

0017

CASTLE GATE HOLDING COMPANY

Castle Gate Mine
P.O. Box 30
847 NW HWY 191
Helper, Utah 84526
(435)472-0475
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September 21, 2004

*INCOMING
10070004 OK
Task ID# 2038*

Ms. Pamela Grubaugh-Littig
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Re: Phase I Bond Release Application, Sowbelly Substation Area, Castle Gate Mine, C/007/004, Castle Gate Holding Company, Carbon County, Utah

Dear Ms. Grubaugh-Littig:

Castle Gate Holding Company (CGHC) is submitting the aforementioned. If you have any questions or need additional information, please do not hesitate to Dennis Ware at (435) 472-4737.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

Enclosures

File in:
 Confidential
 Shelf
 Expandable
Refer to Record No. *0017* Date *09212004*
In C *10070004.004 Incoming*
For additional information

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SEP 24 2004

DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESS

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Castle Gate Holding Company

Mine: Castle Gate Mine

Permit Number: C/007/004

Title: Sowbelly Substation Area Phase I Bond Release

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

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

- | | |
|---|---|
| <input 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"/> Yes <input checked="" type="checkbox"/> No | 2. Is the application submitted as a result of a Division Order? DO# _____ |
| <input 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"/> Yes <input checked="" type="checkbox"/> No | 4. Does the application include operations in hydrologic basins other than as currently approved? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 6. Does the application require or include public notice publication? |
| <input 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"/> 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"/> Yes <input checked="" type="checkbox"/> No | 9. Is the application submitted as a result of a Violation? NOV # _____ |
| <input 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"/> Yes <input checked="" type="checkbox"/> No | 11. Does the application affect the surface landowner or change the post mining land use? |
| <input 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"/> Yes <input checked="" type="checkbox"/> No | 13. Does the application require or include collection and reporting of any baseline information? |
| <input 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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 15. Does the application require or include soil removal, storage or placement? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 16. Does the application require or include vegetation monitoring, removal or revegetation activities? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 17. Does the application require or include construction, modification, or removal of surface facilities? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 18. Does the application require or include water monitoring, sediment or drainage control measures? |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 19. Does the application require or include certified designs, maps or calculation? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 20. Does the application require or include subsidence control or monitoring? |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 21. Have reclamation costs for bonding been provided? |
| <input 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"/> Yes <input checked="" type="checkbox"/> No | 23. Does the application affect permits issued by other agencies or permits issued to other entities? |

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) 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.

JOHNNY PAPPAS
Print Name

[Signature] Sr. Env. Engineer, 9/20/04
Sign Name, Position, Date

Subscribed and sworn to before me this 20th day of SEPTEMBER, 2004

Britanie Hackwell
Notary Public



My commission Expires: _____
Attest: State of UTAH JULY 4, 2004 } ss:
County of CARBON

For Office Use Only: 	Assigned Tracking Number: 	Received by Oil, Gas & Mining <div style="text-align: center; font-size: 1.2em; font-weight: bold;">RECEIVED</div> <div style="text-align: center; font-size: 1.2em; font-weight: bold;">SEP 24 2004</div> <div style="text-align: center;">DIV. OF OIL, GAS & MINING</div>
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TABLE 3.1-2
SUMMARY OF BONDING AND RECLAMATION COSTS

SITE	DISTURBED ACRES	BONDING AMOUNT
Sowbelly Canyon (Gulch)	21	233,000 148,000
Hardscrabble Canyon	39	318,100 235,000
Adit No. 1	3	129,054
TOTAL	63	680,154 512,054

SECTION 3.2
SOWBELLY CANYON
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SUMMARY AND CALCULATIONS

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Rip-rap sizes and depths have also been verified in the field. Certification statements for the various ditch sections and rip-rap are provided in Appendix 3.2C.

Detailed reclamation hydrology data is provided in Tables 3.2-2 through 3.2-9. Reclamation "As-Built" Hydrology calculations are provided in Appendix 3.2G.

Filter Blanket - Soil tests were performed on all ditch sections in 1994 by EarthFax Engineering, Inc., and previously provided to the Division. Based on these tests, filter blanket was required only on the areas of SBRD-1 using the larger rip-rap. Therefore, the only areas of reclaimed channel which have filter blanket beneath the rip-rap are sections SBRD-1A, SBRD-1B, and SBRD-1C. In all other reclaimed channels, and on section SBRD-1D, the rip-rap was placed directly on the native soil. (See Appendix 3.2D).

Substation Area - This area was reclaimed in 2003. The affected area was reshaped, mulched with approximately 2-ton per acre of noxious weed-free hay, deep gouged, reseeded, mulched with approximately 1.5 ton per acer noxious weed-free straw and 500 pounds per acre of a hydromulch and tackifier mix.

SBRD-5 - This diversion was constructed along the entire slope, thereby removing the need for the installation of culvert SBRC-2.

SBRD-3 - This diversion was also extended thereby removing the need for the installation of culvert SBRC-3.

SBRD-6 - This diversion was constructed.

SBRD-7 - This diversion was divided into two segments, 7A and 7B, to account for an additional watershed due to the existing culvert SBRC-1 being located further down the county road.

As-built reclamation conditions and certification of diversions and culverts is presented in Appendix 3.2 G. The location of the reclamation features is shown on Exhibit 3.2-13.

3.2-5(4) Alternate Sediment Control Measures

After the initial reclamation was performed in 1993-1994, a number of deficiencies remained unresolved, preventing issuance of Phase I Bond Release. Based on discussions with UDOGM, the company agreed to re-reclaim a substantial portion of the site. This reclamation was completed in 1995, and included the following significant items:

- (1) Reconstruction and/or repair of most of reclaimed channel SBRD-1 and all of SBRD-4;
- (2) Removal of Reclaimed Ponds 016 and 017;
- (3) Removal of the temporary access road (A-2);
- (4) Regrading of approximately 75% of the reclaimed site;
- (5) Heavy surface roughening with hay mulch incorporation of the reclaimed areas;
- (6) Broadcast reseeding and straw mulching of the re-reclaimed areas.

The main effect of the elimination of the sedimentation ponds and re-reclamation was to convert the entire reclaimed site into an Alternate Sediment Control Area or ASCA. The alternate sediment control has been accomplished by the application of the following methods:

- (1) Deep surface ripping and roughening;
- (2) Mulch and/or chemical tacifier;
- (3) Erosion control netting (upper road);

Each of the separate areas and treatment methods are shown on Exhibit 3.2-13.

A summary and calculations for the "As-Built" Alternate Sediment Control measures is

provided in Appendix 3.2I.

The alternate sediment controls constructed during Phase II reclamation will be inspected quarterly or after every major storm event. Observations made during these inspections, as well as corrective actions taken, will be recorded. Corrections to any weaknesses in the implementation of the sediment control plan will be remedied immediately to prevent future sediment runoff into the main stream channel. Corrective action will be taken when a gully greater than nine inches in depth is created due to lack of vegetation establishment. Corrective action will consist of regrading of the ground surface only as necessary to fill in nine inch gullies caused by erosion, and reseeding and mulching, as necessary, to re-establish vegetation.

3.2-6 Reclamation Timetable

Phase I

- | | |
|---------------------------------|---------------------|
| 1. Demolition-structure removal | Completed Fall 1988 |
| 2. Portal sealing | Completed Fall 1988 |

Phase II

- | | |
|--|-----------------------|
| 3. Installation of reclamation sediment control structures | Completed Summer 1994 |
| 4. Grading and removal of Ponds 003, 004 and 005 | Completed Summer 1994 |
| 5. Soil Testing | Completed Summer 1995 |
| 6. Addition of soil amendments
Removal or burial of toxic and acid forming material | Completed Fall 1995 |
| 7. Seed bed preparation | Completed Fall 1994 |

- | | |
|---|---------------------|
| 8. Seeding and mulching | Completed Fall 1994 |
| 9. Reclamation to resolve deficiencies prior to Phase I Bond Release. | Completed Fall 1995 |

Phase III

- | | |
|--|---------------------------------|
| 9. Vegetation and pond maintenance | Until vegetation is established |
| 10. Reclamation and water quality monitoring | Until bond release |

Phase IV

- | | |
|--|---------------------|
| 12. Reclamation of electrical substation area, including grading, seeding and mulching | Completed Fall 2003 |
| 13. Monitoring of substation reclamation | Until bond release |

3.2-7 Reclamation Costs

Reclamation costs are included in Section 3.1-10, Table 3.1-2.

3.2-8 Stream Buffer Zone

Castle Gate Mine has Valid Existing Rights to perform underground mining and reclamation activities within 100 feet of the Sowbelly Canyon Stream Buffer Zone. The original construction within 100 feet of the intermittent stream was done prior to SMCRA. The latest construction consists of the reclamation of the main channel. However, if a disturbance is planned in an area not presently within the disturbed area boundary and falling within a stream buffer zone, then a variance will be applied for, as required by R645-301-731-600.

TABLE 3.2-8
SOWBELLY CANYON
RECLAMATION AS-BUILT HYDROLOGY CHANNEL SUMMARY

RECLAMATION DIVERSION DITCH	MINIMUM BOTTOM WIDTH (FT)	SIDE SLOPE H:V	MINIMUM DEPTH (FT.)	MAXIMUM SLOPE (%)	MINIMUM SLOPE (%)	MAXIMUM FLOW DEPTH (FT.)	FREE-BOARD (FT.)	MAXIMUM VELOCITY (FPS)
SBRD-1A	11	2.2:1	2.8	17.06	17.06	1.26	1.54	14.67
SBRD-1B	10.4	2.0:1	2.8	6.00	4.76	1.85	0.95	10.52
SBRD-1C	10	2.0:1	2.6	10.73	7.27	1.66	0.92	13.21
SBRD-1D	10	2.0:1	2.5	5.40	3.33	1.78	0.75	11.85
SBRD-2	4	2.0:1	1.2	16.24	6.06	0.15	1.07	3.81
SBRD-3 ⁽¹⁾	3.75	1.8:1	1.2	25.0	4.0	0.19	1.01	3.81
SBRD-4	3.5	1.67:1	1.0	20.61	6.00	0.27	0.73	5.83
SBRD-5 ⁽¹⁾	4.0	1.7:1	0.75	40.0	16.70	0.09	0.66	3.20
SBRD-6 ⁽¹⁾	0.0	15/2:1	1.0	8.0	4.40	0.15	0.85	2.32
SBRD-7A ⁽¹⁾	2.0	10/2:1	1.0	6.70	4.40	0.22	0.78	2.69
SBRD-7B ⁽¹⁾	3.0	13/2.7:1	0.75	7.0	4.0	0.18	0.57	2.71
*SBRD-8	3.5	1.5:1	1.3	7.14	6.09	2.45	0.00	14.51
SBRD-9	8	2.0:1	1.5	4.72	4.72	1.31	0.19	9.36
SBRD-10	6	2.0:1	1.5	6.57	6.57	0.37	1.13	5.44

* See Appendix 3.2H

⁽¹⁾ See Addendum to Appendix 3.2G

TABLE 3.2-9
SOWBELLY CANYON
RECLAMATION AS-BUILT HYDROLOGY
CULVERT SUMMARY

CULVERT	CONTRIBUTORY WATERSHEDS	TOTAL DRAINAGE AREA (ACRES)	DESIGN DISCHARGE ^(d) (CFS)	SIZE (CMP)	INLET TYPE	SLOPE (%)	PEAK VELOCITY (FPS)	RIPRAP REQUIRED ^(e) D50 (IN)
SBRC-1 ^(a)	SBRWS-U1,U2,U12	22.7 27.1	4.44 1.75 ^(e)	36"	PROJ.	3.1	3.5 2.6	NONE
SBRC-2^(b)	SBRWS-U4	17.2	4.04	-	-	-	-	-
SBRC-3^(c)	SBRWS-U3,U4,R2	44.8	2.77 ^(e)	54"	PROJ.	9	6.0	4

- (a) Operational phase culvert SBC-10 renamed SBRC-1.
- ~~(b) Culvert will be installed when sub station is removed.~~
- ~~(c) Operational phase culvert SBC-8 renamed SBRC-3.~~
- (d) Peak discharge flow calculated using the 10 year-6 hour storm event.
- (e) Culvert has the capacity to pass the peak flow from a 100 year-6 hour storm event.

ADDENDUM

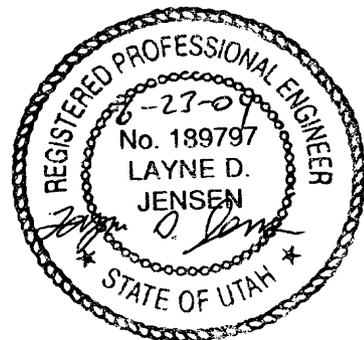
TO

APPENDIX 3.2G

RECLAMATION AS-BUILT HYDROLOGY CALCULATIONS

SUBSTATION AREA CHANNELS AND CERTIFICATIONS

*Sowbelly Canyon Substation Area As-built
Reclamation Channels and Certification*



Sowbelly Canyon Substation Area As-built
Reclamation Channels and Certification

Calculations below represent the minimum measurements of the as-built channel. Therefore the rest of the channel has a greater capacity than the cross-section modeled. Design values and Peak flows obtained from Appendix 3,2E

SBRD-3

$Q_{10-6} = 2.04 \text{ cfs}$ (From previous calculations)

	<u>as-built</u>	<u>Design</u>	
Bottom Width	3.75'	4'	See pages 4+5 for Calculation Sheets and Figures 1+2
Side Slopes	1.8:1	3:1	
Depth	1.2'	1.2'	
Riprap D_{50}	6"	3"	
min slope	4%	4%	
max slope	25%	53%	
max Flow Depth	0.19'	0.2'	
max velocity	3.81 fps	6.14 fps	

Although the minimum cross-section is smaller than the design the channel still easily handles the design event with 1' of freeboard. Although the as-built channel is smaller which would suggest a greater flow depth the depth is about the same because I used an equation for Manning's n which took into account the slope. Previous calculations did not account for how n changes with slope. See pg 16 for explanation of the channel extension beyond the App. design

SBRD-5

$Q_{10-6} = 1.04 \text{ cfs}$ (from previous Calculations)

	<u>as-built</u>	<u>Design</u>	
Bottom Width	4.0'	3.0'	See pages 6+7 for Calculation sheets and Figures 1+2
Side Slopes	1.7:1	2:1	
Depth	0.75"	1.0"	
Riprap D_{50}	6"	2.5"	
min slope	16.7%	8%	
max slope	40%	20%	
max flow Depth	0.09'	0.14'	
max flow velocity	3.2 fps	3.67 fps	

This channel can easily handle the design event. See pg 16 for an explanation of why this channel was extended beyond that shown on the approved reclamation plan.

SBRO-6

$Q_{10-6} = 0.37 \text{ cfs}$

	<u>as-built</u>	<u>Design</u>
Bottom Width	0	0
Side Slope R	15:1 + 50:1 *	3:1
Side Slope L	2:1	3:1
Depth	12"	1.2'
Riprap	roadbase	1"
min slope	4.4%	5%
max slope	8%	5%
Max. flow depth	0.15'	0.2'
max. velocity	2.32 fps	2.76 fps

See pages 8+9 for
calculation sheets and
Figures 3+4

* see figure

Channel easily handles the design event.

SBRO-7A

The culvert (SBRC-1) was placed farther down-stream than the design called for. Thus SBRO-7 is longer than planned and has a larger watershed area contributing to the channel. An additional watershed has been added (SBRWS-UR2) as seen on page 10

$CP = 75$

$\text{Area} = 192,500 \text{ ft}^2 = 4.42 \text{ Acres}$

Average slope = 57%

Hydraulic length = 700'

Time of concentration = 0.061 hrs

$Q_{10-6} = 0.34 \text{ cfs. (See pg 11)}$

Total Flow = $0.37 + 1.04 + 0.34 = 1.75 \text{ cfs}$

SBRO-7A (cont.)

	<u>as-built</u>	<u>Design</u>	
Bottom width	2'	0	
Side slope R	10:1 + 50:1	3:1	See pages 12+13 for Calculation sheets and Figures 3+4
Side slope L	2:1	3:1	
Depth	12"	1.4'	
Riprap	6"	2"	
min slope	4.4%	10%	
max slope	6.7%	10%	
max flow depth	0.22'	0.4'	
max velocity	2.69 fps	3.68 fps	

This section can easily handle the design event.

SBRO-7B

$$Q_{10-6} = 1.75 \text{ cfs}$$

	<u>as-built</u>	<u>Design</u>	
Bottom width	3'	0	
Side slope R	13:1	3:1	See pages 14+15 for Calculation sheets and Figures 3+4
Side slope L	2.7:1	3:1	
Depth	9"	1.4'	
Riprap	Rocky vegetated soil	2"	
min slope	4%	10%	
max slope	7%	10%	
max flow depth	0.18'	0.4'	
max velocity	2.71 fps	3.68 fps	

SBRD-3 MIN SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly Canyon As-Built
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.036
Slope	0.040000 ft/ft
Left Side Slope	1.80 H : V
Right Side Slope	1.80 H : V
Bottom Width	3.75 ft
Discharge	2.04 cfs

$n = 0.0456 (\text{slope} \times 0.50)^{0.159} = 0.0763$
0.04 6
 (Abt, et al. 1987)

Results	
Depth	0.19 ft < 1.2 ft
Flow Area	0.8 ft ²
Wetted Perimeter	4.55 ft
Top Width	4.45 ft
Critical Depth	0.20 ft
Critical Slope	0.034686 ft/ft
Velocity	2.56 ft/s
Velocity Head	0.10 ft
Specific Energy	0.30 ft
Froude Number	1.07
Flow Type	Supercritical

1.0' freeboard

SBRD-3 MAX SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly Canyon As-Built
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.049
Slope	0.250000 ft/ft
Left Side Slope	1.80 H : V
Right Side Slope	1.80 H : V
Bottom Width	3.75 ft
Discharge	2.04 cfs

$$n = 0.0456 (0.25 \times 6)^{0.159} = 0.49$$

Results	
Depth	0.13 ft
Flow Area	0.5 ft ²
Wetted Perimeter	4.30 ft
Top Width	4.23 ft
Critical Depth	0.20 ft
Critical Slope	0.062175 ft/ft
Velocity	<u>3.81 ft/s</u> < 5.0 fpr non erosive
Velocity Head	0.23 ft
Specific Energy	0.36 ft
Froude Number	1.89
Flow Type	Supercritical

SBRD-5 MIN SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly Canyon As-Built
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.046
Slope	0.167000 ft/ft
Left Side Slope	1.70 H : V
Right Side Slope	1.70 H : V
Bottom Width	4.00 ft
Discharge	1.04 cfs

$$n = 0.0456 (0.167 \times 6)^{0.159} = 0.046$$

Results	
Depth	0.09 ft < 0.75
Flow Area	0.4 ft ²
Wetted Perimeter	4.37 ft
Top Width	4.32 ft
Critical Depth	0.13 ft
Critical Slope	0.062753 ft/ft
Velocity	2.66 ft/s
Velocity Head	0.11 ft
Specific Energy	0.20 ft
Froude Number	1.56
Flow Type	Supercritical

$$\text{freeboard} = 0.66'$$

SBRD-5 MAX SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly Canyon As-Built
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.052 $n = 0.0456 (0.4 \times 6)^{0.159} = 0.052$
Slope	0.400000 ft/ft
Left Side Slope	1.70 H : V
Right Side Slope	1.70 H : V
Bottom Width	4.00 ft
Discharge	1.04 cfs

Results	
Depth	0.08 ft
Flow Area	0.3 ft ²
Wetted Perimeter	4.31 ft
Top Width	4.27 ft
Critical Depth	0.13 ft
Critical Slope	0.082862 ft/ft
Velocity	3.20 ft/s $< 5 \text{ ft/s} \therefore \text{not erosive}$
Velocity Head	0.16 ft
Specific Energy	0.24 ft
Froude Number	2.04
Flow Type	Supercritical

SBRD-6 MINIMUM SLOPE Worksheet for Triangular Channel

Project Description	
Worksheet	Sowbelly
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.030
Slope	0.044000 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	15.00 H : V
Discharge	0.37 cfs

Results	
Depth	0.15 ft <i>< 1.0' ∴ ok</i>
Flow Area	0.2 ft ²
Wetted Perimeter	2.65 ft
Top Width	2.60 ft
Critical Depth	0.16 ft
Critical Slope	0.030841 ft/ft
Velocity	1.85 ft/s
Velocity Head	0.05 ft
Specific Energy	0.21 ft
Froude Number	1.18
Flow Type	Supercritical

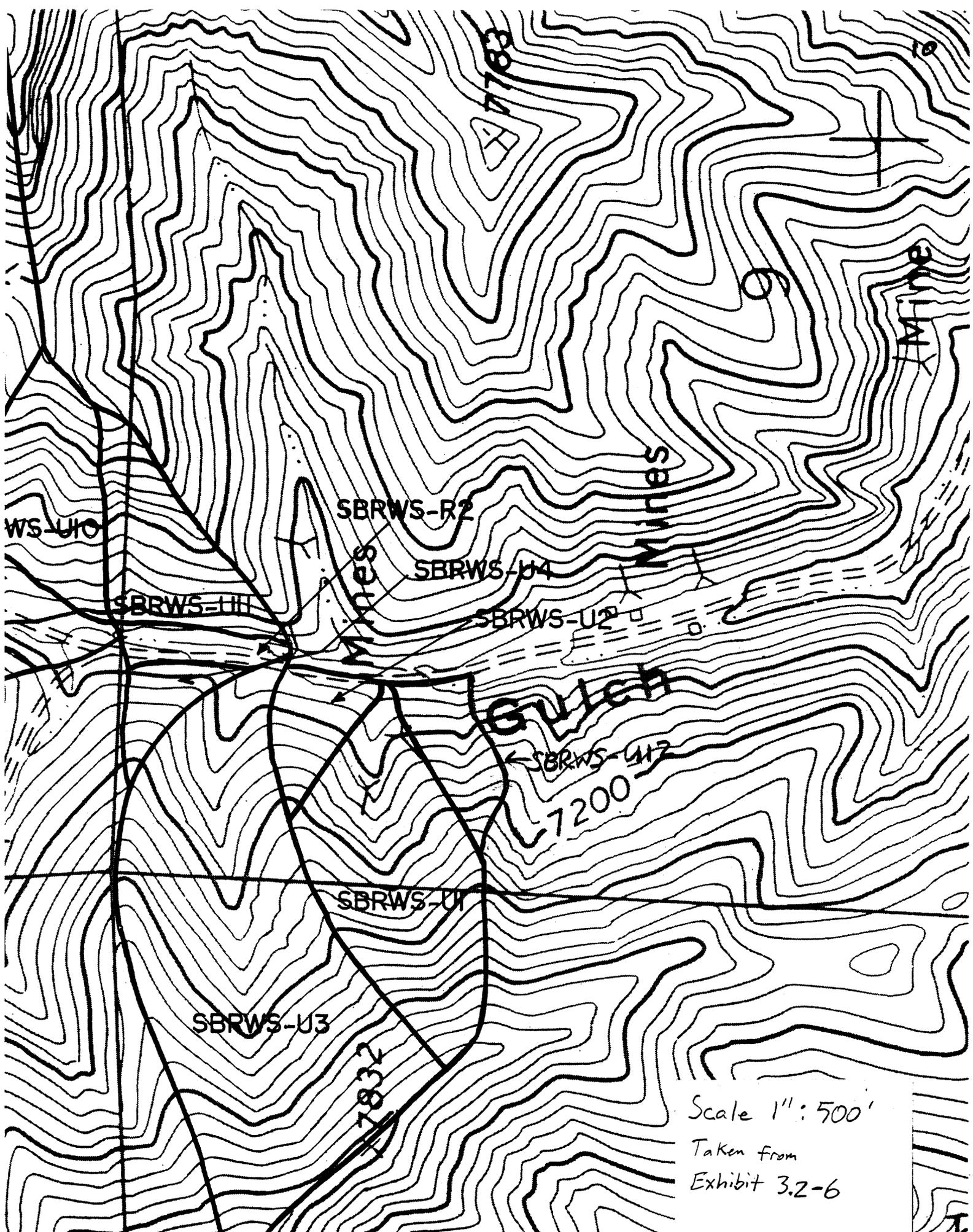
freeboard = 0.85'

SBRD-6 MAXIMUM SLOPE Worksheet for Triangular Channel

Project Description	
Worksheet	Sowbelly
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.030 <i>road base</i>
Slope	0.080000 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	15.00 H : V
Discharge	0.37 cfs

Results	
Depth	0.14 ft
Flow Area	0.2 ft ²
Wetted Perimeter	2.37 ft
Top Width	2.33 ft
Critical Depth	0.16 ft
Critical Slope	0.030839 ft/ft
Velocity	2.32 ft/s <i>< 5 fps is OK</i>
Velocity Head	0.08 ft
Specific Energy	0.22 ft
Froude Number	1.56
Flow Type	Supercritical



WS-U10

SBRWS-R2

SBRWS-U4

SBRWS-U2

SBRWS-U11

Gulch

SBRWS-U12

7200

SBRWS-U1

SBRWS-U3

7832

7788

7600

7500

7400

Miles

Scale 1" : 500'

Taken from
Exhibit 3.2-6

Triangular Hydrograph Calculations using
SCSHYDRO Program

Watershed I.D.:
SBRWS-U12

INPUT SUMMARY

STORM : WATERSHED :
Dist.= SCS Type `b' Area = 4.42 acres
Depth = 1.40 inches CN = 75.00
Duration = 6.0 hrs Time conc.= 0.06 hrs

OUTPUT SUMMARY

Runoff depth: 0.132 inches
Initial abstr: 0.667 inches
Peak flow: 0.34 cfs (0.077 iph)
at time: 2.521 hrs

SBRD-7A MINIMUM SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	SOWBELLY
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.037
Slope	0.044000 ft/ft <i>O₅₀ = 6" Slope = 4.4%</i>
Left Side Slope	2.00 H:V
Right Side Slope	10.00 H:V
Bottom Width	2.00 ft
Discharge	1.75 cfs

Results	
Depth	0.22 ft <i>< 1' ∴ ok</i>
Flow Area	0.7 ft ²
Wetted Perimeter	4.68 ft <i>Freeboard = 0.78'</i>
Top Width	4.62 ft
Critical Depth	0.23 ft
Critical Slope	0.037269 ft/ft
Velocity	2.42 ft/s
Velocity Head	0.09 ft
Specific Energy	0.31 ft
Froude Number	1.08
Flow Type	Supercritical

SBRD-7A MAXIMUM SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	SOWBELLY
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.040 <i>0.50 = 6" Slope = 6.7%</i>
Slope	0.067000 ft/ft
Left Side Slope	2.00 H : V
Right Side Slope	10.00 H : V
Bottom Width	2.00 ft
Discharge	1.75 cfs

Results	
Depth	0.20 ft
Flow Area	0.7 ft ²
Wetted Perimeter	4.49 ft
Top Width	4.43 ft
Critical Depth	0.23 ft
Critical Slope	0.042475 ft/ft
Velocity	<u>2.69 ft/s</u> <i>< 5 fps ∴ OK</i>
Velocity Head	0.11 ft
Specific Energy	0.31 ft
Froude Number	1.24
Flow Type	Supercritical

SBRD-7B MINIMUM SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035 <i>rocky soil with vegetation</i>
Slope	0.040000 ft/ft
Left Side Slope	2.70 H : V
Right Side Slope	13.00 H : V
Bottom Width	3.00 ft
Discharge	1.75 cfs

Results	
Depth	0.18 ft <i>< 0.75' ok</i>
Flow Area	0.8 ft ²
Wetted Perimeter	5.84 ft
Top Width	5.80 ft
Critical Depth	0.19 ft
Critical Slope	0.034716 ft/ft
Velocity	2.23 ft/s
Velocity Head	0.08 ft
Specific Energy	0.26 ft
Froude Number	1.07
Flow Type	Supercritical

Freeboard = 0.57'

SBRD-7B MAXIMUM SLOPE Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Sowbelly
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.035 <i>Rocky soil w/ vegetation</i>
Slope	0.070000 ft/ft
Left Side Slope	2.70 H : V
Right Side Slope	13.00 H : V
Bottom Width	3.00 ft
Discharge	1.75 cfs

Results	
Depth	0.15 ft
Flow Area	0.6 ft ²
Wetted Perimeter	5.44 ft
Top Width	5.41 ft
Critical Depth	0.19 ft
Critical Slope	0.034716 ft/ft
Velocity	<u>2.71 ft/s</u> <i>< 5 fps ∴ OK</i>
Velocity Head	0.11 ft
Specific Energy	0.27 ft
Froude Number	1.38
Flow Type	Supercritical

Reclamation Culverts

SBRC-1

Culvert Diameter = 36"

$Q_{10-6} = 1.75$ cfs

Inlet type = projecting.

Very low slope as evidenced by sediment buildup.
Assume slope = 1%

$HW/O = 48/36 = 1.33$

Inlet capacity = 45 cfs \gg 1.75 cfs

Pipe Capacity = 38.9 cfs \gg 1.75 cfs. See page 17

Outlet velocity = 2.64 fps. See page 17

The culvert slope, not the type of inlet, controls the capacity of the culvert. However, even with sediment buildup the culvert has plenty of capacity to handle the design event.

Outlet velocity below 5 fps, therefore, no outlet protection is required. No evidence of erosion at the outlet was observed.

Uninstalled Reclamation Culverts

Two culverts (SBRC-2 and 3) included in the approved reclamation plan were not installed. SBRC-5 was extended to remove the need for SBRC-2. The approved reclamation plan used a culvert to drop runoff down a steep Pre-SMCRA slope. PMC elected to reclaim the Pre-SMCRA slope (although not required) and extend SBRC-5 to create a more stable configuration and make the reclamation more visually pleasing.

Reclamation channel SBRC-3 was extended to eliminate the need for SBRC-3. Culverts have a greater potential for problems and require maintenance periodically. To minimize potential problems SBRC-3 was removed and replaced with an open channel.

SBRC-1 Worksheet for Circular Channel

Project Description	
Worksheet	SOWBELLY
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

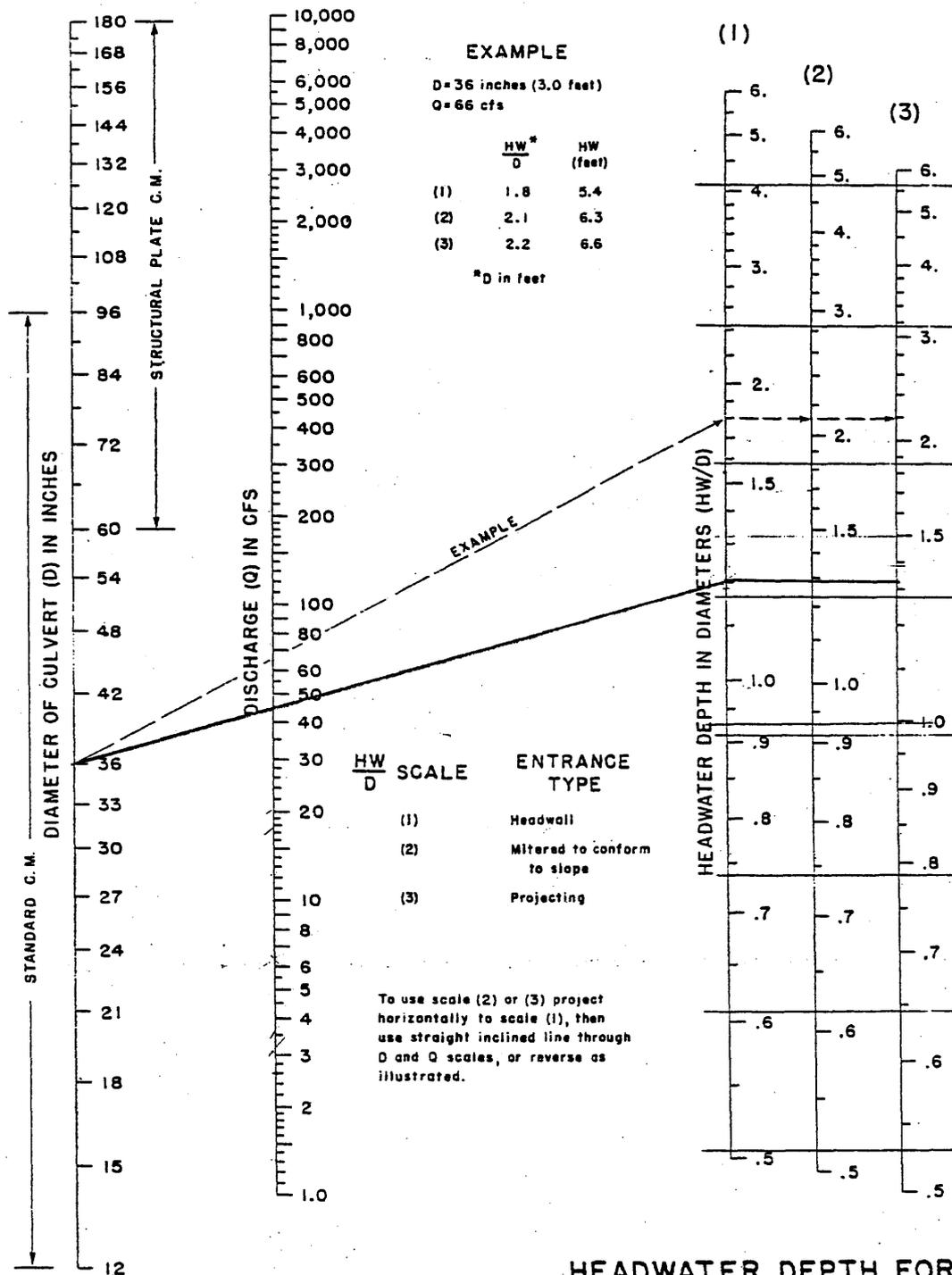
Input Data	
Mannings Coefficient	0.024
Slope	0.010000 ft/ft
Diameter	36 in
Discharge	1.75 cfs

Results	
Depth	0.45 ft
Flow Area	0.7 ft ²
Wetted Perimeter	2.38 ft
Top Width	2.14 ft
Critical Depth	0.41 ft
Percent Full	15.0 %
Critical Slope	0.014569 ft/ft
Velocity	2.64 ft/s
Velocity Head	0.11 ft
Specific Energy	0.56 ft
Froude Number	0.84
Maximum Discharge	38.86 cfs
Discharge Full	36.13 cfs
Slope Full	0.000023 ft/ft
Flow Type	Subcritical

< 5 fws no outlet protection required

< 45 cfs ∴ not inlet controlled

CHART 5

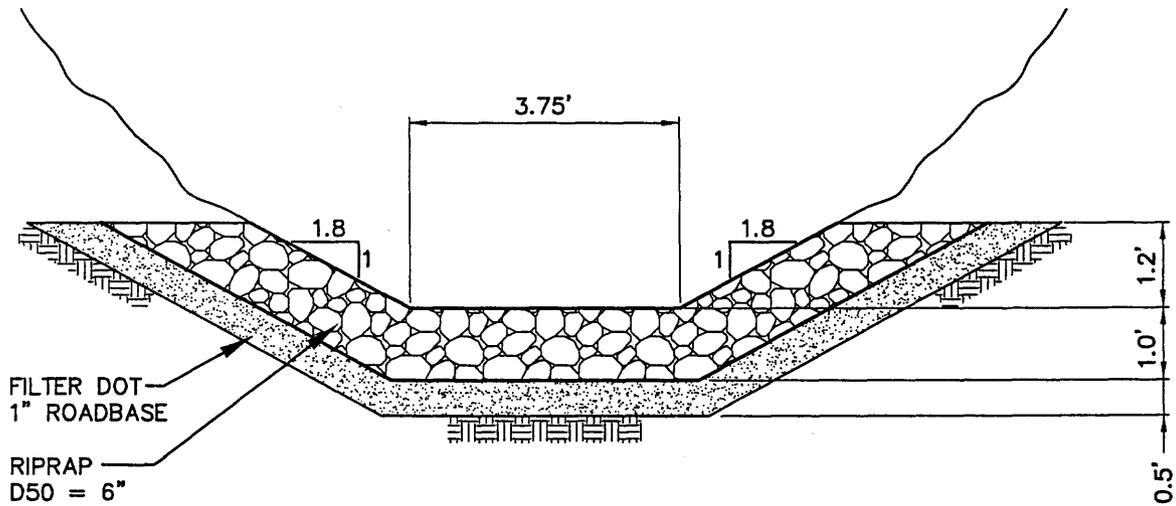


HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

BUREAU OF PUBLIC ROADS JAN 1963

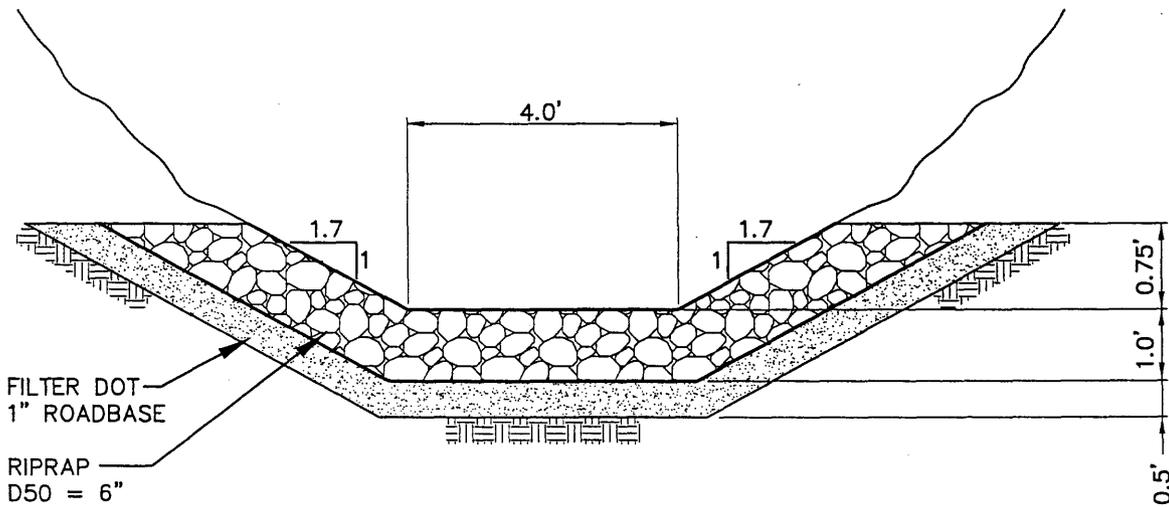
5-23

Ref (U.S. Dept. of Transportation, 1977)



DESIGN FLOW DEPTH = 0.2'
 AS-BUILT FLOW DEPTH = 0.19'
 DESIGN MAX. VELOCITY = 6.14 fps.
 AS-BUILT MAX. VELOCITY = 3.81 fps.

SBRD-3
 NO SCALE

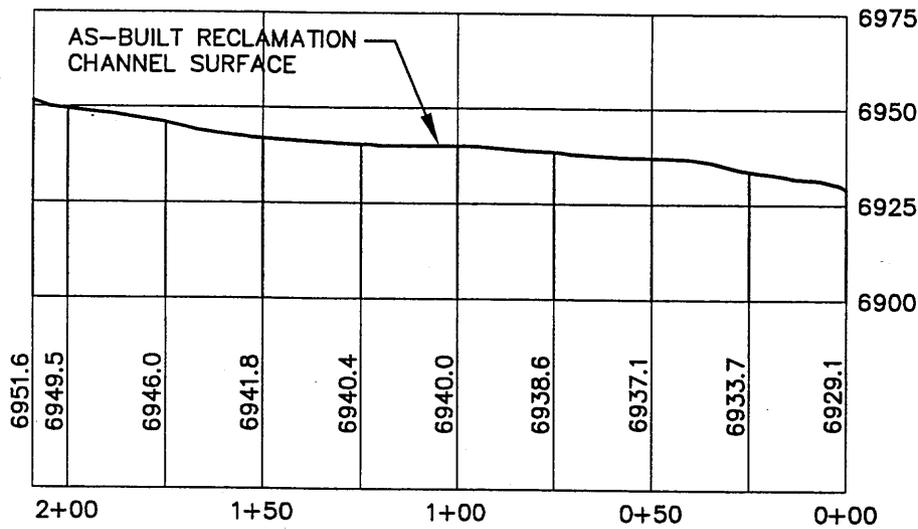


DESIGN FLOW DEPTH = 0.14'
 AS-BUILT FLOW DEPTH = 0.09'
 DESIGN MAX. VELOCITY = 3.67 fps.
 AS-BUILT MAX. VELOCITY = 3.20 fps.

SBRD-5
 NO SCALE

FIGURE 1. SOWBELLY CANYON SUBSTATION AREA CHANNEL CROSS-SECTIONS



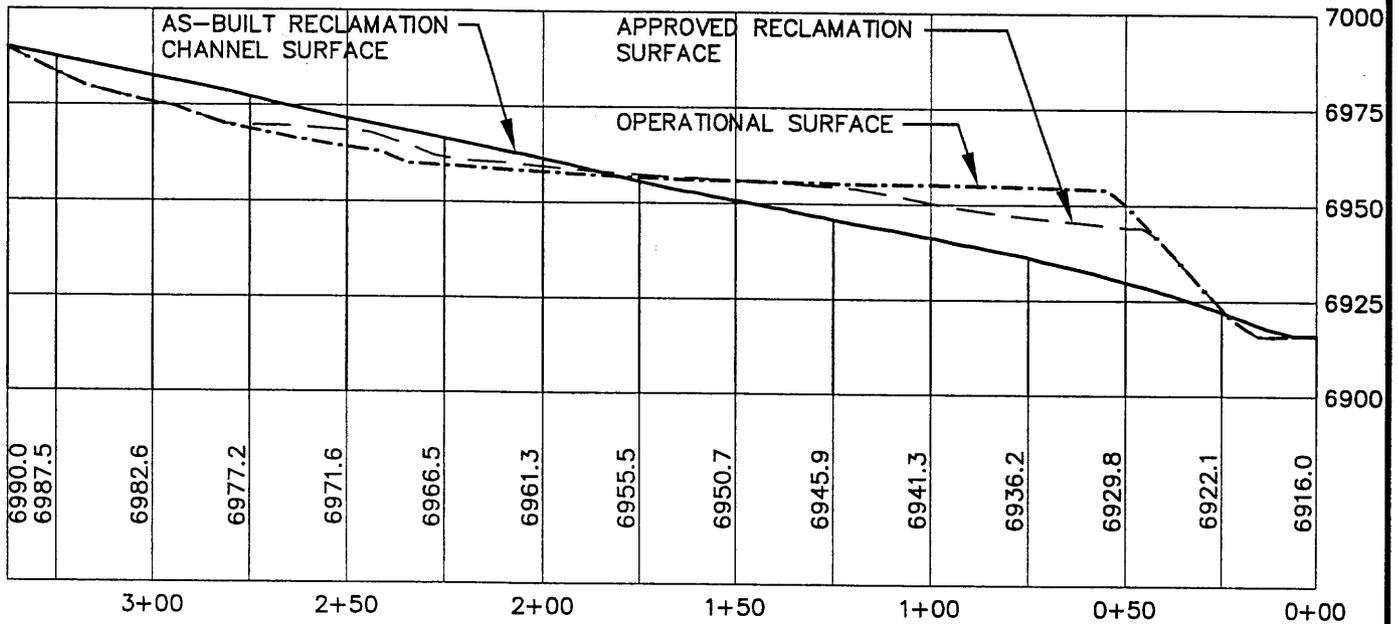


MAX. SLOPE = 25.0%

MIN. SLOPE = 4.0%

AVE. SLOPE = 10.8%

SBRD-3



MAX. SLOPE = 40.0%

MIN. SLOPE = 16.7%

AVE. SLOPE = 22.0%

SBRD-5

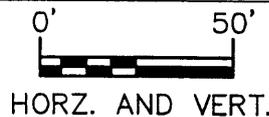
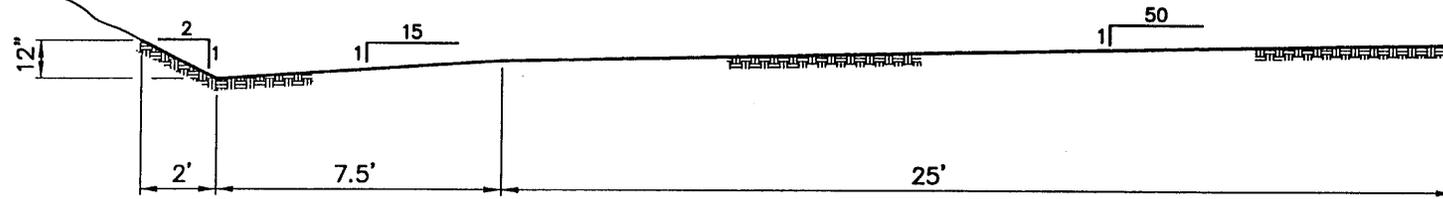


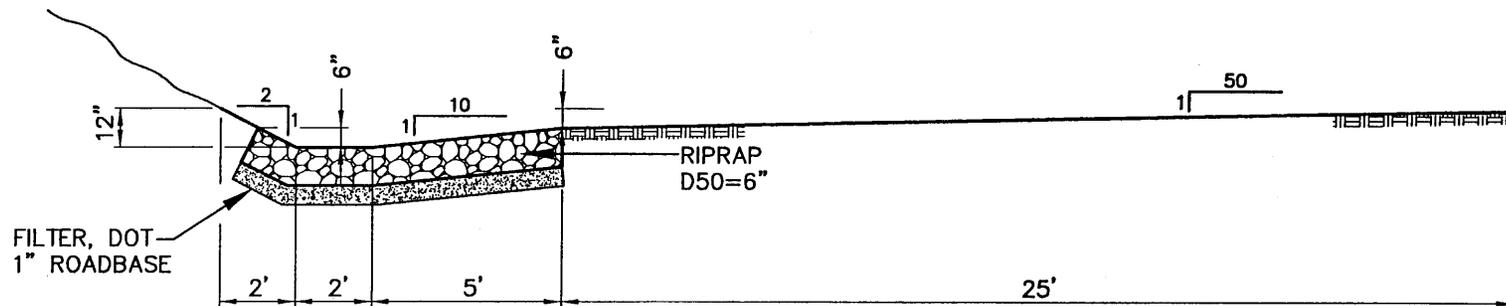
FIGURE 2. SOWBELLY SUBSTATION AREA CHANNEL PROFILES





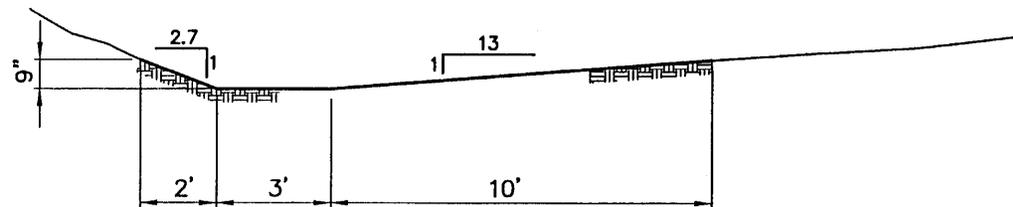
DESIGN FLOW DEPTH = 0.20'
 AS-BUILT FLOW DEPTH = 0.15'
 DESIGN MAX. VELOCITY = 2.76 fps
 AS-BUILT MAX. VELOCITY = 2.32 fps

SBRD-6
 NO SCALE



DESIGN FLOW DEPTH = 0.40'
 AS-BUILT FLOW DEPTH = 0.22'
 DESIGN MAX. VELOCITY = 3.68 fps
 AS-BUILT MAX. VELOCITY = 2.69 fps

SBRD-7A
 NO SCALE

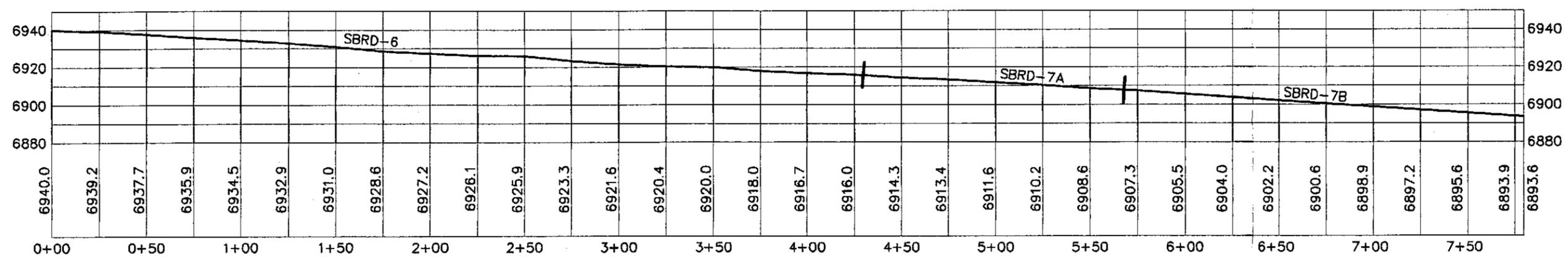


DESIGN FLOW DEPTH = 0.40'
 AS-BUILT FLOW DEPTH = 0.18'
 DESIGN MAX. VELOCITY = 3.68 fps
 AS-BUILT MAX. VELOCITY = 2.71 fps

SBRD-7B
 NO SCALE

FIGURE 3. SOWBELLY CANYON SUBSTATION AREA CHANNEL CROSS-SECTIONS





MAX. SLOPE = 8.0%
MIN. SLOPE = 4.0%
AVE. SLOPE = 6.0%

SBRD-6, SBRD-7A AND SBRD-7B

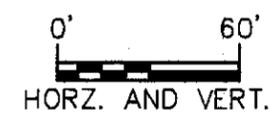


FIGURE 4. SOWBELLY SUBSTATION AREA CHANNEL PROFILES



Chapter 3, Section 3.2
Castle Gate Mine
Sowbelly Canyon

APPENDIX 3.2K

PUBLIC NOTICE AND AGENCY AND LAND OWNER LETTERS

Public Notice

**Application for Phase I Bond Release
Sowbelly Gulch Substation Area
Castle Gate Holding Company
Castle Gate Mine
Permit C/007/004, Approved 12/24/94
Carbon County, Utah**

Castle Gate Holding Company, 999 Corporate Blvd., Linthicum Heights, MD 21090, has completed Phase I of the approved reclamation plan for the Sowbelly Gulch substation area of the Castle Gate Mine. This is based on meeting the backfilling and grading and drainage control requirements for Phase I reclamation in accordance with the approved reclamation plan.

In accordance with the provisions of R645-301-880, of the State of Utah R645-Coal Mining Rules, notice is hereby given to the general public that Castle Gate Holding Company is applying for partial release of the performance bond posted for this operation.

The surety bond posted for the Castle Gate Mine is \$680,154 of which \$233,000 is designated for the Sowbelly Gulch reclamation. Castle Gate Holding Company is seeking release of \$85,000 from the Sowbelly Gulch portion of the bond. All earthwork, drainage control, and revegetation have been completed on site.

The Sowbelly Gulch No. 5 Mine is located on the Standardville, Utah, U.S. Geological Survey 7.5 minute quadrangle map. The mine site is located in Sowbelly Gulch, approximately 4 miles west-northwest of Helper, Utah. Reclamation work was performed on approximately 1.8 acres located on the following described lands:

Township 13 South, Range 9 East, SLB&M, Utah

Section 9: NW1/4 NW1/4

The Utah Division of Oil, Gas and Mining will now evaluate the proposal to determine whether it meets all the criteria of the Permanent Program Performance Standards according to the requirements of the Utah Coal Mining Rules.

Written comments, objections and requests for public hearing or information conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Closing date for submission of such comments, objections and requests for public hearing or information conference on this proposal must be submitted by Month Date, 2004.

Published in the Sun Advocate – Month Date, Date, Date, Date, 2004

CASTLE GATE HOLDING COMPANY

Castle Gate Mine
P.O. Box 30
847 NW HWY 191
Helper, Utah 84526
(435)472-0475
Fax: (435)472-4782

September 21, 2004

Mr. Roger Wheeler
Director Land Management
American Electric Power
700 Morrison Road
Gahanna, Ohio 43230-6642

Re: Notification of Application for Phase I Bond Release, Substation Area, Sowbelly Gulch No. 5 Mine, Castle Gate Holding Company, Castle Gate Mine, C/007/004, Carbon County, Utah

Dear Mr. Wheeler:

Castle Gate Holding Company has completed Phase I of the approved reclamation plan for the substation area at the Sowbelly Gulch No. 5 Mine. This is based on meeting the backfilling and grading requirements for Phase I reclamation.

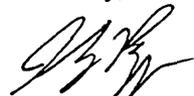
In accordance with the provisions of R645-301-880 of the State of Utah R645 Coal Mining Rules, this letter will serve as notification that Castle Gate Holding Company intends to file an application with the Utah Division of Oil, Gas and Mining for partial release of the performance bond posted for this operation.

The surety bond posted for the Castle Gate Mine is \$680,154 of which \$233,000 is designated for the Sowbelly Gulch reclamation. Castle Gate Holding Company is seeking release of \$85,000 from the Sowbelly Gulch portion of the bond. All earthwork and revegetation has been completed on site.

Comments concerning Phase I bond release from the legal or equitable owner of record of the surface areas to be affected and from the Federal, Utah and local government agencies which would have to initiate, implement, approve, or authorize the proposed use of the land following reclamation should be mailed to: Plateau Mining Corporation, Attention: Johnny Pappas, P.O. Box 30, Helper, Utah 84526.

If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

CASTLE GATE HOLDING COMPANY

Castle Gate Mine
P.O. Box 30
847 NW HWY 191
Helper, Utah 84526
(435)472-0475
Fax: (435)472-4782

September 21, 2004

Mr. Mark Mackiewicz
Bureau of Land Management
125 South 600 West
Price, Utah 84501

Re: Notification of Application for Phase I Bond Release, Substation Area, Sowbelly Gulch No. 5 Mine, Castle Gate Holding Company, Castle Gate Mine, C/007/004, Carbon County, Utah

Dear Mr. Mackiewicz:

Castle Gate Holding Company has completed Phase I of the approved reclamation plan for the substation area at the Sowbelly Gulch No. 5 Mine. This is based on meeting the backfilling and grading requirements for Phase I reclamation.

In accordance with the provisions of R645-301-880 of the State of Utah R645 Coal Mining Rules, this letter will serve as notification that Castle Gate Holding Company intends to file an application with the Utah Division of Oil, Gas and Mining for partial release of the performance bond posted for this operation.

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Sincerely,



Johnny Pappas
Sr. Environmental Engineer

CASTLE GATE HOLDING COMPANY

Castle Gate Mine
P.O. Box 30
847 NW HWY 191
Helper, Utah 84526
(435)472-0475
Fax: (435)472-4782

September 21, 2004

Mr. William D. Krompel
Commissioner
120 East Main Street
Price, Utah 84501

Re: Notification of Application for Phase I Bond Release, Substation Area, Sowbelly Gulch No. 5 Mine, Castle Gate Holding Company, Castle Gate Mine, C/007/004, Carbon County, Utah

Dear Mr. Krompel:

Castle Gate Holding Company has completed Phase I of the approved reclamation plan for the substation area at the Sowbelly Gulch No. 5 Mine. This is based on meeting the backfilling and grading requirements for Phase I reclamation.

In accordance with the provisions of R645-301-880 of the State of Utah R645 Coal Mining Rules, this letter will serve as notification that Castle Gate Holding Company intends to file an application with the Utah Division of Oil, Gas and Mining for partial release of the performance bond posted for this operation.

The surety bond posted for the Castle Gate Mine is \$680,154 of which \$233,000 is designated for the Sowbelly Gulch reclamation. Castle Gate Holding Company is seeking release of \$85,000 from the Sowbelly Gulch portion of the bond. All earthwork and revegetation has been completed on site.

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If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

CASTLE GATE HOLDING COMPANY

Castle Gate Mine
P.O. Box 30
847 NW HWY 191
Helper, Utah 84526
(435)472-0475
Fax: (435)472-4782

September 21, 2004

Mr. Dave Levanger
Carbon County Planning and Zoning
120 East Main Street
Price, Utah 84501

Re: Notification of Application for Phase I Bond Release, Substation Area, Sowbelly Gulch No. 5 Mine, Castle Gate Holding Company, Castle Gate Mine, C/007/004, Carbon County, Utah

Dear Mr. Levanger:

Castle Gate Holding Company has completed Phase I of the approved reclamation plan for the substation area at the Sowbelly Gulch No. 5 Mine. This is based on meeting the backfilling and grading requirements for Phase I reclamation.

In accordance with the provisions of R645-301-880 of the State of Utah R645 Coal Mining Rules, this letter will serve as notification that Castle Gate Holding Company intends to file an application with the Utah Division of Oil, Gas and Mining for partial release of the performance bond posted for this operation.

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If you have any questions or need additional information, please do not hesitate to contact me at (435) 472-4741.

Sincerely,



Johnny Pappas
Sr. Environmental Engineer

**Application for Phase I Bond Release
Sowbelly Gulch No. 5 Mine Substation Area
Castle Gate Holding Company
Castle Gate Mine
C/007/004**

September 2004

