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File
ACT/007/021
Blazon No. 1 Mine

Blazon Co.

(MINING CONTRACTORS & CONSULTANTS)

RECEIVED
OCT 13 1981
DIVISION OF
OIL, GAS & MINING

October 6, 1981

Mr. Dave Lof
Division of Oil, Gas, and Mining
State of Utah
1588 West North Temple
Salt Lake City, Utah 84116

Dear Mr. Lof:

Enclosed you will find a plan requested by you concerning the installation of a 8" culvert to provide drainage for portal pad run-off and mine water discharge leaving the portal area.

The enclosed map indicates the location of the proposed culvert. Drainage calculations are based on the "Blazon No. 1 Mine Drainage Study" received by DOGM August 15, 1979 and approved by the Department of Health September 20, 1979.

Culvert calculations are based on the Chezy-Manning equation and a "n" value taken from Vennard and Street's Elementary Fluid Mechanics.

If you have any questions, please feel free to call me (801-448-9408).

Sincerely,

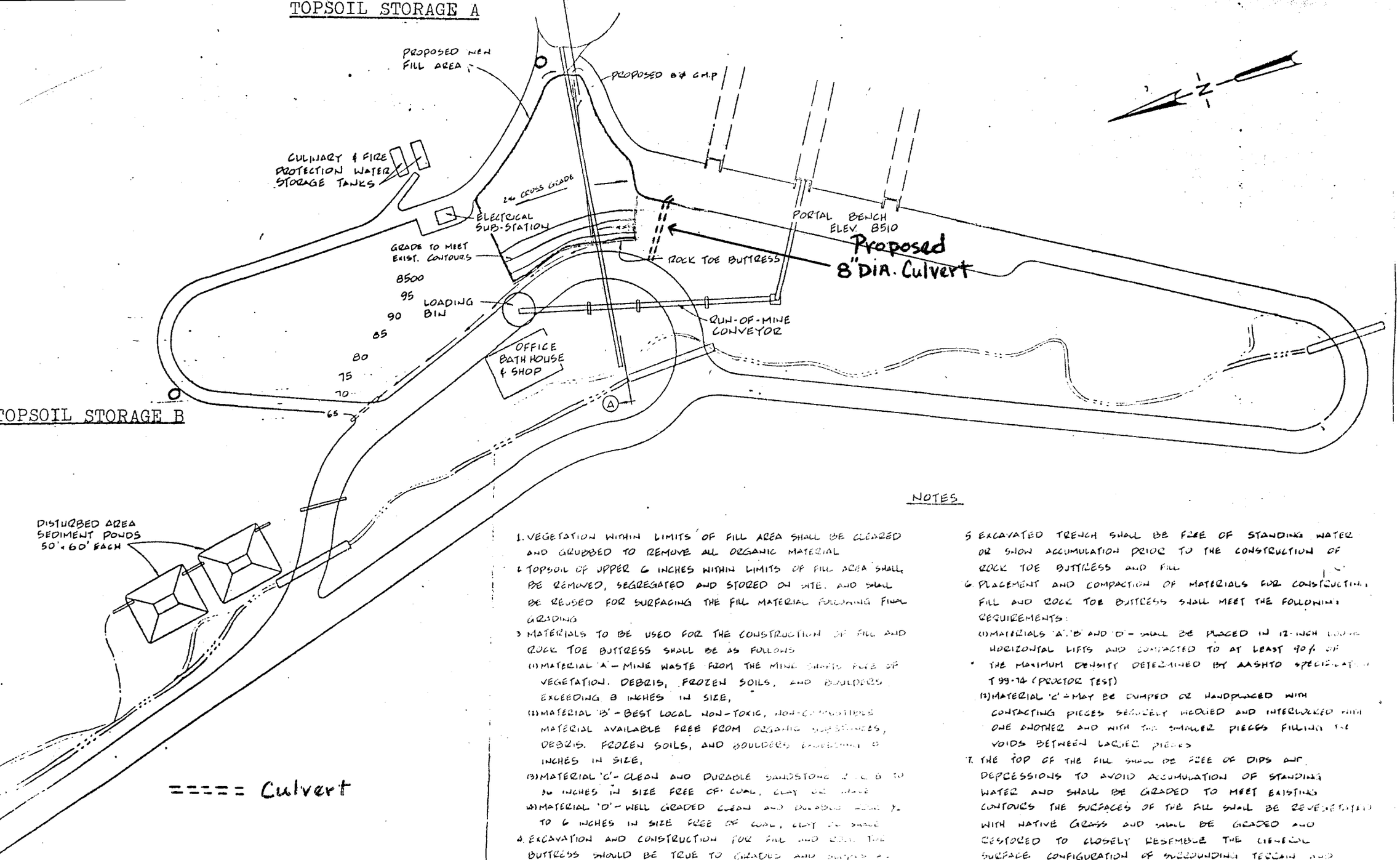
Kirk R. Harvey

Kirk R. Harvey
Mining Engineer

Enclosures

KRH/mah

Clear Creek Star Route • Helper, Utah 84526 • Telephone (801) 448-9408



NOTES

1. VEGETATION WITHIN LIMITS OF FILL AREA SHALL BE CLEARED AND GRUBBED TO REMOVE ALL ORGANIC MATERIAL
2. TOPSOIL OF UPPER 6 INCHES WITHIN LIMITS OF FILL AREA SHALL BE REMOVED, SEGREGATED AND STORED ON SITE, AND SHALL BE REUSED FOR SURFACING THE FILL MATERIAL FOLLOWING FINAL GRADING
3. MATERIALS TO BE USED FOR THE CONSTRUCTION OF FILL AND ROCK TOE BUTTRESS SHALL BE AS FOLLOWS
   (1) MATERIAL 'A' – MINE WASTE FREE OF VEGETATION, DEBRIS, FROZEN SOILS, AND BOULDERS EXCEEDING 8 INCHES IN SIZE,
   (2) MATERIAL 'B' – BEST LOCAL NON-TOXIC, NON-COMPACTIBLE MATERIAL AVAILABLE FREE FROM ORGANIC SUBSTANCES, DEBRIS, FROZEN SOILS, AND BOULDERS EXCEEDING 8 INCHES IN SIZE,
   (3) MATERIAL 'C' – CLEAN AND DURABLE SANDSTONE [illegible] 8 TO 36 INCHES IN SIZE FREE OF COAL, CLAY OR SHALE
   (4) MATERIAL 'D' – WELL GRADED CLEAN AND DURABLE [illegible] ½ TO 6 INCHES IN SIZE FREE OF COAL, CLAY OR SHALE
4. EXCAVATION AND CONSTRUCTION FOR FILL AND ROCK TOE BUTTRESS SHOULD BE TRUE TO GRADES AND SHAPES AS SHOWN
5. EXCAVATED TRENCH SHALL BE FREE OF STANDING WATER OR SNOW ACCUMULATION PRIOR TO THE CONSTRUCTION OF ROCK TOE BUTTRESS AND FILL
6. PLACEMENT AND COMPACTION OF MATERIALS FOR CONSTRUCTING FILL AND ROCK TOE BUTTRESS SHALL MEET THE FOLLOWING REQUIREMENTS:
   (1) MATERIALS 'A', 'B' AND 'D' – SHALL BE PLACED IN 12-INCH LOOSE HORIZONTAL LIFTS AND COMPACTED TO AT LEAST 90% OF THE MAXIMUM DENSITY DETERMINED BY AASHTO SPECIFICATION T 99-74 (PROCTOR TEST)
   (2) MATERIAL 'C' – MAY BE DUMPED OR HANDPLACED WITH CONTACTING PIECES SECURELY WEDGED AND INTERLOCKED WITH ONE ANOTHER AND WITH THE SMALLER PIECES FILLING THE VOIDS BETWEEN LARGER PIECES
7. THE TOP OF THE FILL SHALL BE FREE OF DIPS AND DEPRESSIONS TO AVOID ACCUMULATION OF STANDING WATER AND SHALL BE GRADED TO MEET EXISTING CONTOURS. THE SURFACES OF THE FILL SHALL BE REVEGETATED WITH NATIVE GRASS AND SHALL BE GRADED AND RESTORED TO CLOSELY RESEMBLE THE GENERAL SURFACE CONFIGURATION OF SURROUNDING TERRAIN AND BLEND INTO AND COMPLIMENT THE DRAINAGE PATTERN OF THE SURROUNDING TERRAIN, AND BE [illegible] COMPATIBLE OF SUPPORTING POSTMINING LAND USES

A) Calculation of drainage quantity

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Basic formula (Rational Method)

$$Q = CiA$$

Q = Storm runoff in cubic feet sec.

C = Coefficient of imperviousness

i = Intensity of rainfall in inches per hour (in/hr.)

A = Contributing area in acres

1.) Calculation for Snow runoff:

Given:	Snowpack	260"
	Moist Content	10%
	runoff (2½ weeks)	75%
	Area	.32 Acres

$$Q = \frac{\frac{260\,in}{12\,in/ft} \times .10 \times .32A \times 43560\,ft^2/A}{18\,days \times 24\,hrs/day \times \frac{3600\,sec}{hr.}}$$

$Q = .02\ ft^3/sec.$ or $1.2\ ft^3/min$ or $9\ gal/min$

2.) Calculation for Rain runoff:

Based on a 10 year - 49 minute storm the calculations are as follows:

formula: $Q = CiA$

Given: $C = .20$
$i = .74$ in/hr.
$A = .32$ Acres

$Q = (.20)(.74)(.32) = .05$ cfs

$Q = .05\ ft^3/sec$ or $3.0\ ft^3/min$ or 22.50 gal/min

Due to the fact that Rain runoff is greater than Snow runoff, colvert sizing will be based on calculation #2.

3.) Calculation of Total discharge

In addition to direct pad runoff this covert will also be used when needed for transportation of underground mine water coming off the hill from the mine.

The maximum estimated quanity to be pumped from the mine would be 75 gpm.

Therefore the total discharge would equal:

Total discharge = 22.50 gal/min + 75 gal/min = 97.50 gal/min

or 13 ft^3/min

B) Calculation of culvert size

Chezy-Manning equation

Formula:

$$Q = a \frac{1.486}{n} R^{2/3} S^{1/2}$$

Q = Carring Capacity or discharge in cubic feet sec.

a = Cross-Sectional area of culvert in square feet.

n = A cofficient whose value depends on the degree of roughness.

R = a/p = The "hydraulic radius", which is the quotient of the cross-sectional area divided by the "wetted perimeter," p, or length of the cross line of contact between the water and the colvert.

S = Slope in feet/foot

Given:

Culvert size = 8" dia. Culvert
radius (r) = .33 ft.
area (a) = .35 ft.^{2}
Corrigated steel roughness (n) = .024
perimeter (p) = 2.09 ft.
Hydraulic radius (R) = .167 ft.
45° Slope (S) = 1.0

Calculation:

$$Q = .35\,ft^2 \left(\frac{1.486}{.024}\right)(.167)^{2/3}(1)^{1/2}$$

$$Q = 6.572\ ft^3/sec.\ \text{or}\ 394.3\ ft^3/min$$

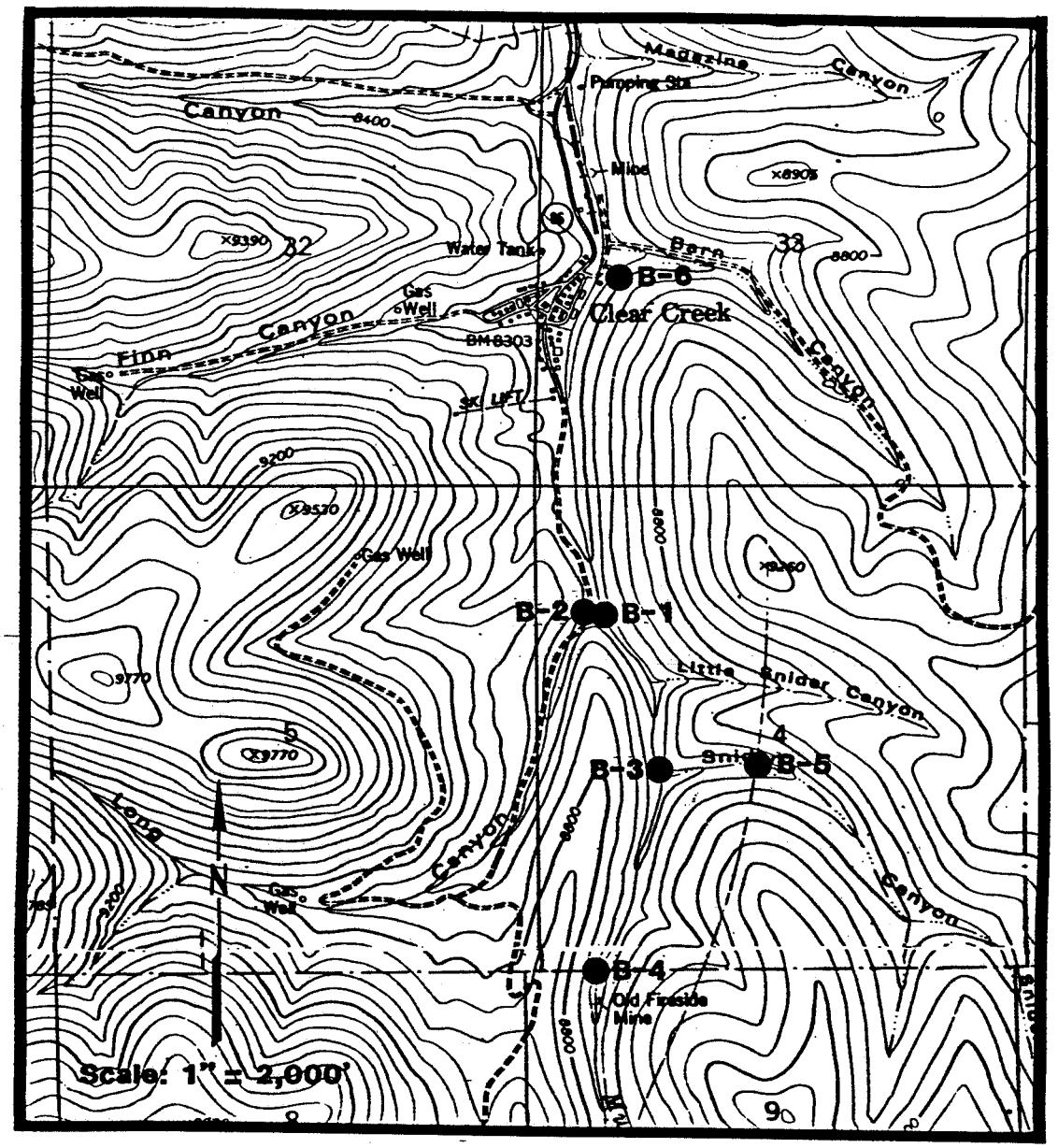
or 2957 gal/min

Safety Factor (using an 8" culvert) $= \dfrac{\text{Culvert Capacity}}{\text{Calculated Quanity}} = \dfrac{2957\,gpm}{97.50\,gpm}$

S.F. = 30.3

c) Conclusion

A. 8" dia. Culvert is more than Adequate.



BLAZON MINE WATER QUALITY MONITORING SITES

AS OF OCTOBER 1981

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