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PRICE RIVER COAL COMPANY
P.O. BOX 629 HELPER, UTAH 84526 (801) 472-3411

RECEIVED
MAY 24 1984
DIVISION OF OIL
GAS & MINING

May 21, 1984

CERTIFIED RECEIPT REQUESTED
Certified No. P290262 269

Mr. Wayne Hedburg, Staff Hydrologist
Division of Oil, Gas, and Mining
4241 State Office Building
Salt Lake City, UT 84114

Re: Upgrading surface ditches which direct flow to Ponds 012A and 012B at Castle Gate

Dear Mr. Hedburg:

We are submitting calculations related to upgrading the referenced ditches to 10-year, 24-hour storm runoff capacity as you required in your 4-17-84 letter; under authority of UMC 817.43(a). We are unclear as to why you feel this action is needed. The existing ditch has not failed due to any precipitation event but because of excess water from broken subsurface public and private water lines during January and February this year. The point at which excess water flowed from the permit area was approximately at cross section No. 6 (see 3-28-84 submittal) on the 'B' ditch. You will note that the ditch, at this point, has a cross sectional area of 17 $ft.^2$, more than adequate for the 10-year, 24-hour storm runoff. Please also note that most ditch cross sections would provide adequate flow capacity for the 10-year, 24-hour storm.

During the first week of April, normal maintenance activities increased the capacity of both ditches, particularly Ditch 'B'. You may confirm this with Inspector Pruitt who was here on 4-16-84 and 5-17-84.

The designs now provided relate to the need to further upgrade Ditch 'B' due to the changes in drainage pattern associated with modifications of the thickener overflow pond. The design provides equal capacity in Ditch 'A' and 'B' for their combined drainage area. The proposed capacity is almost quadruple that needed but it is difficult to construct a ditch much smaller with the equipment at hand.

The configuration proposed will alter in the last 500 feet of Ditch 'B' to a deeper, more narrow structure similar to the dimensions shown for cross section No. 6.

The concerns which you express in your letter of 5-15-84 about using an on-site, paved road to determine part of the required 0.3' freeboard of Ditch 'B' at Section No. 2, are not particularly well-founded. The needed flow depth, 0.1', is entirely below the shoulder of the road. Freeboard is only air, and there should be no problem with air lying on a paved road. The point of ditches and berm is to retain on-site drainage on site. You may note that at

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Section No. 2 the flow would have to raise 1.2' in order to overtop the berm. Before this could occur, the water would cross the road to Ditch 'A'. We do not see a problem with water sheet flowing across a paved road as long as it all flows to a sediment pond, nor do we see a problem with designating the entire area from Ditch 'A', including the road, to the top of the west berm of Ditch 'B' as a diversion to Pond 12A and 12B. This event could, of course, never occur as a result of the miniscule flows derivable from the 2-year or 10-year storms. The point remains to be that runoff and any operational water flows are directed to ponds; which it is!

We trust that the above satisfied your concerns relative to a highly questionable notice of violation.

Very truly yours,

PRICE RIVER COAL COMPANY

R. L. Wiley

Rob L. Wiley
Environmental Engineer

RLW:jp

Attachments

cc: K. Hutchinson
M. Keller
G. Cook
File

DESIGN FOR 10-YEAR, 24-HOUR STORM PEAK FLOW IN TWO DITCHES AT CASTLE GATE

Q = CiA

C = Runoff coefficient

CN = 70 = mostly coal piles, partly vegetated

10-year, 24-hour storm = 1.9"

Use SCS Fig. 10-1

Runoff = 0.3" .204" C = $\frac{0.3}{1.9}$ = 0.158

i = Intensity in inches/hr.

Function of Tc

$Tc = 0.0078\ L^{0.77}\ S^{-0.385}$

	Ditch A	Ditch B
L =	2,350	2,350
S =	0.03	0.02
Tc =	11.86 say 10 min.	14.32 say 15 min.

i for 10 min. = 0.31 (Price) x 1.06 (C.G.) = 0.33

0.33 x 6 = 1.98

i for 15 min. = 0.39 (Price) x 1.06 (C.G.) = 0.41

0.41 x 4 = 1.64

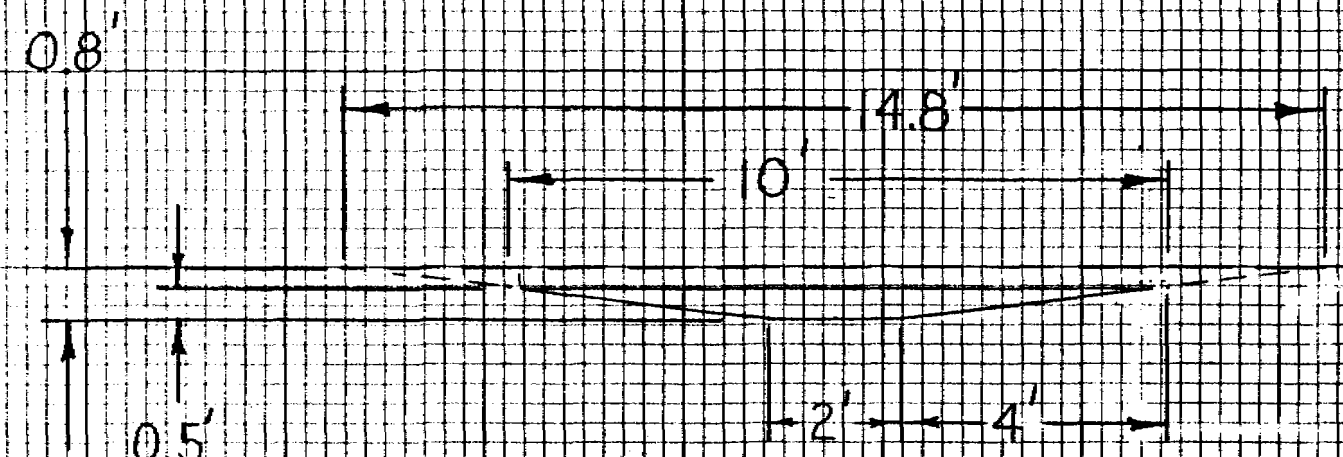
A = Area (acres)

Ditch A = 12.7 acres
Ditch B = 6.0 acres

PEAK FLOW

Ditch A	Ditch B
(0.158) (1.98) (12.7)	(0.158) (1.64) (6.0)
3.97 say 4 cfs	1.55 say 1.6 cfs

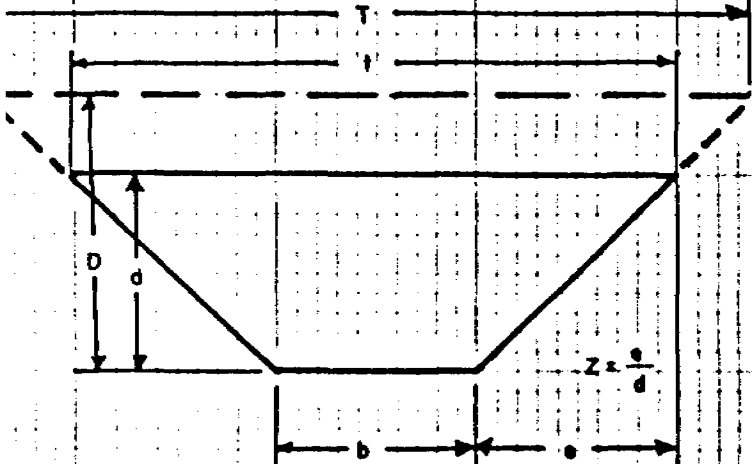
In case either would have to carry total flow, design typical for 5.6 cfs - both ditches.



PROPOSED CONFIGURATION
DITCH A OR B
CASTLE GATE PREP
PLANT

(SCALE: 1" = 3')

DESIGN WORKSHEET FOR TRAPEZOIDAL SHAPED CHANNEL



FACTOR VALUES

T____ t 7'

D____ d 0.3

b 2 e 2.5'

z 8.33

FORMULAS

a = X-SECT. AREA = $bd + Zd^2$ 1.35

p = WETTED PERIMETER = $b + 2d\sqrt{Z^2+1}$ 7.03

R = HYDRAULIC RADIUS = $\frac{a}{p}$ 0.19

T / t = TOP WIDTH = b+2DZ / b+2dZ

V = VELOCITY (fps) = $\frac{1.486}{n} R^{2/3} S^{1/2}$ 5.22

Q = CAPACITY (cfs) = aV 7.2

n = COEF. ROUGHNESS 0.040

S = SLOPE 0.025

DATE 5-16-84

CHANNEL LOCATION Ditch A or B
Castle Gate

REQ'D PEAK FLOW 5.6 cfs

ACTUAL CAPACITY USED BY ESTIMATED 10YR, 24HR STORM PEAK FLOW!

Actual y normal and velocity

5.6	Q
8.	Z
2.	W
0.	Y
0.025	S
0.04	N

NORM. FLOW

2.411130761	V
2.322561717	A
5.6	Q
8.	Z
2.	W
.4287049629	Y
0.025	S
0.04	N

JW 6-14-84

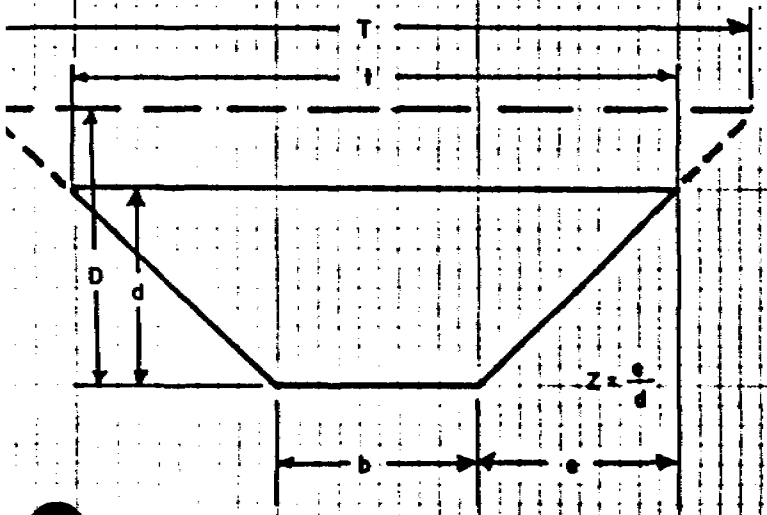
$2(0.3) + 8.33(0.3)^2$

$0.6 + 0.75 = 1.35$

$2 + 2(0.3)\sqrt{8.33^2+1} = 7.0$

$(37.15)(0.333)(0.43) = 5.32$

DESIGN WORKSHEET FOR TRAPEZOIDAL SHAPED CHANNEL



DATE 5-16-84

FACTOR VALUES

T — t 7

D — d 0.3

b 2 — e 2.6

25.33

FORMULAS

q = X-SECT. AREA = bd + Zd² = 1.35

p = WETTED PERIMETER = b + 2d√(Z²+1) = 9.03

R = HYDRAULIC RADIUS = q/p = 0.149

T = TOP WIDTH = b+2DZ / b+2dZ

V = VELOCITY (fps) = (1.486/n) R^(2/3) S^(1/2) = 5.32

Q = CAPACITY (cfs) = qV = 7.2

n = COEF. ROUGHNESS = 0.040

S = SLOPE = 0.025

CHANNEL LOCATION — DITCH A OR B

CASTLE GATE

Q'D PEAK FLOW — 5.6 cfs

0.3' FREEBOARD

TOTAL CAPACITY

TRIGGER STORM FLOW

0.3' = D

2.5' ± e

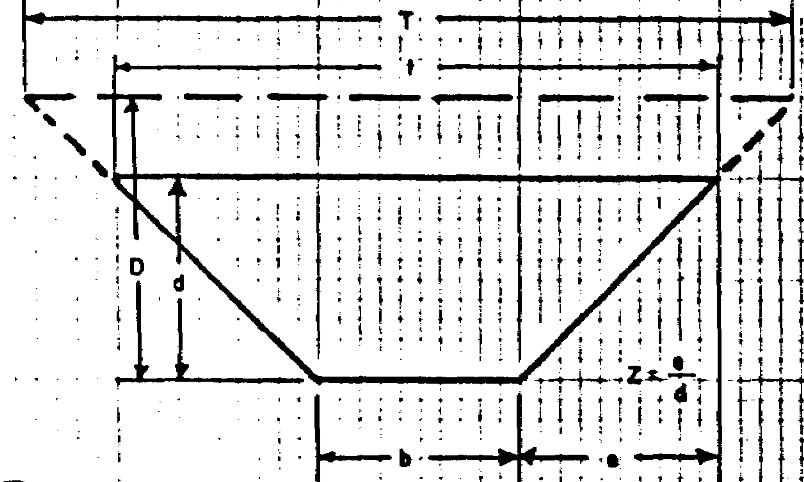
ACTUAL CAPACITY USED BY ESTIMATED 10 YR, 24 HR STORM PEAK FLOW:

$$2(0.3) + 8.33(0.3)^2$$

$$0.6 + 0.75 = 1.35$$

$$2 + 2(0.3)\sqrt{8.33^2 + 1} = 9.03$$

$$(37.5)(0.333)(0.43) = 5.32$$



DESIGN WORKSHEET FOR TRAPEZOIDAL SHAPED CHANNEL

DATE 5-18-

FACTOR VALUES

T 14.8 t 10 9.5

D 0.8 d 0.5

b 2 e 4 3.

z 8

FORMULAS

a = X-SECT. AREA = $bd + Zd^2$ 3

p = WETTED PERIMETER = $b + 2d\sqrt{Z^2+1}$ 10.06

R = HYDRAULIC RADIUS = $\frac{a}{p}$ 0.30

$\frac{T}{t}$ = TOP WIDTH = $\frac{b+2DZ}{b+2dZ}$ 14.8 / 10

V = VELOCITY (fps) = $\frac{1.486}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$ 7.16 FPS

Q = CAPACITY (cfs) = aV 21.5

n = COEF. ROUGHNESS 0.04

S = SLOPE 0.025

CHANNEL LOCATION DITCH A or B

CASTLE GATE

REQ'D PEAK FLOW 5.6 cfs

$2 + 1\sqrt{8^2+1}$

PROPOSED CONFIGURATION

(37.15)(0.448)(0.

Recc calc ...

0.	Q
8.	Z
2.	W
0.5	Y
0.025	S
0.04	N

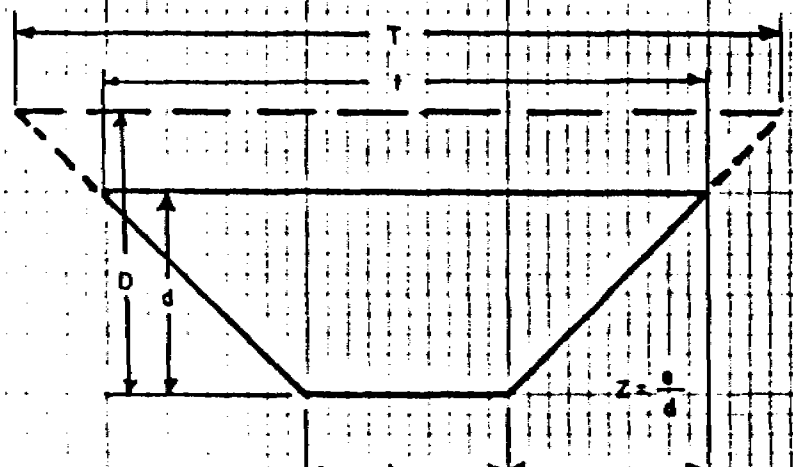
NORM. FLOW

2.628533357	V
3.	A
7.885600071	Q
8.	Z
2.	W
0.5	Y
0.025	S
0.04	N

gw 6-14-84

DESIGN WORKSHEET FOR TRAPEZOIDAL SHAPED CHANNEL

DATE 5-18-



CHANNEL LOCATION DITCH A OR B CASTLE GATE

REQ'D PEAK FLOW 5.6 cfs

PROPOSED CONFIGURATION

FACTOR VALUES			
T	14.8	t	10
D	0.8	d	0.5
b	2	e	4
Z	8		

FORMULAS

q = X-SECT. AREA = $bd + Zd^2$ 3

pp = WETTED PERIMETER = $b + 2d\sqrt{Z^2+1}$ 10.06

R = HYDRAULIC RADIUS = $\frac{q}{p}$ 0.30

T = TOP WIDTH = $b+2DZ$ 14.8

t = TOP WIDTH = $b+2dZ$ 10

V = VELOCITY (fps) = $\frac{1.486}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$ 7.16 FPS

Q = CAPACITY (cfs) = qV 21.5

n = COEF. ROUGHNESS 0.04

S = SLOPE 0.025

$2 + 1\sqrt{8^2+1}$

$(37.15)(0.4148)(0.43)$