S. [illegible] (Sect. w/ [illegible])
D. [illegible] (letter)
Mis [illegible] (letter)

0014

CASTLE GATE
COAL COMPANY

RECEIVED
SEP 23 1986
DIVISION OF
OIL, GAS & MINING

September 18, 1986

FILE COPY

Mr. Lowell Braxton
Administrator
Division of Oil, Gas & Mining
Three Triad Center
Salt Lake City, Utah 84180

Re: Hardscrabble Canyon Diversion D-6

Dear Mr. Braxton:

The attached engineering calculations are being furnished to you as requested in your letter dated 21 August 1986.

The HEC II computer run on the as build configuration of the channel (attachment #1) shows a decrease in velocity and lowering of computed water elevations as compared to the original design. The summary table on page 4 of attachment #1 shows all computed water surface elevations have at least .3 feet of freeboard.

Attachment #4 of this letter is a calculation which shows that the existing cobble bank of D-6 channel bottom does not require a filter blanket to prevent erosion within the placed rip-rap.

Also enclosed (attachment #5) is a calculation which was previously given to DOGM that justifies the use of the eight inch rip-rap for erosion protection in channel D-6.

cc4.1042

P. O. Box 449 • Helper, Utah 84526 • 801/472-5523

Any questions on these justifications can be directed to me at our Helper office.

Sincerely,

Richard H. Allison, Jr., P.E.
Project Supervisor

RHA:sk

Attachments

cc: Dave Miller
Project file
Chrono

cc4.1042

9/8/86

RIPRAP BEDDING CALCULATION

$$\frac{D_{15}\ \text{Riprap}}{D_{85}\ \text{Bank}} < 5 < \frac{D_{15}\ \text{Riprap}}{D_{15}\ \text{Bank}} \quad 40$$

$\frac{3.0"}{1.5"}$ = 2 which is less than 5

#4 Mesh passed 15% of bank material

$\frac{3.0}{.185}$ = 16.21 which is greater than 5 but less than 40.

The above calculation was done based on a bank sieve analysis done by Commercial Testing of Price, Utah, and riprap sieve analysis done by Lowder-Milk Rock Products, Helper, Utah.

This calculation is documented in Use of Riprap for Bank Protection, U. S. Department of Transportation Hydraulic Circulum No. 11, p. 16. This reference was furnished to the Division through Mr. Rick Summers.

The conclusion of this analysis and calculation is that the existing bank material is adequate bedding for riprap placed in diversion D-6.

Attachment #4

THIS RUN EXECUTED 09/09/86 15:42:55

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**********************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAR. 1982
  ERROR CORR -  01,02,03,04,05
  MODIFICATION -  50,51,52,53,54,55
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DIVERSION D-6 AS-BUILT

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
*	70.000	0.00	0.00	0.00	6583.80	368.00	6586.81	6586.81	6587.93	258.77	8.47	43.46	22.88
*	290.000	220.00	0.00	0.00	6599.80	368.00	6603.19	6603.19	6604.25	261.21	8.28	44.45	22.77
*	700.000	410.00	0.00	0.00	6623.00	352.00	6626.74	6626.74	6627.97	274.00	8.91	39.52	21.26
*	900.000	200.00	0.00	0.00	6637.00	352.00	6640.44	6640.44	6641.64	258.86	8.79	40.05	21.88
*	1300.000	400.00	0.00	0.00	6663.90	352.00	6667.29	6667.29	6668.27	242.98	7.95	44.30	22.58
*	1575.000	275.00	0.00	0.00	6693.60	352.00	6696.90	6696.90	6697.93	274.21	8.14	43.27	21.26

ATTACHMENT 1

DESIGN OF RIPRAP BLANKET FOR DIVERSION D-6

(From Use of Riprap for Bank Protection, Hydraulic Engineering Circular No. 11, U.S. Department of Transportation, Bureau of Public Roads, June 1967)

CHANNEL CHARACTERISTICS

BOTTOM WIDTH (B) = 6 FEET

SIDE SLOPES = 3H:1V (LEFT) & 0.75H:1V (RIGHT)

FLOW DEPTH (D) = 5.2 FEET

AVERAGE VELOCITY (V) = 10.5 FEET/SECOND

DETERMINE STONE SIZE REQUIRED TO RESIST DISPLACEMENT

ASSUME K (d50 STONE SIZE) = 0.75 FEET = 9 INCHES

K/D = 0.75/5.2 = 0.14

$\therefore$ Vs/V = 0.56 (FROM FIGURE 1, HEC-11)

$\therefore$ Vs = 0.56 x 10.5 = 5.88 FEET/SECOND

HEC-11 RECOMMENDS MULTIPLYING Vs BY A FACTOR OF BETWEEN 1.0 AND 2.0 TO ACCOUNT FOR CHANNEL SINUOUSITY (1.0 FOR STRAIGHT CHANNELS & 2.0 FOR VERY SINUOUS CHANNELS).

DUE TO SLIGHT BENDS IN CHANNEL, INCREASE Vs BY 1.5 TIMES

$\therefore$ Vs = 1.5 x 5.88 = 8.82 FEET/SECOND

FROM FIGURE 2 (HEC-11) FOR Vs = 8.82 AND 3:1 SIDE SLOPES, d50 = 0.7 FEET

THE ASSUMED STONE SIZE (0.75 FEET) $\cong$ COMPUTED STONE SIZE (0.70 FEET)

$\therefore$ USE ASSUMED STONE SIZE, d50 = 0.75 feet = 9 inches

Document Information Form

Mine Number: C/007/004

File Name: Incoming
Castle-Gate

To: Lowell Braxton

From:

Person Richard H. Allison

Company Castle Gate

Date Received: 9-23-81

Explanation: Graph - Attachment #2 Diversion Ditch D-1

cc: