



Alton Coal Development, LLC

463 North 100 West, Suite 1

Cedar City, Utah 84720

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March 5, 2015

Daron R. Haddock
Coal Program Manager
Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

C/025/0005
Received 3/5/2015
Task ID #4811

Subject: **Engineering Evaluation of Reconstructed Lower Robinson Creek, Alton Coal Development, LLC, Coal Hollow Mine, Kane County, Utah, C/025/0005, Task ID #4776**

Dear Mr. Haddock,

In compliance with Citation 16149, Alton Coal Development, LLC (ACD) has had a professional engineer evaluate the reconstructed Lower Robinson Creek. Appendix 5-10 "Evaluation and Erosion control Design of the Reclaimed Lower Robinson Creek Channel is being submitted for approval. Upon approval ACD will resume reconstruction of the channel utilizing the designs recommended in Appendix 5-10.

Changes to the MRP associated with this amendment have been uploaded to the DOGM's server for review. PDF versions of the drawing are not certified. Upon approval, 2 (two) clean hard copies of the text and certified drawings for insertion into the MRP will be submitted. Please do not hesitate to contact me if you have any questions 435-691-1551.

Sincerely

B. Kirk Nicholes
Environmental Specialist

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Alton Coal Development, LLC

Mine: Coal Hollow Mine

Permit Number:

C/025/0005

Title: Engineering evaluation of Lower Robinson Creek Reconstruction

Description, Include reason for application and timing required to implement:

Result of Citation 16149

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- | | | | | | |
|-------------------------------------|-------------------------------------|-----|-------------------------------------|----|---|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ <input type="checkbox"/> increase <input type="checkbox"/> decrease. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 6. Does the application require or include public notice publication? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 7. Does the application require or include ownership, control, right-of-entry, or compliance information? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 9. Is the application submitted as a result of a Violation? NOV # <u>16149</u> |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 10. Is the application submitted as a result of other laws or regulations or policies?
<i>Explain:</i> _____ |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 15. Does the application require or include soil removal, storage or placement? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 20. Does the application require or include subsidence control or monitoring? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 21. Have reclamation costs for bonding been provided? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Yes | <input checked="" type="checkbox"/> | No | 24. Does the application include confidential information and is it clearly marked and separated in the plan? |

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

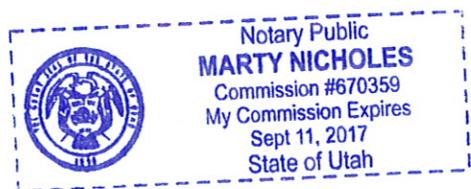
I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

<u>B. Kirk Nicholes</u>	<u>Environmental Specialist</u>	<u>03/03/2015</u>	
Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 4 day of March, 2015

Notary Public: , state of Utah.

My commission Expires: <u>9-11-2017</u>	}	
Commission Number: <u>670359</u>	}	
Address: <u>1670 E Millstone Cir</u>	}	
City: <u>Enoch</u> State: <u>UT</u> Zip: <u>84721</u>	}	



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553.800	Backfilling and Grading: Thick Overburden	5-80
560	Performance Standards	5-84

APPENDICES

5-1	Geotechnical Analysis - Sediment Impoundments and Excess Spoil Structure
5-2	Sediment Impoundment and Diversion Structure Analysis
5-3	Robinson Creek Culvert and Diversion Analysis
5-4	Coal Hollow Mine Blasting Plan
5-5	Reclamation Slope Stability Evaluation/Analysis
5-6	Post-Mining Roads Backfill Analysis
5-7	Location of & Standards and Specifications for ASCAs and ASCMs in use at Coal Hollow Mine
5-8	Feasibility of Highwall Mining the Smirl Seam at the Alton Coal Development, LLC Coal Hollow Mine
5-9	Norwest Corporation Underground Letter Reports
<u>5-10</u>	<u>Evaluation and Erosion Control Design of the Reclaimed Lower Robinson Creek Channel Coal Hollow Mine</u>

DRAWINGS

General

5-1	Pre-mining Topography
5-2	Disturbance Sequence

Facilities (5-3 to 5-8C)

5-3	Facilities and Structures Layout
5-3A	Culverts
5-3B	Underground Facilities and Structures Layout
5-4	Loadout Elevation View 1
5-5	Loadout/Stockpile Elevation View 2
5-6	Office Elevation View
5-7	Maintenance Shop Elevation View
5-8	Wash Bay, Oil and Fuel Storage Elevation View
5-8A	Wash Bay Equipment Layout
5-8B	Facilities and Structural – Electrical
5-8C	Facilities and Structural – Water Plan

Coal Recovery (5-9 to 5-14)

5-9	Coal Extraction Overview
5-10	Coal Removal Sequence
5-11	Shallow Coal Recovery Cover Cross Section
5-12	Deep Coal Recovery Cross Section
5-13	Strip Ratio Isopach
5-14	Coal Thickness Isopach

Overburden Handling (5-15 to 5-19)

5-15	Overburden Isopach
5-16	Overburden Removal Sequence

Appendix 5-10

**EVALUATION AND EROSION CONTROL DESIGN
OF THE RECLAIMED
LOWER ROBINSON CREEK CHANNEL
COAL HOLLOW PROJECT**

EVALUATION AND EROSION CONTROL DESIGN
OF THE RECLAIMED
LOWER ROBINSON CREEK CHANNEL
COAL HOLLOW PROJECT



BY
DAN W. GUY
REGISTERED PROFESSIONAL ENGINEER
STATE OF UTAH

EVALUATION AND EROSION CONTROL DESIGN
OF THE RECLAIMED
LOWER ROBINSON CREEK CHANNEL
COAL HOLLOW PROJECT

Evaluation

The Lower Robinson Creek channel has been reclaimed and reseeded; however, it will not be connected to the original drainage for at least 3 growing seasons. Diversion Ditch 4 has been extended along the channel and will continue to divert runoff to Sediment Pond 3. This means the reclaimed channel will only see direct precipitation until vegetation is firmly established. The original design of the reclaimed channel is shown on drawings 5-20A and 5-21A of the MRP. These designs show a channel with 12" minimum rip-rap in the bottom 10' of the channel. The channel side slopes were to be 2H:1V in the rip-rap section, 10H:1V in the floodplain and 3H:1V to the top of the channel. The actual reclaimed channel has an average bottom width of 3.2', with average 2.36H:1V side slopes and an average depth of approximately 8'. No rip-rap was placed in the restored channel; however, the entire channel has been seeded with the approved seed mix for the Coal Hollow Project (Table 3-37 of the MRP) and will be enhanced with willow cuttings to further provide erosion control.

This evaluation was performed to assess the adequacy of the restored channel. It was based on an erodible soil with stable vegetation, using the 10 year – 6 hour design flow of 83.5 cfs, taken from MRP Appendix 5-3, "Lower Robinson Creek Culvert and Diversion Analysis", by Dr. James E. Nelson.

Calculations were performed using the Office of Surface Mining Storm Program 6.20, by Gary E. McIntosh. A conservative value of 5.0 fps was used as the allowable velocity in this channel to prevent erosion. This value was selected from Table 3.4, Permissible Velocities for Vegetated Channels, "Applied Hydrology and Sedimentology for Disturbed Areas", by Barfield, Warner and Haan. Based on a review of numerous websites and Table 3.1, Typical Values for Manning's n, in the above referenced "Applied Hydrology and Sedimentology for Disturbed Areas", by Barfield, Warner and Haan, a Manning's number (n) of 0.030 was considered reasonable for the vegetated channel.

The flow calculations were performed on the average channel configuration, based on 6 cross-sections taken along the length of the reclaimed channel. The following is a list of parameters used in the calculations:

- Design Flow - 83.5 cfs
- Bottom Width - 3.2 ft.
- Side Slopes - 2.36H:1V
- Channel Slope - 1.83%
- Manning's n - 0.030

Using the above criteria, the calculated flow velocity would be 6.84 fps at a depth of 1.70 feet. Since this velocity is slightly above the estimated allowable velocity of 5.0 fps for vegetated channels, a further evaluation was performed using rock check dams at various intervals to reduce the effective slope of the channel and the velocity of flows. It was determined that placement of 3.0' high rock check dams at the intervals shown below, would provide velocity control by effectively reducing the average slope to 0.75%. When this slope is used with the above criteria, the calculated velocity is 4.91 fps at a depth of 2.09 feet. This is within the allowable limits of velocity for vegetated channels, and is also well below the depth limitation for the reclaimed channel. The reclaimed channel is shown on Figure 1 "Robinson Creek Reconstruction Plan View".

Check Dams

Proposed check dam locations are based on the surveyed channel configuration and are shown on Figure 2 "Robinson Creek Reconstruction Design and Details". The locations of the proposed 3' high rock check dams are at the following station locations on the profile:

- 350'
- 500'
- 1000'
- 1300'

It is also proposed that a 4' high check dam be constructed at location 1500'. This dam will tie into the designed rip-rap transition into the main channel below. The locations of the proposed dams are based on the ground survey and actual slopes of the reclaimed channel.

The check dams are proposed to be constructed of 6" D50 rip-rap material or 4" - 6" grouted rock. The entire dam and apron will be underlain by erosion control fabric, keyed-in to the sides and bottom of the channel. A typical design of the check dam is shown on Drawing 5-21A "Robinson Creek Reconstruction Design and Details".

The following criteria were used to calculate the flows after the check dams are in place:

- Design Flow - 83.5 cfs
- Bottom Width - 8.0 ft.
- Side Slopes - 2H:1V
- Channel Slope - 0.75 %
- Manning's n - 0.030

Using the above criteria, the calculated flow velocity would be 4.76 fps at a depth of 1.57 feet. This would be well within the allowable velocity and depth for this channel at the design flow.

It should be noted that although the entire channel may not achieve an 8' bottom width between the check dams, the calculations show the velocities to be less than 5 fps for even the existing bottom width of 3.2' (4.91 fps at 2.09' depth); therefore, the reduction of the effective slope between dams is the critical factor in controlling the erosion of the channel.

Transition to Main Channel

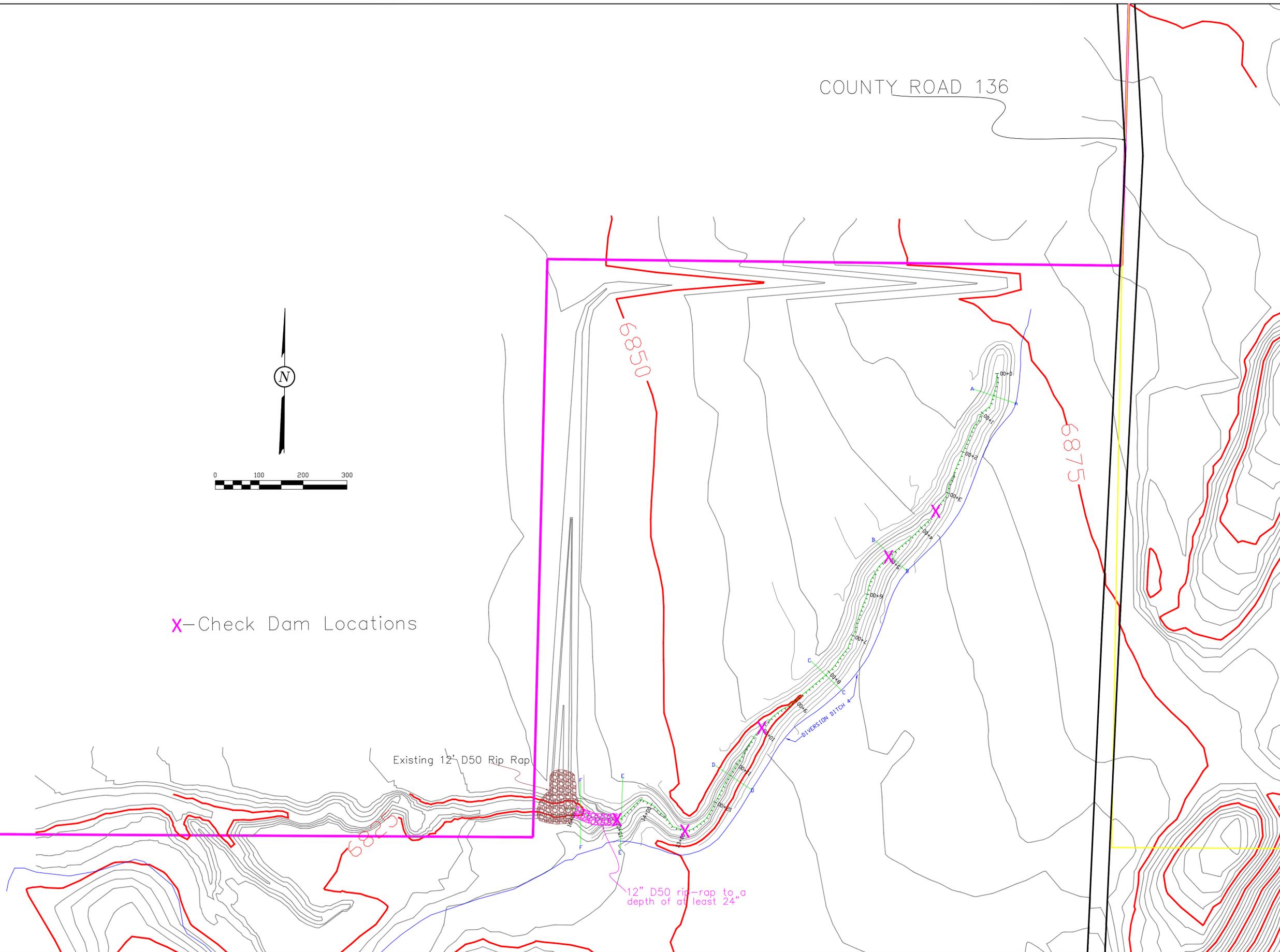
At approximately location 1500' of the reclaimed channel, the configuration and slope change to blend into the main rip-rapped channel below. At this point, the reclaimed channel becomes more "U"-shaped with an approximate 4' bottom width, 1H:1V to 1.8H:1V side slopes and an average slope of 8.0%. When the design runoff of 83.5 cfs is routed through this section, calculations show a velocity of 12.35 fps at a depth of 1.18 feet. Since this is an erosive velocity, it is proposed to rip-rap the entire section from station 1500' to the existing main channel at approximately station 1700'.

It is projected to place erosion control fabric along the entire length of this section, and at least 10' up each side slope, making sure the fabric is keyed-in to prevent undercutting. The section will then be lined with 12" D50 rip-rap to a depth of at least 24". To provide a smoother transition, it is planned to place the rip-rap to create a channel with a minimum 6' bottom width and side slopes not to exceed 1.5H:1V. The rip-rap should be properly graded or grouted.

The flow characteristics through the transition zone were evaluated using the criteria after placement of the rip-rap with the above channel dimensions. The following are the parameters used:

- Design Flow - 83.5 cfs
- Bottom Width - 6.0 ft.
- Side Slopes - 1.5H:1V
- Channel Slope - 8.0%
- Manning's n - 0.038 (Considered conservative for large rock lining).

Using the above criteria, the calculated flow velocity would be 9.91 fps at a depth of 1.10 feet. The attached Rip-Rap Chart in Figure 3 shows that 12" D50 rock is considered adequate to resist displacement at the projected velocity in the transition area. This rip-rap sizing will also match and tie into the existing, repaired outfall of the Robinson Creek diversion.



X—Check Dam Locations

Existing 12" D50 Rip Rap

12" D50 rip-rap to a depth of at least 24"

COUNTY ROAD 136

LEGEND:
 PERMIT BOUNDARY
 FEDERAL COAL OWNERSHIP
 FOUND SECTION CORNER

**ROBINSON CREEK
 RECONSTRUCTION
 PLAN VIEW**

COAL HOLLOW
 PROJECT
 ALTON, UTAH

FIGURE 1

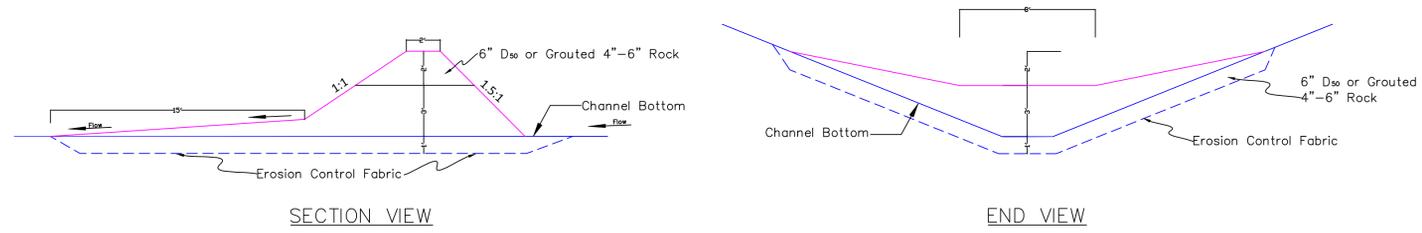
REVISIONS	
DATE:	BY:

DRAWN BY: K. NICHOLS	CHECKED BY:
DRAWING: Figure 1	DWG
JOB NUMBER: 1400	DATE: 02/16/15
	SCALE: 1" = 100'
	SHEET



Coal Hollow Project
 463 North 100 West, Suite 1
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 Phone: (435)867-5331
 Fax: (435)867-1192

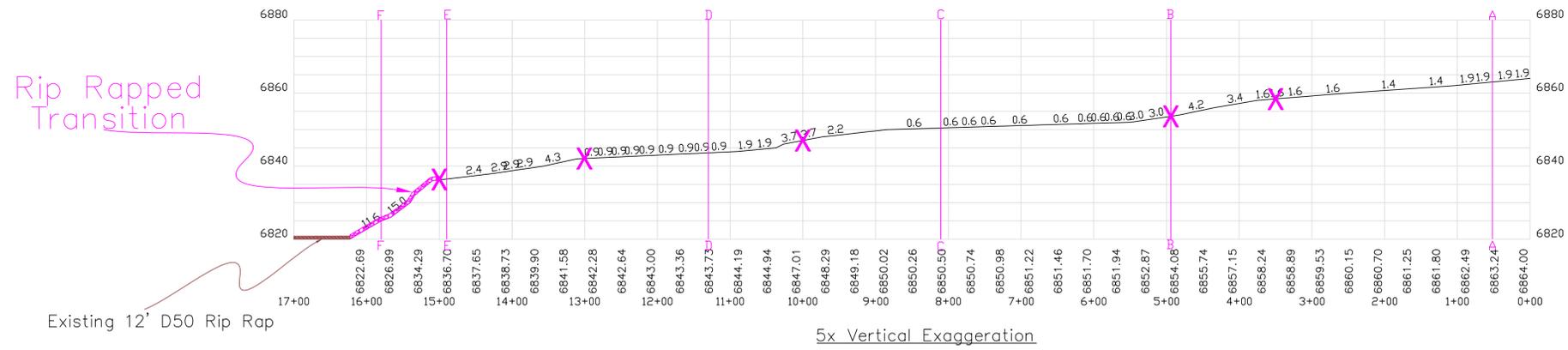
LOWER ROBINSON CHECK DAM TYPICAL



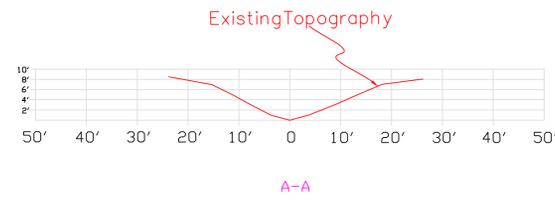
SECTION VIEW

END VIEW

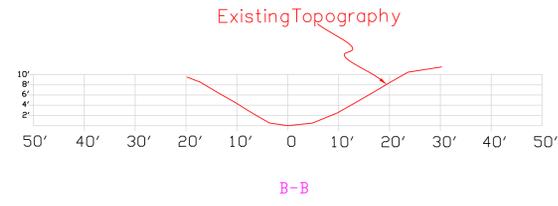
RECONSTRUCTED LOWER ROBINSON CREEK PROFILE



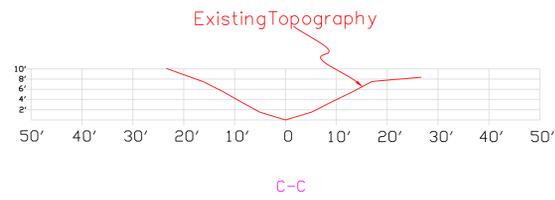
X-Check Dam Locations



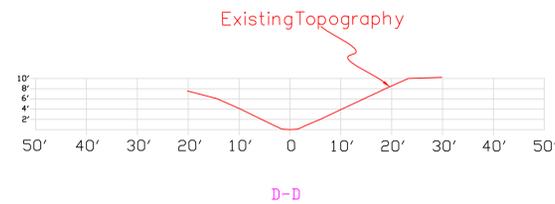
A-A



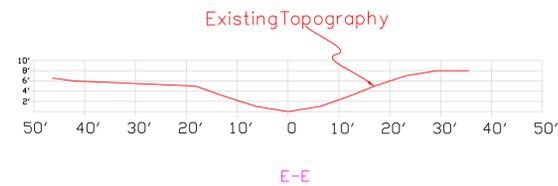
B-B



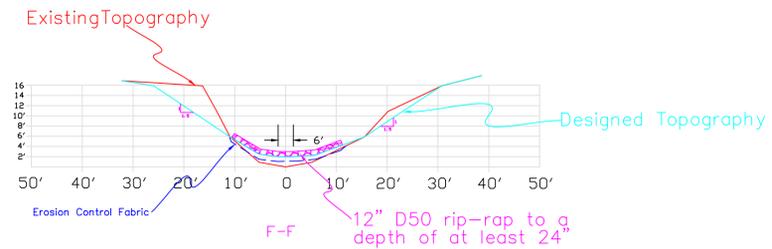
C-C



D-D



E-E



F-F

Coal Hollow Project
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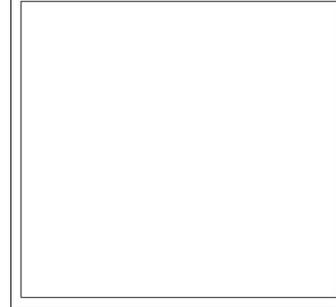
ROBINSON CREEK
 RECONSTRUCTION
 DESIGN & DETAILS

COAL HOLLOW
 PROJECT
 ALTON, UTAH

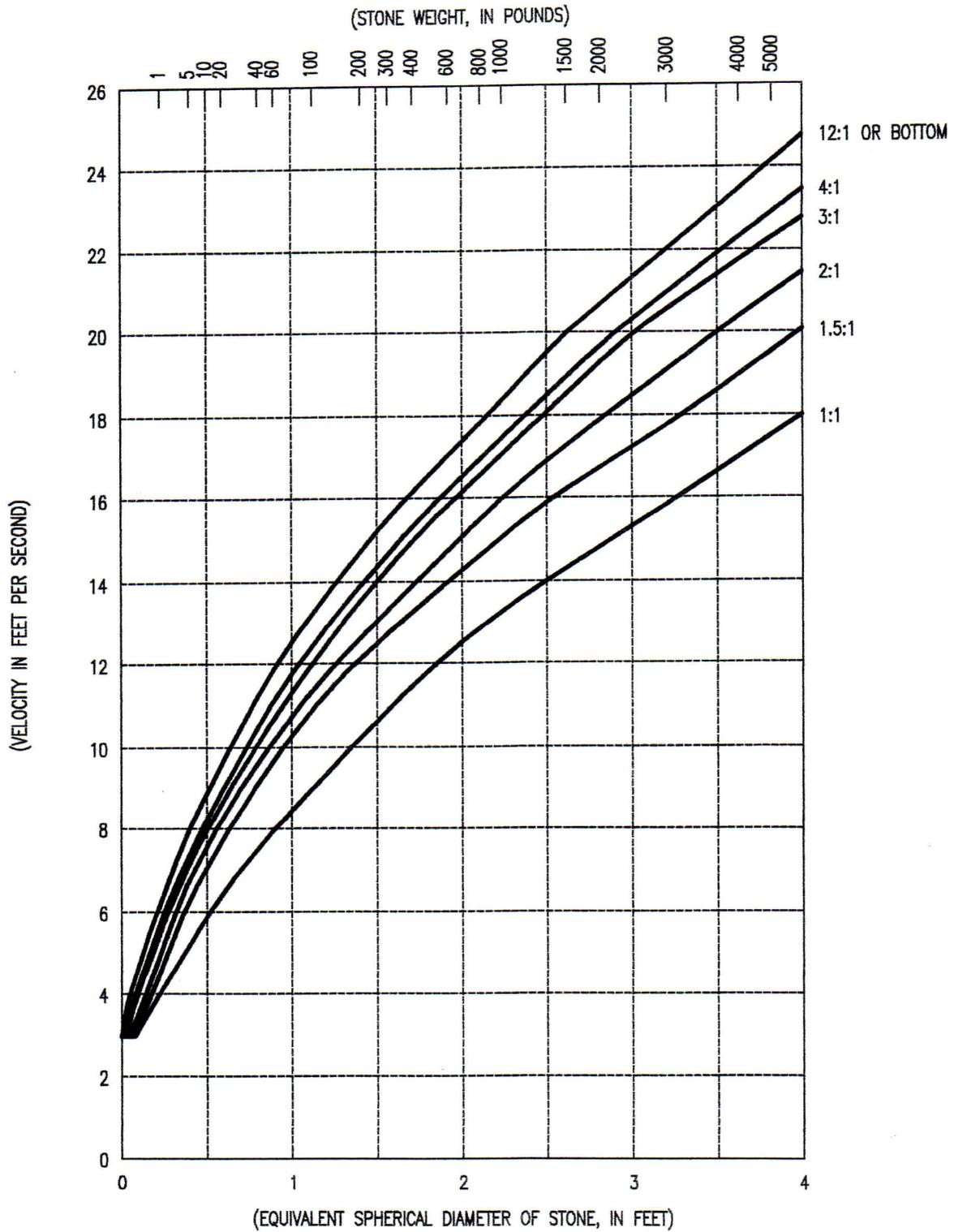
FIGURE 2

REVISIONS	
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DRAWN BY:	CHECKED BY:
K. NICHOLS	DWG
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	SHEET



RIP-RAP CHART



SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

NOTE:

ADAPTED FROM REPORT OF SUBCOMMITTEE ON SLOPE PROTECTION, AM. SOC. CIVIL ENGINEERS PROC. JUNE 1948.
FOR STONE WEIGHING 165 LBS. PER CUBIC FEET.

Figure 3