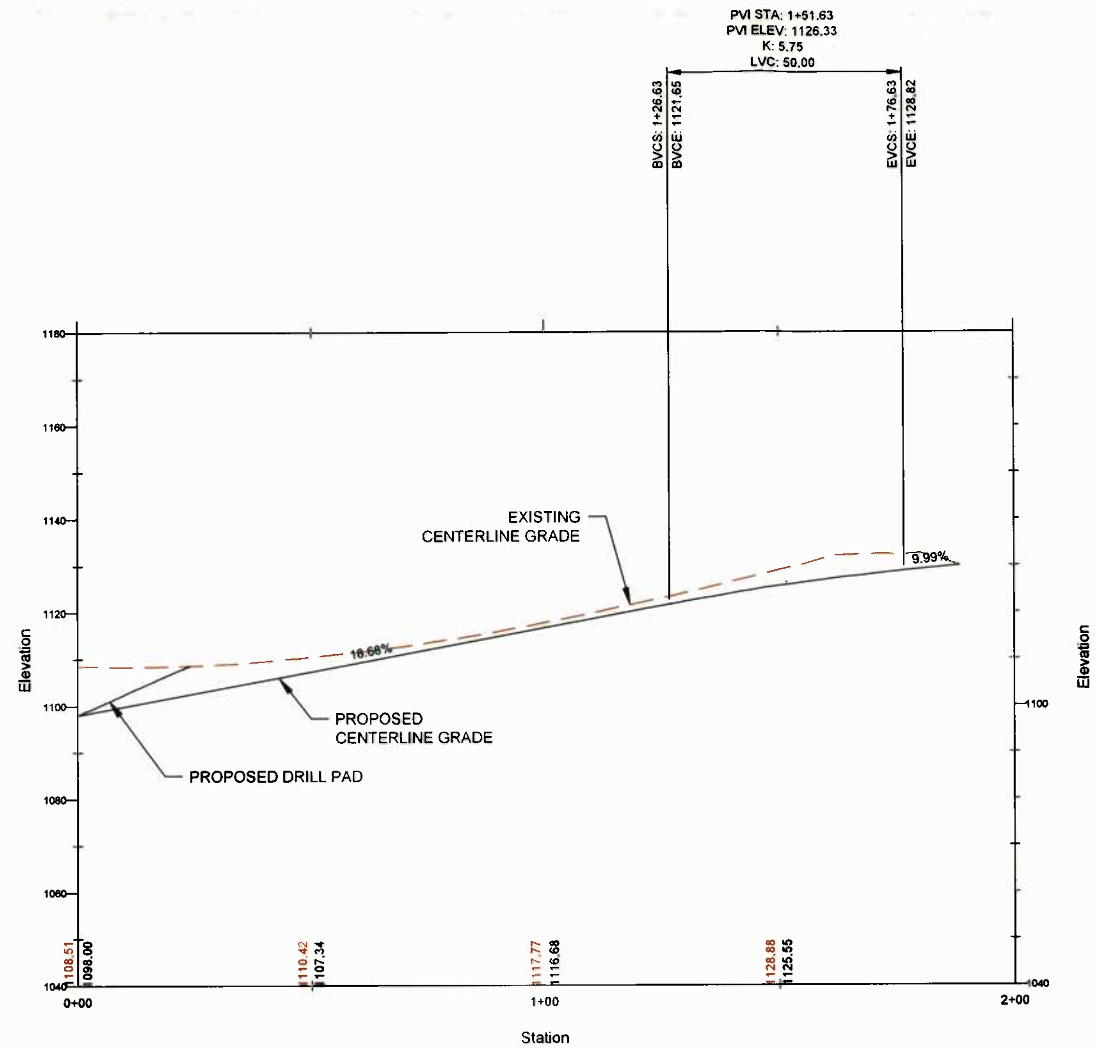
16

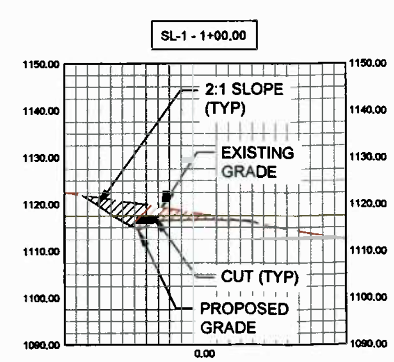
16 of 27 sheets

PLOTTED: 03 Mar 2014, 12:10pm, rparker

ATTACHED IMAGES
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Cell; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 16 PRIMARY ACCESS ROAD CROSS SECTION & PROFILE

10-15-12 REVISED BY: CAL





LEGEND

AREA IN FILL

AREA IN CUT

NOTES:

1. REFER TO SITE PLAN SHEET FOR ADDITIONAL ACCESS ROAD INFORMATION INCLUDING STORMWATER AND EROSION CONTROL MEASURES.

20 10 0 20
SCALE: 1 INCH=20 FEET
HORIZONTAL SCALE

20 10 0 20
SCALE: 1 INCH=20 FEET
VERTICAL SCALE

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP
REGISTERED
20354
STATE OF
WEST VIRGINIA
PROFESSIONAL ENGINEER

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PROJ. NO. 133141

ACAD FILE: CROSS SECTIONS & PROFILES.dwg

MACKAY WELL & W.C. PAD SECONDARY ACCESS ROAD CROSS SECTION & PROFILE

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

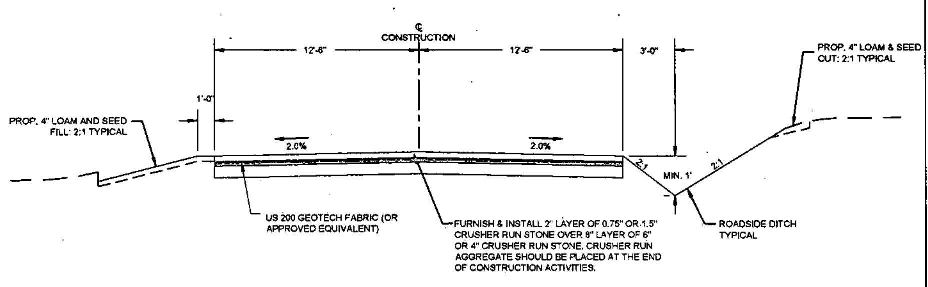
DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

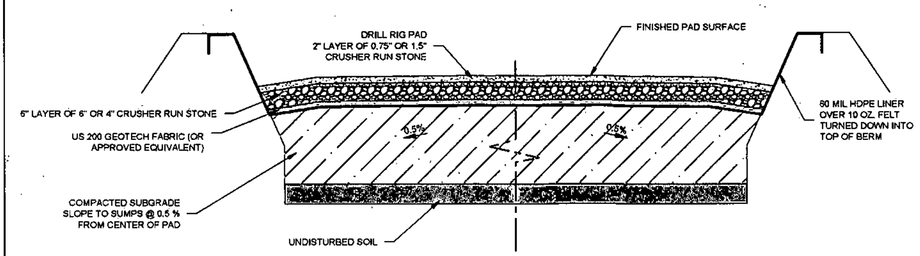
17

PLOTTED: 03 Mar 2014, 12:10pm, rparker

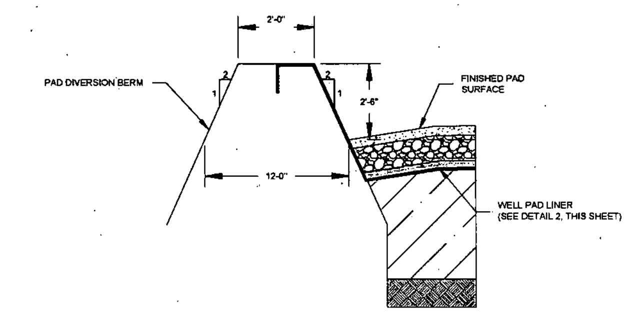
ATTACHED IMAGES:
ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 17 SECONDARY ACCESS ROAD CROSS SECTION & PROFILE



1/18 TYPICAL SECTION - SITE ACCESS DRIVE DETAIL
NTS



2/18 TYPICAL PAD CROSS-SECTION DETAIL
NTS



3/18 TYPICAL PAD CONTAINMENT BERM DETAIL
NTS

PIPE INSTALLATION PROCEDURES

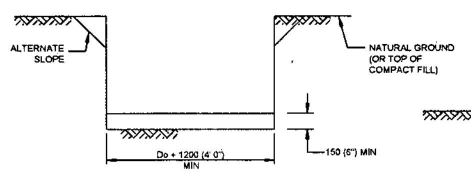
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

A. PIPE LYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED (97% SPD) FILL.
B. THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.
C. THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL (TO MINIMUM 97% SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE NATURAL GROUND.

STEP 1: REMOVE TOPSOIL (COMPRESSIBLE LAYER OF ORGANIC MATERIAL) TO A WIDTH EQUAL TO 5 OUTSIDE DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS ABOVE A, B. & C.. ALSO IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MAKE MIN WIDTH 5 DIAMETERS OF PIPE). PAY AS CLASS 1 EXCAVATION.

STEP 2: CONSTRUCT THE EMBANKMENT TO 1200 (4' - 0") ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 1800 (72") OR GREATER SEE NOTE 1.

STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 1200 (4' - 0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.

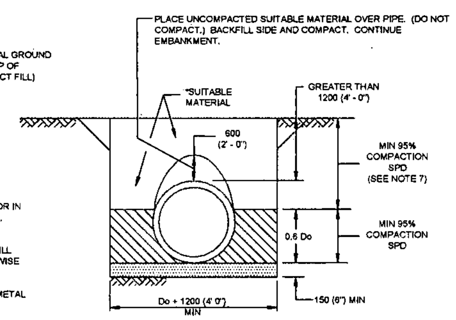


STEP 4: FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 150+40 MM/M (6"+1/2" INCH/FT) OF Do+1200 (4' - 0"), BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE, 400 (16") MAX.

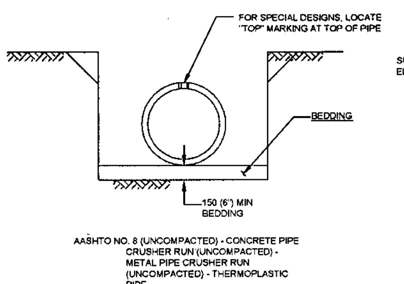
NOTE: IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF BEDDING ELEVATION. (UNLESS OTHERWISE SPECIFIED.)

STEP 5: LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.

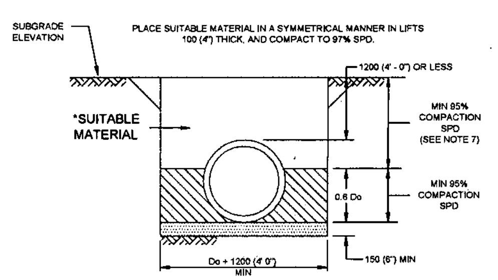
STEP 6: PLACE CRUSHER RUN COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 0.6 Do. COMPACT TO 95% SPD. TEST THE SIDE OF BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



GREATER THAN 1.2 m (4') TO 14.6 m (48')
FOR FILLS OVER 14.6 m (48'), SEE NOTE 6.



AASHTO NO. 8 (UNCOMPACTED) - CONCRETE PIPE
CRUSHER RUN (UNCOMPACTED) - METAL PIPE CRUSHER RUN (UNCOMPACTED) - THERMOPLASTIC PIPE



SHALLOW FILLS 1200 (4' - 0") AND LESS

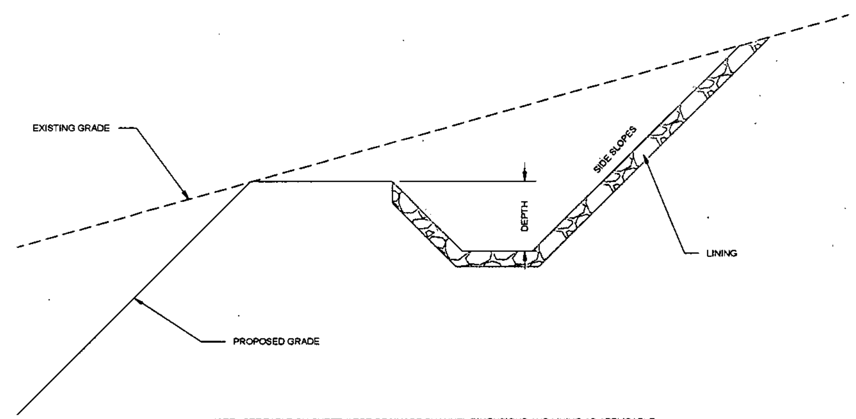
LEGEND

(stippled)	AGGREGATE FOR BEDDING (AASHTO NO. 8)
(hatched)	COARSE AGGREGATE (CRUSHER RUN)

Do = OUTSIDE DIAMETER OF PIPE, MILLIMETERS (INCHES)
SPD = STANDARD PROCTOR DENSITY
ID = INSIDE DIAMETER

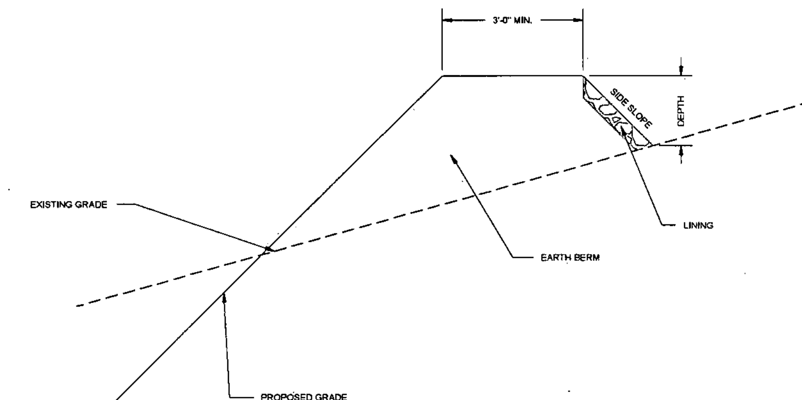
*SUITABLE MATERIAL = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

4/18 CIRCULAR PIPE INSTALLATION DETAIL
NTS



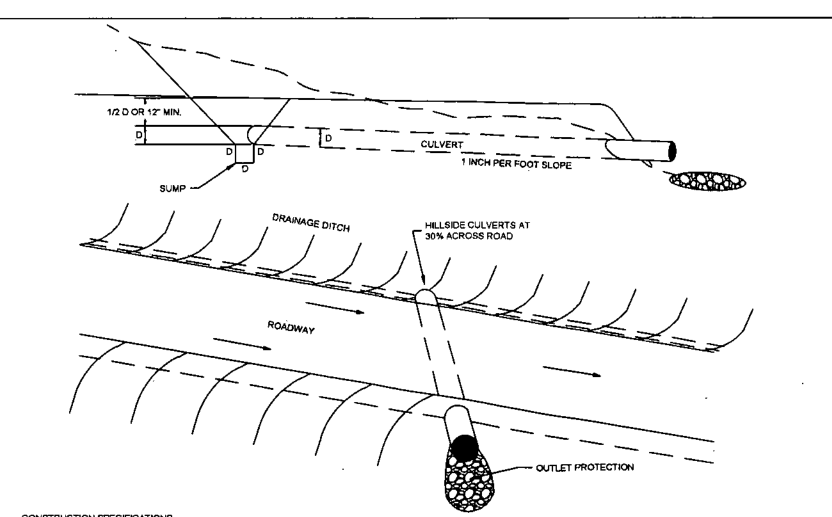
NOTE: SEE TABLE ON SHEET # FOR DRAINAGE CHANNEL DIMENSIONS AND LINING AS APPLICABLE.

5/18 TYPICAL DRAINAGE CHANNEL DETAIL
NTS



NOTE: SEE TABLE ON SHEET # FOR DRAINAGE BERM DIMENSIONS AND LINING AS APPLICABLE.

6/18 TYPICAL DRAINAGE BERM DETAIL
NTS



CONSTRUCTION SPECIFICATIONS
1. CULVERTS WITH OUTLETS ONTO LENGTHY FILL SLOPES MAY REQUIRE SLOPE DRAINS WITH OUTLET PROTECTION DEPENDING ON THE STEEPNESS OF THE OUTSLOPE.
2. RIPRAP USED AS OUTLET PROTECTION MUST BE HARD, ANGULAR AND OF A QUALITY RESISTANT TO WEATHERING AND DISINTEGRATION. RIPRAP SHOULD BE GROUTED ON STEEP OR LENGTHY FILL SLOPES WITH A MINIMUM THICKNESS TWO TIMES THE MAXIMUM STONE DIAMETER, BUT NOT LESS THAN SIX INCHES.

7/18 DITCH RELIEF CULVERT DETAIL
NTS

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MACKAY WELL & W.C. PAD DETAILS

ANTERO RESOURCES CORPORATION
MACKAY WELL & WATER CONTAINMENT PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY WEST VIRGINIA

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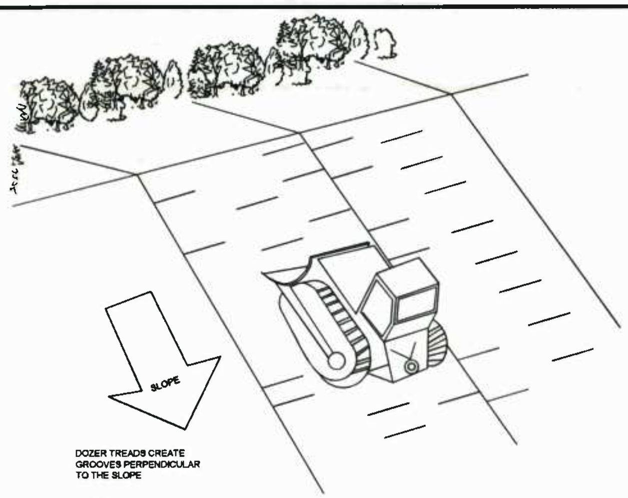
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION
18
18 of 27 sheets

PLOTTED: 03 Mar 2014, 12:11pm, rparker

ATTACHED IMAGES: Images: CHESAPEAKE-36X36-Q4903.jpg
ATTACHED XREFS: XRef: ANTERO 11x17 TITLE BLOCK
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 18 DETAILS

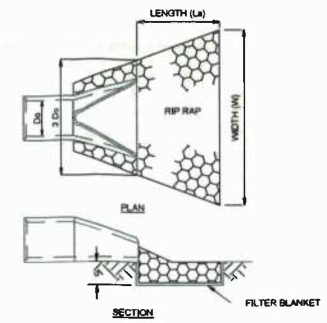
10-15-12 REVISED BY: CAL



NOTES
TRACKING SLOPES IS DONE BY RUNNING TRACKED MACHINERY UP AND DOWN THE SLOPE, LEAVING TREAD MARKS PARALLEL TO THE CONTOUR. IF A BULLDOZER IS USED, THE BLADE SHOULD BE UP.

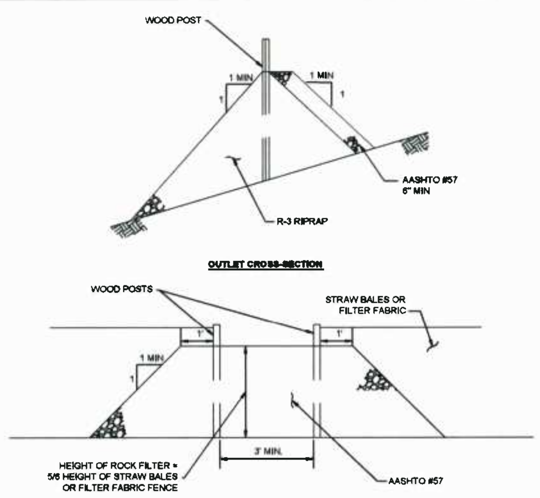
1/19 BULLDOZER TRACKING DETAIL
NTS

OUTLET	Do	3Do	La	W	RIP RAP	d
FES 1	15"	3.75'	8'	7'	R-4 RIPRAP	18"
FES 2	18"	4.50'	8'	7.7'	R-4 RIPRAP	18"
FES 3	15"	3.75'	8'	7'	R-4 RIPRAP	18"
FES 4	18"	4.50'	8'	7.7'	R-4 RIPRAP	18"



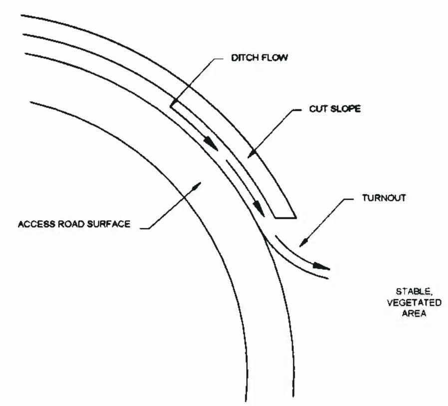
NOTES
1. IF FLARED END SECTION IS DISCHARGING INTO DITCH FROM THE SIDE, EXTEND RIP RAP UP DITCH BANK ON OFF-SIDE A MINIMUM OF 4 FEET.
2. USE WVDEP RIP RAP GRADATION AND FILTER BLANKET REQUIREMENTS PER THE TABLE ON SHEET 3.17-3 OF THE "WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES MANUAL 2006" FOR BLANKET THICKNESS.
3. A SUITABLE NON-WOVEN GEOTEXTILE FABRIC, USED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS, MAY BE SUBSTITUTED FOR FILTER BLANKET STONE UNDER THE RIP RAP.
4. D = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6".

2/19 RIP RAP OUTLET PROTECTION DETAIL
NTS

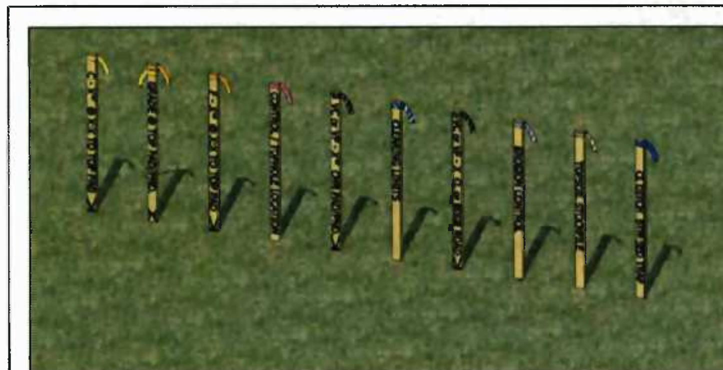


Sediment must be removed when accumulations reach 1/3 the height of the outlet.

3/19 ROCK FILTER OUTLET DETAIL
NTS

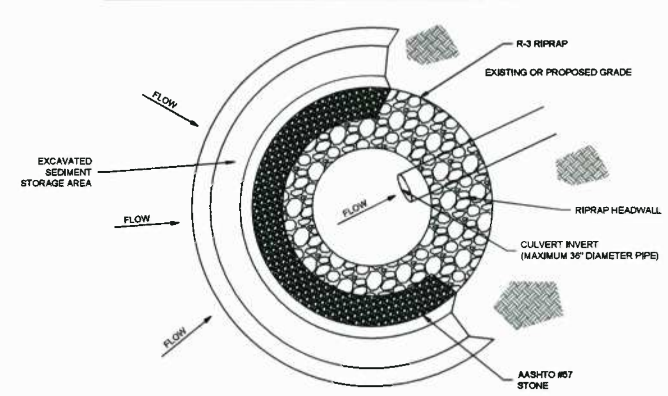


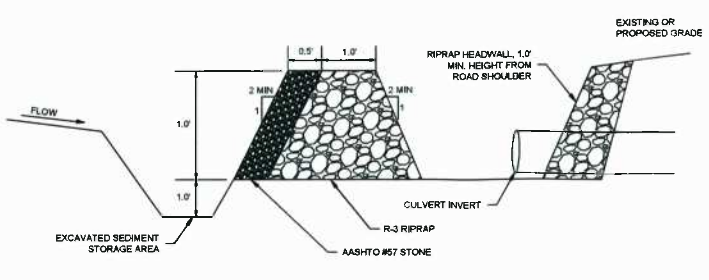
4/19 TURN OUT DETAIL
NTS



Yellow Ribbon: Yellow Ribbon used to indicate top of Cuts (C). Cut to be determined at time of stakeout. Slope determined by site design	
Yellow & Orange Ribbon: Yellow and Orange Ribbon used to indicate Grade at Top of Pad/Pond/Pit	
Orange Ribbon: Orange Ribbon used to indicate toes of Fills (F). Fill to be determined at time of stakeout. Slope determined by site design	
Pink Ribbon: Pink Ribbon used to indicate Top Hole Location. Pink Ribbon used to indicate Survey Control Location	
Pink & Black Stripe Ribbon: Pink & Black Stripe Ribbon used to indicate Vertical Cut (VC) at Pad/Pond/Pit corner or edge. Pink & Black Stripe Ribbon used to indicate Vertical Fill (VF) at Pad/Pond/Pit corner or edge. Vertical Cut/Vertical Fill to be determined at time of stakeout	
Blue & White Stripe Ribbon: Blue & White Stripe Ribbon used to indicate clearing limits/construction limits	
Orange & Black Stripe Ribbon: Orange & Black Stripe Ribbon used to indicate Vertical Cut (VC) at Centerline or edge of access road. Orange & Black Stripe Ribbon used to indicate Vertical Fill (VF) at centerline or edge of access road	
Pink & White Stripe Ribbon: Pink & White Stripe Ribbon used to indicate Erosion and Sediment Control Structures. Silt Fence (SF) Reinforced Filter Fence (RFF) Super Silt Fence (SSF) Filter Sock (FS)	
Orange & White Stripe Ribbon: Orange & White Stripe Ribbon used to indicate Topsoil Stockpile Locations	
Blue Ribbon: Blue Ribbon used to indicate Centerline (℄) Ditch. Blue Ribbon used to indicate Bottom (BTM) Sediment Traps	

5/19 ANTERO RESOURCES STANDARD RIBBON COLOR SCHEME
NTS





DESIGN CRITERIA AND CONSTRUCTION SPECIFICATIONS
1. MINIMUM STONE HEIGHT SHOULD BE 1.0' WITH SIDE SLOPES NO STEEPER THAN 2:1. THE STONE "HORSESHOE" AROUND THE PIPE INLET SHOULD BE CONSTRUCTED OF R-3 RIPRAP WITH A MINIMUM CREST WIDTH OF 1.0'. THE OUTSIDE FACE OF THE RIPRAP SHOULD BE COVERED WITH A 6" THICK LAYER OF #57 STONE.
2. THE EMBANKMENT OVER THE PIPE MUST BE PROTECTED FROM OVERTOPPING. THE TOP OF THE STONE SHOULD BE A MINIMUM OF 1.0' BELOW THE TOP OF THE FILL OVER THE PIPE AND TIE INTO THE FILL ON BOTH SIDES OF THE PIPE. THE INSIDE TOE OF THE RIPRAP SHOULD BE NO CLOSER THAN 2' FROM THE CULVERT OPENING TO ALLOW PASSAGE OF HIGH FLOWS.
3. THE SEDIMENT STORAGE AREA SHOULD BE EXCAVATED UPSTREAM OF THE ROCK PIPE INLET PROTECTION, WITH A MINIMUM DEPTH OF 1.0' BELOW GRADE.
4. CLEAR THE AREA OF ALL DEBRIS THAT MIGHT HINDER EXCAVATION AND DISPOSAL OF SPOIL.
5. INSTALL THE R-3 RIPRAP IN A SEMI-CIRCLE AROUND THE PIPE INLET. THE STONE SHOULD BE BUILT UP HIGHER ON EACH END WHERE IT TIES INTO THE EMBANKMENT. ADJUST CREST AND BOTTOM WITH AS NECESSARY TO FACILITATE PLACEMENT WITHIN THE DITCH/CHANNEL. THE MINIMUM HEIGHT SHOULD BE 1.0', BUT ALSO LOWER THAN THE SHOULDER OF THE EMBANKMENT OR DIVERSIONS.
6. THE SEDIMENT STORAGE AREA SHOULD BE EXCAVATED AROUND THE OUTSIDE OF THE STONE HORSESHOE 1.0' BELOW NATURAL GRADE.
7. WHEN THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, FILL DEPRESSION AND ESTABLISH FINAL GRADING ELEVATIONS. COMPACT AREA PROPERLY, AND STABILIZE WITH GROUND COVER.

6/19 ROCK PIPE INLET DETAIL
NTS

ISSUED FOR CONSTRUCTION

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3	-	-	-
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5	-	-	-

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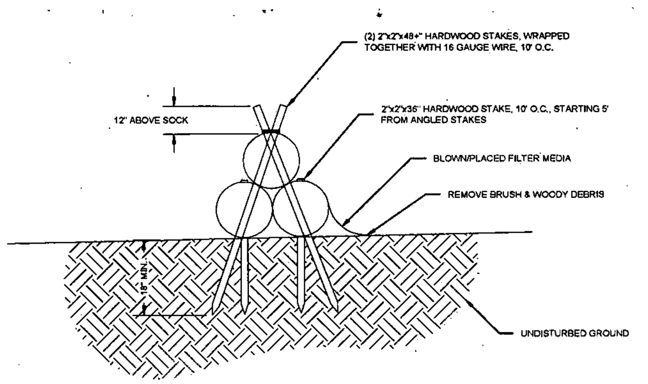
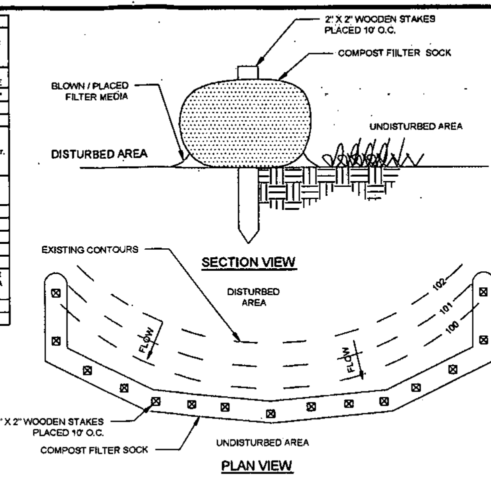


1/20 TRIPLE STACKED FILTER SOCK DETAIL
NTS

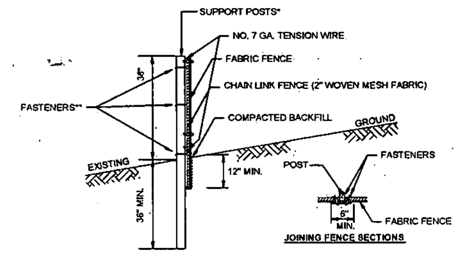
COMPOST SOCK FABRIC MINIMUM SPECIFICATIONS					
MATERIAL TYPE	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament POLYPROPYLENE (MFPP)	HEAVY DUTY Multi-Filament Polypropylene (HDMFPP)
MATERIAL CHARACTERISTICS	PHOTO-DEGRADABLE	PHOTO-DEGRADABLE	BIO-DEGRADABLE	PHOTO-DEGRADABLE	PHOTO-DEGRADABLE
SOCK DIAMETERS	12" 18"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"	12" 18" 24" 32"
MESH OPENING	3/8"	3/8"	3/8"	3/8"	3/8"
TENSILE STRENGTH		26 psi	26 psi	44 psi	202 psi
ULTRA VIOLET STABILITY % ORIGINAL STRENGTH (ASTM G-155)	23% at 1000 hr.	23% at 1000 hr.		100% at 1000 hr.	100% at 1000 hr.
MINIMUM FUNCTIONAL LONGEVITY	6 MONTHS	9 MONTHS	6 MONTHS	1 YEAR	2 YEARS
TWO-PLY SYSTEMS					
INNER CONTAINMENT NETTING			HDPE		
			CONTINUOUSLY WOUND		
			FUSION-WELDED JUNCTURES		
			3/4" X 3/4" MAX. APERTURE SIZE		
OUTER FILTRATION MESH			COMPOSITE POLYPROPYLENE FABRIC (WOVEN LAYER AND NON-WOVEN FLEEECE MECHANICALLY FUSED VIA NEEDLE PUNCH)		
			3/16" MAX. APERTURE SIZE		
SOCK FABRICS COMPOSED OF BURLAP MAY BE USED ON PROJECTS LASTING 6 MONTHS OR LESS.					

COMPOST STANDARDS	
ORGANIC MATTER CONTENT	80%-100% (DRY WEIGHT BASIS)
ORGANIC PORTION	FIBROUS AND ELONGATED
pH	5.5-8.0
MOISTURE CONTENT	35%-55%
PARTICLE SIZE	98% PASS THROUGH 1" SCREEN
SOLUBLE SALT CONCENTRATION	5.0 dS/m (mmhos/cm) MAXIMUM



NOTES
1. SOCK FABRIC SHALL MEET STANDARDS OF TABLE SHOWN ABOVE. COMPOST SHALL MEET THE STANDARDS OF TABLE SHOWN ABOVE.
2. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN SOCK ALIGNMENT. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE SOCK IF SO SPECIFIED BY THE MANUFACTURER.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE SOCK AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIODEGRADABLE FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS. PHOTODEGRADABLE SOCKS AFTER 1 YEAR. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

2/20 COMPOST FILTER SOCK DETAIL
NTS



* POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS OR 4" x 4" POST.

** CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE FENCE POST WITH WIRE TIES OR STAPLES. GEOTEXTILE FABRIC SHALL BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID-SECTIONS.

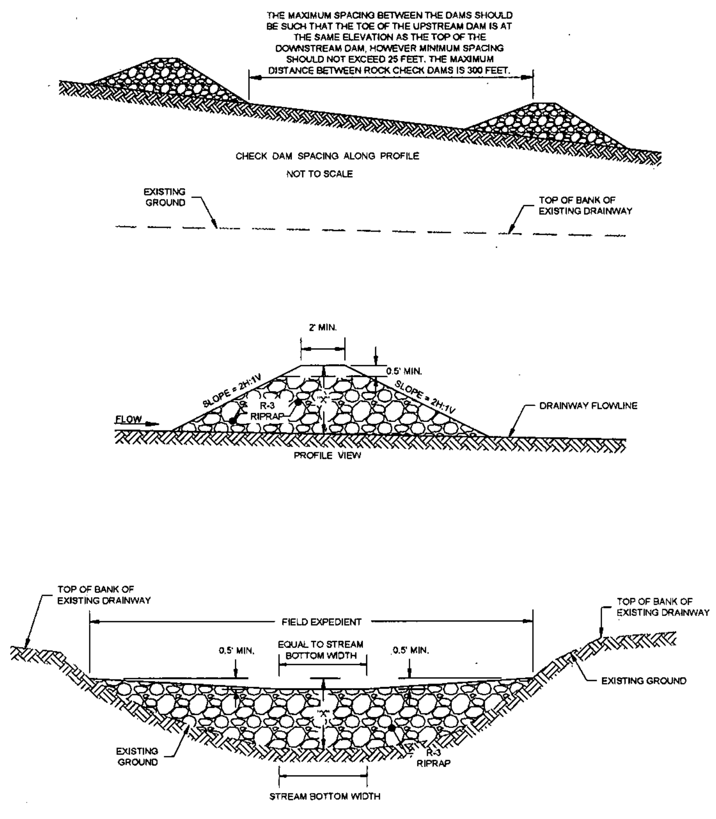
NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN-LINK FENCE.

FILTER FABRIC FENCE SHOULD BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE. NO SECTION OF SILT FENCE SHOULD EXCEED A GRADE OF 5 PERCENT FOR MORE THAN A DISTANCE OF 20 FEET.

THE LENGTH OF SLOPE ABOVE THE FENCE SHALL NOT EXCEED 400 FEET IN STEEP TERRAIN. IN FLATTER AREAS THE LENGTH CAN BE EXTENDED WITH THE APPROVAL OF THE ENGINEER.

SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

3/20 SUPER SILT FENCE DETAIL
NTS



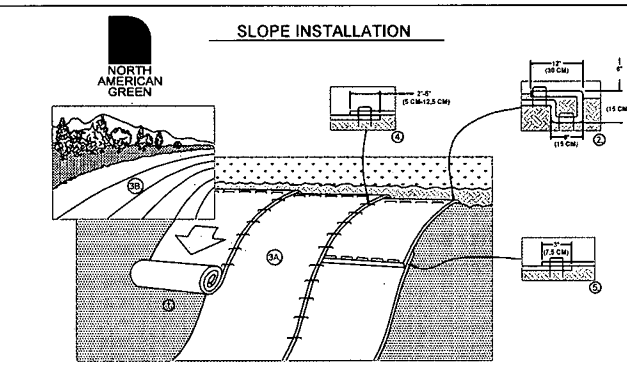
NOTES
1. "X" DIMENSION AS DETAILED BY THE SPECIFCATIONS. FOR SEDIMENT CONTROL THE MAXIMUM HEIGHT OF THE ROCK CHECK DAM IS 3 FEET. HOWEVER, ROCK CHECK DAMS CAN BE CONSTRUCTED IN SMALLER DITCHES. THE CENTER OF THE ROCK CHECK DAM SHALL BE 0'-6" LOWER THAN THE OUTER EDGES AS SHOWN.
2. ROCK CHECK DAMS ARE NORMALLY INSTALLED IN EXISTING DRAINS AND THE TOP CROSS SECTION OF THE DAM SHOULD HAVE A LEVEL CENTER SECTION THE SAME WIDTH AS THE EXISTING CHANNEL BOTTOM AND 0'-6" LOWER THAN THE OUTER EDGES OF THE DAM. ROCK CHECK DAMS PLACED IN PROJECT CONSTRUCTED FLAT-BOTTOM DITCHES SHALL HAVE SIMILAR DIMENSIONS.
3. THE CENTER OF ROCK CHECK DAMS CONSTRUCTED IN PROJECT CONSTRUCTED "VEE" SHAPED OR EXISTING "VEE" SHAPED DITCHES SHALL BE 0'-6" LOWER THAN AND SLOPED TO THE OUTER TOP EDGES OF THE DITCH SO HIGH FLOWS GO OVER THE TOP OF THE DAM AND NOT AROUND THE EDGES.
4. ROCK CHECK DAMS SHALL BE REMOVED AFTER THE FIRST GROWING SEASON .

4/20 ROCK CHECK DAM DETAIL
NTS

ID NUMBER	SSF(LF)	FS(LF)	ID NUMBER	SSF(LF)	FS(LF)
1		79	25	101	
2		110	26	562	
3		96	27	391	
4		321	28		127
5		309	29	97	
6	51		30	79	
7	134		31	86	
8		29	32	87	
9		55	33	667	
10	91		34	56	
11	100		35	121	
12	32		36	416	
13	178		37	415	
14	33		38	63	
15	213		39	96	
16	29		40	322	
17	39		41	266	
18		50	42	156	
19		60	43	148	
20		56	44		53
21		56	45	192	
22	390		46	328	
23	184		47	86	
24	127		48	149	
			TOTALS	6485	1398

5/20 SUPER SILT FENCE & FILTER SOCK TABLE
NTS

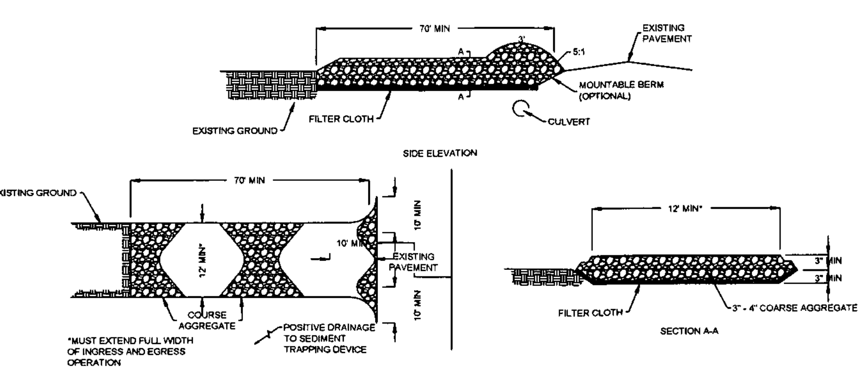
SLOPE INSTALLATION



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, 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 BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE 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 EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" - 5" (5 CM - 12.5 CM) OVERLAP DEPENDING ON BLANKET TYPE.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE BLANKET WIDTH. NOTE: *IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

DETAIL AND LANGUAGE PROVIDED BY NORTH AMERICAN GREEN — REV. 1/2004

6/20 SLOPE PROTECTION INSTALLATION DETAIL
NTS



CONSTRUCTION SPECIFICATIONS
1. CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AND PROPERLY GRADE IT.
2. PLACE THE 3 INCH CRUSHED ROCK TO MATCH FINISHED GRADE AT THE ROADWAY AND SMOOTH IT.
3. PROVIDE DRAINAGE WHERE NEEDED TO CARRY WATER TO A SEDIMENT TRAP OR OTHER SUITABLE OUTLET.

MAINTENANCE:
MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOP-DRESSING WITH ADDITIONAL 3 INCH CRUSHED ROCK. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.

MAINTENANCE SHOULD BE PROVIDED DAILY, BUT AT A MINIMUM EVERY SEVEN DAYS AND AFTER EVERY RAIN OF 0.5 INCH OR GREATER.

7/20 STONE CONSTRUCTION ENTRANCE DETAIL
NTS

ISSUED FOR CONSTRUCTION

SEAL
JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
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2	-	-	-
3	-	-	-
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PROJ. NO. 133141
ACAD FILE: DETAILS.dwg

MACKAY WELL & W.C. PAD DETAILS

ANTERO RESOURCES CORPORATION
MACKAY WELL & WATER CONTAINMENT PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 0.5 1.0 1.5 2.0
CONSTRUCTION
20
20 of 27 sheets

PLOTTED: 03 Mar 2014, 12:11pm, rparker

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ATTACHED XREFS: XRef ANTERO 11x17 TITLE BLOCK
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 20 DETAILS

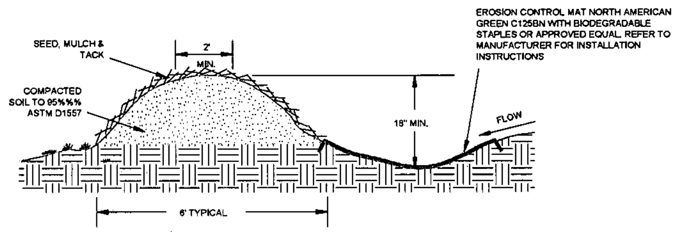
10-15-12 REVISED BY: CAL

INSTALLATION

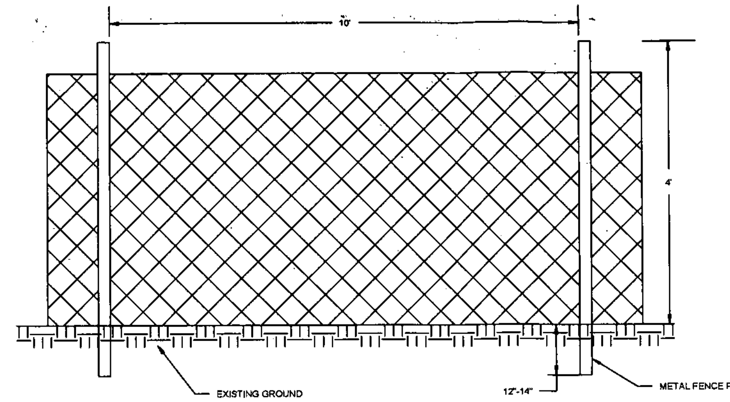
1. WHEN CLEARING THE LOCATION FOR THE DIVERSION, ONLY CLEAR ENOUGH ROOM. FOR CONSTRUCTION AND MAINTENANCE EQUIPMENT ACCESS. DO NOT CLEAR ANY ADDTIONAL AREA UNTIL ALL EROSION CONTROL DEVICES ARE IN PLACE.
2. REMOVE ALL STUMPS, ROOTS AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY.
3. INSTALL DIVERSION AND COMPACT AS SHOWN IN DETAIL. INSURE POSITIVE DRAINAGE DURING CONSTRUCTION OF BERM.
4. SCARIFY, SEED, MULCH AND TACK DISTURBED AREAS IMMEDIATELY UPON COMPLETION OF BERM.
5. INSTALL EROSION CONTROL MAT N.A.G. C125BN PER MANUFACTURER'S RECOMMENDATIONS AND KEY INTO SIDES OF CHANNEL TO PREVENT WATER FROM UNDERMINING OR DAMAGING CHANNEL LINER.

MAINTENANCE

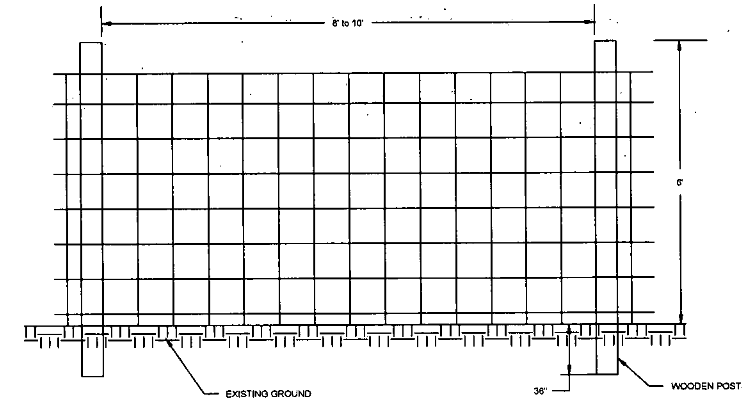
INSPECT TEMPORARY DIVERSIONS ONCE A WEEK AND AFTER EVERY RAINFALL. IMMEDIATELY REMOVE SEDIMENT FROM THE FLOW AREA AND REPAIR THE DIVERSION RIDGE. CAREFULLY CHECK OUTLETS AND MAKE TIMELY REPAIRS AS NEEDED. WHEN THE AREA PROTECTED IS PERMANENTLY STABILIZED, REMOVE THE RIDGE AND THE CHANNEL TO BLEND WITH THE NATURAL GROUND LEVEL AND APPROPRIATELY STABILIZE IT.



1/21 TEMPORARY DIVERSION BERM DETAIL
NTS



2/21 TYPICAL CONSTRUCTION FENCE DETAIL
NTS



3/21 TYPICAL WOVEN WIRE FENCE DETAIL
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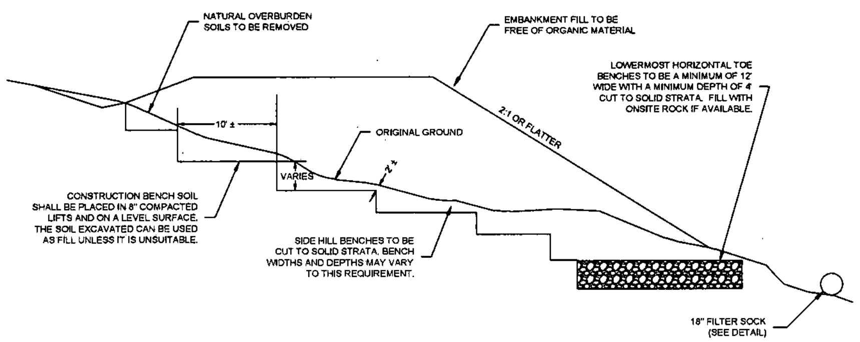
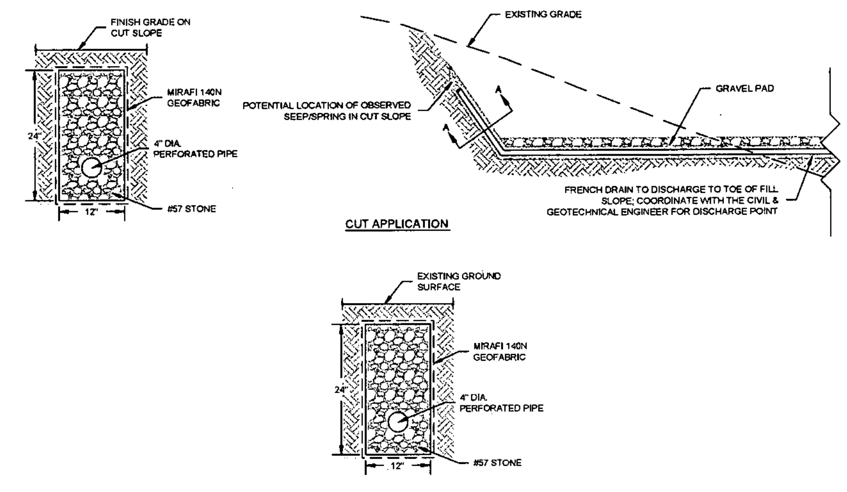
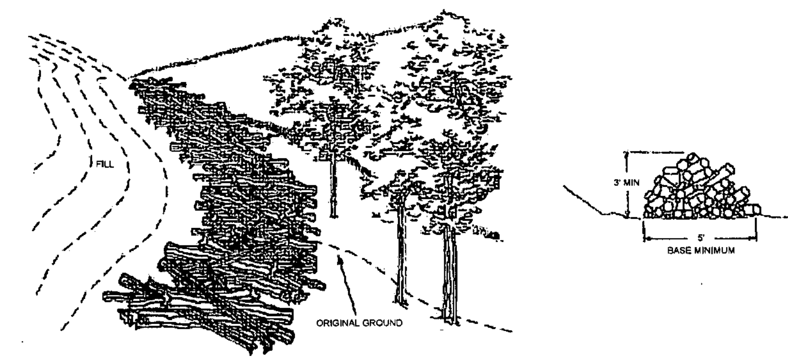


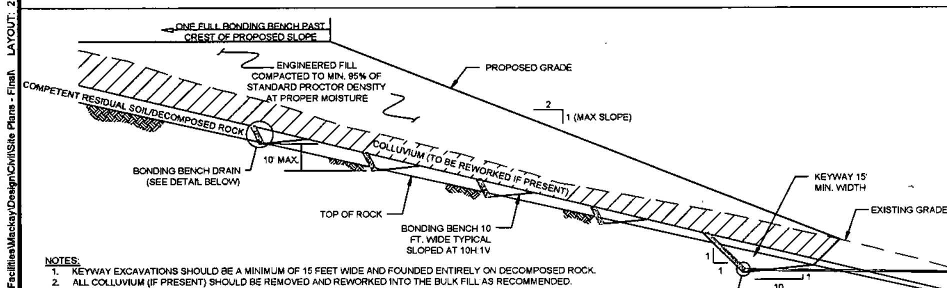
4/21 EMBANKMENT FILL BENCH DETAIL (TYP.)
NTS



5/21 SEEP/SPRING FRENCH DRAIN DETAIL
NTS

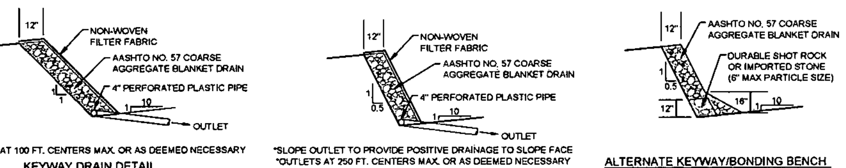


6/21 BRUSH PILE SEDIMENT BARRIER DETAIL
NTS



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.

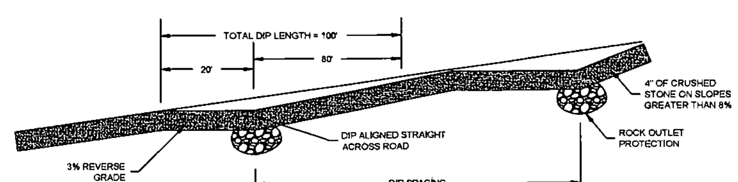


*OUTLETS AT 100 FT. CENTERS MAX. OR AS DEEMED NECESSARY
KEYWAY DRAIN DETAIL
N.T.S.

*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.

7/21 TYPICAL KEYWAY, BENCH, AND DRAINAGE DETAIL
NTS



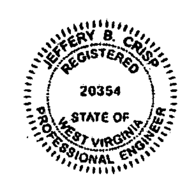
DESIGN CRITERIA
1. MAXIMUM ROAD GRADE ON WHICH DIPS CAN BE CONSTRUCTED IS 10%
2. A 3% REVERSE GRADE SHOULD BE CONSTRUCTED IN THE EXISTING ROADBEND, BY CUTTING UPGRADE OF THE DIP LOCATION.
3. BROADBASED DIP SHOULD BE ARMORED WITH STONE TO WITHSTAND EXPECTED TRAFFIC.
4. DRAINAGE OUTLET PROTECTION SHALL BE PROVIDED WITH APPROPRIATE SEDIMENT BARRIER STRUCTURES.

SPACING OF CROSS DRAINS

ROAD GRADE (%)	DISTANCE BETWEEN DRAINS (FT)
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140

8/21 BROAD-BASED DIP DETAIL
NTS

ISSUED FOR CONSTRUCTION



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MACKAY WELL & W.C. PAD DETAILS

ANTERO RESOURCES CORPORATION
MACKAY WELL & WATER CONTAINMENT PAD
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RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0
CONSTRUCTION

21

21 of 27 sheets

PLOTTED: 03 Mar 2014, 12:11pm, rparker

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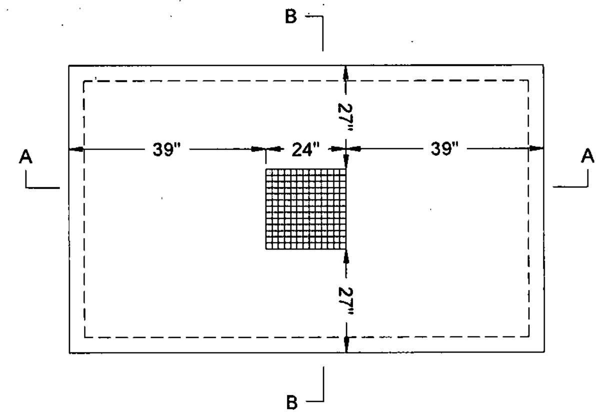
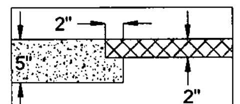
ATTACHED XREFS: Xref: ANTERO 11x17 TITLE BLOCK
CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 21 DETAILS

10-15-12 REVISED BY: CAL

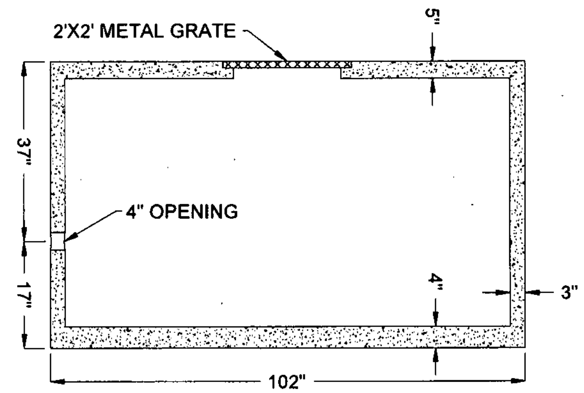


PLAN VIEW: LOW PROFILE TANK CATCH BASIN

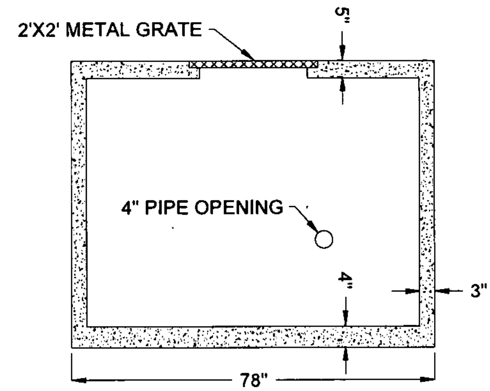
RITCHIE CONCRETE LOW PROFILE TANK CATCH BASIN 1,000 GALLON CAPACITY



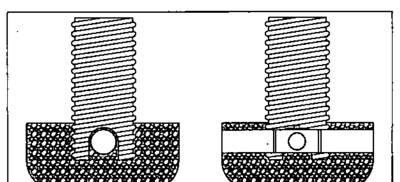
METAL GRATE DETAIL



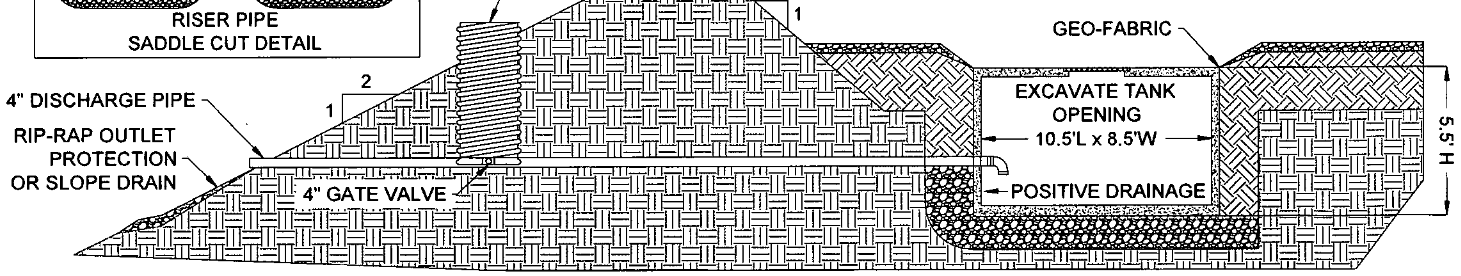
SECTION A-A: LOW PROFILE TANK CATCH BASIN



SECTION B-B: LOW PROFILE TANK CATCH BASIN



RISER PIPE SADDLE CUT DETAIL



1/22 PAD DEWATERING SYSTEM (SUMP SYSTEM)
NTS

INSTALLATION SEQUENCE

1. CONSTRUCT WELL PAD TO SUBGRADE.
2. EXCAVATE SUMP HOLE 1' LARGER THAN THE LENGTH, WIDTH, AND HEIGHT OF TANK.
3. USE CRUSHER RUN STONE TO PREPARE THE BOTTOM OF THE EXCAVATION. MAKE SURE TO LEVEL THE TANK FROM SIDE TO SIDE AND HAVE POSITIVE FLOW TOWARD THE OUTLET (APPROXIMATELY 1-2").
4. MAKE CERTAIN THE OUTLET ON THE TANK LINES UP WITH THE DISCHARGE DITCH FOR INSTALLING THE DISCHARGE PIPE AND VALVE.
5. SET THE TANK IN THE EXCAVATION AND LEVEL.
6. INSTALL PIPE SECTION, (APPROXIMATELY 1-2' PIECE) INTO THE OUTLET FITTING ON THE TANK. USE HYDRAULIC CEMENT AROUND THE CONNECTION TO ENSURE POSITIVE SEAL.
7. INSTALL 4" VALVE ONTO SHORT SECTION OF THE PIPE WITH GLUE (MAKE CERTAIN TO CLEAN AND PRIME BOTH VALVE AND PIPE BEFORE GLUING CONNECTION).
8. INSTALL SECTIONS OF PIPE ONTO THE OUTLET SIDE OF THE VALVE UNTIL THE PIPE EXTENDS THROUGH THE BERM AND SLOPE APPROXIMATELY 1'. LEAVE THE END OF THE PIPE EXPOSED (MAKE CERTAIN TO CLEAN AND PRIME THE PIPE AND JOINTS BEFORE GLUING THE CONNECTIONS).
9. MAKE CERTAIN THAT THE PIPE IS SUPPORTED AND MAINTAINS POSITIVE FLOW AWAY FROM THE VALVE. USE EXCAVATED SOIL FROM THE DISCHARGE DITCH TO SUPPORT THE PIPE.
10. INSTALL THE RISER FOR THE VALVE. USE A SECTION OF HDPE PIPE WITH A LARGER DIAMETER THAN THE VALVE (MINIMUM 8" DIAMETER HDPE PIPE). CUT A "SADDLE" ON THE BOTTOM OF THE RISER PIPE SO THAT THE RISER PIPE WILL REST ON THE DISCHARGE PIPE, SURROUNDING THE VALVE AND KEEPING DIRT AWAY FROM THE OPERATION OF THE VALVE.
11. FILL AROUND THE VALVE WITH CRUSHER RUN STONE AND 1' ON THE RISER PIPE TO KEEP SOIL OUT.
12. STABILIZE THE RISER PIPE SO THAT IT REMAINS PERPENDICULAR TO THE VALVE (RISER PIPE NEEDS TO BE PERPENDICULAR TO ALLOW SMOOTH OPERATION OF HANDLE AND VALVE). MAKE SURE TO REMOVE THE FACTORY HANDLE ON THE VALVE AND TO FIT "T" HANDLE (ALTERNATE HANDLE) ONTO THE EXPOSED PLUG ON THE TOP OF THE VALVE.
13. BEGIN BACKFILLING THE TANK EXCAVATION AND DISCHARGE DITCH, USE THE SOIL EXCAVATED FROM THE TANK HOLE TO BACKFILL THE TANK AND DISCHARGE DITCH. DO NOT BACKFILL WITH ANY LARGE ROCKS AGAINST THE TANK AND BE CERTAIN NOT TO OVER-COMPACT AROUND THE TANK. IMPROPER BACKFILLING AND OVER-COMPACTION AROUND THE TANK WILL LEAD TO THE TANK COLLAPSING. IT IS RECOMMENDED THAT FINER SOILS ARE USED TO BACKFILL AROUND THE TANK AND DISCHARGE PIPE TO REDUCE VOIDS AND EXCESSIVE SETTLING.
14. ONCE BACKFILLING IS COMPLETE, THE TOP OF THE TANK SHOULD BE FLUSH WITH THE SUB-GRADE.
15. CUT THE RISER PIPE OFF 2' ABOVE SUB-GRADE TO ALLOW FOR THE RISER PIPE TO EXTEND 1' ABOVE THE FINAL GRADE AND KEEP SURFACE WATER FROM ENTERING THE PIPE.
16. REPAIR THE PAD BERM AND FILL SLOPE.
17. INSTALL RIP-RAP SPILLWAY FROM THE DISCHARGE PIPE OUTLET TO THE BOTTOM OF THE SLOPE. DEPENDING ON SITE CONDITIONS, THE SPILLWAY WILL DISCHARGE THROUGH A LEVEL SPREADER TO VEGETATION OR E&S CONTROLS OR DISCHARGE FROM THE SPILLWAY INTO AN ACCESS ROAD DITCH.
18. WITH TANK INSTALLATION COMPLETE, THE WELL PAD CAN THEN BE STONED. WHEN USING GEO-FABRIC (TYPAR), BE SURE TO LAP THE FABRIC OVER THE EDGE OF THE LID ON THE TANK. THIS LAP WILL HELP RUN-OFF TO FLOW INTO THE TANK. TAPER STONE DOWN FROM THE PAD TO THE TANK, SO THERE IS NOT A "LIP" OR TRIP HAZARD ON THE EDGE OF STONE.
19. BE SURE NOT TO RUN A SMOOTH DRUM OR SHEEPS-FOOTED ROLLER OVER THE TANK LID OR VIBRATE TOO CLOSE TO THE SIDES OF THE TANK. COMPACTING OR OPERATING HEAVY EQUIPMENT NEAR THE TANK MAY CAUSE THE WALLS ON THE TANK TO FAIL. KEEP TRAFFIC OFF OF THE TANK. IT IS RECOMMENDED THAT BARRIERS BE INSTALLED TO PREVENT TRAFFIC FROM DRIVING OVER OR PARKING ON OR NEAR THE TANK.

OPERATIONAL NOTE:

THE DEWATERING VALVE WILL REMAIN CLOSED DURING DRILLING AND COMPLETION OPERATIONS. ANY WATER CAPTURED DURING THE DRILLING AND COMPLETION OPERATIONS WILL BE TESTED PRIOR TO BEING DISCHARGED OR PUMPED BY A COMMERCIAL VENDOR. AFTER DRILLING AND COMPLETION OPERATIONS ARE COMPLETE, THE VALVE WILL BE OPENED BY A DESIGNATED RESPONSIBLE PERSON ONLY.

ISSUED FOR CONSTRUCTION

NO.	REVISION	BY	DATE
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4		-	-
5		-	-

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CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY WEST VIRGINIA

JEFFERY B. CRISP REGISTERED 20354 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

SEAL

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

22

PLOTTED: 03 Mar 2014, 12:11pm, rparker

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CAD FILE: G:_clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT: 22 DETAILS

10-15-12 REVISED BY: CAL

Tensar International Corporation
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Poseyville, Indiana 47633
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www.nagreen.com

Material and Performance Specification
S150BN Erosion Control Blanket

Description

The short-term double net erosion control blanket shall be a machine-produced mat of 100% agricultural straw with a functional longevity of up to 12 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with a 100% biodegradable woven natural fiber netting. The netting shall consist of machine directional strands formed from two intertwined yarns with cross directional strands interwoven through the twisted machine strands (commonly referred to as a Leno weave) to form an approximate 0.50 x 1.0 (1.27 x 2.54 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The S150BN shall meet Type 2.D specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) *FP-03 Section 713.17*

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.31 in (7.87 mm)
Resiliency	ECTC Guidelines	80.5%
Water Absorbency	ASTM D1117	381%
Mass/Unit Area	ASTM 6475	9.29 oz/yd² (315 g/m²)
Swell	ECTC Guidelines	15%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	6.23 oz-in
Light Penetration	ECTC Guidelines	10.1%
Tensile Strength -MD	ASTM D6818	189.6 lbs/ft (2.81 kN/m)
Elongation - MD	ASTM D6818	10.4%
Tensile Strength - TD	ASTM D6818	214.8 lbs/ft (3.19 kN/m)
Elongation - TD	ASTM D6818	6.8%

Material Content		
Matrix	100% Straw Fiber	0.5 lbs/yd² (0.27 kg/m²)
Netting	Top –Leno woven 100% biodegradable organic jute Bottom – 100% biodegradable organic jute	9.3 lb/1000 ft² (4.5 kg/100 m²) 7.7 lb/1000 ft² (3.76 kg/100 m²)
Thread	degradable	

Maximum Permissible Shear Stress	
Unvegetated Shear Stress	1.85 lbs/ft² (88 Pa)
Unvegetated Velocity	6.00 ft/s (1.83 m/s)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.00014	0.039	NA
20-50 ft	0.01	0.070	NA
≥ 50 ft (15.2 m)	0.02	0.100	NA

Standard Roll Sizes			
Width	6.67 ft (2.03 m)	8.0 ft (2.4 m)	15.5 ft (4.72 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)	90 ft (27.43 m)
Weight ± 10%	52.22 lbs (23.69 kg)	65.28 lbs (29.61 kg)	101.2 lbs (45.9 kg)
Area	80 yd² (66.9 m²)	100 yd² (64.8 m²)	155 yd² (129.6 m²)
	Leno Weave Top Only	Leno Top and Bottom	Leno Top and Bottom

Roughness Coefficients: Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.055
0.50 – 2.0 ft	0.055 - 0.021
≥ 2.0 ft (0.60 m)	0.021

Bench Scale Testing (NTPEP)

Test Method	Parameters	Results
ECTC 2 Rainfall	50 mm (2 in)/hr-30 min 100mm (4 in)/hr-30 min 150 mm (6 in)/hr-30 min	SLR** = 16.19 SLR** = 15.74 SLR** = 15.31
ECTC 3 Shear Res.	Shear at 0.50 inch soil loss	2.1lbs/ft²
ECTC 4 Germination	Top Soil, Fescue, 21 day incubation	239% improvement of biomass

* Bench Scale tests should not be used for design purposes
** Soil Loss Ratio = Soil Loss Bare Soil/Soil Loss with RECP

Proud Participant of:

Tensar International Corporation warrants that at the time of delivery the product furnished hereunder shall conform to the specification stated herein. Any other warranty including merchantability and fitness for a particular purpose, are hereby executed. If the product does not meet specifications on this page and Tensar is notified prior to installation, Tensar will replace the product at no cost to the customer. This product specification supersedes all prior specifications for the product described above is and is not applicable to any products shipped prior to January 1, 2011.

1/23 NORTH AMERICAN GREEN S150BN EROSION CONTROL BLANKET (OR EQUIVALENT)
NTS

Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

Material and Performance Specification
SC250 Turf Reinforcement Mat

Description

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 70% straw and 30% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The SC250 shall meet Type 5A, B, and C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) *FP-03 Section 713.18*

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.72 in (18.3 mm)
Resiliency	ASTM 6524	95.2%
Density	ASTM D792	0.53 oz/in³
Mass/Unit Area	ASTM 6566	17.88oz/yd² (606 g/m²)
UV Stability	ASTM D4355 /1000 hr	100%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	222.65 oz-in
Light Penetration	ECTC Guidelines	9.9%
Tensile Strength -MD	ASTM D6818	620 lbs/ft (9.05 kN/m)
Elongation - MD	ASTM D6818	35%
Tensile Strength - TD	ASTM D6818	737 lbs/ft (10.75 kN/m)
Elongation - TD	ASTM D6818	16%

Material Content		
Matrix	70% Straw Fiber 30% Coconut Fiber	0.35 lbs/yd² (0.27 kg/m²) 0.15 lbs/yd² (0.08 kg/m²)
Netting	Top and Bottom, UV stabilized Polypropylene Middle, Corrugated UV stabilized Polypropylene	5 lb/1000 ft² (2.44 kg/100 m²) 24 lb/1000 ft² (11.7 kg/100m²)
Thread	Polypropylene, UV stable	

Maximum Permissible Shear Stress		
	Short Duration	Long Duration
Phase 1 Unvegetated	3.0 lbs/ft² (144 Pa)	2.5 lbs/ft² (120Pa)
Phase 2 Partially Veg.	8.0 lbs/ ft² (383 Pa)	8.0 lbs/ft² (383 Pa)
Phase 3 Fully Veg.	10.0 lbs/ft² (480 Pa)	8.0 lbs/ ft² (383 Pa)
Unvegetated Velocity	9.5 ft/s (2.9 m/s)	
Vegetated Velocity	15 ft/s (4.6 m/s)	

Standard Roll Sizes	
Width	6.5 ft (2.0 m)
Length	55.5 ft (16.9 m)
Weight ± 10%	34 lbs (15.42 kg)
Area	40 yd² (33.4 m²)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.0010	0.0209	0.0507
20-50 ft	0.0081	0.0266	0.0574
≥ 50 ft (15.2 m)	0.0455	0.0555	0.081

Bench Scale Testing (NTPEP)

Test Method	Parameters	Results
ECTC 2 Rainfall	50 mm (2 in)/hr-30 min 100mm (4 in)/hr-30 min 150 mm (6 in)/hr-30 min	SLR** = 18.25 SLR** = 20.97 SLR** = 22.74
ECTC 3 Shear Res.	Shear at 0.50 inch soil loss	7.7 lbs/ft²
ECTC 4 Germination	Top Soil, Fescue, 21 day incubation	523% improvement of biomass

* Bench Scale tests should not be used for design purposes
** Soil Loss Ratio = Soil Loss Bare Soil/Soil Loss with RECP

Roughness Coefficients: Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.040
0.50 – 2.0 ft	0.040-0.012
≥ 2.0 ft (0.60 m)	0.011

Proud Participant of:

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2/23 NORTH AMERICAN GREEN SC250 TURF REINFORCEMENT MATTING (OR EQUIVALENT)
NTS

Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

Material and Performance Specification
C350 Turf Reinforcement Mat

Description

The composite turf reinforcement mat (C-TRM) shall be a machine-produced mat of 100% coconut fiber matrix incorporated into permanent three-dimensional turf reinforcement matting. The matrix shall be evenly distributed across the entire width of the matting and stitch bonded between a super heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings, an ultra heavy UV stabilized, dramatically corrugated (crimped) intermediate netting with 0.5 x 0.5 inch (1.27 x 1.27 cm) openings, and covered by an super heavy duty UV stabilized nettings with 0.50 x 0.50 inch (1.27 x 1.27 cm) openings. The middle corrugated netting shall form prominent closely spaced ridges across the entire width of the mat. The three nettings shall be stitched together on 1.50 inch (3.81cm) centers with UV stabilized polypropylene thread to form permanent three-dimensional turf reinforcement matting. All mats shall be manufactured with a colored thread stitched along both outer edges as an overlap guide for adjacent mats.

The C350 shall meet Type 5A, B, and C specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) *FP-03 Section 713.18*

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.67 in (17.0 mm)
Resiliency	ASTM 6524	90%
Density	ASTM D792	0.53 oz/in³
Mass/Unit Area	ASTM 6566	12.57 oz/yd² (426 g/m²)
UV Stability	ASTM D4355 /1000 hr	86%
Porosity	ECTC Guidelines	99%
Stiffness	ASTM D1388	3.83 oz-in
Light Penetration	ECTC Guidelines	9.0%
Tensile Strength -MD	ASTM D6818	625 lbs/ft (9.12 kN/m)
Elongation - MD	ASTM D6818	22%
Tensile Strength - TD	ASTM D6818	768 lbs/ft (11.21 kN/m)
Elongation - TD	ASTM D6818	15%

Material Content		
Matrix	100% Coconut Fiber	0.5 lbs/yd² (0.27 kg/m²)
Netting	Top and Bottom, UV stabilized Polypropylene Middle, Corrugated UV stabilized Polypropylene	8 lb/1000 ft² (3.91 kg/100 m²) 24 lb/1000 ft² (11.7 kg/100m²)
Thread	Polypropylene, UV stable	

Maximum Permissible Shear Stress		
	Short Duration	Long Duration
Phase 1 Unvegetated	3.2 lbs/ft² (153 Pa)	3.0 lbs/ft² (144 Pa)
Phase 2 Partially Veg.	10.0 lbs/ ft² (480 Pa)	10.0 lbs/ft² (480 Pa)
Phase 3 Fully Veg.	12.0 lbs/ft² (576 Pa)	10.0 lbs/ ft² (480 Pa)
Unvegetated Velocity	10.5 ft/s (3.2 m/s)	
Vegetated Velocity	20 ft/s (6.0 m/s)	

Standard Roll Sizes	
Width	6.5 ft (2.0 m)
Length	55.5 ft (16.9 m)
Weight ± 10%	37 lbs (16.8 kg)
Area	40 yd² (33.4 m²)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.0005	0.015	0.043
20-50 ft	0.018	0.031	0.050
≥ 50 ft (15.2 m)	0.035	0.047	0.057

Bench Scale Testing (NTPEP)

Test Method	Parameters	Results
ECTC 2 Rainfall	50 mm (2 in)/hr-30 min 100mm (4 in)/hr-30 min 150 mm (6 in)/hr-30 min	SLR** = 18.32 SLR** = 19.65 SLR** = 20.48
ECTC 3 Shear Res.	Shear at 0.50 inch soil loss	7.5 lbs/ft²
ECTC 4 Germination	Top Soil, Fescue, 21 day incubation	243% improvement of biomass

* Bench Scale tests should not be used for design purposes
** Soil Loss Ratio = Soil Loss Bare Soil/Soil Loss with RECP

Roughness Coefficients: Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.041
0.50 – 2.0 ft	0.040-0.013
≥ 2.0 ft (0.60 m)	0.012

Proud Participant of:

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3/23 NORTH AMERICAN GREEN C350 TURF REINFORCEMENT MATTING (OR EQUIVALENT)
NTS

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
△		-	-
△		-	-
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www.kleinfelder.com

PROJ. NO. 133141
ACAD FILE: DETAILS.dwg

MACKAY WELL & W.C. PAD DETAILS

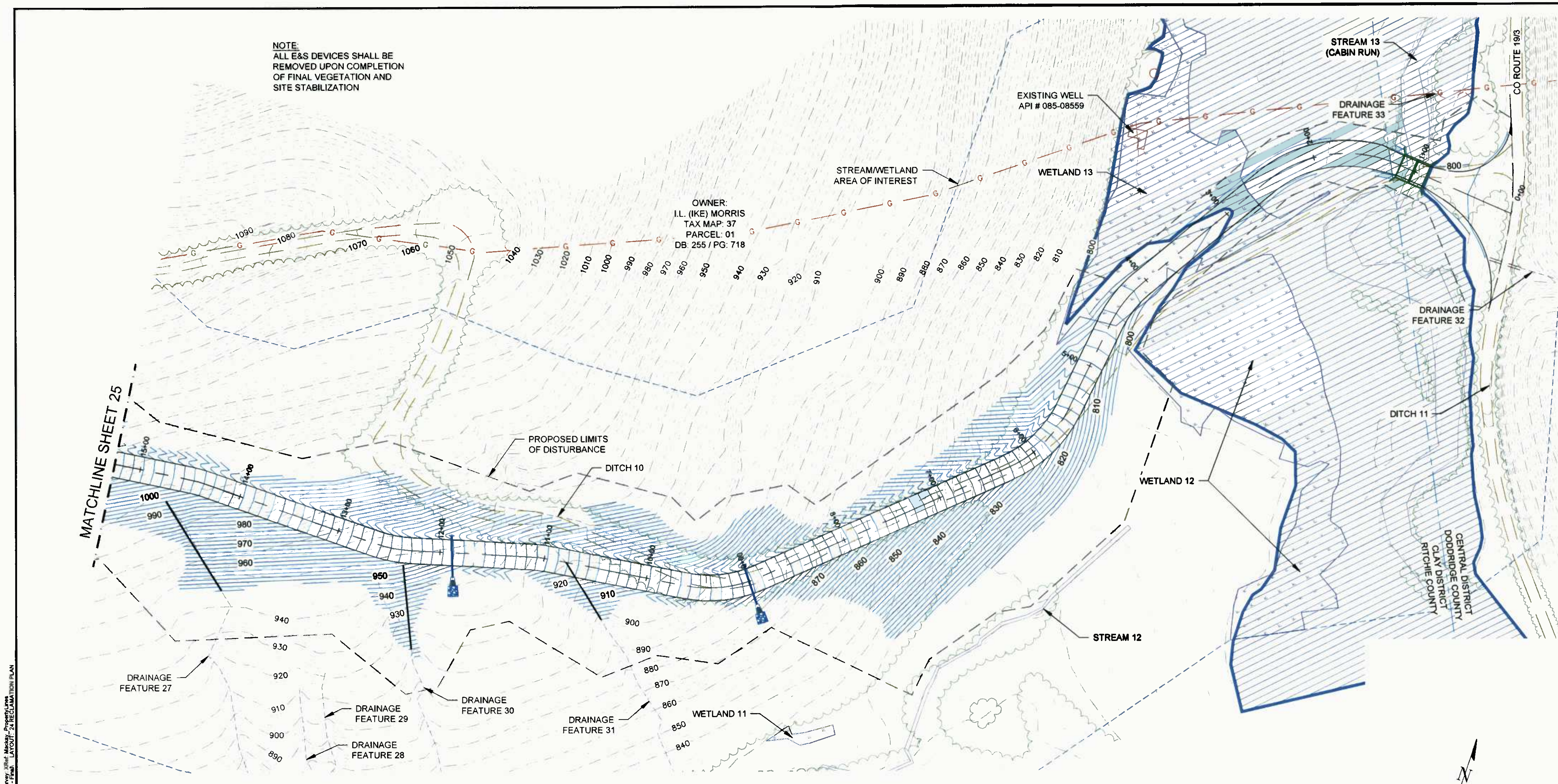
ANTERO RESOURCES CORPORATION
MACKAY WELL & WATER CONTAINMENT PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION
23
23 of 27 sheets

PLOTTED: 03 Mar 2014, 12:11pm, rparker



50 25 0 50
SCALE: 1 INCH=50 FEET

ISSUED FOR CONSTRUCTION

LEGEND

1360	EX. INDEX CONTOUR
	EX. INTERMEDIATE CONTOUR
	EX. TREE LINE
	EX. PROPERTY LINE
	EX. COUNTY LINE
	EX. RIGHT OF WAY
	EX. WETLAND
	EX. STREAM
	EX. DRAINAGE FEATURE
	EX. CULVERT
G	EX. GAS LINE
W	EX. WATER LINE
OHW	EX. OVERHEAD POWER LINE
	EX. UTILITY POLE
	EX. ROAD
	EX. TRAIL
X	EX. FENCE
	EX. STRUCTURE
	STREAM/WETLAND AREA OF INTEREST
	100' WETLAND BUFFER
	PROP. LIMITS OF DISTURBANCE
	PROP. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)
1360	PROP. INDEX CONTOUR
	PROP. INTERMEDIATE CONTOUR
	PROP. ROAD CENTERLINE
	PROP. PADS & ROAD EDGE
X	PROP. CONSTRUCTION FENCE
	PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
	PROP. PAD PERIMETER SUMP
	PROP. WELL HEAD
	PROP. PVC PIPE FOR SUMP SYSTEM
	PROP. FRENCH DRAIN

NOTES:

1. MUNICIPAL BOUNDARY LINES SHOWN ARE APPROXIMATE IN LOCATION, BASED ON MAPS BY OTHERS, AND MAY NOT CORRESPOND TO THE LEGAL LOCATION.
2. UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND NOT GUARANTEED TO BE COMPLETE.
3. NO PERMANENT PUBLIC SANITARY SEWER NOR POTABLE WATER IS PROPOSED AT THE SITE.
4. NO BUFFER AREAS, PLANTINGS, OR LANDSCAPING ARE PROPOSED AT THE SITE. NO PERMANENT OPEN SPACE OR PUBLIC USE AREAS ARE PROPOSED AT THE SITE.
5. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE (FIRM) PANELS 54085C0225C & 54017C0220C INDICATES FLOOD ZONE A IS WITHIN THE PROJECT AREA.
6. ALL PROPOSED SLOPES ARE 2H:1V EXCEPT WHERE NOTED.
7. FILL OVER 50 VERTICAL FEET ON SPOIL PAD NEEDS A 10' BENCH.
8. FILL SLOPES SHALL BE TOE KEYED PER THE OVERALL PLAN ON SHEET 6, AND THE DETAIL SHOWN ON SHEET 21.

SITE RECLAMATION NOTES:

1. THE WATER CORRAL MUST BE REMOVED PRIOR TO BACKFILLING THE WATER CONTAINMENT PAD. ANY REMAINING FLUID MUST BE DISPOSED OF IN AN APPROVED MANNER.
2. DRILL CUTTINGS, DRILLING MUD AND LINER, FOR WELLS PERMITTED UNDER WV CODE 22-6A AND 35CSR-8, MUST BE REMOVED FROM SITE AND DISPOSED OF AT AN APPROVED SOLID WASTE FACILITY OR IF THE SURFACE OWNER CONSENTS THE DRILL-CUTTINGS AND ASSOCIATED DRILLING MUD MAY BE MANAGED ON SITE IN A MANNER APPROVED BY THE SECRETARY.
3. THE OPERATOR SHALL GRADE OR TERRACE AND PLANT, SEED OR SOD THE AREA DISTURBED THAT IS NOT REQUIRED IN PRODUCTION OF THE WELL IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN.
4. INSTALL ALL PERMANENT WATER DRAINAGE AND DIVERSION DITCHES. IN AREAS OF LONG SLOPES, IT MAY BE DESIRABLE TO INSTALL ANGLED DIVERSION DITCHES TO AID IN CONTROLLING WATER RUNOFF AND EROSION.
5. STOCKPILED TOPSOIL SHOULD BE RE-SPREAD OVER DISTURBED AREA. TOPSOIL SHOULD NOT BE ADDED TO SLOPES STEEPER THAN 2:1 UNLESS GOOD BONDING TO THE SUB-SOIL CAN BE ACHIEVED.
6. PRIOR TO SEEDING, SOIL SHOULD BE LOOSENED BY DISKING, BULLDOZER TRACKING, ETC. NOTE THAT BULLDOZER TRACKING CAN COMPACT WET CLAY SOILS AND RESTRICT ESTABLISHMENT OF VEGETATION.
7. MAINTAINING SEDIMENT BARRIERS IS CRITICAL UNTIL VEGETATION IS REESTABLISHED. TEMPORARY SEDIMENT CONTROL DEVICES SUCH AS SUPER SILT FENCING SHALL BE REMOVED ALONG WITH SEDIMENT AFTER AT LEAST A 70% VEGETATIVE COVER IS ESTABLISHED.
8. DURING SITE RECLAMATION ALL FILL AREAS SHALL BE COMPACTED IN 24" MINIMUM LIFT THICKNESS (12" RECOMMENDED) WITH A VIBRATING SHEEPSFOOT ROLLER TO 90% COMPACTION PER STANDARD PROCTOR DENSITY, ASTM D-698. MOISTURE CONTENT WILL BE CONTROLLED IN ACCORDANCE WITH THE STANDARD PROCTOR TEST (ASTM D-698) RESULTS.

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

SEAL

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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CRANBERRY TOWNSHIP, PA 16066
PH. 724-772-7072 FAX. 724-772-7079
www.kleinfelder.com

PROJ. NO. 133141
ACAD FILE: RECLAMATION PLAN.dwg

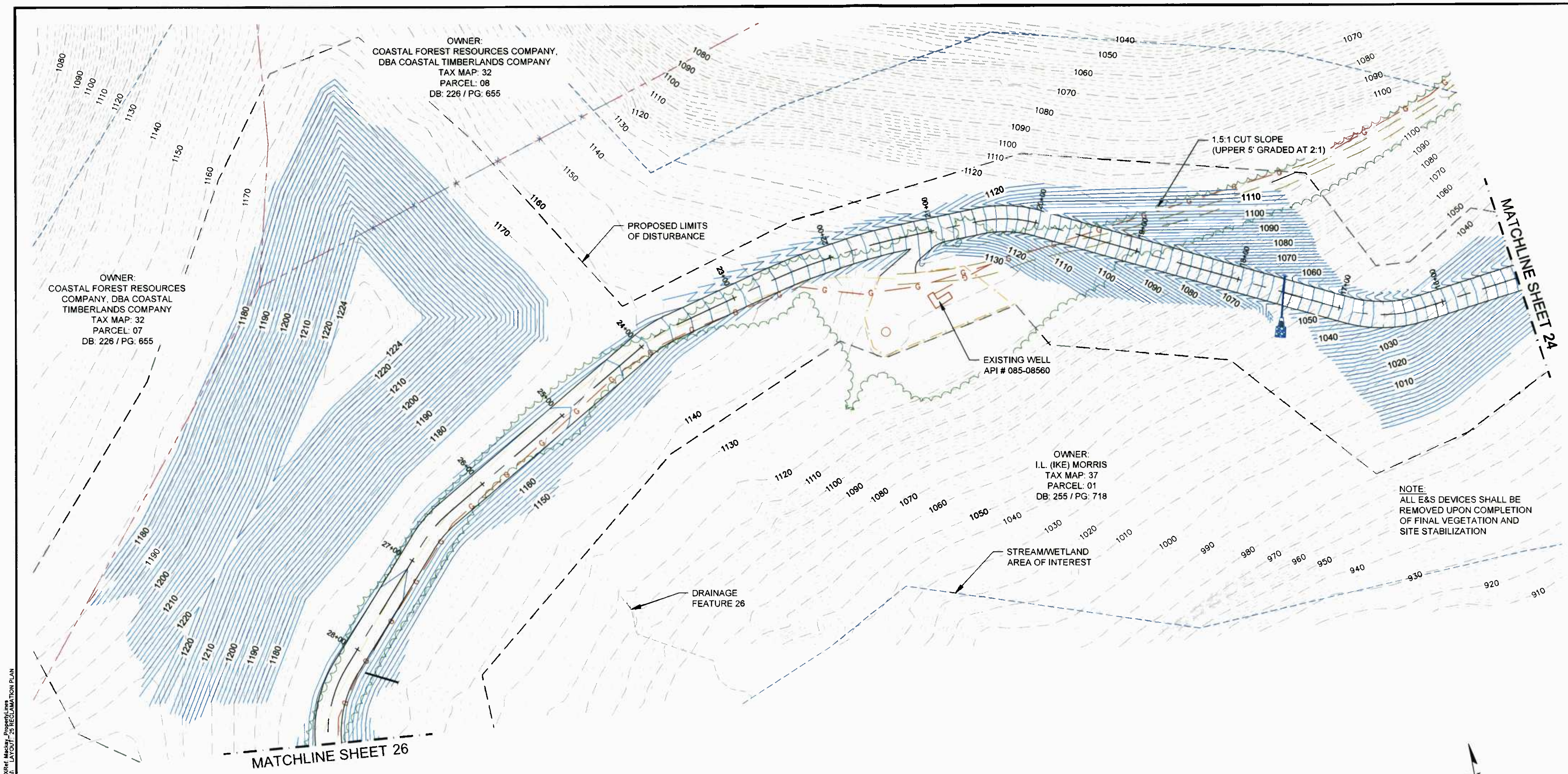
MACKAY WELL & W.C. PAD RECLAMATION PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

PLOTTED: 03 Mar 2014, 12:14pm, rparker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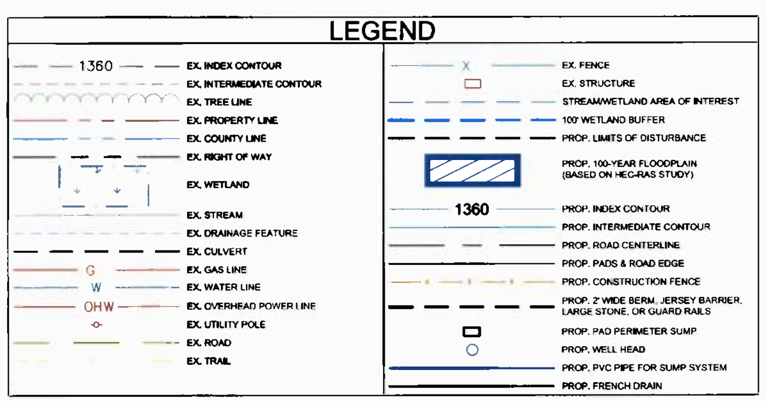
COASTAL FOREST RESOURCES COMPANY,
DBA COASTAL TIMBERLANDS COMPANY
TAX MAP: 32
PARCEL: 08
DB: 226 / PG: 655
OWNER:
COASTAL FOREST RESOURCES
COMPANY, DBA COASTAL
TIMBERLANDS COMPANY
TAX MAP: 32
PARCEL: 07
DB: 226 / PG: 655
PROPOSED LIMITS
OF DISTURBANCE
1.5:1 CUT SLOPE
(UPPER 5' GRADED AT 2:1)
EXISTING WELL
API # 085-08560
MATCHLINE SHEET 24
OWNER:
I.L. (IKE) MORRIS
TAX MAP: 37
PARCEL: 01
DB: 255 / PG: 718
NOTE:
ALL E&S DEVICES SHALL BE
REMOVED UPON COMPLETION
OF FINAL VEGETATION AND
SITE STABILIZATION
STREAM/WETLAND
AREA OF INTEREST
DRAINAGE
FEATURE 26
MATCHLINE SHEET 26


LEGEND
1360
EX. INDEX CONTOUR
EX. INTERMEDIATE CONTOUR
EX. TREE LINE
EX. PROPERTY LINE
EX. COUNTY LINE
EX. RIGHT OF WAY
EX. WETLAND
EX. STREAM
EX. DRAINAGE FEATURE
EX. CULVERT
EX. GAS LINE
EX. WATER LINE
EX. OVERHEAD POWER LINE
EX. UTILITY POLE
EX. ROAD
EX. TRAIL
EX. FENCE
EX. STRUCTURE
STREAM/WETLAND AREA OF INTEREST
100' WETLAND BUFFER
PROP. LIMITS OF DISTURBANCE
PROP. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)
PROP. INDEX CONTOUR
PROP. INTERMEDIATE CONTOUR
PROP. ROAD CENTERLINE
PROP. PADS & ROAD EDGE
PROP. CONSTRUCTION FENCE
PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
PROP. PAD PERIMETER SUMP
PROP. WELL HEAD
PROP. PVC PIPE FOR SUMP SYSTEM
PROP. FRENCH DRAIN

NOTES:

1. MUNICIPAL BOUNDARY LINES SHOWN ARE APPROXIMATE IN LOCATION, BASED ON MAPS BY OTHERS, AND MAY NOT CORRESPOND TO THE LEGAL LOCATION.
2. UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND NOT GUARANTEED TO BE COMPLETE.
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5. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE (FIRM) PANELS 54085C0225C & 54017C0220C INDICATES FLOOD ZONE A IS WITHIN THE PROJECT AREA.
6. ALL PROPOSED SLOPES ARE 2H:1V EXCEPT WHERE NOTED.
7. FILL OVER 50 VERTICAL FEET ON SPOIL PAD NEEDS A 10' BENCH.
8. FILL SLOPES SHALL BE TOE KEYED PER THE OVERALL PLAN ON SHEET 6, AND THE DETAIL SHOWN ON SHEET 21.

SITE RECLAMATION NOTES:

1. THE WATER CORRAL MUST BE REMOVED PRIOR TO BACKFILLING THE WATER CONTAINMENT PAD. ANY REMAINING FLUID MUST BE DISPOSED OF IN AN APPROVED MANNER.
2. DRILL CUTTINGS, DRILLING MUD AND LINER, FOR WELLS PERMITTED UNDER WV CODE 22-6A AND 35CSR-8, MUST BE REMOVED FROM SITE AND DISPOSED OF AT AN APPROVED SOLID WASTE FACILITY OR IF THE SURFACE OWNER CONSENTS THE DRILL-CUTTINGS AND ASSOCIATED DRILLING MUD MAY BE MANAGED ON SITE IN A MANNER APPROVED BY THE SECRETARY.
3. THE OPERATOR SHALL GRADE OR TERRACE AND PLANT, SEED OR SOD THE AREA DISTURBED THAT IS NOT REQUIRED IN PRODUCTION OF THE WELL IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN.
4. INSTALL ALL PERMANENT WATER DRAINAGE AND DIVERSION DITCHES. IN AREAS OF LONG SLOPES, IT MAY BE DESIRABLE TO INSTALL ANGLED DIVERSION DITCHES TO AID IN CONTROLLING WATER RUNOFF AND EROSION.
5. STOCKPILED TOPSOIL SHOULD BE RE-SPREAD OVER DISTURBED AREA. TOPSOIL SHOULD NOT BE ADDED TO SLOPES STEEPER THAN 2:1 UNLESS GOOD BONDING TO THE SUB-SOIL CAN BE ACHIEVED.
6. PRIOR TO SEEDING, SOIL SHOULD BE LOOSENED BY DISKING, BULLDOZER TRACKING, ETC. NOTE THAT BULLDOZER TRACKING CAN COMPACT WET CLAY SOILS AND RESTRICT ESTABLISHMENT OF VEGETATION.
7. MAINTAINING SEDIMENT BARRIERS IS CRITICAL UNTIL VEGETATION IS REESTABLISHED. TEMPORARY SEDIMENT CONTROL DEVICES SUCH AS SUPER SILT FENCING SHALL BE REMOVED ALONG WITH SEDIMENT AFTER AT LEAST A 70% VEGETATIVE COVER IS ESTABLISHED.
8. DURING SITE RECLAMATION ALL FILL AREAS SHALL BE COMPACTED IN 24" MINIMUM LIFT THICKNESS (12" RECOMMENDED) WITH A VIBRATING SHEEPSFOOT ROLLER TO 90% COMPACTION PER STANDARD PROCTOR DENSITY, ASTM D-698. MOISTURE CONTENT WILL BE CONTROLLED IN ACCORDANCE WITH THE STANDARD PROCTOR TEST (ASTM D-698) RESULTS.

N

50 25 0 50
SCALE: 1 INCH=50 FEET

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
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2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-

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PROJ. NO. 133141
ACAD FILE: RECLAMATION PLAN.dwg

MACKAY WELL & W.C. PAD RECLAMATION PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY
WEST VIRGINIA

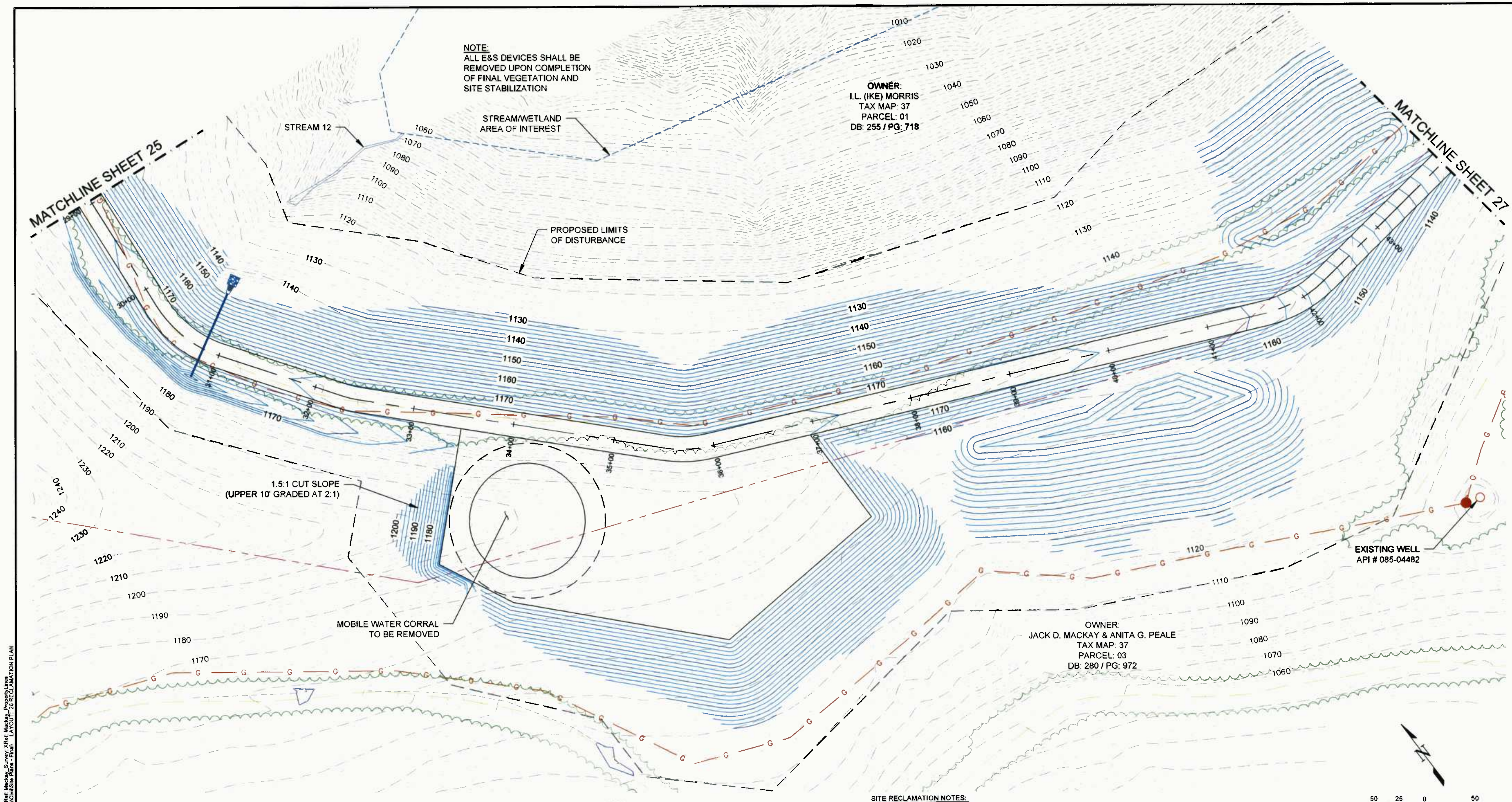
DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

CONSTRUCTION

25

25 of 27 sheets

PLOTTED: 03 Mar 2014, 12:14pm, rparker



ISSUED FOR CONSTRUCTION

NOTES:

1. MUNICIPAL BOUNDARY LINES SHOWN ARE APPROXIMATE IN LOCATION, BASED ON MAPS BY OTHERS, AND MAY NOT CORRESPOND TO THE LEGAL LOCATION.
2. UTILITY LOCATIONS SHOWN ARE APPROXIMATE AND NOT GUARANTEED TO BE COMPLETE.
3. NO PERMANENT PUBLIC SANITARY SEWER NOR POTABLE WATER IS PROPOSED AT THE SITE.
4. NO BUFFER AREAS, PLANTINGS, OR LANDSCAPING ARE PROPOSED AT THE SITE. NO PERMANENT OPEN SPACE OR PUBLIC USE AREAS ARE PROPOSED AT THE SITE.
5. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE (FIRM) PANELS 54085C0225C & 54017C0220C INDICATES FLOOD ZONE A IS WITHIN THE PROJECT AREA.
6. ALL PROPOSED SLOPES ARE 2H:1V EXCEPT WHERE NOTED.
7. FILL OVER 50 VERTICAL FEET ON SPOIL PAD NEEDS A 10' BENCH.
8. FILL SLOPES SHALL BE TOE KEYED PER THE OVERALL PLAN ON SHEET 6, AND THE DETAIL SHOWN ON SHEET 21.

SITE RECLAMATION NOTES:

1. THE WATER CORRAL MUST BE REMOVED PRIOR TO BACKFILLING THE WATER CONTAINMENT PAD. ANY REMAINING FLUID MUST BE DISPOSED OF IN AN APPROVED MANNER.
2. DRILL CUTTINGS, DRILLING MUD AND LINER, FOR WELLS PERMITTED UNDER WV CODE 22-6A AND 35CSR-8, MUST BE REMOVED FROM SITE AND DISPOSED OF AT AN APPROVED SOLID WASTE FACILITY OR IF THE SURFACE OWNER CONSENTS THE DRILL-CUTTINGS AND ASSOCIATED DRILLING MUD MAY BE MANAGED ON SITE IN A MANNER APPROVED BY THE SECRETARY.
3. THE OPERATOR SHALL GRADE OR TERRACE AND PLANT, SEED OR SOD THE AREA DISTURBED THAT IS NOT REQUIRED IN PRODUCTION OF THE WELL IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN.
4. INSTALL ALL PERMANENT WATER DRAINAGE AND DIVERSION DITCHES. IN AREAS OF LONG SLOPES, IT MAY BE DESIRABLE TO INSTALL ANGLED DIVERSION DITCHES TO AID IN CONTROLLING WATER RUNOFF AND EROSION.
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6. PRIOR TO SEEDING, SOIL SHOULD BE LOOSENED BY DISKING, BULLDOZER TRACKING, ETC. NOTE THAT BULLDOZER TRACKING CAN COMPACT WET CLAY SOILS AND RESTRICT ESTABLISHMENT OF VEGETATION.
7. MAINTAINING SEDIMENT BARRIERS IS CRITICAL UNTIL VEGETATION IS REESTABLISHED. TEMPORARY SEDIMENT CONTROL DEVICES SUCH AS SUPER SILT FENCING SHALL BE REMOVED ALONG WITH SEDIMENT AFTER AT LEAST A 70% VEGETATIVE COVER IS ESTABLISHED.
8. DURING SITE RECLAMATION ALL FILL AREAS SHALL BE COMPACTED IN 24" MINIMUM LIFT THICKNESS (12" RECOMMENDED) WITH A VIBRATING SHEEPSFOOT ROLLER TO 90% COMPACTION PER STANDARD PROCTOR DENSITY, ASTM D-698. MOISTURE CONTENT WILL BE CONTROLLED IN ACCORDANCE WITH THE STANDARD PROCTOR TEST (ASTM D-698) RESULTS.

LEGEND

EX. INDEX CONTOUR (1360)	EX. FENCE
EX. INTERMEDIATE CONTOUR	EX. STRUCTURE
EX. TREE LINE	STREAM/WETLAND AREA OF INTEREST
EX. PROPERTY LINE	100' WETLAND BUFFER
EX. COUNTY LINE	PROP. LIMITS OF DISTURBANCE
EX. RIGHT OF WAY	PROP. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)
EX. WETLAND	PROP. INDEX CONTOUR (1360)
EX. STREAM	PROP. INTERMEDIATE CONTOUR
EX. DRAINAGE FEATURE	PROP. ROAD CENTERLINE
EX. CULVERT	PROP. PADS & ROAD EDGE
EX. GAS LINE (G)	PROP. CONSTRUCTION FENCE
EX. WATER LINE (W)	PROP. 2' WIDE BERM, JERSEY BARRIER, LARGE STONE, OR GUARD RAILS
EX. OVERHEAD POWER LINE (OHW)	PROP. PAD PERIMETER SUMP
EX. UTILITY POLE	PROP. WELL HEAD
EX. ROAD	PROP. PVC PIPE FOR SUMP SYSTEM
EX. TRAIL	PROP. FRENCH DRAIN

NO.	REVISION	BY	DATE
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

MACKAY WELL & W.C. PAD RECLAMATION PLAN

ANTERO RESOURCES CORPORATION
MACKAY WELL & W.C. PAD
CLAY & CENTRAL DISTRICT
RITCHIE & DODDRIDGE COUNTY WEST VIRGINIA

KLEINFELDER
Bright People. Right Solutions.
230 EXECUTIVE DRIVE, SUITE 122
CRANBERRY TOWNSHIP, PA 16066
PH. 724-772-7072 FAX. 724-772-7079
www.kleinfelder.com

PROJ. NO. 133141
ACAD FILE: RECLAMATION PLAN.dwg

SEAL
JEFFERY B. CRISP
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

DESIGNED BY: RAP
MODIFIED BY: -
CHECKED BY: JBC
DATE: 03-03-2014
SCALE:
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
0 0.5 1.0 1.5 2.0

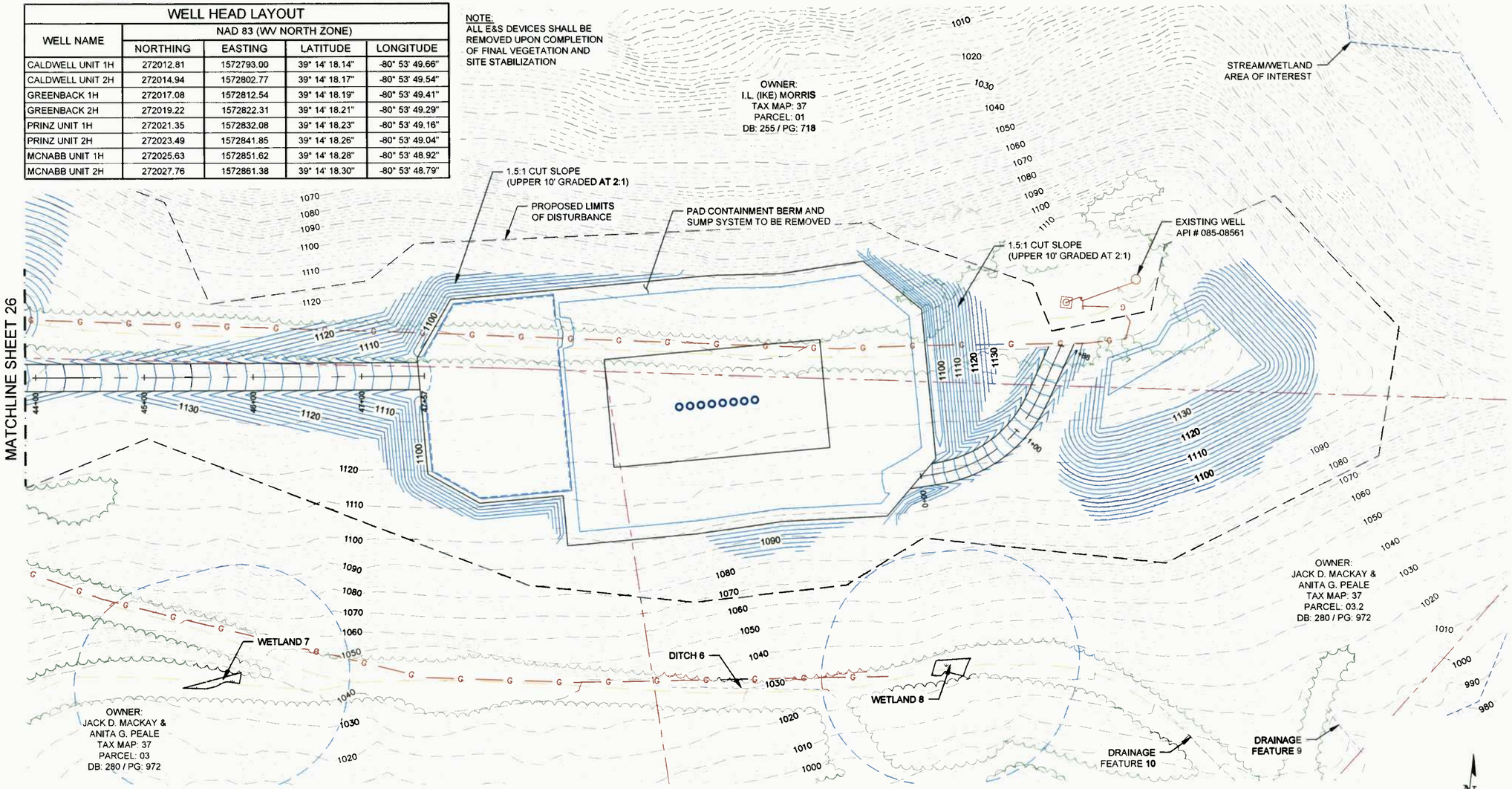
CONSTRUCTION
26
26 of 27 sheets

PLOTTED: 03 Mar 2014, 12:14pm, rparker

REVISED BY CAL

WELL HEAD LAYOUT				
WELL NAME	NAD 83 (WV NORTH ZONE)			
	NORTHING	EASTING	LATITUDE	LONGITUDE
CALDWELL UNIT 1H	272012.81	1572793.00	39° 14' 18.14"	-80° 53' 49.66"
CALDWELL UNIT 2H	272014.94	1572802.77	39° 14' 18.17"	-80° 53' 49.54"
GREENBACK 1H	272017.08	1572812.54	39° 14' 18.19"	-80° 53' 49.41"
GREENBACK 2H	272019.22	1572822.31	39° 14' 18.21"	-80° 53' 49.29"
PRINZ UNIT 1H	272021.35	1572832.08	39° 14' 18.23"	-80° 53' 49.16"
PRINZ UNIT 2H	272023.49	1572841.85	39° 14' 18.26"	-80° 53' 49.04"
MCNABB UNIT 1H	272025.63	1572851.62	39° 14' 18.28"	-80° 53' 48.92"
MCNABB UNIT 2H	272027.76	1572861.38	39° 14' 18.30"	-80° 53' 48.79"

NOTE:
ALL E&S DEVICES SHALL BE REMOVED UPON COMPLETION OF FINAL VEGETATION AND SITE STABILIZATION



LEGEND

- EX. INDEX CONTOUR (1360)
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- EX. TREE LINE
- EX. PROPERTY LINE
- EX. COUNTY LINE
- EX. RIGHT OF WAY
- EX. WETLAND
- EX. STREAM
- EX. DRAINAGE FEATURE
- EX. CULVERT
- EX. GAS LINE (G)
- EX. WATER LINE (W)
- EX. OVERHEAD POWER LINE (OHW)
- EX. UTILITY POLE
- EX. ROAD
- EX. TRAIL
- EX. FENCE (X)
- EX. STRUCTURE
- STREAM/WETLAND AREA OF INTEREST
- 100' WETLAND BUFFER
- PROP. LIMITS OF DISTURBANCE
- PROP. 100-YEAR FLOODPLAIN (BASED ON HEC-RAS STUDY)
- PROP. INDEX CONTOUR (1360)
- PROP. INTERMEDIATE CONTOUR
- PROP. ROAD CENTERLINE
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N

50 25 0 50
SCALE: 1 INCH=50 FEET

ISSUED FOR CONSTRUCTION

SEAL

JEFFERY B. CRISS
REGISTERED
20354
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER

NO.	REVISION	BY	DATE
1	-	-	-
2	-	-	-
3	-	-	-
4	-	-	-
5	-	-	-
6	-	-	-

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2100 EXECUTIVE DRIVE, SUITE 122
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PH. 724-772-7072 FAX. 724-772-7079
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ACAD FILE: RECLAMATION PLAN.dwg

MACKAY WELL & W.C. PAD RECLAMATION PLAN

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CLAY & CENTRAL DISTRICT
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CONSTRUCTION

27

27 of **27** sheets

PLOTTED: 03 Mar 2014, 12:15pm, rparker

ATTACHED IMAGES
ATTACHED XREFS XRef ANTERO 11x17 TITLE BLOCK; XRef Mackay_Base; XRef Mackay_Civil; XRef Mackay_Survey; XRef Mackay_PropertyLines
CAD FILE G:\Clients\Antero\Facilities\Mackay\Design\Civil\Site Plans - Final\ LAYOUT - 27 RECLAMATION PLAN

10-15-12 REVISED BY CAL