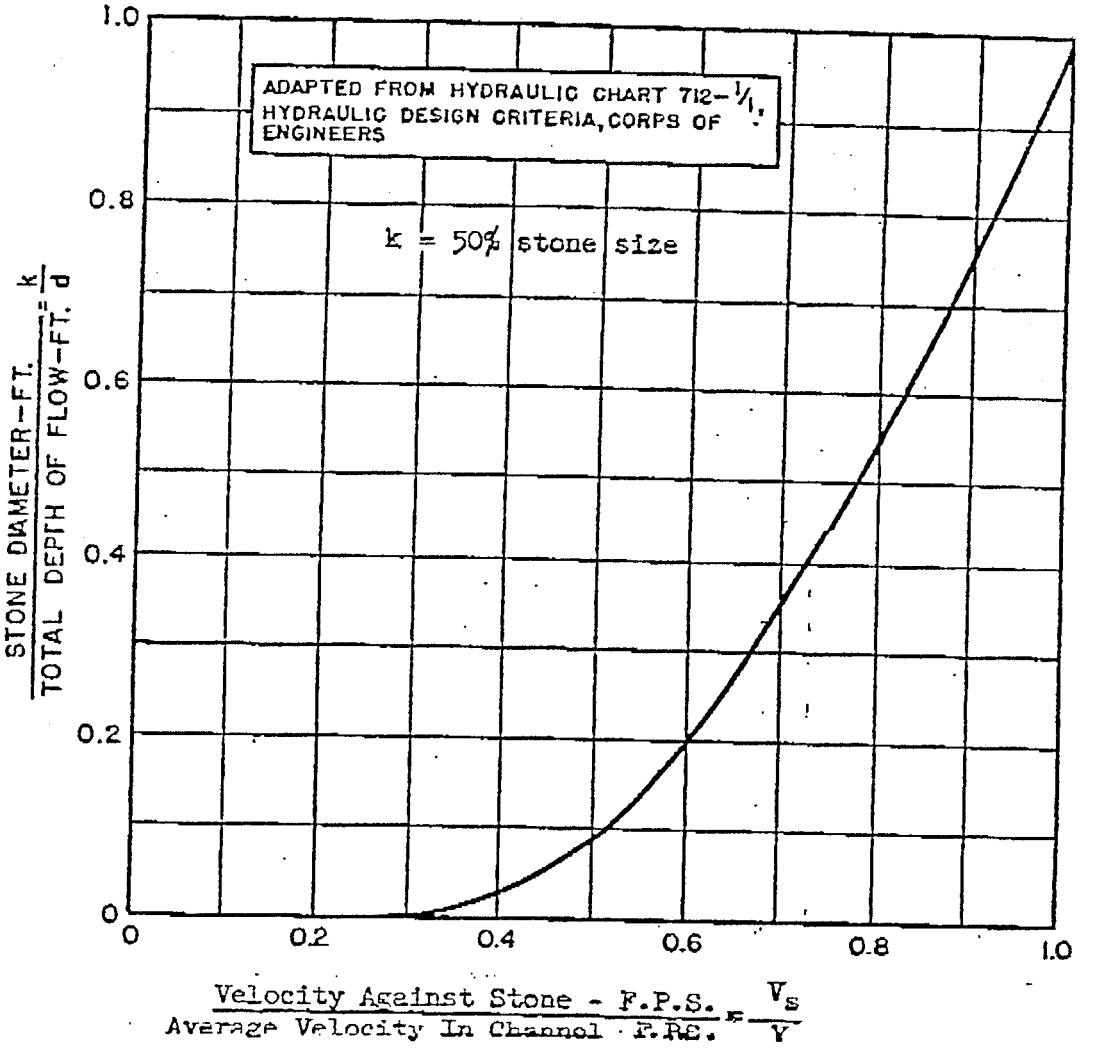
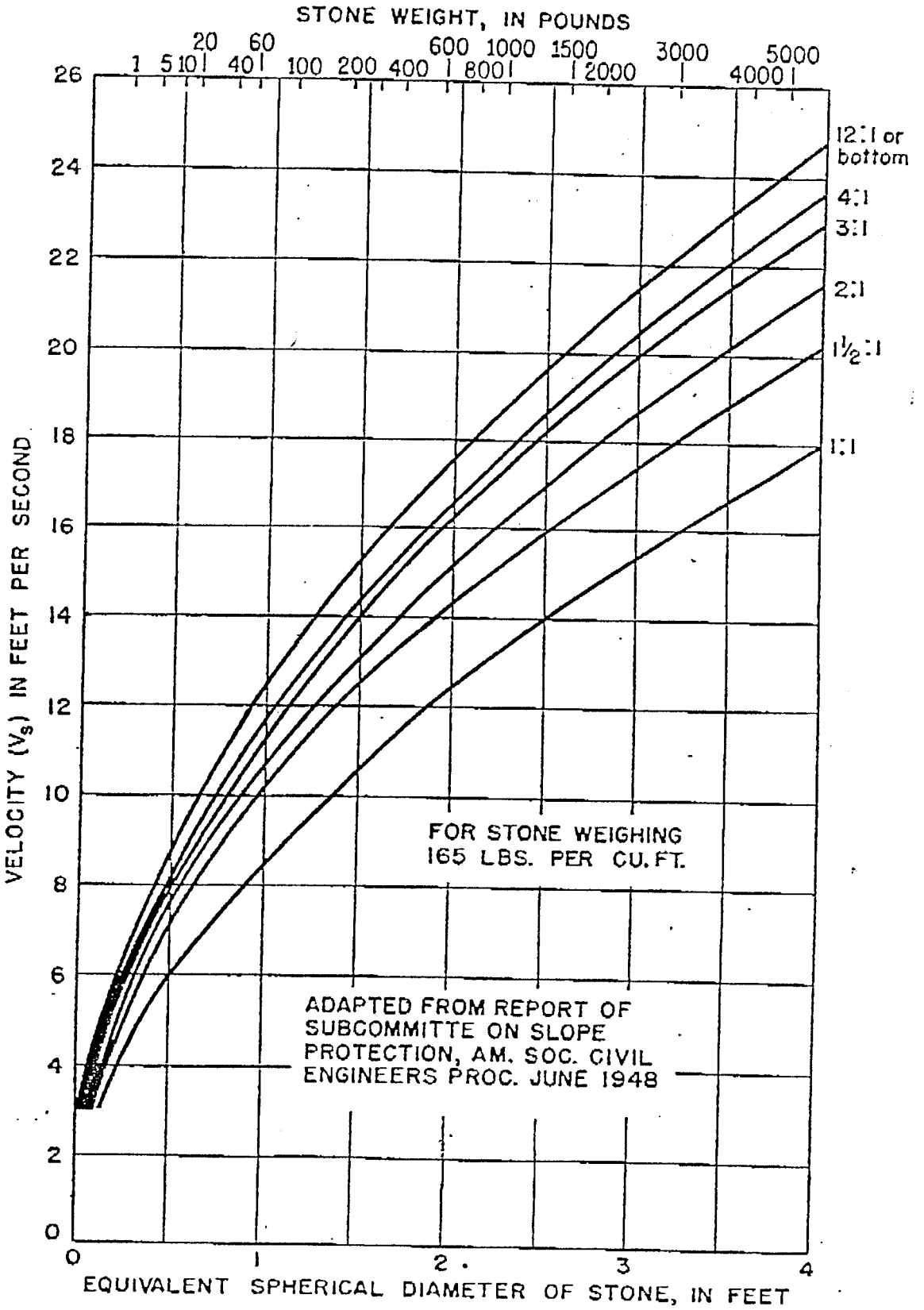


Source: Searcy (1967)



Source: Seeley (1967)

- Riprap conclusion:

  Use 12" 18"

  Side slopes → d_{50} = 0.9 ft (2:1 side) = 1.5 ft (4:1 side)

  Bottom → d_{50} = 0.5 ft (6")

- Size and spacing of roughness elements

  h = 1.0 ft (see pg. 24 of this calc.)

  L = D_i = 14.0 ft (D_i = D − 2h)

  h_e = 2h = 2.0 ft

  Use 5 roughness elements (as recommended by HEC-14) — welded to the inside of the culvert. Provide gussets on the downstream side of the roughness elements to prevent collapse under high flow or high debris conditions.

- Typical roughness element sections → see pages 29C and 29D of this calc.

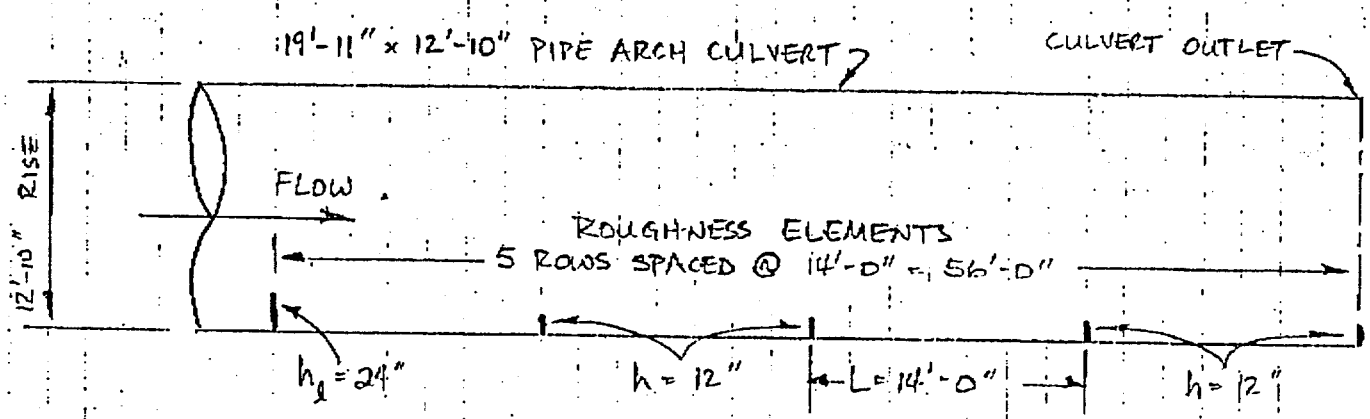
- Outlet design → provide a riprap apron downstream from the culvert outlet. The length of this apron should be the length required for the flow to stabilize and fully expand to the width of the channel. Base the outlet channel on an existing bottom width of 20 ft and 2h:1v sideslopes.

  According to the U.S. Army Corps of Engineers (1982), the length required for flow to stabilize downstream from a constriction (such as a bridge or culvert) is four times the average width of the side constriction. Using the hydraulic info. on pg. 27 of this calc., d/D_i = 0.80. Due to the similarity between the hydraulic elements graphs of the pipe arch and circular CMPs (see pg 20 and 21 of this calc.), the same depth relationship is assumed for the pipe arch culvert, with D_i = (12'-10") − (2'-0") = 10'-10" = 10.83'

  Thus,

  $$d = (0.80)(10.83\text{ ft})$$
  $$= 8.66\text{ ft}$$

  This depth of flow exceeds the depth at which the maximum culvert span is reached. Thus, the width of flow within the culvert will be 19'-11". For practical purposes, set width at 20 ft.



ELEVATION OF DOWNSTREAM END OF PROPOSED SOLDIER CREEK BYPASS CULVERT WITH ROUGHNESS ELEMENTS

SCALE: 1" = 10'

DESIGN NOTES:

1. ROUGHNESS ELEMENTS TO BE CUT FROM 0.250" (MIN) PLATE STEEL.
2. WELD ROUGHNESS ELEMENTS TO CULVERT WALLS AND BOTTOM.
3. ALL ELEMENT EDGES TO BE SMOOTHED AND CORNERS TO BE ROUNDED.
4. FIRST UPSTREAM ELEMENT IS 24" HIGH. ALL OTHERS 12" HIGH.

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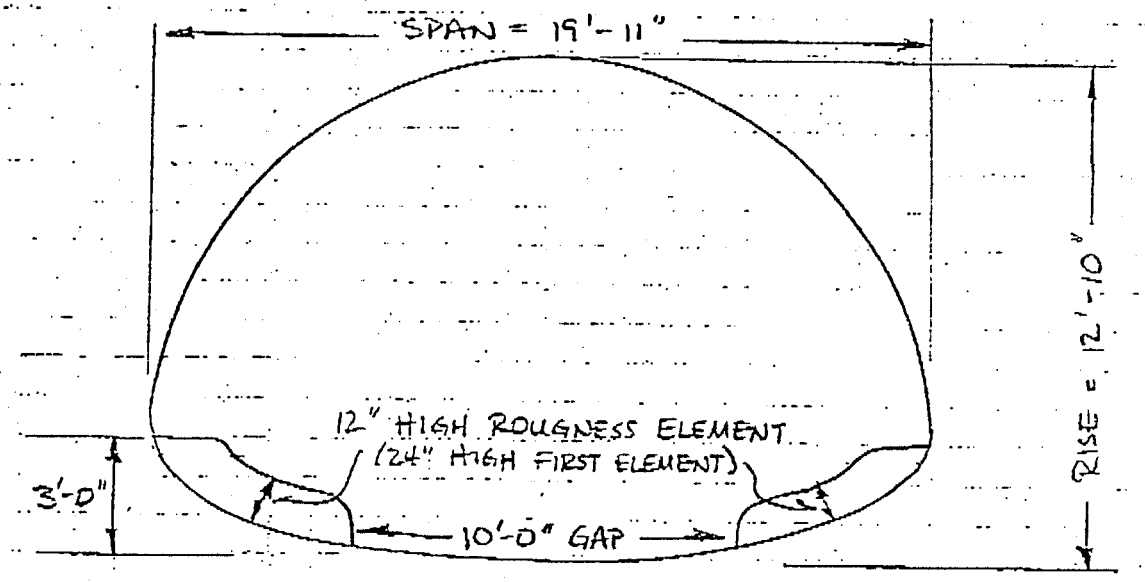
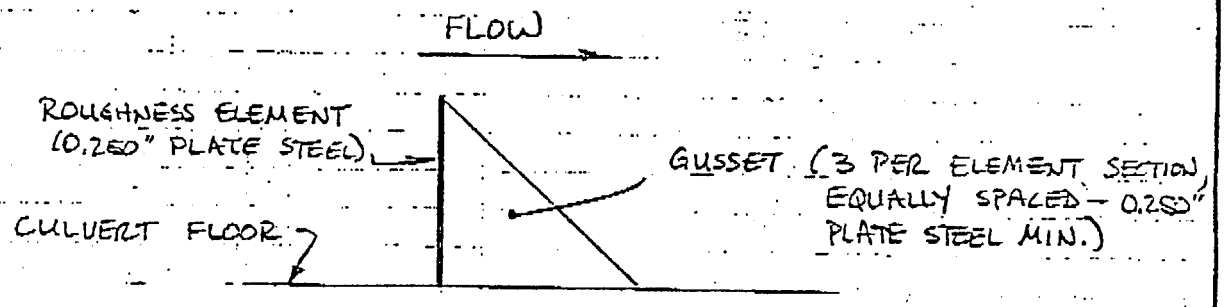
ENGINEERS / SCIENTISTS

PROJECT C-109-04 PAGE 29 C OF 29
COMPUTED RBJ DATE 11 Aug 89
CHECKED _____ DATE _____



BYPASS CULVERT END VIEW

SCALE: 1" = 5'



GUSSET DETAIL

SCALE: 1" = 1'

NOTE: DIMENSIONS DOUBLED AT FIRST UPSTREAM ELEMENT.

From HEC-2 calculations (Appendix E of MRP) the flow characteristics in the stream channel immediately downstream from the culvert outlet are as follows:

HEC-2 Section No. → 5

Flow depth → 6.95 ft
Flow width → 33.45 ft
Flow velocity → 20.0 ft/s

} Natural conditions

Since the outlet apron will maintain the same channel side slopes, the same channel bottom slope, the same hydraulic roughness (n=0.040), and the same bottom width, hydraulic conditions will remain the same. Thus, the constriction will be calculated using the above flow top width.

$$\text{Constriction} = \frac{33.45\text{ ft} - 20.0\text{ ft}}{2} = 6.7\text{ ft}$$

Apron length = (4)(6.7) = 26.8 ft ⇒ Use a length of 28 ft
Outlet velocity → equivalent to natural conditions
• Typical outlet sections → see pp 29F and 29G of this calc.

NOTE: Pursuant to the Division's review (Conditional Approval, New Surface Facilities, September 5, 1989), the constriction value was recalculated to 8.5 ft., resulting in a riprap apron length of 34. Therefore, the riprap apron shall be installed to a minimum length of 34 feet from the culvert outlet.

References

American Iron and Steel Institute. 1983. Handbook of Steel Drainage and Highway Construction Products. 3rd ed. Washington, D.C.

Barfield, B.J., R.C. Warner, and C.T. Haan. 1981. Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press, Stillwater, Oklahoma.

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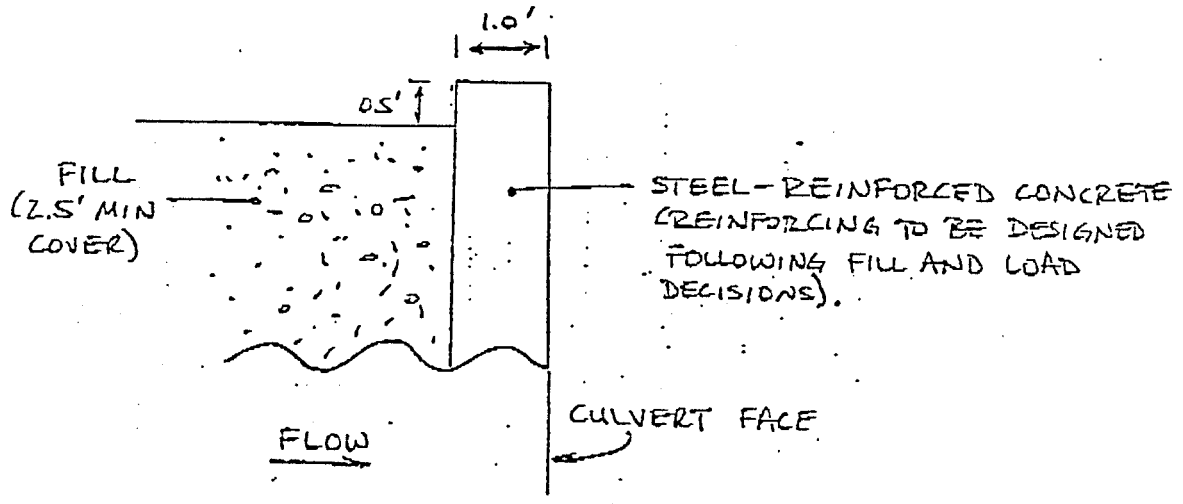
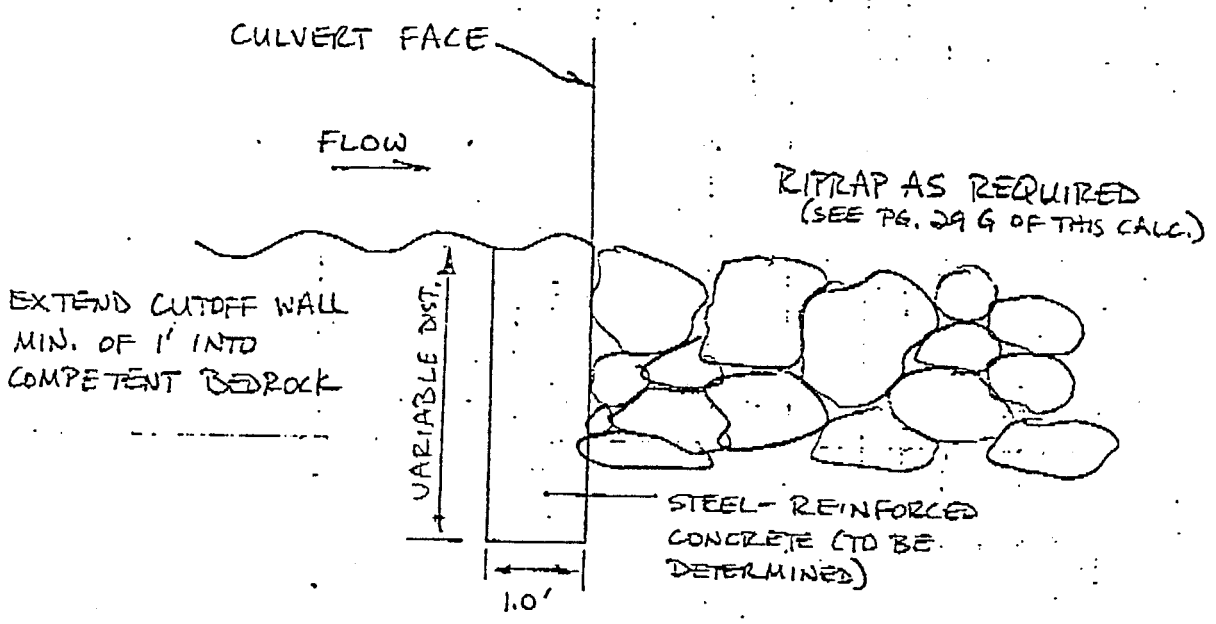
Searcy, J.K. 1967. Use of Riprap for Bank Protection. Hydraulic Engineering Circular No. 11. Federal Highway Administration, Washington, D.C.

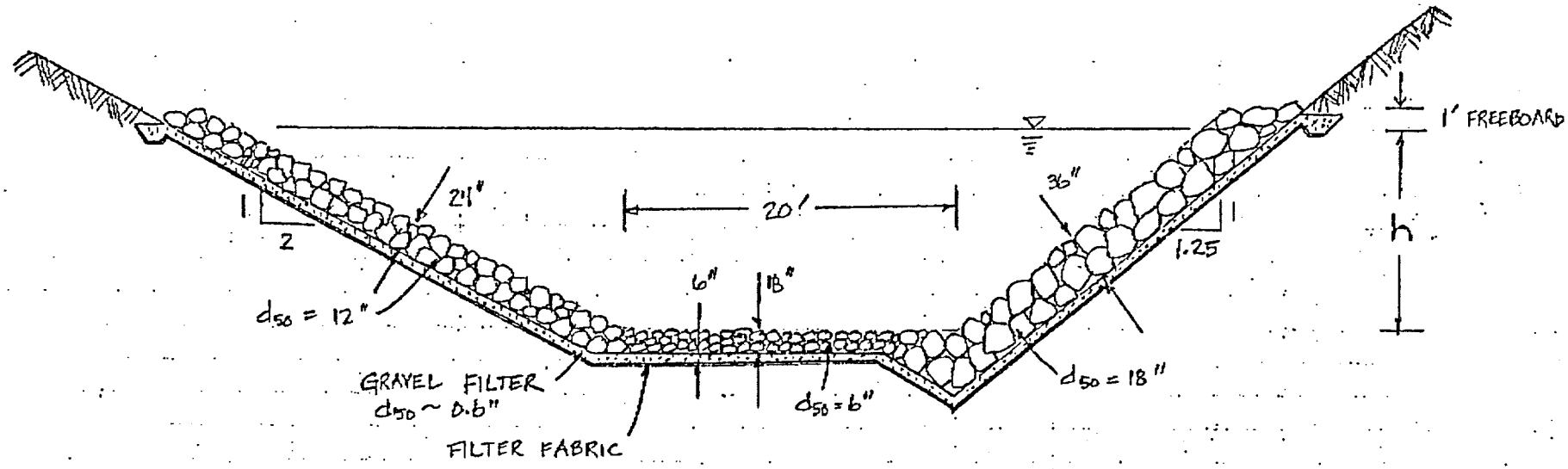
U.S. Army Corps of Engineers. 1982. HEC-2 Water Surface Profiles Users Manual. Hydrologic Engineering Center. Davis, California.



UPPER OUTLET HEADWALL TYP. SECTION
SCALE: 1"=2'



LOWER OUTLET HEADWALL TYP. SECTION
SCALE: 1"=2'



CULVERT OUTLET APRON

Scale: 1" = 10'

Note: h = 11.2 feet at culvert outlet and transitions to h = 7.0' 28 feet downstream of the culvert outlet (i.e., at downstream end of apron).

APPENDIX (E)

Hydraulic Analyses of Soldier Creek

REGISTERED PROFESSIONAL ENGINEER
No. 7102
RICHARD B. WHITE
STATE OF UTAH

Richard B. White
18 May 1989

The calculations contained in this appendix were originally performed when site plans called for the storage yard and portal expansions to both be on the east side of Soldier Creek, with no Soldier Creek bypass culvert. Thus, the calculations are generally representative of natural Soldier Creek conditions adjacent to the portal area and downstream therefrom.

RBW
18 May 1989

Hydraulic Analysis of Soldier Creek

1.0 INTRODUCTION

A hydraulic analysis of Soldier Creek was performed to evaluate the flow depths and average velocities of the creek adjacent to the proposed pad and box cut construction. This information is needed to determine the following:

1. The size of riprap required on the slope of the pad fill area which will be used for storage.
2. The adequacy of the low chord elevation of the proposed new bridge.
3. The erosion potential of the near-vertical streambank slopes adjacent to the box cut of the portal area.

The hydraulic analysis of Soldier Creek was performed prior to the slope stability analysis of the storage fill area which was originally designed to have a side slope of 1:1. Therefore, all hydraulic calculations are based on this side slope. Any expected changes in the hydraulic analysis due to variations in fill slope are discussed in subsequent sections.

There are 7 sections in this Appendix including the introduction. Section 2 describes the HEC-2 model used for the hydraulic analysis and Section 3 provides the results of the hydraulic analysis. Riprap design for the pad fill slope is provided in Section 4, while the proposed new bridge low chord elevation is discussed in Section 5. Section 6 discusses the potential for erosion along the steep side slopes adjacent to the box cut area and references are presented in Section 7. Design calculations and HEC-2 data are contained in Attachments A, B, and C.

2.0 COMPUTER MODEL

2.1 General. The hydraulic analysis of the Soldier Creek channel was performed using the HEC-2 computer model developed by the U.S. Army Corps of Engineers for the computation of water surface profiles.

The HEC-2 program is intended for calculating water surface profiles for steady, gradually varied flow in natural or man-made channels. Both subcritical and supercritical flow profiles can be calculated. The effects of various obstructions such as bridges, culverts, weirs, and structures in the flood plain may be considered in the computations. The computational procedure is based on the solution of the one-dimensional energy equation with energy loss due to friction evaluated with Manning's equation. The procedure is generally known as the Standard Step Method.

2.2 Input for HEC-2. Input required for the HEC-2 computer model includes channel cross section geometry, Manning's roughness coefficients, bridge or culvert data, starting water surface elevations, and design flow rates.

Channel cross section geometry for Soldier Creek was obtained from a contour map of the area which is drawn to a scale of 1" = 50' with a 2-foot contour interval. Bank slopes and bottom widths estimated from the base map were field checked. Refer to Plate A1-1 for the plan and profile of Soldier Creek, and Plates A1-2 and A1-3 for the channel cross sections. The cross sectional geometry for sections 8, 9, and 10 was modified slightly to include the near-vertical left bank slope which had eroded since the topographic map was produced. → Not. Instability inherent in this AREA

The Manning's roughness coefficient for the Soldier Creek channel was estimated to be 0.048. The approximation of this roughness coefficient was based on a method defined by the Soil Conservation Service (1963). Estimation procedures are presented in Attachment A.

One bridge will be constructed across Soldier Creek for access to the pad area. The location of the bridge is shown on Plate A1-1. It is expected that the bridge will span the creek and that bridge piers will not be required for support in the center of the span. Thus, the hydraulic analysis was conducted without special bridge considerations since the bridge will not significantly interrupt the existing flow pattern of the creek.

Because the existing channel slope is steep, it was assumed that the flow would be supercritical and, therefore, calculation of the water surface profile would begin at the upstream end of the reach and work downstream. Since there were no data on Soldier Creek water surface elevations, critical depth was assumed at section 20 as a starting water surface elevation for the HEC-2 model. This was calculated by the model from the geometry of the cross section. ?

The design flow rate used for the hydraulic analysis was based on the 100-year, 24-hour storm event. Vaughn Hansen Associates (1982) estimated the peak discharge for this event to be 2900 cubic feet per second.

3.0 HYDRAULIC RESULTS

The HEC-2 input and output files for Soldier Creek are presented in Attachment B. A summary of the Soldier Creek channel flow depths and velocities is presented in Table 3-1. Refer to Plate A1-1 for the location of each channel section.

The channel slope is steep and flow is supercritical through most of the reach. At two channel sections (sections 6 and 7) the flow is subcritical because it backs up behind a constriction in the channel at section 6. Downstream of this section the flow returns to supercritical for the remainder of the reach.

If further slope stability analysis on the storage area fill slope (sections 13, 14, and 15 on Plate A1-1) results in a design which requires

TABLE 3-1

SUMMARY OF HYDRAULIC ANALYSIS

Section No.	Water Surface Elevation (Feet)	Flow Depth (Feet)	Flow Velocity (Ft/sec)
1	6677.27	7.27	16.96
2	6681.94	8.44	16.34
3	6686.12	7.12	15.45
4	6688.83	6.33	18.11
5	6693.95	6.95	19.97
6	6700.08	11.08	14.94
7	6701.38	10.38	14.23
8	6701.30	8.30	15.73
9	6702.14	7.14	17.58
10	6703.20	5.70	20.45
11	6708.70	8.70	16.55
12	6711.84	8.34	13.54
13	6712.02	6.02	15.00
14	6716.84	7.84	14.34
15	6719.29	8.29	15.26
16	6722.08	7.58	16.19
17	6726.68	7.68	13.96
18	6729.44	7.64	14.62
19	6734.31	5.81	13.26
20	6739.13	7.63	12.30

a flatter side slope, the flow depths in the channel would be slightly less, and, correspondingly, the flow velocities would also decrease slightly beyond that estimated in this analysis. Thus, the results presented herein are considered conservative.

4.0 RIPRAP DESIGN

Based on the flow depths and velocities calculated for the Soldier Creek channel, the required riprap size was determined for the 1:1 sideslopes adjacent to the pad fill area. Channel sections 13, 14, and 15 (refer to Plate A1-1) are representative sections of the fill area and, therefore, riprap sizing was calculated at each section.

At sections 13, 14, and 15, the flow velocities vary between 14.3 and 15.3 feet per second, and flow depths vary between 6.0 and 8.3 feet. Calculations for riprap sizes are based on a method defined by the U.S. Department of Transportation, Federal Highway Administration (1967).

Riprap sizing calculations are presented in Attachment C. Based on these calculations, the median required riprap size was determined to be 12.6 inches, 9.6 inches, and 10.8 inches at sections 13, 14, and 15, respectively. To simplify construction, a minimum median riprap size of 12.6 inches will be placed on the entire fill slope. A layer of filter fabric will be placed on the slope prior to placement of riprap to protect the slope from soil erosion due to flow through the voids in the riprap. A 6 inch layer of minus 3 inch bedding material will be placed on top of the filter fabric to assure that the filter fabric conforms to the slope, and to protect the filter fabric during the placement of riprap. A typical section for riprap placement is presented in Figure 4-1.

If the side slopes of the fill area are decreased during final slope design, velocities adjacent to the fill will decrease slightly. Under these conditions, the design riprap size will be conservatively large. Therefore,

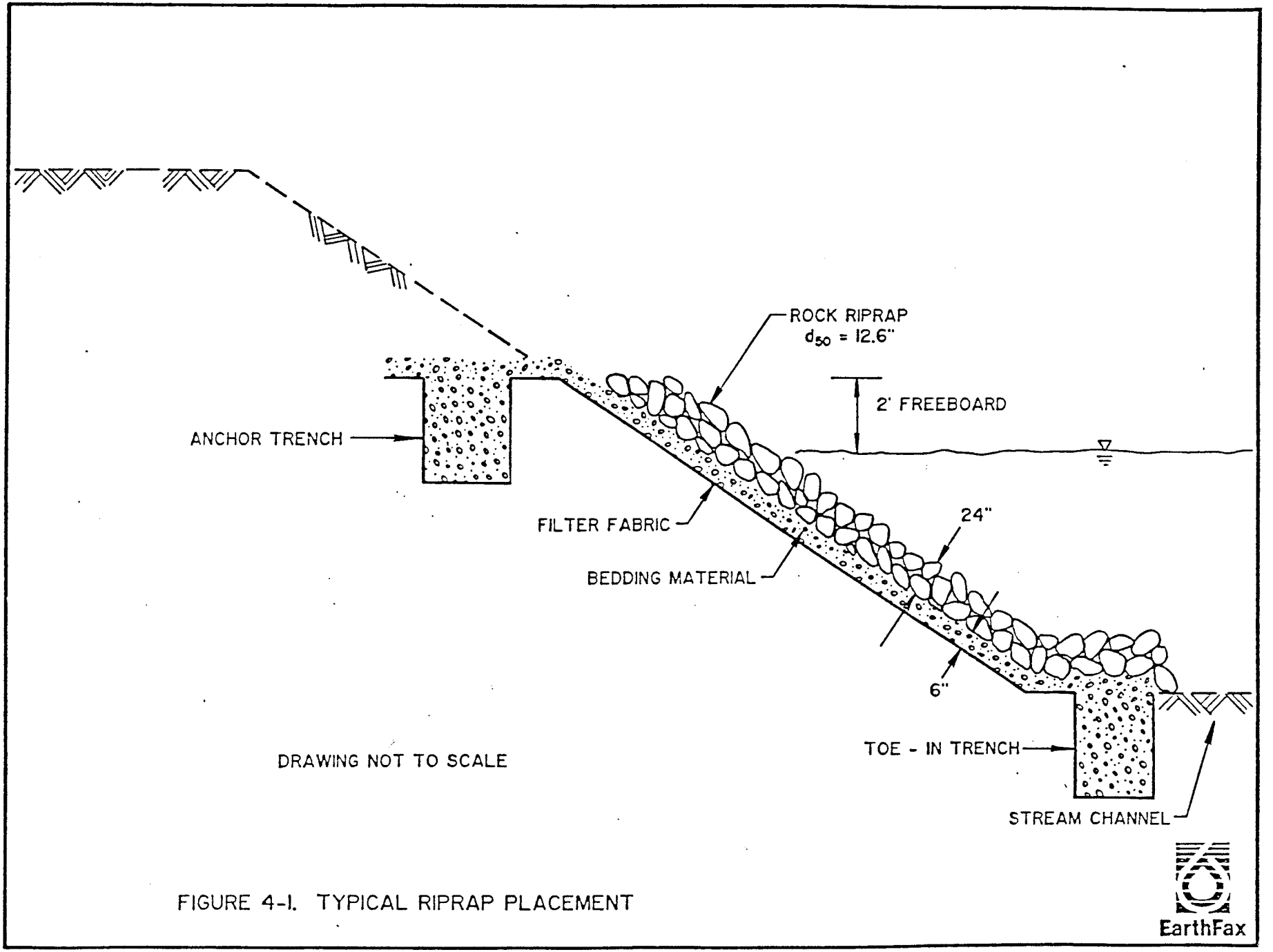


FIGURE 4-1. TYPICAL RIPRAP PLACEMENT

a median riprap size of 12.6 inches remains appropriate for a modified fill slope.

5.0 BRIDGE DESIGN DATA

The HEC-2 results were examined to determine if the design low chord elevation of the proposed bridge would have sufficient freeboard above the 100-year storm water surface elevation. Refer to the Soldier Creek plan and profile on Plate A1-1 for the bridge location.

The minimum low chord elevation of the proposed bridge is 6727 feet and the computed water surface elevation at the bridge location (refer to Plate A1-1) is 6718 feet. The freeboard between the proposed low chord elevation and the water surface elevation is 9 feet. Thus, the freeboard is sufficient to prevent the bridge from interfering with the stream flow.

6.0 STREAMBANK NEAR BOX CUT

The Soldier Creek streambank adjacent to the proposed box cut consists of near-vertical natural slopes, for an approximate channel length of 140 feet. Channel sections 8, 9 and 10 (refer to Plate A1-2) provide a typical representation of the existing channel and streambank.

A slope stability analysis was performed for the steep channel slopes and the results are discussed in Appendix A-3. In addition, streambank erosion and undercutting during large storm events was examined.

Based on the hydraulic analysis, flow velocities vary between 15.7 and 20.4 feet per second and flow depths vary between 5.7 and 8.3 feet along the near-vertical streambank slopes. With these high velocities, it is probable that additional erosion will occur.

A typical section of the stream channel, slope, and proposed box cut is presented in Figure 6-1. As shown on Figure 6-1, 25 to 30 feet of

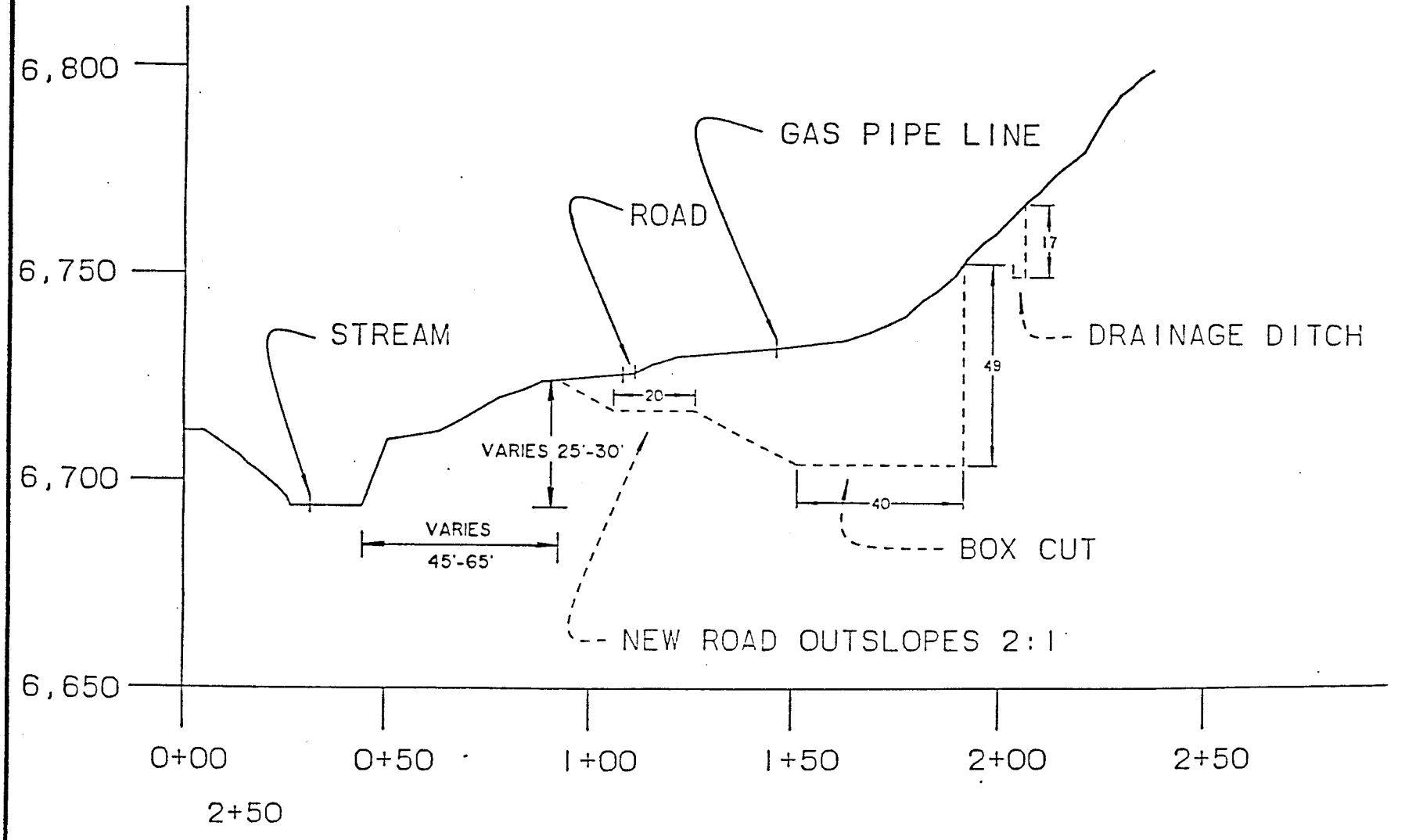


FIGURE 6-I. TYPICAL CHANNEL AND BOX CUT SECTION

EarthFax

elevation exists between the toe of the near-vertical channel slope and the top of the box cut. In addition, the toe of the steep channel bank is separated from the box cut by a minimum horizontal distance of 45 feet. Due to the large magnitude of these vertical and horizontal separations, immediate remediation is not necessary. However, this reach will be monitored closely for additional signs of erosion and undercutting. If significant erosion does occur during future storm events, streambank protection will be designed and installed to assure a stable slope between the box cut and Soldier Creek.

7.0 REFERENCES

Chow, V.T. 1959. Open-Channel Hydraulics. McGraw-Hill. New York, New York.

U.S. Army Corps of Engineers. 1982. HEC-2 Water Surface Profiles. The Hydrologic Engineering Center. Davis, California.

U.S. Department of Agriculture. 1963. Guide for Selecting Roughness Coefficient "n" Values for Channels. Soil Conservation Service. Lincoln, Nebraska.

U.S. Department of Transportation. 1967. Use of Riprap for Bank Protection. Hydraulic Engineering Circular No. 11. Federal Highway Administration. Washington, D.C.

Vaughn Hansen Associates. June 2, 1982. Letter to Mr. C. B. Tillson, Jr. of Kaiser Engineering.

ATTACHMENT A

Roughness Coefficient Calculations

Manning's n Calculations

Ref: USDA SCS, 1963, Guide For Selecting Roughness Coefficient "n" Value for Channels. Lincoln, Nebraska

1st Step: Basic n value

channel in Earth, Basic n = 0.02

2nd Step: Degree of irregularity

Minor irregularities : add 0.005

3rd Step: Variations in Shape.

Large + small x-sections alternate occasionally : add .005

4th Step: obstructions

Minor obstructions : add .01

5th Step: Vegetation

low effect on n : add .005

6th Step: meandering

$n_s = .02 + .005 + .005 + .01 + .005 = .045$

$l_m / l_s = \frac{1490'}{1220'} = 1.22 \Rightarrow$ borders on Minor to appreciable.

$\Rightarrow$

Modify n_s by $.075 n_s$ since $\frac{l_m}{l_s}$ is on dividing line.

Modifying value $= .075 n_s = .075 (.045) = .003$

Step 7: Add it all up.

$\eta = n_s + .003 = .048$

ATTACHMENT B

HEC-2 Input and Output

HEC-2 INPUT

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*  UPDATED MAY 1984                                 *
*  IBM-PC-XT VERSION AUGUST 1985                    *
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*  THE HYDROLOGIC ENGINEERING CENTER *
*  609 SECOND STREET, SUITE D       *
*  DAVIS, CALIFORNIA 95616          *
*  (916) 440-2105 (FTS) 448-2105    *
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  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
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T1 Hydraulics at Soldier Creek Coal Co. - Supercritical Flow
T2 Project C-109-02
T3 Soldier Creek

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J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
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NC	.043	.043	.042	.000	.000	.000	.000	.000	.000	.000

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BR	732.000	65.000	731.500	69.000	732.000	73.000	734.000	85.000	740.000	105.000
BR	745.000	137.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	19.000	8.000	.000	105.000	100.000	90.000	100.000	.000	.000	.000
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BR	730.000	37.000	732.000	75.000	740.000	105.000	.000	.000	.000	.000
X1	18.000	12.000	.000	130.000	65.000	135.000	100.000	.000	.000	.000
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BR	740.000	122.000	742.000	130.000	.000	.000	.000	.000	.000	.000
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BR	716.000	48.000	720.000	56.000	728.000	71.000	732.000	82.000	.000	.000
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BR	712.000	55.000	714.000	60.000	720.000	69.000	724.000	78.000	.000	.000
X1	14.000	7.000	15.000	82.000	105.000	105.000	105.000	.000	.000	.000
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BR	718.000	73.000	719.000	82.000	.000	.000	.000	.000	.000	.000
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BR	702.000	55.000	700.000	60.000	702.000	69.000	704.000	71.000	710.000	78.000
BR	714.000	92.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	10.000	11.000	24.000	84.000	50.000	50.000	50.000	.000	.000	.000
BR	720.000	.000	716.000	8.000	714.000	24.000	712.000	28.000	710.000	35.000
BR	698.000	41.000	697.500	54.000	698.000	61.000	700.000	66.000	710.000	76.000
BR	713.000	84.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	9.000	12.000	31.000	96.000	50.000	50.000	50.000	.000	.000	.000
BR	720.000	.000	718.000	23.000	716.000	31.000	714.000	34.500	710.000	37.000
BR	703.000	50.000	696.000	52.000	695.000	64.000	696.000	72.000	700.000	78.000
BR	710.000	85.000	712.000	96.000	.000	.000	.000	.000	.000	.000
X1	8.000	9.000	27.000	77.000	50.000	50.000	50.000	.000	.000	.000

GR	720.000	.000	712.000	15.000	710.000	27.000	694.000	31.500	693.000	45.000
GR	694.000	51.000	700.000	56.500	710.000	69.000	712.000	77.000	.000	.000
X1	7.000	11.000	.000	84.000	65.000	40.000	50.000	.000	.000	.000
GR	720.000	.000	710.000	19.000	700.000	31.000	696.000	34.000	692.000	41.000
GR	691.000	46.000	692.000	49.000	694.000	52.000	700.000	60.000	710.000	77.000
GR	711.000	84.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	6.000	12.000	.000	96.000	45.000	55.000	50.000	.000	.000	.000
GR	720.000	.000	710.000	21.000	704.000	28.000	702.000	42.000	700.000	46.000
GR	690.000	53.500	689.000	57.000	690.000	60.000	692.000	66.000	700.000	74.000
GR	710.000	90.000	711.000	96.000	.000	.000	.000	.000	.000	.000
X1	5.000	10.000	.000	95.000	125.000	75.000	100.000	.000	.000	.000
GR	710.000	.000	700.000	19.000	690.000	42.000	688.000	46.000	687.000	51.000
GR	688.000	59.000	690.000	62.000	700.000	73.000	706.000	81.000	708.000	95.000
X1	4.000	10.000	.000	132.000	120.000	70.000	100.000	.000	.000	.000
GR	710.000	.000	700.000	17.000	690.000	40.000	684.000	49.000	682.500	60.000
GR	684.000	69.000	690.000	85.000	700.000	98.000	706.000	114.000	708.000	132.000
X1	3.000	8.000	.000	92.000	75.000	120.000	100.000	.000	.000	.000
GR	700.000	.000	690.000	11.000	680.000	32.000	679.000	40.000	680.000	51.000
GR	690.000	63.000	700.000	74.000	708.000	92.000	.000	.000	.000	.000
X1	2.000	11.000	.000	108.000	70.000	125.000	100.000	.000	.000	.000
GR	700.000	.000	696.000	15.000	690.000	34.000	680.000	54.000	674.000	60.000
GR	673.500	67.000	674.000	71.000	676.000	75.000	680.000	81.100	690.000	92.000
GR	700.000	108.000	.000	.000	.000	.000	.000	.000	.000	.000
X1	1.000	9.000	.000	112.000	.000	.000	.000	.000	.000	.000
GR	700.000	.000	690.000	15.000	680.000	34.000	672.000	47.000	670.000	56.000
GR	672.000	66.000	680.000	83.000	691.000	97.000	700.000	112.000	.000	.000
EJ	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

HEC-2 OUTPUT

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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS   BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA   LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN      SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID     ENDST

*PROF 1


*SECNO 20.000
3720 CRITICAL DEPTH ASSUMED
    20.00      7.63    739.13    739.13    743.00    741.48      2.35       .00       .00    760.00
    2900.        0.     2900.        0.        0.      236.        0.        0.        0.    746.00
      .00       .00     12.30       .00      .048      .048      .048      .000    731.50     51.64
  .021994        0.        0.        0.         0        13         0       .00     50.88    102.52
0
*SECNO 19.000

1645 INT SEC ADDED BY RAISING SEC     19.00,   2.250FT AND MULTIPLYING BY    .949


3301 HV CHANGED MORE THAN HVINS

     1.01      5.11    735.86    737.29       .00    740.61      4.75       .87       .00    762.25
    2900.        0.     2900.        0.        0.      166.        0.        0.        0.    742.25
      .00       .00     17.50       .00      .048      .048      .048      .000    730.75     18.70
  .084363       33.       23.        9.         7        15         0       .00     58.21     76.91
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.750FT AND MULTIPLYING BY   1.018


3301 HV CHANGED MORE THAN HVINS

     1.02      5.45    735.45    736.50       .00    739.07      3.62      1.54       .00    761.50
    2900.        0.     2900.        0.        0.      190.        0.        0.        0.    741.50
      .00       .00     15.26       .00      .048      .048      .048      .000    730.00     18.86
  .056704       33.       23.        9.         4        11         0       .00     60.71     79.57
0

1645 INT SEC ADDED BY RAISING SEC      1.02,   -.750FT AND MULTIPLYING BY   1.018


3301 HV CHANGED MORE THAN HVINS

     1.03      5.71    734.96    735.69       .00    737.96      3.00      1.11       .00    760.75
    2900.        0.     2900.        0.        0.      209.        0.        0.        0.    740.75
      .00       .00     13.90       .00      .048      .048      .048      .000    729.25     19.07
  .043482       33.       23.        9.         4        11         0       .00     62.80     81.87
0
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS    BANK ELEV
   Q         OLOB      OCH       OROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNB       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CDRAR     TOPWID      ENDST


 1645 INT SEC ADDED BY RAISING SEC      1.03,   -.750FT AND MULTIPLYING BY   1.017

     19.00      5.81    734.31    734.92       .00    737.04      2.73       .92       .00    760.00
    2900.        0.     2900.        0.        0.      219.        0.        0.        0.    740.00
      .00       .00     13.26       .00      .048      .048      .048      .000    728.50     19.35
  .038378       33.       23.        9.         3         8         0       .00     64.30     82.65
0
 *SECNO 18.000

 1645 INT SEC ADDED BY RAISING SEC     18.00,   3.350FT AND MULTIPLYING BY   1.421


 3301 HV CHANGED MORE THAN HVINS

      1.01      6.25    731.40    732.46       .00    734.92      3.52      2.12       .00    753.35
    2900.        0.     2900.        0.        0.      193.        0.        1.        0.    745.35
      .00       .00     15.06       .00      .046      .048      .048      .000    725.15     47.46
  .047026       50.       50.       45.         4        11         0       .00     55.39    102.84
0

 1645 INT SEC ADDED BY RAISING SEC      1.01,  -3.350FT AND MULTIPLYING BY    .704

     18.00      7.64    729.44    730.30       .00    732.76      3.32      2.16       .00    750.00
    2900.        0.     2900.        0.        0.      198.        0.        1.        0.    742.00
      .00       .00     14.62       .00      .048      .049      .048      .000    721.80     30.97
  .039688       50.       50.       45.         6        11         0       .00     51.17     82.13
0
 *SECNO 17.000
     17.00      7.68    726.68    726.77       .00    729.71      3.03      3.05       .00    750.00
    2900.        0.     2900.        0.        0.      208.        0.        1.        0.    734.00
      .01       .00     13.96       .00      .048      .048      .048      .000    719.00     41.66
  .024190       65.      100.      135.         2         5         0       .00     35.70     77.36
0
 *SECNO 16.000

 1645 INT SEC ADDED BY RAISING SEC     16.00,   3.375FT AND MULTIPLYING BY   1.101

1
  03-27-89      10:53:34
 3301 HV CHANGED MORE THAN HVINS

      1.01      7.27    725.15    726.03       .00    728.97      3.82       .74       .00    743.38
    2900.        0.     2900.        0.        0.      185.        0.        1.        0.    733.38
      .01       .00     15.69       .00      .048      .048      .048      .000    717.88     25.77
  .036653       21.       25.       29.         4         6         0       .00     39.53     65.30
0
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS    BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICCNT     CORAR     TOPWID      ENDST

 1645 INT SEC ADDED BY RAISING SEC      1.01,  -1.125FT AND MULTIPLYING BY    .969

      1.02      7.32    724.07    725.06      .00    728.04      3.97       .93       .00    742.25
     2900.        0.     2900.        0.       0.     181.        0.        2.        0.    732.25
       .01       .00     15.99       .00     .048     .048      .048      .000    716.75     24.93
   .037909       21.       25.       29.        2         8         0       .00     38.49     63.42
0

 1645 INT SEC ADDED BY RAISING SEC      1.02,  -1.125FT AND MULTIPLYING BY    .968

      1.03      7.44    723.07    724.07      .00    727.09      4.03       .95       .00    741.13
     2900.        0.     2900.        0.       0.     180.        0.        2.        0.    731.13
       .01       .00     16.10       .00     .048     .048      .048      .000    715.63     24.03
   .037968       21.       25.       29.        3         8         0       .00     37.62     61.65
0

 1645 INT SEC ADDED BY RAISING SEC      1.03,  -1.125FT AND MULTIPLYING BY    .967

     16.00      7.58    722.08    723.09      .00    726.15      4.07       .95       .00    740.00
     2900.        0.     2900.        0.       0.     179.        0.        2.        0.    730.00
       .01       .00     16.19       .00     .048     .048      .048      .000    714.50     23.13
   .037842       21.       25.       29.        3         8         0       .00     36.76     59.89
0
 *SECNO 15.000

 1645 INT SEC ADDED BY RAISING SEC     15.00,   1.750FT AND MULTIPLYING BY   1.042

      1.01      8.08    720.83    721.49      .00    724.44      3.61      1.71       .00    737.75
     2900.        0.     2900.        0.       0.     190.        0.        2.        0.    725.75
       .01       .00     15.25       .00     .048     .048      .048      .000    712.75     34.29
   .030920       43.       50.       58.        4         8         0       .00     36.15     70.44
0

 1645 INT SEC ADDED BY RAISING SEC      1.01,  -1.750FT AND MULTIPLYING BY    .960

     15.00      8.29    719.29    719.89      .00    722.91      3.62      1.53       .00    736.00
     2900.        0.     2900.        0.       0.     190.        0.        2.        1.    724.00
       .01       .00     15.26       .00     .048     .048      .048      .000    711.00     32.71
   .030369       43.       50.       58.        3         8         0       .00     35.23     67.94
0
 *SECNO 14.000
     14.00      7.84    716.84    717.19      .00    720.03      3.19      2.88       .00    734.00
     2900.        0.     2900.        0.       0.     202.        0.        3.        1.    719.00
       .01       .00     14.34       .00     .045     .048      .048      .000    709.00     32.16
   .027284       85.      100.      112.        3         5         0       .00     38.52     70.68
0
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        QLOSS    BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 13.000

1645 INT SEC ADDED BY RAISING SEC     13.00,   2.250FT AND MULTIPLYING BY    .931

3301 HV CHANGED MORE THAN HVINS

     1.01      5.43   713.68   715.29      .00   719.00      5.33      1.03      .00   734.25
    2900.        0.    2900.       0.       0.     157.        0.        3.       1.   719.25
      .01       .00    15.52      .00     .048     .048      .048     .000   708.25    26.13
  .061626       26.      26.      26.        6       11         0       .00    38.55    64.67
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.750FT AND MULTIPLYING BY   1.025

3301 HV CHANGED MORE THAN HVINS

     1.02      5.75   713.25   714.44      .00   717.60      4.35      1.40      .00   733.50
    2900.        0.    2900.       0.       0.     173.        0.        3.       1.   718.50
      .01       .00    16.74      .00     .049     .048      .049     .000   707.50    26.52
  .046756       26.      26.      26.        4       11         0       .00    40.29    66.81
0

1645 INT SEC ADDED BY RAISING SEC      1.02,   -.750FT AND MULTIPLYING BY   1.024

3301 HV CHANGED MORE THAN HVINS

     1.03      5.94   712.69   713.60      .00   716.48      3.79      1.12      .00   732.75
    2900.        0.    2900.       0.       0.     186.        0.        3.       1.   717.75
      .01       .00    15.63      .00     .049     .048      .048     .000   706.75    27.01
  .038950       26.      26.      26.        3       11         0       .00    41.76    68.77
0

1645 INT SEC ADDED BY RAISING SEC      1.03,   -.750FT AND MULTIPLYING BY   1.024

    13.00      6.02   712.02   712.79      .00   715.51      3.49       .97      .00   732.00
    2900.        0.    2900.       0.       0.     193.        0.        3.       1.   717.00
      .01       .00    15.00      .00     .048     .048      .048     .000   706.00    27.58
  .035161       26.      26.      26.        2        8         0       .00    42.95    70.54
0
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   SECND     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        QLOSS    BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECND 12.000

1645 INT SEC ADDED BY RAISING SEC     12.00.   1.250FT AND MULTIPLYING BY   1.233


3301 HV CHANGED MORE THAN HVINS

     1.01      7.44   712.19   712.24      .00   714.81      2.62      .70      .00   731.25
    2900.        0.    2900.       0.       0.     223.       0.       3.       1.    717.25
      .01       .00    12.98      .00     .048     .048     .048     .000   704.75    48.85
  .023014       38.      25.      13.        6       11        0      .00    44.43    93.28
0

1645 INT SEC ADDED BY RAISING SEC      1.01.  -1.250FT AND MULTIPLYING BY    .811

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    12.00      8.34   711.84   711.84      .00   714.69      2.85      .57      .04   730.00
    2900.        0.    2900.       0.       0.     214.       0.       3.       1.    716.00
      .01       .00    13.54      .00     .048     .048     .048     .000   703.50    39.26
  .022922       38.      25.      13.       20        8        0      .00    37.96    77.22
0

*SECND 11.000

1645 INT SEC ADDED BY RAISING SEC     11.00,   2.625FT AND MULTIPLYING BY   1.231


3301 HV CHANGED MORE THAN HVINS

     1.01      7.96   710.58   711.38      .00   714.34      3.76      .35      .00   732.63
    2900.        0.    2900.       0.       0.     186.       0.       3.       1.    716.63
      .01       .00    15.56      .00     .048     .048     .048     .000   702.63    55.09
  .034420        9.      13.      16.        4        8        0      .00    38.01    93.10
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.875FT AND MULTIPLYING BY    .937

     1.02      6.05   709.80   710.81      .00   713.89      4.09      .45      .00   731.75
    2900.        0.    2900.       0.       0.     179.       0.       3.       1.    715.75
      .01       .00    16.22      .00     .048     .048     .048     .000   701.75    51.47
  .027438        9.      13.      16.        2        8        0      .00    35.96    87.42
0
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS    BANK ELEV
   Q        OLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA    LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

 1645 INT SEC ADDED BY RAISING SEC      1.02,   -.875FT AND MULTIPLYING BY    .933

     1.03     8.32   709.19   710.25      .00   713.42     4.23      .47      .00   730.88
    2900.       0.    2900.       0.       0.     176.       0.       3.       1.   714.88
      .01      .00    16.50      .00     .048     .048     .048     .000   700.88    47.65
  .037945       9.      13.      16.        3        8        0      .00    34.26    81.91
0

 1645 INT SEC ADDED BY RAISING SEC      1.03,   -.875FT AND MULTIPLYING BY    .928

    11.00     8.70   708.70   709.71      .00   712.95     4.25      .47      .00   730.00
    2900.       0.    2900.       0.       0.     175.       0.       4.       1.   714.00
      .01      .00    16.55      .00     .048     .048     .048     .000   700.00    43.74
  .037053       9.      13.      16.        4        8        0      .00    32.74    76.48
0
 *SECNO 10.000

 1645 INT SEC ADDED BY RAISING SEC     10.00,   1.875FT AND MULTIPLYING BY    .897

 3301 HV CHANGED MORE THAN HVINS

     1.01     6.08   705.45   707.55      .00   712.33     6.87      .62      .00   715.88
    2900.       0.    2900.       0.       0.     138.       0.       4.       1.   714.85
      .01      .00    21.04      .00     .048     .048     .048     .000   699.38    34.26
  .070854      13.      13.      13.        5       11        0      .00    28.13    62.39
0

 1645 INT SEC ADDED BY RAISING SEC      1.01,   -.625FT AND MULTIPLYING BY   1.038

     1.02     5.95   704.70   706.75      .00   711.44     6.74      .88      .00   715.25
    2900.       0.    2900.       0.       0.     139.       0.       4.       1.   714.25
      .02      .00    20.84      .00     .048     .048     .048     .000   698.75    35.64
  .070397      13.      13.      13.        3       11        0      .00    29.02    64.66
0

 1645 INT SEC ADDED BY RAISING SEC      1.02,   -.625FT AND MULTIPLYING BY   1.037

     1.03     5.82   703.94   705.96      .00   710.57     6.62      .88      .00   714.63
    2900.       0.    2900.       0.       0.     140.       0.       4.       1.   713.63
      .02      .00    20.65      .00     .048     .048     .048     .000   698.13    37.02
  .069973      13.      13.      13.        3       11        0      .00    29.91    66.93
0

 1645 INT SEC ADDED BY RAISING SEC      1.03,   -.625FT AND MULTIPLYING BY   1.036

    10.00     5.70   703.20   705.18      .00   709.69     6.49      .87      .00   714.00
    2900.       0.    2900.       0.       0.     142.       0.       4.       1.   713.00
      .02      .00    20.45      .00     .048     .048     .048     .000   697.50    38.40
  .069461      13.      13.      13.        3       11        0      .00    30.80    69.20
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        DLOSS     BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECND 9.000

1645 INT SEC ADDED BY RAISING SEC      9.00,   1.875FT AND MULTIPLYING BY   1.111

3301 HV CHANGED MORE THAN HVINS

     1.01      6.05   702.92   704.68      .00   706.87      5.95      .82      .00   717.86
    2900.        0.    2900.       0.       0.     148.        0.       4.       1.   713.88
      .02       .00    19.57      .00     .048     .048     .048     .000   696.85    56.15
  .062355       13.      13.      13.        4       11        0      .00    31.41    87.56
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.625FT AND MULTIPLYING BY    .967

     1.02      6.41   702.66   704.21      .00   708.15      5.49      .73      .00   717.25
    2900.        0.    2900.       0.       0.     154.        0.       4.       1.   713.25
      .02       .00    18.79      .00     .048     .048     .048     .000   696.25    54.18
  .054268       13.      13.      13.        4       11        0      .00    30.79    64.97
0

1645 INT SEC ADDED BY RAISING SEC      1.02,   -.625FT AND MULTIPLYING BY    .966

     1.03      6.77   702.40   703.76      .00   707.51      5.11      .64      .00   716.63
    2900.        0.    2900.       0.       0.     160.        0.       4.       1.   712.63
      .03       .00    18.14      .00     .048     .048     .049     .000   695.63    52.21
  .048106       13.      13.      13.        4       11        0      .00    30.14    82.35
0

1645 INT SEC ADDED BY RAISING SEC      1.03,   -.625FT AND MULTIPLYING BY    .964

     9.00      7.14   702.14   703.33      .00   706.94      4.80      .57      .00   716.00
    2900.        0.    2900.       0.       0.     165.        0.       4.       1.   712.00
      .02       .00    17.58      .00     .048     .048     .043     .000   695.00    50.24
  .043041       13.      13.      13.        4       11        0      .00    29.47    79.72
0
*SECND 8.000

1645 INT SEC ADDED BY RAISING SEC      8.00,   1.000FT AND MULTIPLYING BY   1.042

3301 HV CHANGED MORE THAN HVINS

     1.01      7.75   701.75   702.50      .00   705.97      4.22      .97      .00   711.00
    2900.        0.    2900.       0.       0.     176.        0.       4.       1.   713.00
      .02       .00    16.46      .00     .048     .048     .048     .000   694.00    30.85
  .035438       25.      25.      25.        4       11        0      .00    28.01    59.85
0
```

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK-    EG        HV        HL        DLOSS     BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA     LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

*SECNO 5.000

1645 INT SEC ADDED BY RAISING SEC      5.00,   1.500FT AND MULTIPLYING BY    .931

3201 HV CHANGED MORE THAN HVINS

     1.01      6.79    695.29    697.73      .00    703.01      7.72      .54       .00    711.50
    2900.        0.    2900.        0.       0.      130.        0.       5.        1.    709.50
      .02       .00     22.29       .00     .048      .048      .048     .000    688.50     30.99
  .057749       11.       13.       14.        5        15         0       .00     30.62     61.61
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.500FT AND MULTIPLYING BY   1.025

3201 HV CHANGED MORE THAN HVINS

     1.02      6.86    694.86    697.14      .00    701.97      7.10     1.04       .00    711.00
    2900.        0.    2900.        0.       0.      136.        0.       5.        1.    709.00
      .02       .00     21.39       .00     .049      .049      .049     .000    685.00     31.59
  .079295       11.       13.       14.        3        11         0       .00     31.61     63.20
0

1645 INT SEC ADDED BY RAISING SEC      1.02,   -.500FT AND MULTIPLYING BY   1.024

     1.03      6.91    694.41    696.53      .00    701.02      6.61      .95       .00    710.50
    2900.        0.    2900.        0.       0.      141.        0.       5.        1.    708.50
      .02       .00     20.63       .00     .048      .048      .048     .000    687.50     32.23
  .072682       11.       13.       14.        2        11         0       .00     32.55     64.78
0

1645 INT SEC ADDED BY RAISING SEC      1.03,   -.500FT AND MULTIPLYING BY   1.024

     5.00      6.95    693.95    695.92      .00    700.14      6.19      .87       .00    710.00
    2900.        0.    2900.        0.       0.      145.        0.       5.        1.    708.00
      .02       .00     19.97       .00     .048      .048      .048     .000    687.00     32.90
  .067277       11.       13.       14.        2        11         0       .00     33.45     66.35
0
*SECNO 4.000

1645 INT SEC ADDED BY RAISING SEC      4.00,   3.000FT AND MULTIPLYING BY    .854

     1.01      6.73    692.23    694.01      .00    697.97      5.74     2.17       .00    713.00
    2900.        0.    2900.        0.       0.      151.        0.       5.        1.    711.00
      .02       .00     19.22       .00     .049      .048      .049     .000    685.50     35.14
  .063184       42.       33.       25.        4        11         0       .00     35.69     70.84
0
```

```
   SECNO     DEPTH     CWSEL     CRIWS     WSELK-    ES        HV        HL        OLDSS     BANK ELEV
   Q         OLOB      OCH       OROB      ALOB      ACH       AROB      VOL       TWA    LEFT/RIGHT
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN       SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID      ENDST

1645 INT SEC ADDED BY RAISING SEC      1.01,  -1.500FT AND MULTIPLYING BY   1.085

     1.02      6.52    690.52    692.19      .00    695.91      5.39      2.06      .00    711.50
    2900.        0.    2900.        0.       0.     156.        0.        5.       1.    709.50
      .02       .00     18.62       .00     .048      .048     .048      .000    684.00     38.44
  .060614       42.       33.       25.        4        11         0       .00     37.94     76.38
0

1645 INT SEC ADDED BY RAISING SEC      1.02,  -1.500FT AND MULTIPLYING BY   1.079

     4.00      6.33    688.83    690.40      .00    693.92      5.09      1.99      .00    710.00
    2900.        0.    2900.        0.       0.     160.        0.        5.       1.    708.00
      .02       .00     18.11       .00     .048      .048     .048      .000    682.50     41.76
  .058662       42.       33.       25.        4        11         0       .00     40.12     81.88
0
*SECNO 3.000

1645 INT SEC ADDED BY RAISING SEC      3.00,   2.625FT AND MULTIPLYING BY   1.012

3201 HV CHANGED MORE THAN HVINS

     1.01      6.70    688.32    689.51      .00    692.66      4.54      1.26      .00    702.63
    2900.        0.    2900.        0.       0.     173.        0.        5.       1.    705.63
      .02       .00     16.72       .00     .048      .048     .048      .000    681.63     20.27
  .040570       30.       25.       18.        4        11         0       .00     38.27     58.54
0

1645 INT SEC ADDED BY RAISING SEC      1.01,   -.875FT AND MULTIPLYING BY    .996

     1.02      6.91    687.66    688.66      .00    691.64      3.98      1.02      .00    701.75
    2900.        0.    2900.        0.       0.     181.        0.        5.       1.    707.75
      .02       .00     16.00       .00     .049      .049     .049      .000    680.75     19.73
  .038531       30.       25.       18.        3        11         0       .00     38.54     58.57
0

1645 INT SEC ADDED BY RAISING SEC      1.02,   -.875FT AND MULTIPLYING BY    .996

     1.03      7.06    686.93    687.83      .00    690.71      3.78       .93      .00    700.88
    2900.        0.    2900.        0.       0.     186.        0.        5.       1.    706.88
      .02       .00     15.60       .00     .048      .049     .049      .000    679.88     19.36
  .035851       30.       25.       18.        3         8         0       .00     39.15     58.50
0

1645 INT SEC ADDED BY RAISING SEC      1.03,   -.875FT AND MULTIPLYING BY    .996

     3.00      7.12    686.12    686.96      .00    689.83      3.71       .88      .00    700.00
    2900.        0.    2900.        0.       0.     188.        0.        5.       1.    706.00
      .02       .00     15.45       .00     .048      .048     .048      .000    679.00     19.14
  .034839       30.       25.       18.        2         8         0       .00     39.20     58.35
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOES   BANK ELEV
   Q        OLOB     OCH      OROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST

*SECNO 2.000

1645 INT SEC ADDED BY RAISING SEC      2.00,   2.750FT AND MULTIPLYING BY   1.188

     1.01     7.52   687.77   684.85      .00   687.98     4.21     1.85      .00   702.75
    2900.       0.    2900.       0.       0.     176.       0.       6.       1.   702.75
      .02      .00    16.46      .00     .048     .048     .045     .000   676.25    61.74
  .039359      38.      50.      60.        4       11        0      .00    35.96    97.70
0

1645 INT SEC ADDED BY RAISING SEC      1.01,  -2.750FT AND MULTIPLYING BY    .842

     2.00     8.44   681.94   682.85      .00   686.09     4.14     1.99      .00   700.00
    2900.       0.    2900.       0.       0.     178.       0.       6.       1.   700.00
      .02      .00    16.34      .00     .048     .048     .045     .000   673.50    50.11
  .036319      35.      50.      60.        5       11        0      .00    33.11    83.22
0
*SECNO 1.000

1645 INT SEC ADDED BY RAISING SEC      1.00,   1.750FT AND MULTIPLYING BY    .905


3301 HV CHANGED MORE THAN HVINS

     1.01     7.61   679.36   680.70      .00   684.04     4.63     2.05      .00   701.75
    2900.       0.    2900.       0.       0.     167.       0.       6.       1.   701.75
      .03      .00    17.36      .00     .048     .048     .045     .000   671.75    34.27
  .046423      35.      50.      63.        6        8        0      .00    36.22    70.50
0

1645 INT SEC ADDED BY RAISING SEC      1.01,  -1.750FT AND MULTIPLYING BY   1.105

     1.00     7.27   677.27   678.56      .00   681.73     4.47     2.31      .00   700.00
    2900.       0.    2900.       0.       0.     171.       0.       6.       1.   700.00
      .03      .00    16.96      .00     .048     .048     .045     .000   670.00    38.45
  .045930      35.      50.      63.        4        8        0      .00    35.74    77.19
0
1
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THIS RUN EXECUTED 03-27-89

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*************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

Soldier Creek

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10KWS	VCH	AREA	.01K
*	20.000	.00	.00	.00	731.50	2900.00	739.13	739.13	741.48	219.94	12.30	235.71	195.55
*	19.000	90.00	.00	.00	728.50	2900.00	734.31	734.92	737.04	383.78	13.26	218.64	148.03
*	18.000	100.00	.00	.00	721.80	2900.00	729.44	730.30	732.76	396.85	14.62	198.30	145.57
	17.000	100.00	.00	.00	719.00	2900.00	726.68	726.77	729.71	241.90	13.96	207.69	186.46
*	16.000	100.00	.00	.00	714.50	2900.00	722.06	722.09	726.15	376.42	16.19	179.09	149.08
*	15.000	100.00	.00	.00	711.00	2900.00	719.29	719.85	722.91	303.69	15.26	190.00	166.41
	14.000	100.00	.00	.00	708.00	2900.00	716.84	717.15	720.03	272.64	14.34	202.30	175.63
*	13.000	105.00	.00	.00	706.00	2900.00	712.02	712.79	715.51	351.61	15.00	193.33	154.66
*	12.000	50.00	.00	.00	703.50	2900.00	711.84	711.84	714.69	229.22	13.54	214.22	191.55
*	11.000	50.00	.00	.00	700.00	2900.00	708.70	709.71	712.95	370.53	16.55	175.23	150.66
*	10.000	50.00	.00	.00	697.50	2900.00	703.20	705.18	709.69	694.61	20.45	141.82	110.03
*	9.000	50.00	.00	.00	695.00	2900.00	702.14	702.33	706.94	430.41	17.58	165.00	139.78
*	8.000	50.00	.00	.00	693.00	2900.00	701.30	701.73	705.14	307.98	15.73	184.37	165.25
*	7.000	50.00	.00	.00	691.00	2900.00	701.36	701.38	704.52	239.25	14.23	203.85	187.49
*	6.000	50.00	.00	.00	689.00	2900.00	700.08	700.08	703.55	258.12	14.94	194.10	180.50
*	5.000	50.00	.00	.00	687.00	2900.00	693.95	695.92	700.14	672.77	19.97	145.24	111.81
*	4.000	100.00	.00	.00	682.50	2900.00	688.83	690.40	693.92	586.62	18.11	160.16	119.73

1

03-27-89 10:53:34

	SECND	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
*	3.000	100.00	.00	.00	679.00	2900.00	686.12	686.96	689.83	348.39	15.45	187.66	155.37
*	2.000	100.00	.00	.00	673.50	2900.00	681.94	682.88	686.09	363.18	16.34	177.51	152.17
*	1.000	100.00	.00	.00	670.00	2900.00	677.27	678.56	681.73	459.30	16.96	170.96	135.32

1

03-27-89 10:53:34

Soldier Creek

SUMMARY PRINTOUT TABLE 150

	SECND	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	20.000	2900.00	739.13	.00	.00	-3.87	50.83	.00
*	19.000	2900.00	734.31	.00	-.65	.00	64.30	90.00
*	18.000	2900.00	729.44	.00	-1.96	.00	51.17	100.00
	17.000	2900.00	726.68	.00	-2.76	.00	35.70	100.00
*	16.000	2900.00	722.08	.00	-.99	.00	36.76	100.00
*	15.000	2900.00	719.29	.00	-1.54	.00	35.23	100.00
	14.000	2900.00	716.84	.00	-2.45	.00	38.52	100.00
*	13.000	2900.00	712.02	.00	-.67	.00	42.95	105.00
*	12.000	2900.00	711.84	.00	-.35	.00	37.96	50.00
*	11.000	2900.00	708.70	.00	-.49	.00	32.74	50.00
*	10.000	2900.00	703.20	.00	-.74	.00	30.80	50.00
*	9.000	2900.00	702.14	.00	-.26	.00	29.47	50.00
*	8.000	2900.00	701.30	.00	-.45	.00	28.68	50.00
*	7.000	2900.00	701.38	.00	-.30	.00	33.01	50.00
*	6.000	2900.00	700.08	.00	-1.30	.00	28.30	50.00
*	5.000	2900.00	693.95	.00	-.46	.00	33.45	50.00

*	4.000	2900.00	688.83	.00	-1.69	.00	40.12	100.00
*	3.000	2900.00	686.12	.00	-.81	.00	39.20	100.00
*	2.000	2900.00	681.94	.00	-1.83	.00	33.11	100.00
*	1.000	2900.00	677.27	.00	-2.10	.00	36.74	100.00

1
03-27-89 10:53:24

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION  SECNO=   20.000  PROFILE= 1  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=   19.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   18.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   16.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   15.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   13.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   12.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   11.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=   10.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    9.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    8.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    7.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    6.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    6.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    6.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=    5.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    4.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    3.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    2.000  PROFILE= 1  INTERPOLATED XSECTIONS USED

CAUTION  SECNO=    1.000  PROFILE= 1  INTERPOLATED XSECTIONS USED
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Summary of Variable Descriptions for HEC-2

Variable Name	Description
CWSEL	Computed water surface elevation.
CRIWS	Critical water surface elevation.
EG	Energy gradient elevation for a cross section which is equal to the computed water surface elevation CWSEL plus the discharge-weighted velocity head HV.
TOPWID	Cross section width at the calculated water surface elevation.
SLOPE (10K*S)	Slope of the energy grade line for the current section (times 10,000).
TIME	Travel time from the first cross section to the present cross section in hours.
VOL	Cumulative volume of water in the stream from the first cross section (in acre-feet for English units or 1000 cubic meters in Metric units).
DEPTH	Depth of flow.
WSELK	Known water surface elevation.
HV	Mean velocity head across the entire cross section.
HL	Energy loss due to friction.
OLOSS	Energy loss due to expansion or contraction.
QLOB	Amount of flow in the left overbank.
QCH	Amount of flow in the channel.
QROB	Amount of flow in the right overbank.

Variable Name	Description
XNL (K*XNL)	Manning's 'n' for the left overbank area (time 1,000).
XNCH (K*XNCH)	Manning's 'n' for the channel area (times 1,000).
XNR (K*XNR)	Manning's 'n' for the right overbank area (times 1,000).
WTN (K*WTN)	Weighted value of Manning's 'n' for the channel based on the distance between cross sections and channel flow from the first cross section. Used when computing Manning's 'n' from high water marks (times 1,000).
CASE	A variable indicating how the water surface elevation was computed. Values of -1, -2, -3, and 0 indicate assumptions of critical depth, minimum difference a fixed change (X5 card) or a balance between the computed and assumed water surface elevations.
STCHL	Station of the left bank.
STCHR	Station of the right bank.
XLBEL	Left bank elevation.
RBEL	Right bank elevation.
AREA	Cross section area.
VCH	Mean velocity in the channel.
STENCL	The station of the left encroachment.
STENCR	The station of the right encroachment.
CLSTA	The centerline station of the trapezoidal excavation.

Variable Name	Description
BW	The bottom width of the trapezoidal excavation.
ELENCL	Elevation of left encroachment.
ELENCR	Elevation of right encroachment.
CHSLOP (K*CHSL)	Channel slope (times 1,000).
.01K	The total discharge (index Q) carried with $S^{1/2}$ = .01 (equivalent to .01 times conveyance).
QLOBP	Percent of flow in the left overbank.
PERENC	The target of encroachment requested on ET card.
TWA	The cumulative topwidth area (acres or 1000 square meters).
SECNO	The cross section identification number.
XLCH	Channel reach length.
ELTRD	Minimum elevation for top of road profile.
ELLC	Maximum low chord elevation.
ELMIN	Minimum elevation in cross section.
Q	Discharge.
EGPRS	Energy elevation assuming pressure flow.
EGLWC	Energy elevation assuming low flow.
QWEIR	Total weir flow at the bridge.
QPR	Total pressure or low flow at the bridge.

Variable Name	Description
H3	Change in water surface elevation from Yarnell's equation.
CLASS	Controlling flow type for bridge solution.
DIFWSP	Difference in water surface elevation for each profile.
DIFWSX	Difference in water surface elevation between sections.
DIFKWS	Difference between known and computed water surface elevations.
SSTA	Starting station where the water surface intersects the ground (on the left side of the cross section).
ENDST	Ending station where the water surface intersects the ground on the right side.
VLOB	Average velocity in the left overbank area.
VROB	Average velocity in the right overbank area.
ALPHA	Velocity head coefficient.
KRATIO	Ratio of the upstream to downstream conveyance.
QROBP	Percent of flow in the right overbank.
QCHP	Percent of flow in the channel.
DIFEG	Difference in energy elevation for each profile.
IHLEQ	Friction loss equation index.
TELMX	Elevation of the lower of the two end points of the cross section.

ATTACHMENT C

Riprap Design

Riprap Sizing

Ref: U.S. D.O.T, Federal Highway Administration. June, 1967. Use of Riprap for Bank Protection. Hydraulic Engineering Circular No. 11. Washington, D.C.

Section 13

flow depth, d = 6.02'
flow velocity, V = 15.00 ft/s

① Assume stone diameter, K = 2'

$$\frac{K}{d} = \frac{2}{6.02} = 0.33$$

$$\frac{V_s}{V} = 0.68 \quad \text{(Fig 1)} \quad (V_s = \text{Velocity against Stone})$$

$$V_s = .68(15) = 10.2 \text{ ft/s}$$

∴ Side Slopes = 1:1

∴ Eqiv. Stone diameter = 1.4' (Fig 2)

② Assume K = 1'

$$\frac{K}{d} = \frac{1}{6.02} = 0.17$$

$$\frac{V_s}{V} = .58, \quad V_s = 8.7 \text{ ft/s}$$

Equiv Stone diameter = 1.05' ✓✓

Ave Riprap Size = 1.05' = 12.6"

Section 14

$d = 7.84'$
$V = 14.34$ ft/s

① Assume $k = 1'$

$\frac{k}{d} = \frac{1}{7.84} = 0.13$

$\frac{V_s}{V} = 0.55$ (Fig 1)

$V_s = 7.9$ ft/s

Equiv. Stone dia $= 0.85'$ (Fig. 2)

② Assume $k = 0.8'$

$\frac{k}{d} = \frac{.8}{7.84} = 0.10$

$\frac{V_s}{V} = 0.52$ (Fig 1)

$V_s = .52(14.34) = 7.46$

Equiv. Stone dia $= 0.80$ ✓✓

$\boxed{\text{Ave. Riprap Size} = 0.8 \text{ ft} = 9.6 \text{ inches}}$

Section 15

$d = 8.29'$
$V = 15.26$ ft/s

① Assume $k = 0.9$ ft

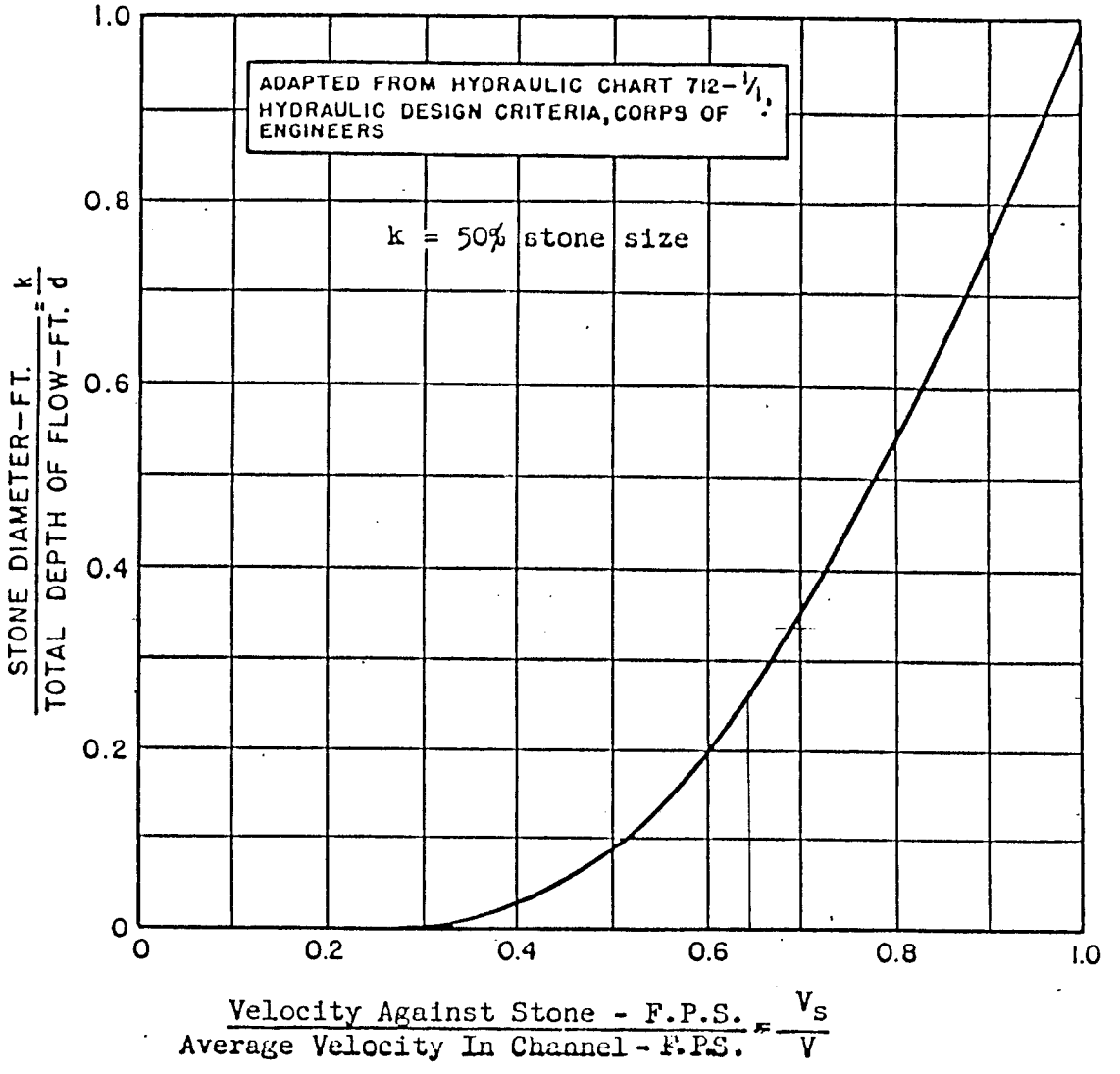
$\frac{k}{d} = \frac{.9}{8.29} = 0.11$

$\frac{V_s}{V} = 0.525$ (Fig 1)

$V_s = .525(15.26) = 8.01$ ft/s

Equiv. Stone dia $= 0.9$ ft (Fig 2)

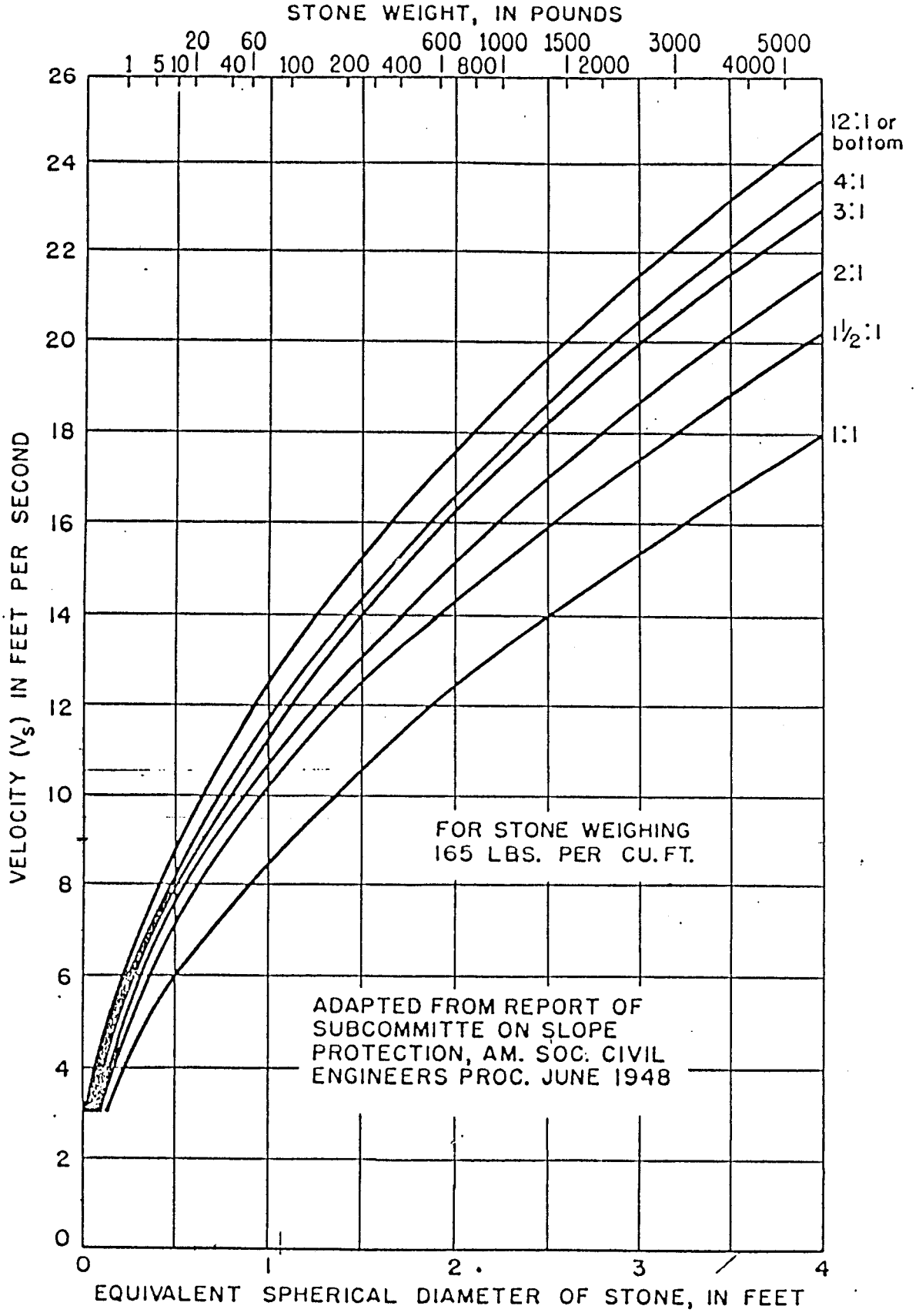
$\boxed{\text{Ave Riprap Size} = 0.9 \text{ ft} = 10.8 \text{ inches}}$



VELOCITY AGAINST STONE ON CHANNEL BOTTOM

(Taken from U.S. Dept. of Transportation, Federal Highway Admin., 1967)

FIGURE 1



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

(Taken from U.S. Dept. of Transportation, Federal Highway Admin., 1967)

FIGURE 2

APPENDIX (F)

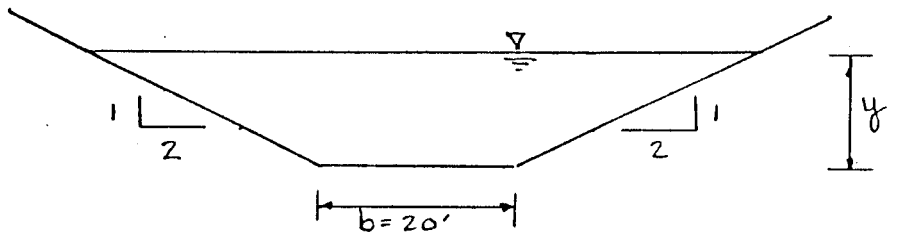
Reclamation Channel
Design Calculations

REGISTERED PROFESSIONAL ENGINEER
No. 8435
CAROL A.
BJORK
STATE OF UTAH

Carol A. Bjork
Aug. 10, 1989

Reclamation Channel Design

Channel dimensions based on information provided by Dave Spillman @ Soldier Creek Coal Co.



Manning's Equation : $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$ (Chow, 1959)

100-year, 24-hour storm event = 2900 cfs (Vaughn Hansen Assoc. 1982)

$n = 0.0395\, d_{50}^{(1/6)}$ For riprap channels where d_{50} represents ave. stone diameter. (From: Barfield, B.J., R.C. Warner, and C.T. Haan. 1983. Applied Hydrology and Sedimentology for Disturbed Areas. Oklahoma Technical Press.)

(d_{50} in feet)
(n does not account for vegetation)

Assume stone diameter = 12" = 1.0 ft

$n = 0.0395\,(1.0)^{1/6} = 0.0395$

$A = \text{Area} = (b + 2y)y = (20 + 2y)y$

$R = \text{Hydraulic Radius} = \frac{\text{Area}}{\text{Wetted perimeter}}$

$= \frac{(b+2y)y}{b + 2y\sqrt{1+(2)^2}} = \frac{(20+2y)y}{20 + 2y\sqrt{5}} = \frac{y(10+y)}{10 + 2.24y}$

S = channel slope = 4.0% (from site cross sections)

Manning Equation ⇒

$$2900 = \frac{1.49}{0.0395}\left((20+2y)y\right)\left[\frac{y(10+y)}{10+2.24y}\right]^{2/3}(.04)^{1/2}$$

$$384.4 = \left[(20+2y)y\right]\left[\frac{y(10+y)}{10+2.24y}\right]^{2/3}$$

Solve for y by trial + Error:

y	function (= 384.4)
7.0'	661.5
6.0'	491.5
5.0'	348.3
5.3'	388.5
5.25'	381.6 ⇐

$\boxed{y = 5.25 \text{ ft}}$

Area = (20 + 2(5.25))(5.25) = 160.13 ft²

Ave. Velocity = $\frac{Q}{A} = \frac{2900 \text{ cfs}}{160.13 \text{ ft}^2} = \boxed{18.1 \text{ ft/sec}}$

Conclusion: For a channel bottom width of 20 feet and side slopes of 2:1, the flow depth will be 5.25 feet. Flow velocities will be approximately 18.1 feet per second. Riprap will be provided on the channel bottom and side slopes as designed in the following pages. Riprap will be placed one foot above the design water surface elevation to provide freeboard. Filter material + Filter fabric is recommended beneath the riprap to prevent erosion. The recommended minimum thickness of the riprap layer is 27 inches.

Will be placed

Riprap Sizing for Reclamation Channel

Velocity = 18.1 ft/sec Depth = 5.25 ft = d

Use Figures 1 + 2 to determine riprap size.

① For channel side slopes, 2:1 ⇒ Assume K = 1 ft

$$\frac{K}{d} = \frac{1.0}{5.25} = 0.19$$

$$\frac{V_s}{V} = 0.59 \qquad V_s = 0.59\,(18.1) = 10.7 \text{ ft/s}$$

equivalent diam. = 1.0 feet OK ✓

∴ $\boxed{d_{50} = 12 \text{ inches}}$

② For channel bottom: Assume K = 0.75 feet

$$\frac{K}{d} = \frac{0.75}{5.25} = 0.14$$

$$\frac{V_s}{V} = 0.56 \qquad V_s = 0.56\,(18.1) = 10.1 \text{ ft/s}$$

equivalent diam = 0.70 ft OK ✓

∴ $\boxed{d_{50} = 9 \text{ inches}}$

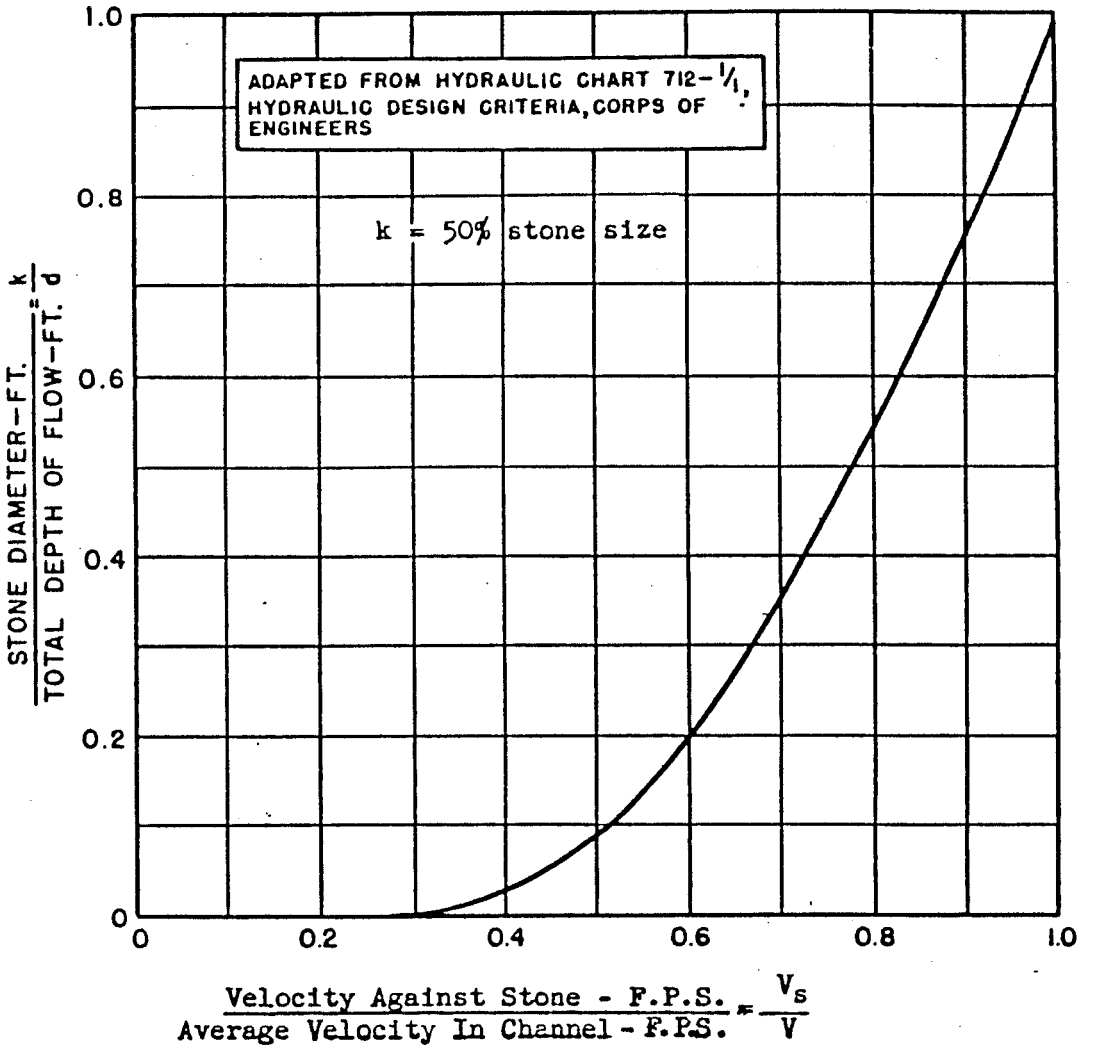


FIG. 1 - VELOCITY AGAINST STONE ON CHANNEL BOTTOM

From: Searcy, J.K. 1967. Use of Riprap for Bank Protection. U.S. Dept. of Transportation. Federal Highway Admin. Hydraulic Engineering Circular No. 11.

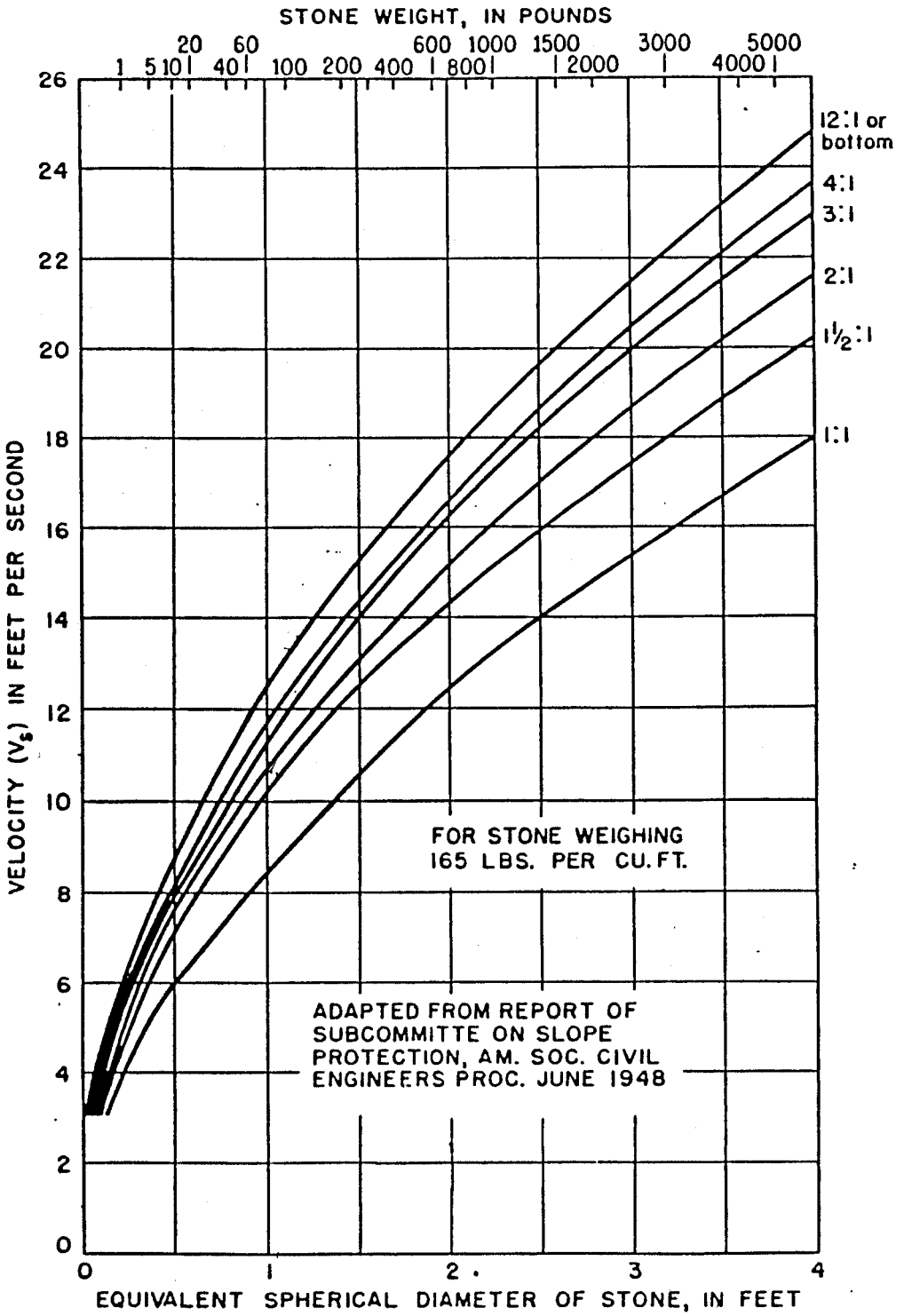
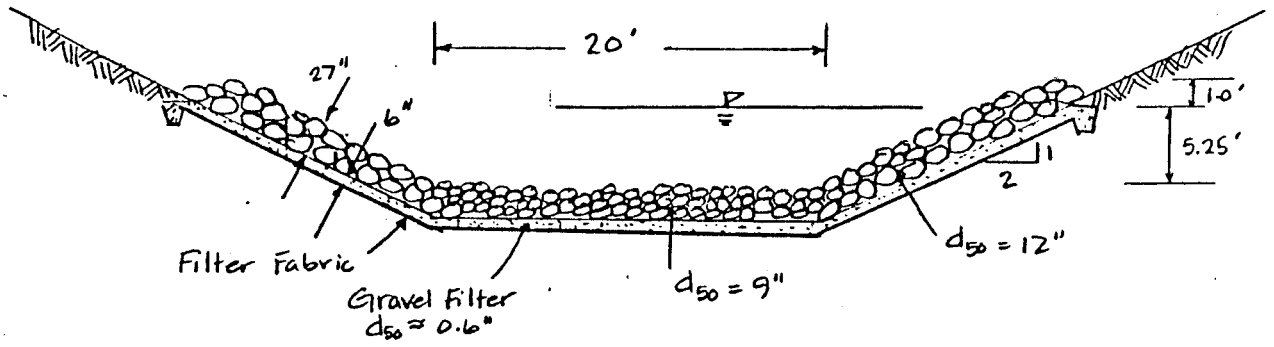


FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES



Reclamation Channel
Typical Section

Not to Scale

Riprap - 4.5 yd^3/ft

Filter - 1.037 yd^3/ft

Appendix G
Illustrations

QUESTAR PIPELINE COMPANY

79 SOUTH STATE STREET • P. O. BOX 11450 • SALT LAKE CITY, UTAH 84147 • PHONE (801) 530-2400

November 1, 1989

NOV 8 1989
SC3

Mr. J. T. Paluso, P.E.
Chief Engineer
Soldier Creek Coal Company
P. O. Box I
Price, Utah 84501

Dear Mr. Paluso:

Re: Conditional License Agreement - Soldier Creek Canyon Mine Surface Facilities Expansion

Included as an attachment are two copies of a proposed conditional license agreement between Questar Pipeline Company and Soldier Creek Coal Company pertaining to Soldier Creek's installation of facilities in proximity to Questar Pipeline's 20-inch diameter, high pressure natural gas transmission pipeline (Main Line 40). The proposed agreement has been approved and endorsed by Questar Pipeline's management.

If Soldier Creek Coal accepts the agreement without any exceptions, please have both copies of the agreement endorsed by an authorized company official. Please then return the copy of the agreement having internal Questar Pipeline approval signatures to me for our files.

Response as soon as possible will enable your construction activities to proceed without delay. You may contact either Larry Bodyfelt at (307) 382-7223 or me at (801) 530-2517 if you have any questions or comments regarding the agreement.

Yours very truly,

C. K. Blair
Supervisor, System Design Engineering

lb

Attachment

SC3 Revised 01/07/91

CONDITIONAL LICENSE

between

QUESTAR PIPELINE COMPANY

and

SOLDIER CREEK COAL COMPANY

CONDITIONAL LICENSE

QUESTAR PIPELINE COMPANY ("Licensor"), a Utah corporation, hereby grants a conditional license ("License") to SOLDIER CREEK COAL COMPANY ("Licensee"), to use a certain portion of lands subject to the Right-of-Way Grant ("Grant"), attached and made part of this License as Exhibit A, only to the extent consistent with Questar Pipeline's rights under the Grant and the terms and conditions of this License. This License is limited to Licensee's proposed installation of certain surface facilities, underground electrical or other utility lines, a road and related pipeline protective split casing or concrete structure (Facilities) as described in Soldier Creek Coal Company's Drawing No. 1251-GA-101, attached and made part of this License as Exhibit B. Licensee represents the Facilities are necessary for the development of its Soldier Canyon Coal Mine. Licensee represents that the Facilities are to be located on and across certain lands subject to the Grant, such lands being generally located in Section 18, Township 13 South, Range 12 East, Carbon County, Utah. Licensee represents that the Facilities will be in proximity to and will in some locations cross above Licensor's 20-inch high-pressure gas pipeline (Pipeline) at the locations shown on Exhibit "B." The License granted is limited solely to use of that portion of the lands subject to the Grant which are required for installation of the Facilities at the locations described on Exhibit B.

This License shall not become effective until and is granted upon the condition that Licensee shall, prior to use of any lands under this License, obtain all grants and approvals authorizing installation, operation and maintenance of the Facilities from

the appropriate owners of those lands required for the Facilities, pursuant to paragraph 14, below. This License is also granted subject to the following terms and conditions:

1. Licensee shall install and maintain the Facilities in conformance with all applicable laws, rules, regulations, orders and requirements of any governmental body or other authority having jurisdiction. In the event of a conflict between any of the terms and conditions of this License and any such law, rule, regulation or requirement, the latter shall govern.

2. Except for the protective structure addressed in paragraph 5 and the conveyor structure described on Exhibit B, Licensee shall maintain a distance of at least 25 feet between the Facilities and the center line of the Pipeline unless prior written approval is obtained from Licensor. Buried electrical or other utility lines necessary for the development of the Soldier Canyon Coal Mine may cross the Pipeline subject to fulfillment of the requirements set forth in paragraph 19. In addition, no part of the Facilities with the exception of the conveyor structure, may overhang above the Pipeline such that access to the Pipeline is limited. The conveyor structure proposed to cross above the Pipeline is permissible as long as: 1) permanent supports are not located within 10 feet of the Pipeline, 2) access to the Pipeline is always available on both sides of the structure, and 3) access around the structure for heavy equipment is always available in the immediate vicinity of the structure.

3. Licensee shall defend, protect, indemnify, save and hold harmless Licensor from and against all claims, loss, expense or liability arising out of or related to any death or injury to any person or any loss or damage to any property, including, but not limited

to, Licensor's Pipeline or other facilities, and arising out of or related to, whether in whole or in part, the exercise of any of the rights granted Licensee, or the breach by Licensee of any of the terms and conditions of this License.

4. In the event Licensor deems it necessary, in its sole judgment, due to the exercise by Licensee of its rights granted under this License, to rebuild, relocate, repair, add to or otherwise perform any work on or in connection with the Pipeline or its other facilities, or if the Licensor incurs additional expenses in operating or maintaining the Pipeline as a result of the Facilities, Licensee shall fully reimburse Licensor for all costs and expenses associated with such work. Accordingly, Licensee shall bear all costs and expenses associated with damage, alteration, revision or relocation to the Facilities which are necessary to accommodate any such new, rebuilt, repaired or relocated facilities of Licensor. Also, Licensee shall fully reimburse Licensor for all costs and expenses incurred by Licensor in evaluating Licensee's proposed installation of Facilities.

5. It is agreed that the road to be installed shall be approximately 25 feet wide and will be installed above the Pipeline at the location designated in Exhibit B to enable vehicular access to the entrance of Licensee's coal mine. Prior to installation of the road, Licensee shall install, at its sole expense, at the sole discretion of Licensor, either approximately 80 linear feet of 24-inch diameter split-casing or a protective concrete structure over the Pipeline designed to withstand all potential vehicular loads over the road. Such installation shall be completed under the direction of Licensor's representative designated in paragraph 6 below and in accordance with Licensor's specifications. Any expenses associated with such installation incurred by Licensor shall be reimbursed by

Licensee within 20 days of receipt of an itemized invoice. No vehicles shall be permitted to cross the Pipeline at any location other than the protected crossing described on Exhibit B without Licensor's prior written consent.

6. Licensee shall give at least 48 hours telephone notification to Licensor in advance of the commencement of installation of the Facilities or in advance of commencement of any subsequent installation or maintenance operations on the Facilities. Licensor may, at its sole discretion, choose to have a representative present during any installation or maintenance activities. The telephone notice shall be given directly to Licensor's Pipeline superintendent, or assistant Pipeline superintendent, at (307) 382-8882, extension 7338.

7. Prior to installation of the Facilities, Licensee shall provide Licensor with its schedule of construction. Based upon the schedule, Licensor will identify, by staking or flagging, the location of the Pipeline and other facilities in the area of Licensee's installation activities.

8. None of the rights granted to Licensee shall be interpreted in any way to prevent or interfere with Licensor's unobstructed operation, maintenance and use of the Pipeline or any of its other facilities.

9. This License is nonexclusive and Licensor reserves the right to grant similar licenses to others, and to make other arrangements for use of lands subject to its Grant, except that no such other licenses or arrangements shall impinge upon the ability of Licensee to reasonably exercise its rights granted under this License.

10. This License and the rights granted hereunder shall not be assigned either in whole or in part without the prior written permission of Licensor.

11. This License is effective only to the extent allowed by the terms and provisions of the Grant and this License and rights granted hereunder, notwithstanding any of its other terms or conditions, are hereby expressly limited, as may be necessary to comply with the terms and provisions of the Grant.

12. In the event of any conflict between any of the terms and conditions of this License and terms and provisions of the Grant, the terms and conditions of the Grant shall control as to the conflict and the remainder of the License shall continue in full force and effect.

13. Licensee shall not exercise any of its rights under this License in any manner which unreasonably interferes with the exercise by Licensor of its rights or performance of its obligations under its Grant.

14. In the event this License becomes effective pursuant to its terms and conditions, it shall remain in effect as long as the Facilities are operated and maintained on that portion of the lands subject to this License. Notwithstanding, this License shall terminate immediately upon any termination of the Grant. For purposes of this License, the term "effective date" shall be defined as that date occurring, if at all, within the initial 120 consecutive days of the grant and acceptance date set forth below, on which Licensee obtains all of the grants and approvals authorizing installation, operation and maintenance of the Facilities from appropriate landowners of those lands required for the Facilities.

15. In the event Licensee has not obtained all grants and approvals authorizing installation, operation and maintenance of all of the Facilities from appropriate landowners of those lands required for the Facilities within 120 consecutive days from the date of grant and acceptance set forth below, then this License shall, in its entirety, automatically terminate and become null and void and of no legal effect whatsoever. Licensor, at its option, may request, and Licensee shall furnish, copies of all such grants and approvals.

16. Licensee shall maintain a minimum of 3 feet of cover over the Pipeline at all locations during installation and maintenance of the Facilities. No grading work resulting in cover depths greater than 5 feet or less than 3 feet will be allowed at any time without the prior written consent of Licensor.

17. No trees or shrubs shall be planted within 10 feet of the Pipeline.

18. Wood or chain-link type fencing is permissible in the vicinity of the Pipeline. However, fencing running parallel to the Pipeline must be offset at least 10 feet in either direction from the center line of the Pipeline. Poles for fencing running perpendicular to the Pipeline must not be set within 5 feet of the Pipeline center line.

19. Any buried electrical or other utility lines necessary for the development of the Soldier Canyon Coal Mine may cross the Pipeline subject to fulfillment of the following requirements:

(i) All buried lines must be installed beneath the Pipeline, with a minimum clearance of 24 inches provided between the top of the line and the bottom of the Pipeline.

(ii) The longitudinal axis of any buried line crossing the Pipeline shall intersect the Pipeline's longitudinal axis at an angle of 45 degrees or more.

THIS CONDITIONAL LICENSE is granted and accepted the 11th day of DECEMBER, 1989, by the authorized representatives of the respective parties whose signatures are set forth below.

LICENSOR:
QUESTAR PIPELINE COMPANY

Attest:

Assistant Secretary

By A.J. Marushack
A.J. Marushack, President and
Chief Executive Office

LICENSEE:
SOLDIER CREEK COAL COMPANY

Attest:

NOTARY PUBLIC
Comm. Exp. 2-[illegible]-93
ROBERT [illegible] PERO
Rt. 1 Box 99A1
Helper, UT
84526
STATE OF UTAH

By R.W. Olsen
Title PRESIDENT

EXHIBIT "A"

to the

CONDITIONAL LICENSE

between

QUESTAR PIPELINE COMPANY

and

SOLDIER CREEK COAL COMPANY

U50-2234-67
(August 1967)

EXHIBIT A

11-5776

IN REPLY REFER TO:

2234
U-067467
(Amended)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Land Office
Post Office Box No. 11505
Salt Lake City, Utah 84111

Certified Mail
Return Receipt Requested

October 16, 1967

DECISION

Right-of-Way Granted

Details of Grant

Serial number of grant:	Utah 067467 (Amended)
Name of Grantee:	Mountain Fuel Supply Co. & Utah Natural Gas Co. P. O. Box 11368 Salt Lake City, Utah 84111
Map showing the location and dimensions of grant	
Map designations:	Uintah Basin 20" pipe line (19 sheets)
Date filed:	June 19, 1967
Permitted use by grantee:	Natural gas pipe line
Authority for grant:	Act of Feb. 25, 1920 (41 Stat. 449), as amended
Date of grant:	Sept. 12, 1962
Expiration date of grant:	None
Rental	
Amount:	$2,176 50/years
When payable by grantee:	In advance (paid through 9/11/2012)

Terms and conditions of the grant are set forth on the following page.

Terms and Conditions of Right-of-Way Grant

Pursuant to the authority vested in the undersigned by Order No. 701 of the Director, Bureau of Land Management, dated July 23, 1964 (29 F.R. 10526), as amended, a right-of-way, the details of which are shown on the preceding page, is hereby granted, subject to the following terms and conditions:

1. Applicable regulations in 43 CFR, Subpart 2234.

2. All valid rights existing on the date of the grant.

3. Filing of proof of construction within five/~~xxxxx~~ years of the date of the grant.

4. The grantee will take all reasonable and necessary precautions to protect and preserve natural scenic values, and to prevent soil erosion. A minimum number of trees will be cut and debris resulting from cutting will be completely disposed of by burning. Litter, debris and other "eyesores" caused by the permittee will be cleaned up within 60 days after construction. Disturbance of the vegetative cover will be kept to a minimum. Where feasible, as determined by the BLM District Manager, soil disturbances, borrow pits and earth scars will be revegetated; adequate soil erosion control practices will be followed such as contour furrowing and installation of water bars to minimize concentration of runoff. Fencing standards for all fences constructed must be approved by the District Manager. Conservation measures or work necessary for maintenance will be applied to the right-of-way as required by the District Manager.

5. The grantee will take all reasonable and necessary precautions not to destroy or otherwise damage, as a result of construction activities, historic or prehistoric sites, ruins, or artifacts on or adjacent to the right-of-way. Should such sites, ruins, or artifacts be discovered during the construction of the right-of-way, construction will immediately be suspended in the area and the Bureau of Land Management District Manager shall be notified. The District Manager shall have the area inspected as quickly as possible and issue instructions for the protection of the site, ruins, or artifacts and the resumption of construction activities.

6. Any other or subsequent use by grantee or others of the lands or facilities granted under this right-of-way must be authorized by this office.

7. EQUAL OPPORTUNITY CLAUSE -- This contract (lease, license, permit) is subject to the provisions of Executive Order No. 11246 of September 24, 1965, a copy of which is attached.

F. S. Kirk

F. S. Kirk
Chief, Adjudication Branch

Attachment

Illustration 10.1.7-2

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Robert L. Morgan
State Engineer

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

1636 West North Temple, Suite 220
Salt Lake City, Utah 84116-3156
801-538-7240

RECEIVED
SEP 27 1990
WATER RIGHTS
PRICE

September 26, 1990

Carbon County
c/o William D. Krompel
Carbon County Courthouse
Price, UT 84501

RE: Stream Channel Alteration Permit 90-91-23SA
Soldier Creek
EXPIRATION DATE: September 26, 1991

Gentlemen:

Your application to Alter Natural Stream Number 90-91-23SA is hereby approved pursuant to the requirements of Section 73-3-29 of the Utah Code Annotated, 1953. This approval also constitutes compliance with Section 404 (c) of the Clean Water Act (33 USC 1344) pursuant to General Permit 040 issued to the State of Utah by the U.S. Army Corps of Engineers on October 15, 1987.

Work Performed under this permit is subject to the following conditions:

1. Impacts to the stream channel and surrounding environment must be minimized. Vegetation should not be destroyed, but if some disturbance is necessary, then revegetating with native species will be required, especially replacement of woody shrubs. The channel contours and configuration must not be changed.

2. Sediment introduced into stream flows during construction must be controlled to prevent increases in turbidity downstream. This can be accomplished either by diverting flows away from the construction area or by constructing sediment control structures.

3. The culvert should be sized to carry flood flows expected at a frequency of 50 to 100 years.

4. When the site is abandoned, the culvert should be removed and the area restored.

5. Changes in the stream gradient should be minimized.

6. Wet cement is toxic to aquatic organisms, and its introduction into waters of the United States would constitute a violation of the Clean Water Act. Wet cement or concrete may <u>not</u> be allowed to enter stream flows. Water must be excluded from areas where concrete or cement is used until it has set. Contaminated water pumped from the construction area may not be discharged in a manner to allow it to enter flows. Equipment used during this type of work must be washed well away from the channel.

Within 30 days after the completion of this project, the State Engineer's office must be contacted for a compliance inspection. Failure to provide such notification would invalidate U. S. Army Corps of Engineer's General Permit 040, thereby placing the applicant in violation of Section 404 of the Clean Water Act.

Arrangements for this compliance may be made through either of the contacts listed below:

Chad Gourley	Division of Water Rights/Dam Safety
Mark Page	Area Engineer

This Decision is subject to the provisions of Rule R625-6 of the Division of Water Rights and to Sections 63-46b-13 and 73-3-14 of the Utah Code Annotated, 1953 as amended, which provide for filing either a Request for Reconsideration with the State Engineer, or an appeal with the appropriate District Court. A Request for Reconsideration is not a prerequisite for a court appeal. A court appeal must be filed within 30 days after the date of this Decision, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

If you have any questions or need further clarification, please feel free to contact Chad Gourley at 538-7379.

Sincerely,

Richard B. Hall, P.E.
Directing Engineer

RBH/CRG/sh

cc: Brooks Carter - Corps of Engineers
Mark Page - Area Engineer
Division of Wildlife - Resource Analyst
Larry Dalton - Regional Resource Analyst
Bob Freeman - U.S. Fish & Wildlife
Jim Dykman - State History
Carolyn Wright - State Planning
Bob Mairley - EPA

Illustration 10.2.1-1

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Moab District
Price River Resource Area
900 North 700 East
Price, Utah 84501

IN REPLY REFER TO:

2810
UTU-62044
(U-065)

APR 29 199

APR 26 1991

Mr. Johnny Pappas
Soldier Creek Coal Company
P. O. Box I
Price, Utah 84501

Dear Mr. Pappas:

Enclosed is a copy of the decision to amend right-of-way UTU-62044 for Carbon County. Also enclosed is a copy of the original right-of-way grant and stipulations.

If you have any questions, please feel free to contact Mark Mackiewicz at 637-4584.

Sincerely yours,

Dean Nyffeler

Acting Area Manager

Enclosures (2)
1-Amendment decision
2-Right-of-way grant

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Moab District
Price River Resource Area
900 North 700 East
Price, Utah 84501

2810
UTU-62044
(U-066)

IN REPLY REFER TO:

APR 26 1991

CERTIFIED MAIL--Return Receipt Requested
Certification No. 765 648 474

DECISION

Carbon County Commission Carbon County Courthouse Price, Utah 84501	: : :	Right-of-Way UTU-62044

Right-of-Way Amendment Approved
Details of Amendment

On August 7, 1990, the Carbon County Commission filed an application to amend right-of-way UTU-62044. The subject application was filed under authority of the Federal Land Policy and Management Act of 1976 (90 Stat. 2776, 43 U.S.C. 1761).

The applicant requested an authorization to realign an existing county road over the following described public lands:

Salt Lake Meridian, Utah
T. 13 S., R. 12 E.,
sec. 7, SE4SE4;
sec. 18, NE4NE4.

Right-of-way UTU-62044 is hereby amended subject to the following terms, conditions and stipulations:

1. The amendment is 100 feet wide, 50 feet on each side of a described centerline, and 1235 feet in length, encompassing 2.83 acres, more or less, and shown on the enclosed map entitled Exhibit B.

2. The amendment is subject to all terms, conditions, and stipulations found in the original grant and subsequent amendments.

3. The enclosed seeding mixture entitled Exhibit C shall be utilized on all disturbed areas along the right-of-way amendment not required for use or maintenance.

4. The holder is authorized to move the road back to its current location upon cessation of mining operations at the Soldier Creek Coal Mine. All reclamation standards outlined in this grant shall apply to this change. In addition, any new reclamation practices commonly in use at the time may be required.

Authority for this action is Section 501 (a) of the Federal Land Policy and Management Act of 1976 (90 Stat. 2776, 43 U.S.C. 1761) and the Code of Federal Regulations, Chapter 43, part 2803.6-1.

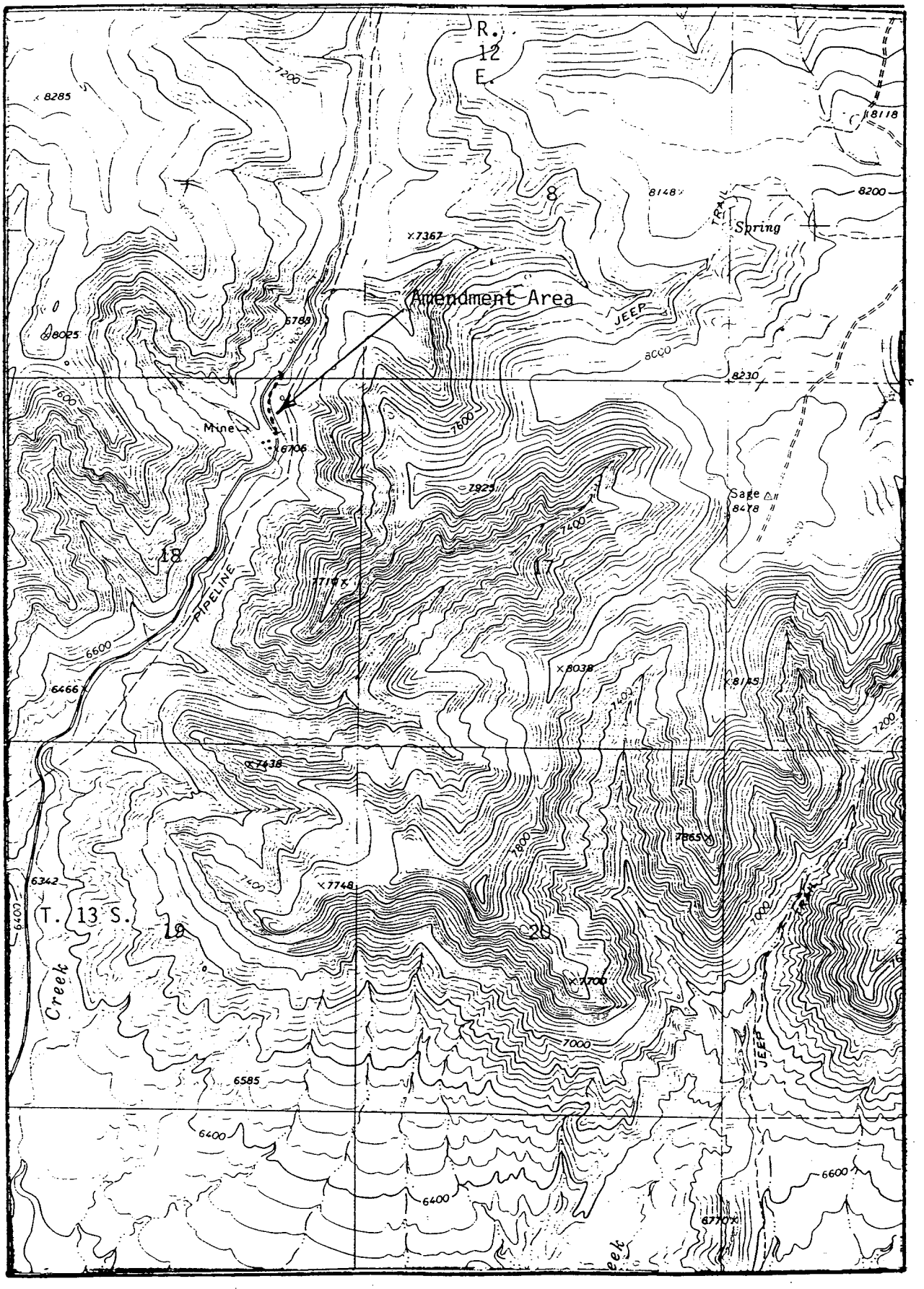
If you are adversely affected by this action, there is a right of appeal to the Board of Land Appeals, Office of the Secretary, in accordance with the regulations in 43 CFR, Part 4, Subpart E. If an appeal is taken, the Notice of Appeal must be filed in the office shown on the enclosed Form 1842-1 (not with the Board or Solicitor), so that the case file can be sent to the Board. A copy of the notice of appeal and any statement of reasons, written arguments or briefs must be served on any adverse parties, and in addition to the Regional Solicitor, U.S. Department of the Interior, Room 6201, Federal Building, 125 South State, Salt Lake City, Utah 84111, within 15 days of the filing of any specific document. Please note, if the procedures set forth in the regulations are not followed, an appeal is subject to dismissal.

If you have any questions, please feel free to contact Mark Mackiewicz of my staff at 637-4594.

Mark E. Bailey
Area Manager

Enclosures (3):
1- Exhibit B, map
2- Exhibit C, seeding mixture
3- Form 1842-1

EXHIBIT B



Pine Canyon 7 1/2 minute USGS quadrangle showing right-of-way amendment location.

2810
UTU-62044
(U-066)

EXHIBIT C

	Variety	Pure Live Seed (PLS) (lbs/acre)
Mountain big sagebrush (*Artemisia tridentata var. vaseyana*)	Hobble Crk	0.2
Bluebunch wheatgrass (*Agropyron spicatum*)	Secar	2.5
Thickspike wheatgrass (*Agropyron dasystachyum*)	Critana	2.0
Great Basin wildrye (*Elymus cinereus*)	Common	3.0
Indiana ricegrass (*Oryzopsis hymenoides*)	Paloma	2.5
Western wheatgrass (*Agropyron smithii*)	Rosana	3.0
Alfalfa (*Medicago sativa*)	Ladak	0.5
Lewis-flax (*linum lewisii*)	Common	1.0
Yellow sweetclover (*Melilotus officinalis*)	Common	0.5
Antelope betterbrush (*Purshia tridentata*)	Common	1.0
Rubber rabbitbrush (*Chrysothamnus nauseosus var. albicaulis*)	Common	1.0
Saskatoon serviceberry (*Amelanchier alnifolia*)	Common	1.0
Winterfat (*Ceratoides lanata*)	Common	2.0
Blueleaf aster (*Aster glaucodes*)	Common	0.5
Rocky Mountain penstemon (*Penstemon strictus*)	Common	0.5
	Total	21.2

Form 2800-14
(August 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Issuing Office

Moab District
Price River Resource Area

Serial Number

U-62044

RIGHT-OF-WAY GRANT

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1. A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

a. By this instrument, the holder, Carbon County Commission, Carbon County Courthouse, Price, Utah 84501, receives a right to construct, operate, maintain, and terminate a highway on public lands described as follows:

Salt Lake Meridian, Utah
T. 14 S., R. 11 E.,
Section 1, lot 1, lot 2, SW1/4NE1/4, W1/2SE1/4
Section 12, W1/2NE1/4, NW1/4SE1/4
Section 13, NW1/4NE1/4, E1/2NW1/4, NW1/4SW1/4
Section 23, SE1/4SE1/4
Section 24, W1/2NW1/4, W1/2SW1/4
Section 26, E1/2NE1/4, SW1/4NE1/4, W1/2SE1/4
Section 35, W1/2NE1/4, SE1/4NW1/4, E1/2SW1/4, SW1/4SW1/4

T. 13 S., R. 11 E.,
Section 25, SW1/4NE1/4, W1/2SE1/4

T. 13 S., R. 12 E.,
Section 18, lot 4, SE1/4NE1/4, SW1/4NE1/4, E1/2SW1/4, SE1/4SW1/4, NW1/4SE1/4
Section 19, lot 1, lot 2, lot 3, lot 4

b. The right-of-way granted herein is 100 feet wide, 46,464 (8.8 miles) feet long, and contains 106.6 acres, more or less.

c. This instrument is issued in perpetuity, unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument, or of any applicable Federal law or regulation.

d. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the right-of-way grant.

3. Rental:

Rental has been waived under the authority of 43 CFR 2803.1-2 (b)(2).

4. Terms and Conditions:

a. This right-of-way is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulation part 2800.

b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 180 days, or otherwise disposed of as stipulated in the right-of-way grant or as directed by the authorized officer.

c. Each grant issued for a term of 20 years or more shall, at the minimum, be reviewed by the authorized officer at the end of the 20th year, and at regular intervals thereafter, not to exceed 10 years. Provided, however, that the right-of-way may be reviewed at any time deemed necessary by the authorized officer.

d. Exhibits A (map), and B (stipulations), and C (Class I, Road Building and Maintenance Standards), attached hereto, are incorporated into and made a part of this grant instrument as fully and effectively as if they were set forth herein in their entirety.

e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant shall constitute grounds for suspension or termination thereof.

f. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.

IN WITNESS WHEREOF, The undersigned agrees to the terms and conditions of this right-of-way grant.

Lee Olsen	Mark E. Bailey
(Signature of Holder)	(Signature of Authorized Officer)
Chairman	Area Manager
(Title)	(Title)
March 7 1988	3/8/88
(Date)	(Effective Date of Grant)
	None
	(Termination Date)

2810
U-62044
(U-066)

EXHIBIT B

STIPULATIONS

1. The holder shall contact the authorized officer at least two (2) days prior to the anticipated start of construction and/or any surface disturbing activities. The authorized officer may require and schedule a preconstruction conference with the holder prior to the holder's commencing construction and/or surface disturbing activities on the right-of-way. The holder and/or his representative shall attend this conference. The holder's contractor, or agents involved with construction and/or any surface disturbing activities associated with the right-of-way, shall also attend this conference to review the stipulations of the grant including the plan(s) of development.

2. The holder shall not initiate any construction or other surface disturbing activities on the right-of-way without the prior written authorization of the authorized officer. Such authorization shall be a written notice to proceed issued by the authorized officer. Any notice to proceed shall authorize construction or use only as therein expressly stated and only for the particular location or use therein described.

3. The authorized officer may suspend or terminate in whole, or part, any notice to proceed which has been issued when, in his judgment, unforeseen conditions arise which result in the approved terms and conditions being inadequate to protect the public health and safety or to protect the environment.

4. The holder shall designate a representative(s) who shall have the authority to act upon and to implement instructions from the authorized officer. The holder's representative shall be available for communication with the authorized officer within a reasonable time when construction or other surface disturbing activities are underway.

5. The holder shall furnish and apply water or use other means satisfactory to the authorized officer for dust control. The authorized officer may request that the construction area be watered if adequate dust control is not being maintained.

6. All persons in the area who are associated with the project will be informed by the holder that they will be subject to prosecution for disturbing archaeological sites or collecting artifacts. If subsurface cultural material is exposed during construction, work at that spot will stop immediately and the BLM, Price River Resource Area Office will be contacted (phone (801) 637-4584). The holder will be responsible for the cost of evaluation of the discovery and proper mitigation measures. Any decision as to proper mitigation shall be made by the authorized officer after consulting with the holder.

7. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of six (6) inches deep, the soil shall be deemed too wet to adequately support construction equipment. The authorized officer shall make the determination if soil moisture conditions are too wet to support construction equipment.

8. The holder shall conduct all activities associated with construction, operation, and termination of the right-of-way within the authorized limits of the right-of-way.

9. When construction activity in connection with the right-of-way breaks or destroys a natural barrier used for livestock control, the gap thus opened shall be fenced to prevent the drift of livestock. The subject natural barrier shall be identified by the authorized officer and fenced by the holder as per instruction of the authorized officer.

10. The holder shall place slope stakes, culvert location and grade stakes, and other construction control stakes as deemed necessary by the authorized officer to ensure construction in accordance with the plan of development. If stakes are disturbed, they shall be replaced before proceeding with construction.

11. The holder shall mark the exterior boundaries of the right-of-way and temporary use areas with a stake and/or lath at 100 foot intervals. The intervals may be varied at the time of staking at the discretion of the authorized officer. The tops of the stakes and/or laths shall be painted and the laths flagged in a distinctive color as determined by the holder. The survey station numbers shall be marked on the boundary stakes and/or laths at the entrance to and the exit from public land. The holder shall maintain all boundary stakes and/or laths in place until final cleanup and restoration is completed and approved by the authorized officer. The stakes and/or laths will then be removed at the direction of the authorized officer.

12. The holder shall clear and remove all roots, woody plants over two (2) feet high, and other vegetative materials from the surfaces to be covered by embankments and disturbed by excavation. Clearing shall be accomplished without mixing topsoil with vegetation. Cleared vegetative materials shall be disposed of as directed by the authorized officer; excess mineral materials shall be stockpiled for disposal by the United States or used in construction in accordance with 43 CFR 2801.1-1(d).

13. Construction-related traffic shall be restricted to routes approved by the authorized officer. New access roads or cross-country vehicle travel will not be permitted unless prior written approval is given by the authorized officer. Authorized roads used by the holder shall be rehabilitated or maintained when construction activities are complete as approved by the authorized officer.

14. The holder shall permit free and unrestricted public access to and upon the right-of-way for all lawful purposes except for those specific areas designated as restricted by the authorized officer to protect the public, wildlife, livestock, or facilities constructed within the right-of-way.

15. The holder shall provide for the safety of the public entering the right-of-way. This includes, but is not limited to, barricades for open trenches, flagmen/women with communication systems for single-lane roads without intervisible turnouts, and attended gates for blasting operations.

16. Existing roads and trails on public lands that are blocked as the result of the construction project shall be rerouted or rebuilt as directed by the authorized officer.

17. Construction sites shall be maintained in a sanitary condition at all times; waste materials at those sites shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment.

18. The holder shall seed all disturbed areas with the seed mixture(s) listed below. The seed mixture(s) shall be planted in the amounts specified in pounds of pure live seed (PLS)/acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed shall be tested and the viability testing of seed shall be done in accordance with State Law(s) and within 9 months prior to purchase. Commercial seed shall be either certified or registered seed. The seed mixture container shall be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed shall be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture shall be evenly and uniformly planted over the disturbed area. Since smaller or heavier seeds have a tendency to drop to the bottom of the drill and are planted first, the holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre noted below are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of the second (2nd) growing season after seeding. The authorized officer is to be notified a minimum of fourteen (14) days prior to seeding of the project.

SALTBUSH VEGETATION TYPE SEED MIXTURE

Pure Live Seed (P.L.S.)
Pounds per Acres

Grasses	Drilled	Broadcast
Galletagrass	1	2
Indian ricegrass	1	2
Squirreltail grass	1	2
Standard crested wheatgrass	1	2
Subtotal	4	8
Forbs		
Lewis flax	0.5	1
Alfalfa (Equal parts Ladak, Nomad, Ranger)	0.5	1
Yellow sweet clover	0.5	1
Gooseberryleaf globemallow	0.5	1
Subtotal	2	4
Shrubs		
Gardner & mat saltbush	1	2
Fourwing saltbush (rincon)	1	2
Prostrate kochia	1	2
Winterfat	1	2
Shadscale	1	2
Subtotal	5	10
Total	11	22

PINYON-JUNIPER VEGETATION TYPE SEED MIXTURES

Pure Live Seed (P.L.S.)
Pounds per Acres

Grasses	Drilled	Broadcast
Western wheatgrass	1	2
Fairway crested wheatgrass	1	2
Indian ricegrass	1	2
Blue grammagrass	1	2
Subtotal	4	8

Forbs		
Alfalfa (Equal parts Ladak, Nomad, Ranger)	1	2
Utah sweetvetch	0.5	1
Small burnet	0.5	1
Lewis flax	0.5	1
Subtotal	2.5	5
Shrubs		
Antelope bitterbrush (Utah seed source)	1	2
Fourwing saltbush (rincon)	1	2
Birchleaf mtn. mahogany	1	2
Utah serviceberry	1	2
Prostrate kochia	1	2
Subtotal	5	10
Total	11.5	23

HYDROMULCH MIXTURE TO BE APPLIED PER ACRE

1,000 lbs aspen fiber
1,000 lbs wood cellulose
100 lbs tackifier
100 lbs commercial fertilizer (16-16-8 or 22-0-0)

Before the seed is planted the authorized officer shall be notified and the seed made available for inspection. Seed sacks shall be labeled stating the kind, weight, variety, purity, germination, source of origin of the seed, lot number and the name and amounts of all weed seed therein. For the purpose of determining the percentage of pure live seed (% P.L.S.) the following formula shall be used: Purity % X Germination % = % P.L.S.

The holder shall seed all disturbed areas, using an agreed upon method suitable for the location. Seeding shall be repeated if a satisfactory stand is not obtained as determined by the authorized officer upon evaluation after the first growing season.

19. The holder shall mitigate impacts to mule deer critical range through enhancement of adjacent habitats. Offsite enhancement will consist of an equal acreage (to the disturbance) habitat improvement projects. Specific project design will be prepared by the authorized officer in coordination with the holder in an effort to match capabilities with a suitable enhancement project.

CLASS I ROADS

SECTION 1

SURVEY AND DESIGN

Definition - Class I roads are defined as all roads existing or planned which are necessary for support of existing facilities on multiple use resource management. The need for this system is presumed to exceed 50 years. Existing roads identified as Class I but which do not presently meet these standards may continue in service at their present standard; however, if maintenance or upgrading activities extend beyond the present limits of disturbance, the work will be done to Class I standards. All new construction of Class I roads will be done to Class I standards.

1. Field Survey Requirements

   (A) Establish a "P" (preliminary) line survey along the route shown on the BLM's Transportation Plan Maps.

   (B) "P" line stationing shall be located to follow the route line with station intervals not exceeding 300 feet.

   (C) Horizontal angular error of closure between "P" line stations shall be ± 1/2° if forward and backward bearings are used, or ± 5 minutes if deflection angles are used.

   (D) Horizontal distances between "P" line stations shall be accurate to within 1 foot in 300 feet.

   (E) Vertical error of closure between "P" line stations shall be within 4.0 feet per mile or 0.1' per station.

   (F) Topographic data at each "P" line station (both right and left) shall be within 1 foot in 100 feet.

   (G) Location of significant features (pipelines, drainages, etc.) shall be required when within 100 feet of the "P" line.

   (H) The "P" line shall be tied to land grid survey corners at the beginning and ending points, as well as at intermediate points that are within one-fourth mile of the "P" line.

2. Design Requirements

   (A) Plot vertical, horizontal and topographic data as well as significant features on standard plan profile sheets to a scale of 1" = 100 feet.

   (B) Plot "L" (layout) line along "P" (preliminary) line using the following design standards criteria:

~~(1) Design speed 25 mph~~.

(2) Travel way width - minimum feet, maximum feet (exceptions may be made to width requirements if approved by BLM prior to construction).

(3) Minimum horizontal curve radius, 200 feet (unless a shorter radius is approved by BLM)

(4) Minimum length of vertical curves (see attached graph~~)~~.

(5) Maximum grade 10% (except pitch grades*).

(6) Mass diagrams and earthwork balancing will not be required; however, obvious areas of waste or borrow shall be noted on the plan and profile as well as proposed locations of borrow or waste disposal areas.

(7) All culverts shall be designed for a 25 year frequency storm with an allowable head of one foot at the pipe inlet. Show all culverts planned to accurate vertical scale on plan profile sheets. The minimum size culvert shall be 18 inches.

The Company shall submit to the BLM two copies of the completed design (plan-profile) sheets along with calculations made to determine the size of any culverts. The BLM will review the proposed design and approve or suggest correction to the Company within ten working days of the receipt of such designs. The design shall be approved by the BLM prior to beginning construction.

3. Construction Control

(A) Determine "P" line to "L" line offsets to within ± 3 feet (horizontal).

(B) Establish the "on the ground" centerline location of the "L" line with 1" x 2" x 16" wood stakes. Location of field stakes shall be such that positive control of the road location is assured, but shall not exceed 300 feet.

(C) Establish reference points for the "L" line at approximate intervals of 300 feet. Reference points may be slope stakes or center line offsets. Reference points shall contain cut or full information for the "L" line station they reference.

(D) Show cut or fill required on each centerline station.

* Pitch grades are defined as those grades exceeding 10% which are necessary because of topography. Such grades shall not extend over 300 feet in length, nor shall they be used to circumvent the intent of these stipulations. Maximum pitch grade shall be 12%.

SECTION 2

CONSTRUCTION STANDARDS

1. Public Convenience and Safety

The Company shall provide, erect, and maintain all necessary signs and other traffic control devices as may be deemed necessary by the BLM and shall take all necessary precautions for the protection of the work and safety of the public during construction of the road.

Warning signs shall be posted wherever directed during blasting operations.

2. Clearing and Grubbing

All clearing and grubbing shall be confined to the limits of actual construction unless otherwise authorized by the BLM.

All surface objects and all trees, stumps, roots and other protruding obstructions not designated to remain shall be cleared and/or grubbed.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be trimmed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 20 feet above the roadbed surface. All perishable material resulting from clearing and grubbing operations shall be disposed of through one of the following methods:

(A) By Burning: If perishable material is burned, it shall be burned under the constant care of competent watchmen at such times and in such a manner that the surrounding vegetation, other adjacent property or anything designated to remain on the right-of-way will not be jeopardized. If permitted, burning shall be done in accordance with applicable laws, ordinances and regulations.

In the event that the Company is directed by the BLM not to start burning operations or to suspend such operations because of hazardous weather conditions, material to be burned which interferes with subsequent construction operations shall be moved to temporary locations clear of construction operations and later placed on a designated spot and burned.

(B) By Burying: Materials and debris which cannot be burned and perishable materials may be disposed of by methods and at locations approved on or off the project. If disposal is by burying, the debris shall be placed in layers with the materials so distributed to avoid nesting. Each layer shall be covered or mixed with earth material by the landfill method to fill all voids. The top layer of material buried shall be covered with at least 24 inches of earth or other approved material and shall be graded, shaped and compacted to present a pleasing appearance.

(C) By Chipping. Woody material smaller than three inch diameter may be disposed of by chipping. The wood chips may be used for mulch, slope erosion control, or may be uniformly spread over selected areas as directed by the BLM. Woody material larger than three inch diameter shall be disposed of as directed by BLM.

3. Excavation

Prior to beginning excavation and fill placement operations, all vegetation or debris within the designated limits of the roadway, except such objects as are designated to remain in place, are to be removed and disposed of as provided in Paragraph #2. All suitable material removed during excavation operation shall be used as far as practicable in the formation of the embankments. It should be noted that this may include end haul if fill placement is over 300 feet from the excavation areas.

4. Embankment Construction

Embankment material shall not be placed when either the materials or the surface on which they will be placed are frozen or too wet (as determined by BLM) for satisfactory compaction.

Embankment materials shall be placed parallel to the axis of the roadway in even, continuous, approximately horizontal layers not more than eight (8) inches in thickness. The full cross section of the fill shall be maintained as each successive layer is placed. Successive layers of material shall be placed on embankment areas so as to produce the best practical distribution of the material. The distribution of the materials throughout the embankment shall be such that it shall be free from lenses, pockets, streaks or layers of material differing substantially in texture, gradation or compaction from the surrounding material. The combined excavation and placing operation shall be such that the materials when placed in the embankment shall be blended sufficiently to secure the best practicable degree of compaction and stability.

No stones that fail to pass a three inch square opening shall be left within four inches of the finished surface.

The Contractor shall route his construction equipment over the layers of embankment material already in place and shall distribute the travel evenly over the entire width of the embankment so as to obtain the maximum compaction while placing the material and to avoid uneven compaction anywhere along the travel route.

Borrow material shall not be used until all of the accessible roadway excavation has been placed in the embankments unless otherwise permitted by the BLM. Borrow areas used by the Company shall be approved by the BLM prior to the start of the excavation. Borrow areas shall be smoothed and left in a pleasing appearance.

Furrow ditches shall conform to the slope, grade and shape of the required cross section, with no projections of roots, stumps, rocks or similar matter. Furrow ditches shall be "V" type ditches excavated to a depth of one foot minimum below finished road surface. Furrow ditch back slopes shall not be cut flatter than 3 to 1. Furrow ditch "turn outs" shall be constructed at intervals not exceeding 500 feet when the cross slope does not exceed 5 percent.

Excess excavation material shall be used insofar as practical to improve the ad grade line or "flatten" fi slopes. Other waste areas shall be approved by BLM prior to placement of waste material.

All slopes, shoulders and road surfaces shall be finished smoothly and in accordance with the lines and grades shown on the drawings and as staked.

5. Culvert Pipe Installation

(A) Materials

The Company shall furnish all corrugated metal or aluminum pipe of the types, sizes, gages and lengths shown on the approved design sheets. Galvanized corrugated metal pipe shall be new and conform to the requirements of AASHO M36. All spots on the pipe where the zinc coating has been injured or destroyed shall be painted with two coats of hot asphaltic paint or otherwise repaired in a satisfactory manner. In no case shall pipes be dragged on the ground.

(B) Excavation

Excavation of trenches for pipe culverts shall be to the lines and grades or elevations shown on the plans or as staked on the ground. Culvert outlets shall be at ground level unless otherwise approved by BLM. The width of the pipe trench shall be two feet wider than the pipe diameter to permit satisfactory placement of the pipe and thorough tamping of the bedding material under and around the pipe.

(C) Bedding

Bed the culvert pipe in a trench cut in natural ground or existing embankment to a depth of not less than 30 percent of the outside pipe diameter plus the thickness of bedding material. The pipe shall be bedded on a minimum of four inches of fine, well graded material. Such material shall be free of stones larger than one-half (1/2) inch in diameter, sticks and other deleterious matter and shall be the best material available at the site. The completed trench and bedding shall be approved by the BLM prior to the installation of the pipe.

(D) Backfill

After the trench and bedding have been approved by the BLM, the pipe may be installed. The pipe shall be laid carefully and true to line and grades as given. Any pipe which is not in true alignment or which shows any undue settlement after being laid, or is damaged, shall be taken up and relaid or replaced. The trench shall then be backfilled with well graded compactable soil selected from excavation or borrow. The material shall be placed along each side of the pipe in layers not over six (6) inches in depth. Each layer of material shall then be thoroughly compacted with hand or mechanical tampers or other approved methods. Special care shall be taken to compact thoroughly the material under the haunches of the pipe and to insure that the backfill material is in intimate contact with the sides of the pipe. The backfill shall be brought up evenly on both sides of the pipe to a depth of at least two feet above the top of the pipe and for its full length.

The completed culvert pipe installation shall be smoothly finished upon completion and shall fully serve the intended purpose.

6. Seeding

(A) The Company shall carry out erosion control items of vegetation establishment during the season established for seeding. Vegetation establishment shall be completed on areas of disturbance as they are completed if actual construction is being accomplished during the seeding season.

Seeding shall be carried out on all of the areas described as follows:

(1) On cut slopes, and shall extend from the bottom of the ditch to the top of the cut slope.

(2) On embankment slopes, and shall extend from the roadway shoulder to the toe of the embankment slope.

(3) On all areas used for disposal of clearing and grubbing debris.

(4) On all borrow pit areas.

(5) On all "side cast" in areas of full bench construction.

(B) Seeding season shall be from September 15 to December 15, or as otherwise allowed by the BLM.

(C) Seed application will be by seed drill or broadcasted and harrowed; other methods will require prior BLM approval.

SECTION 3

ROAD MAINTENANCE STANDARDS

The completed road shall be maintained to the following standards as applicable for the term of the use.

1. Travel Way

   (A) Roadbed is smooth, free of ruts, chuckholes, rocks, slides, washboards; crowned and/or sloped for drainage.

   (B) Free from excessive accumulation of dust pockets of layers which are a driving hazard or public nuisance.

   (C) Berms shall be absent along the shoulder.

   (D) Soft spots, such as those resulting from springs and seeps, shall be absent.

2. Shoulders

   (A) Shoulders are straight and present a uniform line with the surface free from large rocks, limbs, or stumps.

3. Ditches

   (A) Original cross section shall be maintained. Drainage area clear of rocks, slides and sediments.

   (B) Vegetation or sedimentation does not restrict ditch flow or reduce the waterway area.

   (C) Ditch bottom is stable and is not excessively eroded.

   (D) Back slope area above ditches is stable.

4. Culverts

   (A) The barrel is uniform in shape, free from bends which may restrict the flow, separations, rust, wear holes, sedimentation, obstructions, and have sufficient cover to protect the pipe.

   (B) The entrance is the original shape, free from bends, tears, brush, or debris.

(C) No excessive camber or reverse camber which cause water pockets in the pipe.

(D) Erosion at inlets and outlets is controlled.

(E) Riprap is stable and free from undercutting.

5. Other Related Road Features

(A) Right-of-way free of excessive or objectional litter.

6. Fences, Gates and Cattleguards

(A) Posts are sound, plumb and secure.

(B) Wire is tight and securely fastened to the posts.

(C) Stays are uniformly spaced and vertical between posts and affixed to keep the strands properly spaced.

(D) Rock deadmen are propery secured to the fence.

(E) Gates are free from deterioration, damage to structural sections or loose hardware.

(F) Cattleguard pits are clean and functional. End wings securely fastened and in serviceable condition. Cattelguard and base in serviceable condition.

7. Fords and Low Water Crossings

(A) There is a smooth transition between road and ford.

(B) No excessive erosion adjacent to the structure.

(C) The surface of the structure is clear of debris, brush, rocks and sediment.

(D) Bottom of crossing is level with stream bottom.

8. Safety and Hazard Control

(A) Sight distance free of shrubs, trees and obstacles and meets design standards.

(B) Travel way and ditches free of overhanging trees and limbs. No down trees or branches in ditch area.

(C) No unstable material above the roadway.

Illustration 10.2.1-1 (cont'd)

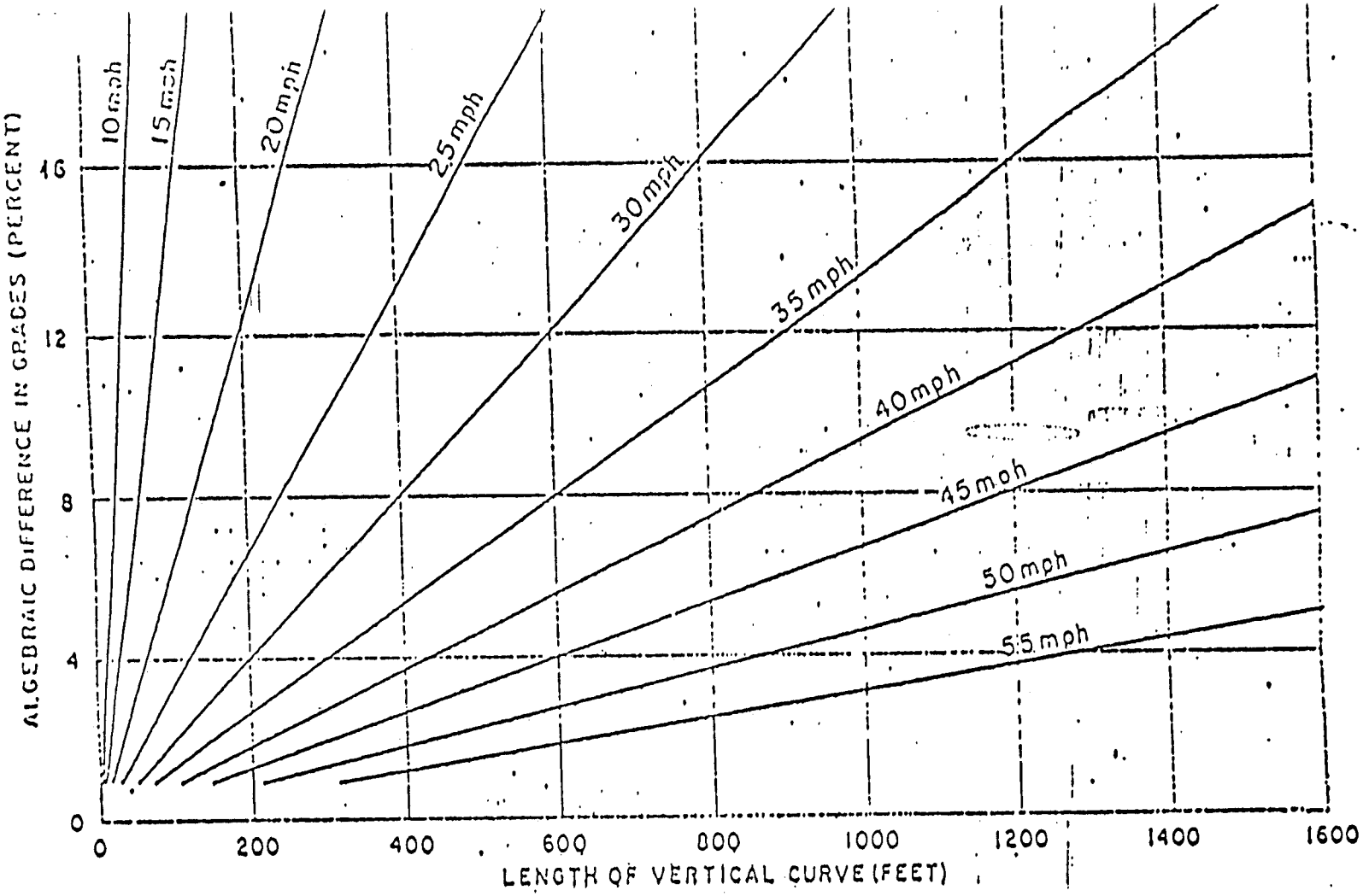
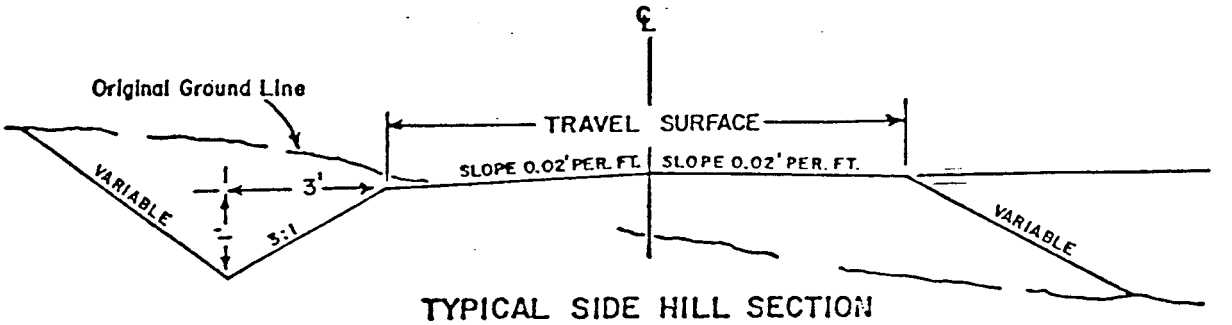
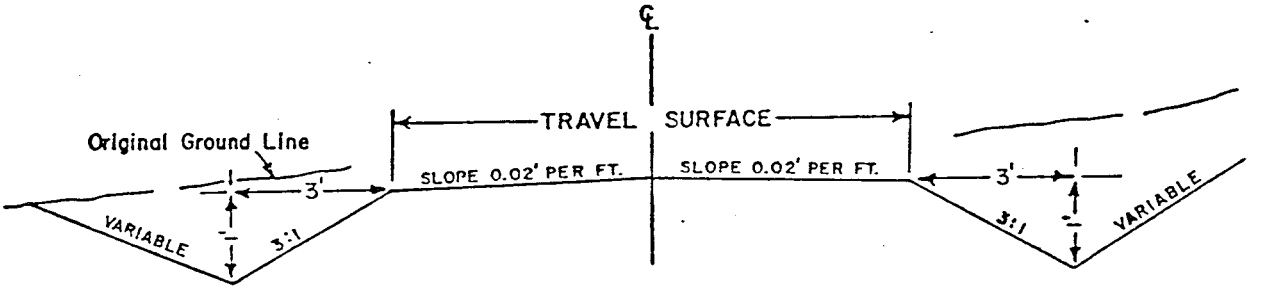


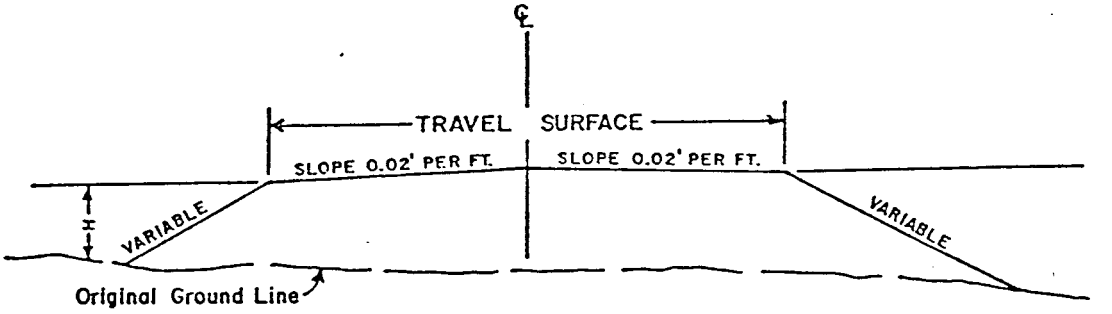
Chart for Estimating Length of Vertical Curves



TYPICAL SIDE HILL SECTION



TYPICAL FULL CUT SECTION



TYPICAL EMBANKMENT SECTION

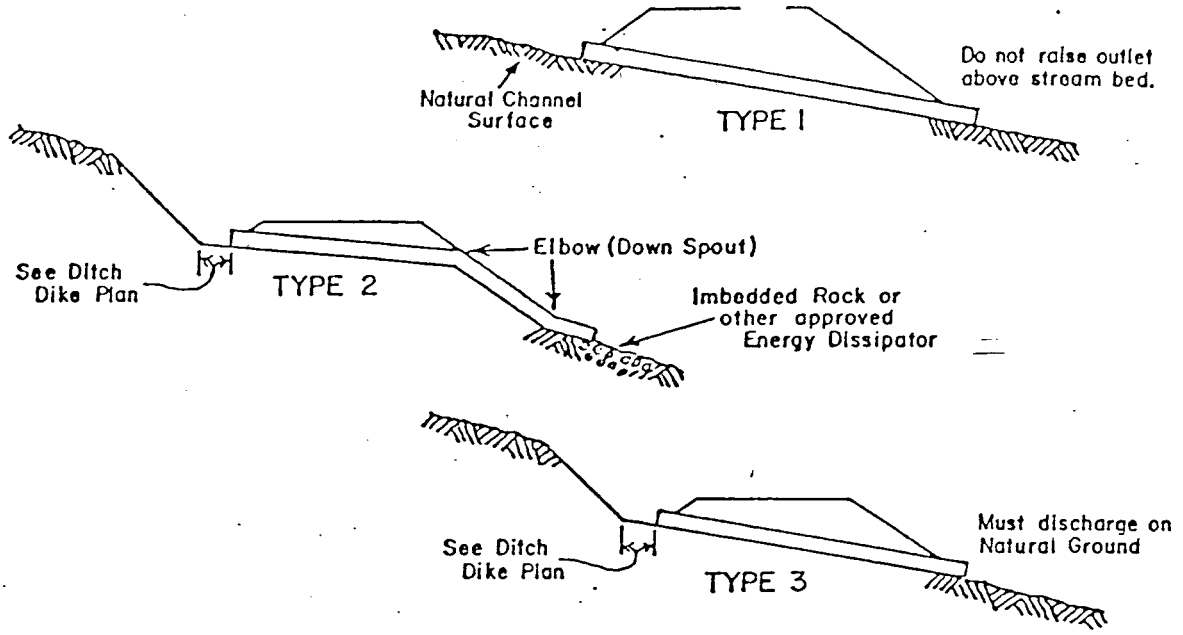
Height of Cut or Fill	Cut Slope	Fill Slope
0' – 3'	3 : 1	4 : 1
3' – 10'	2 : 1	3 : 1
OVER 10'	1½ : 1	2 : 1
ROCK	¼ : 1	—

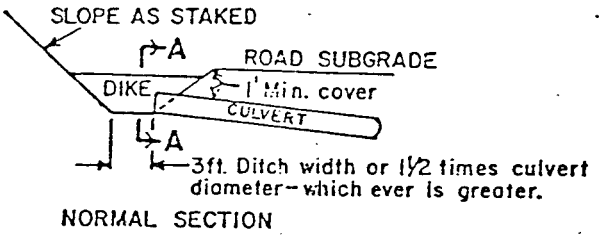
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

TYPICAL ROAD SECTIONS

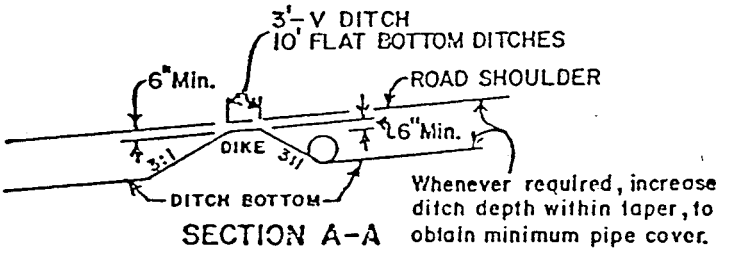
DESIGNED R.A.D.	RECOMM.
DRAWN J.H.S.	RECOMM.
CHECKED	APPROVED
SCALE NONE	
DATE 8-5-81	SHEET ___ OF ___
DRAWING NO.	

Illustration 10.2.1-1 (cont'd)

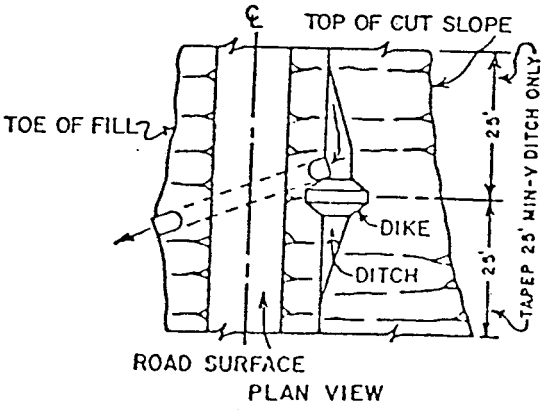




NORMAL SECTION



SECTION A-A



PLAN VIEW

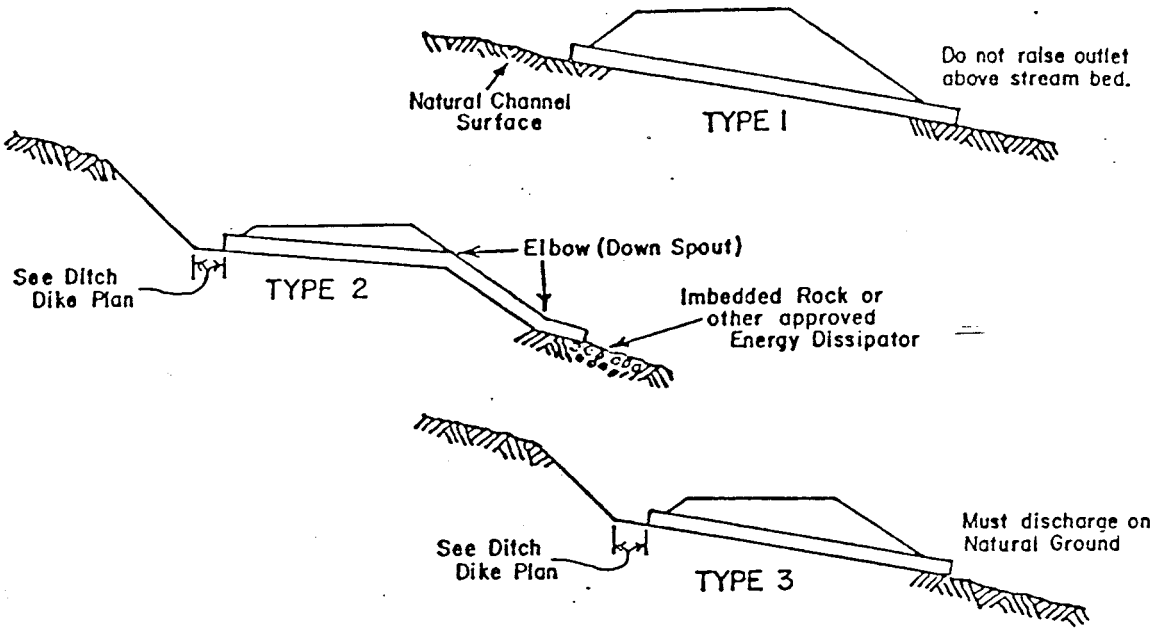
DITCH DIKE

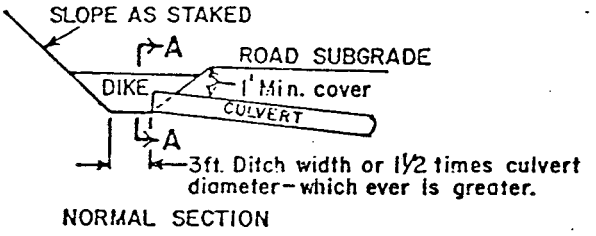
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

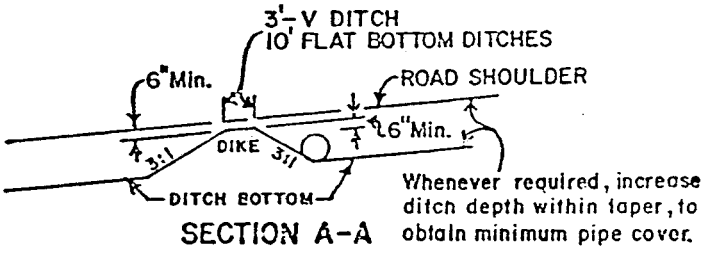
TYPICAL CULVERT INSTALLATIONS

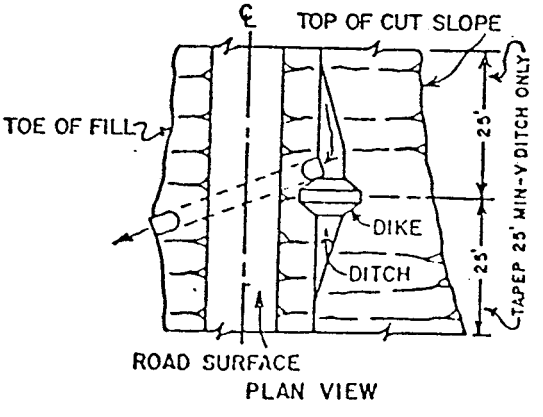
DESIGNED R.A.R.	RECOMM.
DRAWN J.H.S.	RECOMM.
CHECKED	APPROVED
SCALE NONE	
DATE 6-5-81	SHEET ___ OF ___
DRAWING NO.	

☆ GPO 850-178





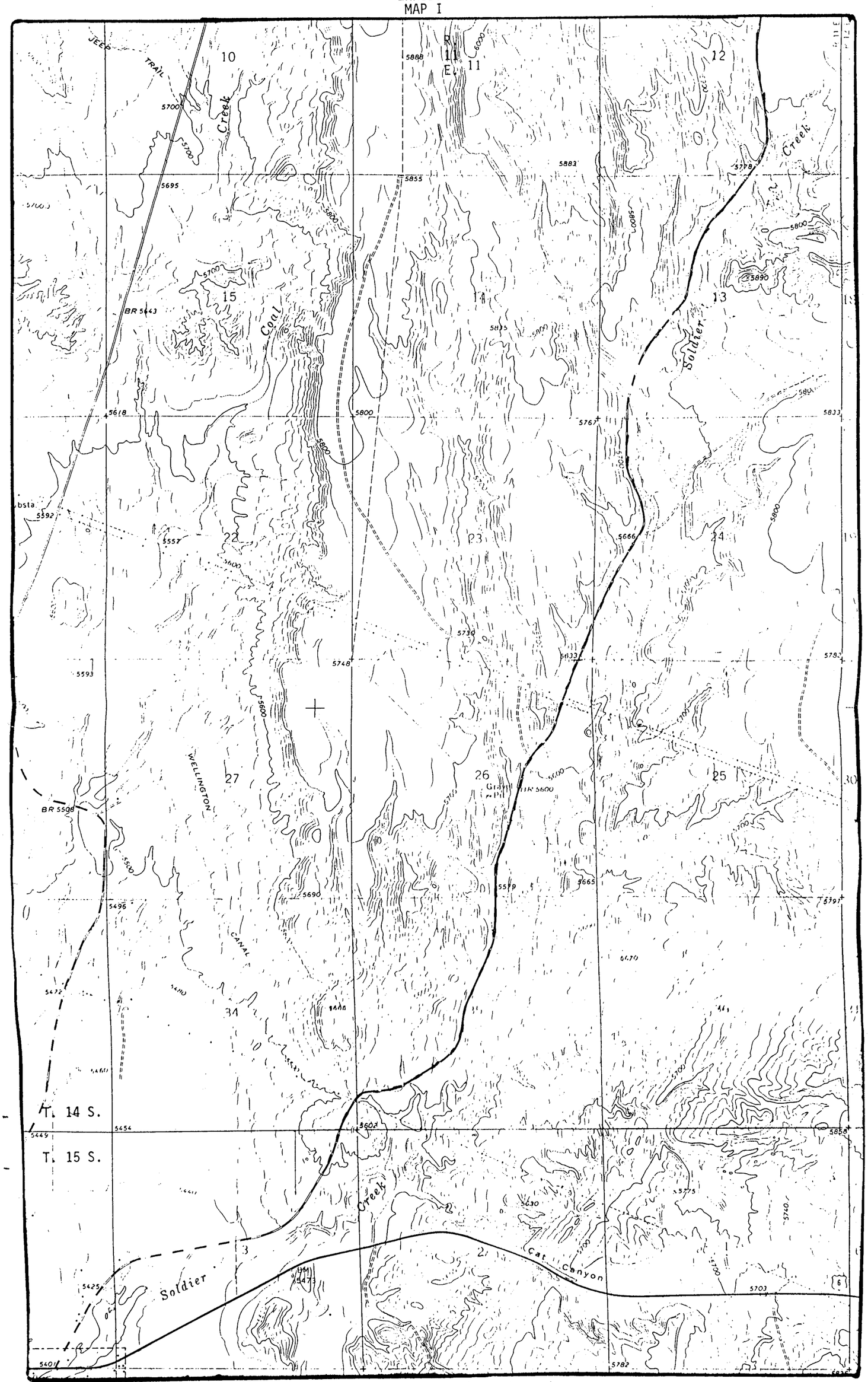




U. S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT	
TYPICAL CULVERT INSTALLATIONS	
DESIGNED R.A.D.	RECOMM.
DRAWN J.H.S.	RECOMM.
CHECKED	APPROVED
SCALE NONE	
DATE 8-5-81	SHEET ___ OF ___
DRAWING NO.	

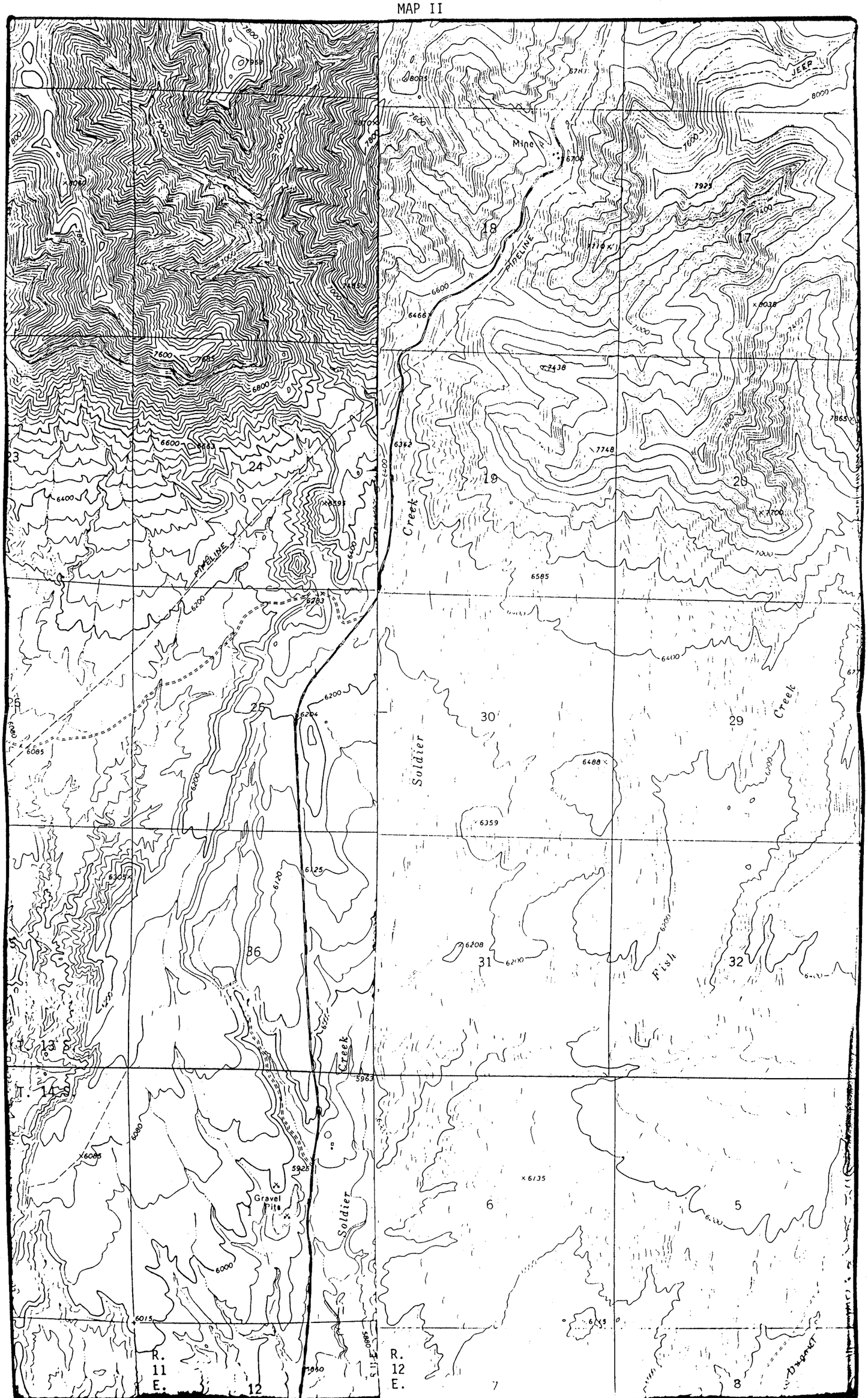
Illustration 10.2.1-1 (cont'd)

EXHIBIT A
MAP I



Wellington, Utah 7½ Minute USGS Quadrangle showing Right-of-way location.

EXHIBIT A
MAP II



ıdman Canyon, Utah and ~~Page~~ Pine Canyon, Utah 7½ Min USGS Quadrangles showing Right-of-way location.

Illustration 10.2.1-2

NICK SAMPINOS
Attorney at Law

First Interstate Bank Bldg
20 West Main - Suite 201
Price, Utah 84501

(801) 637-8100

COPY

JUL 16 1990

July 11, 1990

Mr. Mark Mackiewicz
Bureau of Land Management
900 North 700 East
Price, Utah 84501

RE: Realignment of portion of Soldier Creek Road

Mark:

This letter is submitted to you at the request of the Carbon County Roads Special Service District (District). As you may know, the District, a quasi public entity, receives mineral lease monies from the federal government. Those monies are used by the District to construct and maintain energy impacted roads throughout the unincorporated areas of Carbon County, Utah.

At the meeting of the District's Board tonight, the District decided to proceed with a project that would realign a portion of the Soldier Creek Road near the Soldier Creek Mine offices. It is the District's understanding that you, as a BLM representative, are familiar with the proposed road realignment project and that you have no objection thereto.

Please be advised that the District is supportive of the realignment project and intends to proceed with the acquisition of necessary right-of-ways, and bidding and construction phases as soon as possible. Be further advised that the newly constructed road would be owned by Carbon County and would be maintained thereafter by the District.

Your cooperation and assistance in processing the necessary paperwork that will be soon forthcoming will be truly appreciated.

Sincerely,

Nick Sampinos
Attorney for Carbon County
Roads Special Service District

NS/nn
SC3 Revised 01/07/91
xc: Lee Semken, Chairman, Carbon Co. Roads Special Service Dist.
William Krompel, Chairman, Carbon County Commission
Harold Marston, Carbon County Planner

Illustration 10.2.1-3

COAL IS KING

CARBON COUNTY

PRICE, UTAH 84501

APR 3 1991

March 25, 1991

Tom Paluso
Chief Engineer
Soldier Creek Coal Company
P.O. Box I
Price, UT 84501

Dear Tom:

After reviewing Soldier Creek Coal Company's (SC3) County road relocation project, Carbon County is hereby giving SC3 its approval to proceed with the road relocation. Be further advised that the newly constructed road will be owned by Carbon County and all road related maintenance will be the responsibility of the District.

Sincerely,

William D. Krompel

William D. Krompel
Carbon County Commission

WDK:lb

Illustration 10.2.2-1

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

OCT 16 1989
SC 3

October 13, 1989

Mr. Dave Spillman
Soldier Creek Coal Company
P.O. Box I
Price, Utah 84501

Dear Mr. Spillman:

Re: Final Approval, Amendment, New Surface Facilities, Solider Creek Coal Company, Solider Canyon Mine, ACT/007018-89B, Folder #3, Carbon County, Utah

The submittal received October 11, 1989, regarding the above noted permitting action was reviewed, and found to adequately address the deficiencies identified in the Division's September 26, 1989 letter, by Mike DeWeese and Henry Sauer of the Division's technical staff.

The Division hereby approves the above referenced action. All construction activities may be commenced. Thank you for your cooperation in this matter.

If you have any questions, please call Mike DeWeese or me.

Sincerely,

Susan C. Linner

Susan C. Linner
Reclamation Biologist/
Permit Supervisor

cl
cc: J. Helfrich
M. DeWeese
BT45/336

SC3 Revised 01/07/91

an equal opportunity employer

Illustration 10.2.2-2

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

NOV 05 1990

November 1, 1990

Mr. Rick Olsen, President
Soldier Creek Coal Company
P. O. Box I
Price, Utah 84501

Dear Mr. Olsen:

Re: Amendment Approval, Stream Culvert Extension, Soldier Creek Coal Company, Soldier Canyon Mine, ACT/007/018-90E, Folder #3, Carbon County, Utah

The operator's submittal regarding the above-noted permitting action has been reviewed by the Division's technical staff. The submittal calls for extending the already approved culvert, which is to be used in connection with the new portal facilities.

The Division hereby grants approval for the above referenced action. Please review the attached memos which outline the requirements of this amendment. Keep in mind that this approval is for the culvert extension and associated sediment control only. No other surface facilities are being approved in connection with this amendment. In the event that an open channel is used to divert the stream during construction, a liner must be used to preclude sediment loading.

It is the Division's understanding that this amendment is being done in anticipation of future construction which will include additional new surface facilities and the relocation of the public road. A permit revision will be required for these future changes. In the event that this revision information is not approved on or before July 1, 1991, the Division will require a revised bond amount at that time.

SC3 Revised 01/07/91

an equal opportunity employer

Please submit three (3) additional copies of this amendment by November 30, 1990, for distribution to other agencies. If you have any questions, please feel free to call. Thank you for your cooperation in resolving this matter.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

DRH/jbe
Attachments
cc: J. Helfrich, DOGM
BT46/63-64

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

DATE REPORTED: February 26, 1991

Illustration 10.2.6-1

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
10931	PORT DVLPMT #3		7.3	20.4	28.6	44.9	35.4	155.	24.5	61.7	54.7	33.8	11.5	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

DATE REPORTED: February 26, 1991

Illustration 10.2.6-1 (cont'd)

Lab No.	Location	Depths	Organic Matter %	Total Sulfur %	Neut. Pot. t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyrS AB t/1000t	PyrS ABP t/1000t	Nitrate-Nitrogen ppm	Boron ppm
10931	PORT DVLPMT #3		1.1	-0.01	299.	<0.01	<0.01	<0.01	-0.01	299.	6.89	0.49

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= 'tralization Potential

Inter-Mountain Laboratories, Inc.
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

Illustration 10.2.6-1 (cont'd)

DATE REPORTED: February 26, 1991

Lab No.	Location	Depths	Avail Na meq/100g	Exch Na meq/100g	CEC meq/100g	ESP	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar	H2O Sol Selenium ppm
10931	PORT DVLPMT #3		6.90	2.46	10.9	22.6	1.8	0.1	0.05	17.2	6.3	0.04

* Air dry bulk density was substituted for 1/3 bar bulk density in calculations.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Illustration 10.2.6-2

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 6-15-89

TO: EarthFax Engineering, Inc.
7324 South 1300 East STE 100
Midvale, UT 84047

DATE SUBMITTED: 5-11-89 - SC³-Exploration Cut, 5-8-89

CERTIFICATE OF ANALYSIS

SAMPLE ID:	OVER BURDEN	UNDER BURDEN	EPA METHOD
LAB #:	U041261	U041262	
PARAMETER			
pH Units	7.6	7.5	9045
Conductivity, umhos/cm³	911	1,510	9050
Selenium as Se (Total), mg/Kg	<.05	<.05	7740
Chloride as Cl, mg/Kg	50	101	9252
Sulfate as SO_4, mg/Kg	3,610	6,840	9038
Boron as B (Total), mg/Kg	<5	<5	3050
TOC, %	1.26	1.35	9060
Resistivity, ohms/cm³	1,100	662	9050
Max. Acid Potential, Tons $CaCO_3$/1000 Tons Soil	0.95	0.88	600-2-78-054
Neut. Potential, Tons $CaCO_3$/1000 Tons Soil	0.64	0.71	600-2-28-054
Acid/Base Potential, Tons $CaCO_3$/1000 Tons Soil	-0.31	-0.17	
Texture: % Gravel (Rock)	28.2	21.3	
% Sand	58.1	62.4	
% Silt/Clay	13.7	16.3	

SC3 Revised 01/07/91

Rex Henderson

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 10-11-89

TO: Soldier Creek Coal Company
P.O. Box 1
Price, UT 84501

DATE SUBMITTED: 10-2-89 - Exploration Cut, 9-30-89

CERTIFICATE OF ANALYSIS

SAMPLE ID:	OVER BURDEN	UNDER BURDEN
LAB:	U045057	U045058
PARAMETER		
Total Sulfur as S, %	0.03	0.10
Sulfate Sulfur as S, %	<.005	<.005
Organic (Sulfide) Sulfur as S, %	0.009	0.007
Calcium Carbonate as $CaCO_3$, %	20.3	18.8

NOTE: Unable to determine Pyritic Sulfur due to high level of iron oxides.

SC3 Revised 01/07/91

Ray Henderson

EarthFax

EarthFax
Engineering Inc.
Engineers/Scientists
7324 So. Union Park Ave.
Suite 100
Midvale, Utah 84047
Telephone 801-561-1555

May 23, 1991

Mr. John Pappas
Soldier Creek Coal Company
P.O. Box 1
Price, Utah 84501

Subject: Topsoil thickness survey at the Soldier Creek Coal Mine

Dear John:

On December 10, 1990, EarthFax conducted a topsoil thickness survey at the Soldier Creek Coal Mine south of the ventilating fan facility. Soldier Creek Coal Company has proposed to disturb this area to realign the county road eastward (see Figure 1 , attached). Results of the study were presented in a letter dated December 11, 1990 from EarthFax to Soldier Creek Coal Company. In a technical analysis of the study addressed to Soldier Creek Coal Company dated April 19, 1991, the Utah Division of Oil, Gas, and Mining (DOGM) indicated that the study did not adequately address their concerns. DOGM also indicated that topsoil removal from underneath the present topsoil pile and for any other potentially disturbed areas should be addressed.

The purpose of this letter is to:

1. Augment the topsoil thickness survey presented in the December 11, 1990 letter from EarthFax to Soldier Creek Coal Company (herein referred to as the Streambank/Ridge Location).

2. Present the results of a topsoil thickness survey underneath and adjacent to the present Topsoil Stockpile.

3. Present the results of a topsoil thickness survey of Potential Disturbance Areas.

Abundant sandstone gravel, cobbles, and boulders (about 10 to 20% by volume) are exposed at the ground surface in the study areas. DOGM indicates that provisions have been made to store cobbles and boulders at the topsoil storage site. Vegetation in the study areas generally consists of scattered pinyon pine and juniper, sagebrush, rabbit brush, scrub oak, and grasses.

Streambank/Ridge Location

To allow for expansion of the surface facilities at the mine, Soldier Creek Coal Company proposes to realign the county road by shifting a portion of the road eastward, thereby cutting into the east canyon slope and necessitating topsoil removal and stockpiling for future reclamation (Figure 1).

The Soil Conservation Service (SCS) investigated the topsoil at one location of the site in undisturbed soil adjacent to Soldier Creek (letter from SCS to Soldier Creek Coal Company dated October 16, 1989). The SCS concluded that the topsoil at the test location was 41 inches thick and extended to the top of a very stony material. The SCS indicated that the topsoil material varies from

about 2 to 6 feet thick and can be identified by the very stony material underlying the topsoil.

To determine the topsoil thickness throughout the Streambank/Ridge Location, EarthFax measured the topsoil thickness at five locations (B-1 through B-5 in Figure 1) along the exposed streambanks north, west, and south of the site. These measurements indicated that the topsoil thickness was a maximum along the northwestern edge of the site and rapidly decreased in an upslope direction. As suggested by the SCS, the contact between the topsoil and the underlying stony material was readily apparent.

To supplement the streambank information, EarthFax installed ten hand-augered holes (AH-1 through AH-10 in Figure 1) into the subsurface soil. The stony material underlying the A-horizon material prevented auger penetration below a maximum depth of 10 inches.

Topsoil thickness measurements for the streambank locations and the auger holes are presented in Table 1 (attached). The measurements have been placed in one of two categories depending on the topsoil thickness (see also Figure 1):

Zone 1 - Shallow topsoil (maximum thickness of 14 inches). Average topsoil thickness is 7.4 inches.

Zone 2 - Thick colluvial wedge of topsoil along the streambank. Average topsoil thickness is 47.5 inches.

Calculations presented in Table 1 indicate that the volume of topsoil that can be removed from the site and stockpiled is approximately 680 cubic yards. The original topsoil survey (12/11/1990 letter) indicated that the topsoil volume at this location was 360 yds^3. The increased volume is attributable to an increased disturbance area from the original investigation.

<u>Topsoil Stockpile</u>

The present topsoil stockpile will also be disturbed by realignment of the county road. Therefore, the topsoil stockpile and the underlying in-situ topsoil will be relocated. The volume of topsoil in the stockpile is known from surveys taken before and after formation of the stockpile. According to Soldier Creek Coal, this volume is 660 yds^3.

The Soil Conservation Service investigated the topsoil stockpile (letter from SCS to Soldier Creek dated October 16, 1989). The SCS indicated that the topsoil seemed to vary between about 2 to 6 feet thick and overlies a very stony material.

On May 1, 1991, EarthFax determined the thickness of the in-situ topsoil adjacent to the topsoil stockpile by hand-augering and hand-excavating nine locations (TS-

1 through TS-9 in Figure 1). As above, topsoil was defined as A-horizon soil overlying a very stony material. The topsoil thickness measurements are presented in Table 2 (attached) and ranged between 14 and 39 inches with an average thickness of 22.4 inches. As at the Streambank/Ridge Location, the maximum topsoil thickness measurements were taken near the base of the slope.

Based on calculations presented in Table 2, approximately 1,420 cubic yards of in-situ topsoil underlie and encircle the topsoil stockpile. Therefore, including the topsoil stockpile volume (660 yds^3), the total volume of topsoil at this site is 2,080 yds^3.

Proposed and Potential Disturbance Areas

To accommodate proposed and potential future expansion of the surface mining facilities, Soldier Creek Coal Company may disturb the west slope of Soldier Creek Canyon at three locations (Area 1 through 3 in Figure 1). Area 3 will be disturbed to accommodate construction of a coal silo and associated surface storage facilities. Topsoil overlying the slope 3 will be removed and stockpiled for future reclamation.

On May 1, 1991, EarthFax determined the topsoil thickness at potential disturbance areas by hand-augering eight holes into the subsurface soils and measuring six locations along the existing cut slope (P-1 through P-14 in Figure 1). As above, topsoil was defined as A-horizon material overlying a very stony material. The topsoil thickness measurements are presented in Table 3 (attached) and ranged between 12 and 22 inches with an average thickness of 15.6 inches at Areas 1 and 3 and 14.5 inches at Area 2.

Based on calculations presented in Table 3, approximately 735, 175, and 335 yds^3 of topsoil are present at Areas 1 through 3, respectively. The total topsoil volume is 1,245 yds^3.

We have appreciated the opportunity to provide you with this information. If you have any questions, please call.

Sincerely,

Rhett Brooks
Geotechnical Engineer

Attachments

cc: Richard White, EarthFax
Randy Gainer, EarthFax
Tom Suchoski, EarthFax

TABLE 1

Topsoil Thicknesses and Volumes at the Streambank/Ridge Location

Location	Thickness (inches)
Zone 1	
AH-1	9.5
AH-2	6
AH-3	4
AH-4	5
AH-5	8
AH-6	8
AH-7	10
AH-8	4
AH-9	7
AH-10	6
B-1	7
B-2	14
B-5	8
Average	7.4
Zone 2	
B-3	44
B-4	51
Average	47.5

Topsoil Volume Calculations

Zone	Average Topsoil Thickness (inches)	Surface Area (acres)	Topsoil Volume (yds^3)
1	7.4	0.42	420
2	47.5	0.04	260
Total			680

TABLE 2

Topsoil Thicknesses and Volumes at the Topsoil Stockpile Location

Location	Thickness (inches)
TS-1	17
TS-2	18
TS-3	20
TS-4	22
TS-5	14
TS-6	19
TS-7	20
TS-8	33
TS-9	39
Average	22.4

Topsoil Volume Calculations

Area	Average Topsoil Thickness (inches)	Surface Area (acres)	Topsoil Volume (yds^3)
Stockpile			660
In-situ Soil	22.4	0.47	1,420
Total			2,080

TABLE 3

Topsoil Thicknesses and Volumes at the Potential Disturbance Areas

Location	Thickness (inches)
Area 1	
P-1	17
P-2	22
P-3	12
P-4	12
P-5	12
P-6	21
P-7	15
P-8	17
P-9	16
P-10	16
P-11	12
P-12	15
Average	15.6
Area 2 and Area 3	
P-13	17
P-14	12
Average	14.5

Topsoil Volume Calculations

Area	Average Topsoil Thickness (inches)	Surface Area (acres)	Topsoil Volume (yds^3)
1	15.6	0.35	735
2	14.5	0.09	175
3	15.6	0.16	335
Total			1,245

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

DATE REPORTED: February 26, 1991

Lab No.	Location	Depths	pH	EC mmhos/cm @ 25°C	Saturation %	Calcium meq/l	Magnesium meq/l	Sodium meq/l	SAR	Coarse Fragments %	Sand %	Silt %	Clay %	Texture
10929	STRM. CHA. #1		7.7	3.95	26.4	20.4	19.8	10.3	2.30	52.2	67.5	22.9	9.6	SANDY LOAM
10930	STRM. CHA. #2		7.7	3.69	29.5	20.9	22.4	7.68	1.65	52.7	62.0	26.5	11.5	SANDY LOAM

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

Illustration 10.2.14-1 (cont'd)

DATE REPORTED: February 26, 1991

Lab No.	Location	Depths	Organic Matter %	Total Sulfur %	Neut. Pot. t/1000t	Sulfate Sulfur %	Pyritic Sulfur %	Organic Sulfur %	PyrS AB t/1000t	PyrS ABP t/1000t	Nitrate-Nitrogen ppm	Boron ppm
10929	STRM. CHA. #1		0.1	-0.01	153.	<0.01	<0.01	<0.01	-0.01	153.	4.18	0.72
10930	STRM. CHA. #2		1.3	0.71	140.	<0.01	0.61	0.10	19.1	121.	4.72	0.69

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

SOLDIER CREEK COAL COMPANY
PRICE, UTAH

DATE REPORTED: February 26, 1991

Illustration 10.2.14-1 (cont'd)

Lab No.	Location	Depths	Avail Na meq/100g	Exch Na meq/100g	CEC meq/100g	ESP	Bulk Density *	Water Retention Difference in/in*	Total Kjeldahl Nitrogen %	1/3 bar	15 bar	H2O Sol Selenium ppm
10929	STRM. CHA. #1		1.32	1.05			1.8	0.1	0.04	13.3	5.5	0.03
10930	STRM. CHA. #2		1.27	1.04			1.6	0.1	0.07	15.9	6.0	0.03

* Air dry bulk density was substituted for 1/3 bar bulk density in calculations.
Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,ABPTA= Ammonium Bicarbonate-DPTA, AAO= Acid Ammonium Oxalate
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage, Exch= Exchangeable, Avail= Available

Illustration 10.2.14-2

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 6-15-89

TO: EarthFax Engineering, Inc.
7324 South 1300 East STE 100
Midvale, UT 84047

DATE SUBMITTED: 5-11-89 - SC³ Yard Expansion

CERTIFICATE OF ANALYSIS

SAMPLE ID:	# 1 0-6"	# 1 0-12"
LAB #:	U041263	U041264
PARAMETER		
pH Units	7.6	7.7
Conductivity, umhos/cm³	101	90
% Saturation	32.9	35.7
Alkalinity as $CaCO_3$, mg/Kg	20,500	10,200
Calcium as Ca, mg/Kg (H_2O Sol.)	93	78
Magnesium as Mg, mg/Kg (H_2O Sol.)	26	23
Potassium as K, mg/Kg (H_2O Sol.)	88	121
Sodium as Na, mg/Kg (H_2O Sol.)	41	39
Total Nitrogen as N, mg/Kg	2,650	1,270
Nitrate as NO_3-N, mg/Kg	226	277
Available Phosphate as PO_4-P, mg/Kg	9.02	3.02
Calcium Carbonate as $CaCO_3$, mg/Kg	112	95
TOC, %	1.88	2.15
Texture: % Gravel (Rock)	17.2	33.9
% Sand	61.1	55.7
% Silt/Clay	21.7	10.4
Available Water Capacity @1/2 ATM, %	9.22	12.05
Available Water Capacity @13 ATM, %	4.28	6.33

Rex Henderson

SC3 Revised 01/07/91

Illustration 10.6.3-1

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

350 NORTH 400 EAST
PRICE, UTAH 84501

MAY 29 199

May 28, 1991

Mr. John Pappas
Soldier Creek Coal
Box 1
Price, Utah 84501

Dear Mr. Pappas:

I have examined the soils outside the disturbed areas around the mining area of the Soldier Creek mine. The areas are outlined on the attached map and extend on the east to the area disturbed when the gas pipeline was installed and all other areas extend about 100 feet beyond the perimeter markers or on the north and south as shown on the enclosed map. All lines are approximate.

Five different types of soil were found and described. One was previously described by Carol Franks near the topsoil site and classified as a Cumulic Haplustoll, coarse-loamy over loamy skelatal. I found this soil to make up about 70 percent of the areas mapped C & D on the enclosed map, the Datino soil makes up about 25 percent and another 5 percent of other deep or very deep soils. These soils are on the lower toe slopes under oakbrush, wheat grass and other trees and shrubs. Slopes are 8 to 20 percent. The thickness of the topsoil on the Cumulic soil is from 20 inches to 6 feet thick, mostly 20 inches to 4 feet, topsoil on the Datino and other soils of this unit are 10 to 20 inches thick.

The areas mapped Datino are Loamy-skeletal, mixed Typic Haploborolls on slopes of 20 to 60 percent. These areas are mostly Datino soil, which is very deep but some areas are deep and have bedrock below 40 inches. Also included is a deep or very deep soil with less than 35 percent rock fragments. The topsoil on this unit is mostly 10 to 18 inches thick.

The areas mapped Guben have 15 to 50 percent slopes and are Loamy-skelatal mixed Typic Calciborolls. These soils are similar to Datino but have a higher percent of lime in the soil with lime being all the way to the surface. The topsoil is 7 to 12 inches thick.

The other areas are mapped Travessilla, Rock outcrop and Podo, Rock outcrop. These are both shallow soils that have very thin topsoil layers. Travessilla soils are loamy, mixed (calcareous) Lithic Ustic Torriorthents and Podo soils are loamy, mixed (calcareous) Lithic Ustorthents. Podo

soils have a slightly better topsoil layer that may be leached of carbonates because of more moisture on the more northerly facing slopes. The main limitations of these areas is shallow soil and the amount of rock in the area.

More information on these soils can be found in the Carbon Area Soil Survey. If you have any further questions please contact me at 637-0041. I am attaching copies of the soil descriptions I made in the area.

Leland Sasser

Leland Sasser
Soil Scientist

Enclosures

FILE CODE SOILS-11

SOIL DESCRIPTION

SOIL CONSERVATION SERVICE

Soil type Datino **File No.**

Area Soldier Creek **Date** 5/23/1991 **Stop No.**

Classification Lo-sK mixed

Location 300' South 1200' West NE Corner Sec 18 T13S R12E

N. veg. (or crop) Serviceberry **Climate** Frigid

Parent material Colluvium and Residuum from Sandstone & limestone

Physiography Mountain Sideslope

Relief Convex (Toeslope) **Drainage** Well **Salt or alkali** —

Elevation 6860' **Gr. water** — **Stoniness** Very Stony

Slope 45% **Moisture** Moist

Aspect West **Root distrib.** Throughout **% Clay*** 17%

Erosion Slight to Moderate **% Coarse fragments*** 35 to 40 % **% Coarser than V.F.S.***

Permeability Moderate

Additional notes

60% slope S.I. #1 South topsoil Pile Surface A horizon varies from 6 to 18" thick

0-6" V. Stoney fsl A 10YR 5/3

6-15" gr fsl Bw1 7.5YR 6/6

15+ Vcobbly L Bw2 10YR 5/4

21" Stoped to many cobble & stone

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% clay	Rock frag	Root	
A1	0-4	10YR5/3	10YR3/2	Very Stony fsl	1vfgr	so	vfr	ss/ps	e-	AW	14%	10% st 5% cob 20% gr	3vf 1f,m 4c	
A2	4-14	10YR5/3	10YR3/3	gr fsl	1fsm sbk	sh	vfr	ss/ps	eo	AW	17%	20% gr 3% cob <1% st	2vf,f m+c	
Bw	14-43	7.5YR5/4	7.5YR4/4	Very cobbly fsl	2m sbk	sh	fr	ss/ps	e-	cw	17%	7% st 10% cb 20% gr	2vf,f m /c	
BK	43-64"	7.5YR5/4	7.5YR4/4	Vcobbly fsl	2msbk	sh	fr	ss/ps	es+	GW	17%	7% st 15% cob 20% gr	2vf 1f,m	
BK2	64-75"	7.5YR6/6	7.5YR5/6	Vcobbly fsl	1fsm sbk	sh	fr	ss/ps	es+	AW	15%	30% gr 15% cob 21% st	1vf f+m	
C	75+	10YR7/3	10YR5/4	VStoney fsl	M	sh	vfr	ss/ps	es+	—	14%	10% st 15% cob 20% gr	1vf	

FILE CODE SOILS-11

SOIL DESCRIPTION

Soil type: Podo

File No.

Area: Soldier Creek

Date: 5/23/1991

Stop No.

Classification: Loamy mixed (calcareous) frigid Lithic Ustorthent

Location: 200' South 1000' West NE Corner Sec 18 T 13 S R 12 E

N. veg. (or crop): Pinyon Pine, Juniper, Service berry, Mt. Big Sage, Some Douglas fir

Climate: Frigid

Parent material: Residum from Sandstone + limestone

Physiography: Side Ridge on Mt. Sidelope

Relief: Convex

Drainage: Well

Salt or alkali: —

Elevation: 6795'

Gr. water: —

Stoniness: Very Stoney

Slope: 68%

Moisture: Moist

Aspect: NWest

Root distrib.: To bedrock

% Clay •: ≈ 15%

Erosion: Moderate

% Coarse fragments •: 28-30%

% Coarser than V.F.S. •:

Permeability: Moderately Rapid

Additional notes

• Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	≈ % Clay	Rock frag	Roots
A1	0-2"	10YR5/2	10YR3/3	Very Stoney fsL	1fgr	so	vfr	ss/ps	e-	Aw	14	25% St 10% cob 15% gr	2vf fem ic
A2	2-7"	10YR6/3	10YR4/3	gr fsl	1fgr	so	vfr	ss/ps	e	cw	15	20% gr 5% cob 1% St	↓
C	7-13	7.5YR6/4	7.5YR5/4	gr fsl	1fsbk 9m	so	vfr	ss/ps	es-	As	15	20% gr 5% cob 1% St	✓
R	13"	Sandstone											

FILE CODE SOILS-11

SOIL DESCRIPTION

SOIL CONSERVATION SERVICE

Soil type: Traucssilla

File No.

Area: Soldier Creek

Date: 5/23/1996

Stop No.

Classification: Loamy mixed (Calcareous)

Location: 1300' West 1400' South NE Corner Sec 18 T12S R 12E.

N. veg. (or crop): Utah Juniper

Climate: Mesic

Parent material: Sandstone Residuum

Physiography: Mt. Side Slope

Relief: Convex

Drainage: Well

Salt or alkali: Slight

Elevation: 6760'

Gr. water: —

Stoniness: Very Stony

Slope: 58 %

Moisture: dry

Aspect: South East

Root distrib.: Fractured Rock

% Clay •: 15 %

Erosion: Moderate

% Coarse fragments •: 30-35 %

% Coarser than V.F.S. •:

Permeability: Moderately Rapid

Additional notes

• Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	Rock frag.	% Clay	Root
A	0-3"	10YR5/3	10YR4/4	VStony fsl	1fgr	so	vfr	ss/ps	es	AW	15% ST 15% cob 20% gr	14%	2vf fcm ↓
C	3-9"	10YR6/4	7.5YR5/4	gr fsl	m	sh	vfr	ss/ps	es	AS	20% gr 5% cob 2% ST	15%	
R	9"	Sandstone											

Soil type Guben **File No.**

Area Soldier Creek **Date** 5/23/1991 **Stop No.**

Classification Lo-skelatal mixed mesic

Location 100' North 1200' West SE Corner Sec 7 T13S R12E

N. veg. (or crop) Oak brush, Fungus + Pine Trees, **Climate** Frigid

Parent material Colluvium from Sandstone + Limestone

Physiography Mountain Side-slope Footslope Position

Relief Slight Concave **Drainage** Well **Salt or alkali** Slight

Elevation 6745' **Gr. water** — **Stoniness** Very Stony

Slope 34% **Moisture** moist

Aspect SEast **Root distrib.** Throughout **% Clay** * ≈ 12-13%

Erosion Slight **% Coarse fragments** * 40-50% **% Coarser than V.F.S.** *

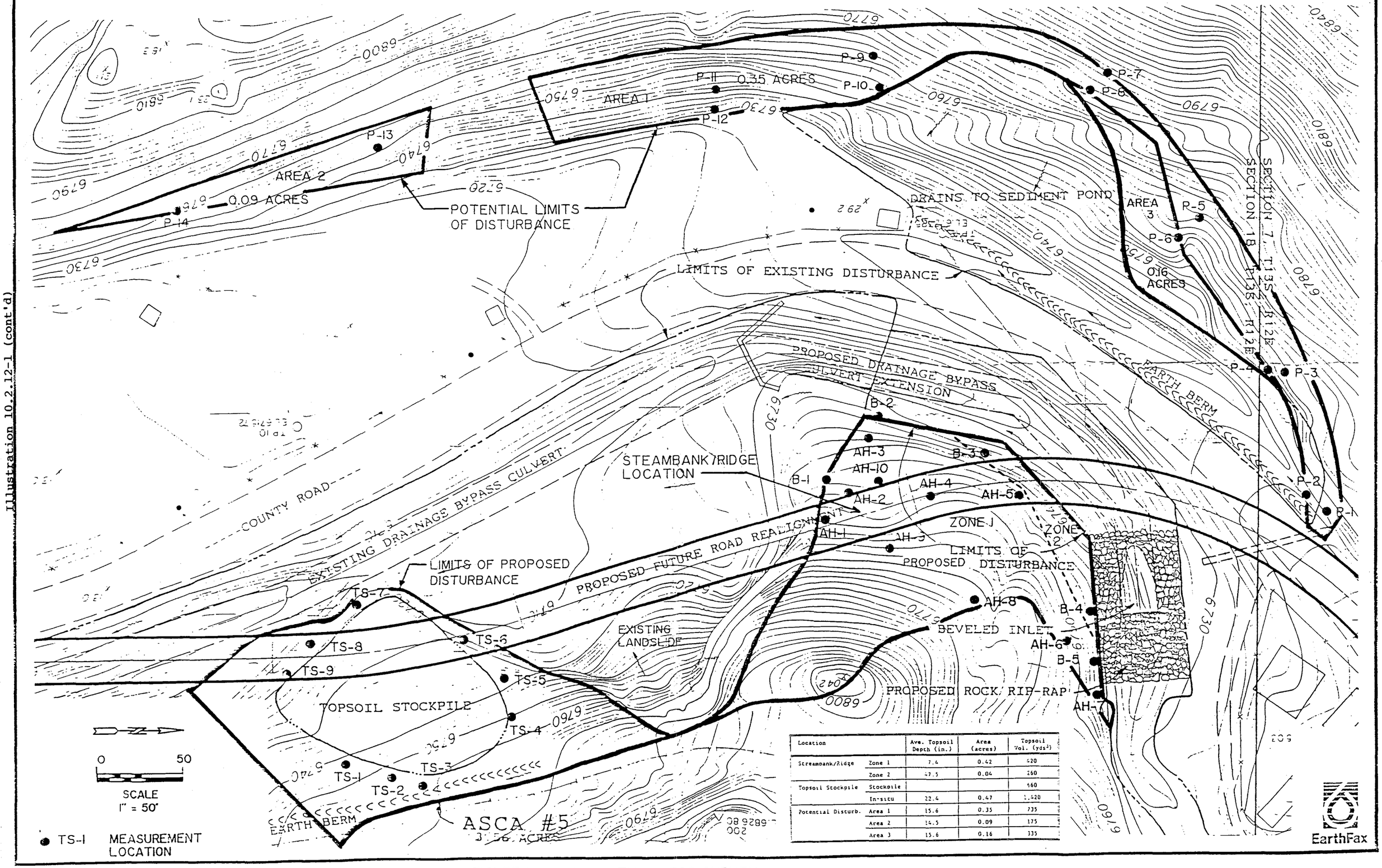
Permeability Moderate

Additional notes

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Clay	% KF	Roots
A	0-7"	10YR 5/2	10YR 3/2	Stoney fsl	1cf gr	so	vfr	ss/ps	e-	AW	≈10%	5% ST 10% cob 15% gr	
Bw1	7-13"	10YR 5/3	10YR 3/3	cob fsl	1fsbk	so	vfr	ss/ps	e+	cw	≈10%	Cob 8% ST 1% 20% gr	
Bw2	13-26	10YR 5/3	10YR 3/3	v cob fsl	1fsbk	sh	vfr	ss/ps	es	cw	13%	Cob 10% ST 2% gr 25%	
BK1	26-37"	10YR 6/4	10YR 4/3	vStoney fsl	1msbk	sh	fr	ss/ps	es+		14%	15% ST 15% cob 20% gr	
BK2	37-54"	10YR 7/3	10YR 5/3	vStoney fsl	1msbk m				cv	cw	15%	10% ST 15% cob 20% gr	
C	54-80+	10YR 6/4	10YR 5/6	vStoney fsl	m	lo	lo	ss/po	es	—	7%	10% ST 15% cob	

Illustration 10.2.12-1 (cont'd)



Location		Ave. Topsoil Depth (in.)	Area (acres)	Topsoil Vol. (yds³)
Streambank/Ridge	Zone 1	7.4	0.42	420
	Zone 2	47.5	0.04	260
Topsoil Stockpile	Stockpile			660
	In-situ	22.4	0.47	1,420
Potential Disturb.	Area 1	15.6	0.35	735
	Area 2	14.5	0.09	175
	Area 3	15.6	0.16	335

FIGURE 1. TOPSOIL THICKNESS SURVEY

Illustration 10.6.3-1 (cont'd)
Dazino
Top Soil Stockpile
Dazino
Pad & Rock Outcrop
Disturbed Area
Inlet Structure
CaD
Guben
Disturbed Area
Mine Portholes
Traussilla R.O.
Traussilla & R.O.
TP 14 EL 6745.03
TP 10 EL 6715.72
TP 12 EL 672785
SC 1 EL 684.7 36

Illustration 10.6.3-2

OCT 17 1989
SC3

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

350 North 4th East
Price, Utah 84501

October 16, 1989

Dave Spillman
Soldier Creek Coal Company
Box 1
Price, Utah 84501

Dear Mr. Spillman:

I have examined the topsoil material where your proposed culvert will be. I have enclosed a complete profile description taken in the undisturbed soil adjacent to the creek, under the oak brush down to the depth of 41 inches where I encountered very stony material (see attached map). The material from 0 to 41 inches is good topsoil. It contains few rock fragments, has a texture of fine sandy loam, a pH of 7.8 and is mollic. It has an average buffering capacity of about 5% $CaCO_3$.

I examined your topsoil stockpile. It appears to be the same material, with a pH of 7.8 and $CaCO_3$ of 14%. Your topsoil material is easily identifiable because there is a lithologic discontinuity at the bottom of the topsoil where it overlies the very stony material. The depth of the topsoil at the site seems to vary from about two feet to six feet.

If you have any further questions, feel free to contact George Cook at 637-0041.

Carol D. Franks

Carol D. Franks
Soil Scientist

Enclosure

SC3 Revised 01/07/91

REV. 12-70
FILE CODE SOILS-11

SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type

File No.

Area Soldier Creek Coal | Date 10-10-89 | Stop No. 1

Classification Cumulic Haploxeroll coarse-loamy over loamy skeletal, mixed, mesic

Location NE ¼ of Sec. 18 R12E T13S

N. veg. (or crop) Oak brush, wheatgrass, bluegrass | Climate 16" ppt

Parent material alluvium over residuum

Physiography mtnside

Relief Convex/Concave | Drainage well | Salt or alkali no

Elevation | Gr. water >60 | Stoniness gr 5%

Slope 10-15% | Moisture no

Aspect West | Rock distrib. | % Clay •

Erosion Slight | % Coarse fragments • | % Coarser than V.F.S. •

Permeability Mod Rapid

Additional notes

topsoil being stockpiled in similar material. Less than 5% cobbles & stones

save material down to very stony layer. Depth seems to vary from 2 to 4 feet.

topsoil stockpile = 10YR 3/3 moist, fsl, (Dry 5%) pH 7.8, 14% CaCO3

Range site = mtn. loam (Oak)

• Control section average CF. O.C.

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction CaCO3	Boundary	Roots	Roots	Pores	CaCO3
A1	0-5		10YR 3/1	cl15 l	2m stk	sh	vfr	so po	7.8 cm	cw	gv 10%	mvf ff	mvf	3%
A2	5-11		10YR 3/3	cl10 fsl	1mscbk	sh	vfr	so po	7.8 cm	gw	gv 10%			6%
A3	11-17		10YR 3/3	"	"	"	"	"	7.8 c		gv 10%			5%
"	17-28		10YR 3/3	"	"	"	"	"	7.8 c		gv 20%			5%
"	28-41		10YR 3/3	"	"	"	"	"	7.8 c	aw	gv 20%			6%
C1	41+	very stony material												

Illustration 10.6.5-1

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 2-9-89

TO: EarthFax Engineering, Inc.
7324 South 1300 East STE 100
Midvale, UT 84047

DATE SUBMITTED: 1-5-89 - Soils, Soldier Creek

CERTIFICATE OF ANALYSIS

SAMPLE ID:	3	4
LAB #:	U037960	U037961
PARAMETER		
pH Units	7.75	7.66
Conductivity, umhos/cm	330	245
% Saturation	38.1	39.4
Calcium as Ca, mg/Kg (H_2O Sol.)	79	166
Magnesium as Mg, mg/Kg (H_2O Sol.)	52	28
Sodium as Na, mg/Kg (H_2O Sol.)	72	57
SAR	1.545	1.078
Selenium as Se, mg/Kg	<.1	<.1
TKN, mg/Kg	1,020	3,120
Nitrate as NO_3-N, mg/Kg	302	237
Boron as B, mg/Kg	<2	<2
TOC, %	1.29	2.62
Maximum Acid Potential, Tons $CaCO_3$/Tons Soil	<1	<1
Neutralization Potential, Tons $CaCO_3$/Tons Soil	0.78	0.81
Texture: % Gravel (Rock)	21.9	10.6
% Sand	42.4	45.5
% Silt/Clay	35.7	43.9
Available Water Capacity @1/2 ATM, %	11.42	9.21
Available Water Capacity @15 ATM, %	6.03	5.39

Rex Henderson

CHEMTECH
CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 2-9-89

TO: EarthFax Engineering, Inc.
7324 South 1300 East STE 100
Midvale, UT 84047

DATE SUBMITTED: 1-5-89 - Soils, Soldier Creek

CERTIFICATE OF ANALYSIS

SAMPLE ID:	1-1	1-2
LAB #:	U037956	U037957
PARAMETER		
pH Units	7.53	7.56
Conductivity, umhos/cm	234	223
% Saturation	37.4	42.7
Calcium as Ca, mg/Kg (H_2O Sol.)	148	136
Magnesium as Mg, mg/Kg (H_2O Sol.)	27	31
Sodium as Na, mg/Kg (H_2O Sol.)	51	55
SAR	1.012	1.107
Selenium as Se, mg/Kg	<.1	<.1
TKN, mg/Kg	1,240	3,300
Nitrate as NO_3-N, mg/Kg	258	245
Boron as B, mg/Kg	290	84
TOC, %	2.01	1.76
Maximum Acid Potential, Tons $CaCO_3$/Tons Soil	<1	<1
Neutralization Potential, Tons $CaCO_3$/Tons Soil	0.83	0.72
Texture: % Gravel (Rock)	17.5	21.5
% Sand	56.0	54.5
% Silt/Clay	26.5	24.0
Available Water Capacity @1/2 ATM, %	8.13	9.79
Available Water Capacity @15 ATM, %	4.33	5.51

Rex Henderson

Illustration 10.6.5-3

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

6100 S. STRATLER
MURRAY, UTAH 84107
(801) 262-7299

DATE: 2-9-89

TO: EarthFax Engineering, Inc.
7324 South 1300 East STE 100
Midvale, UT 84047

DATE SUBMITTED: 1-5-89 - Soils, Soldier Creek

CERTIFICATE OF ANALYSIS

SAMPLE ID:	2-1	2-2
LAB #:	U037958	U037959
PARAMETER		
pH Units	7.53	7.58
Conductivity, umhos/cm	193	205
% Saturation	42.5	43.6
Calcium as Ca, mg/Kg (H_2O Sol.)	189	184
Magnesium as Mg, mg/Kg (H_2O Sol.)	29	49
Sodium as Na, mg/Kg (H_2O Sol.)	47	52
SAR	0.841	0.880
Selenium as Se, mg/Kg	<.1	<.1
TKN, mg/Kg	4,390	3,220
Nitrate as NO_3-N, mg/Kg	213	169
Boron as B, mg/Kg	<2	<2
TOC, %	2.71	3.01
Maximum Acid Potential, Tons $CaCO_3$/Tons Soil	<1	<1
Neutralization Potential, Tons $CaCO_3$/Tons Soil	0.71	0.71
Texture: % Gravel (Rock)	25.5	30.5
% Sand	43.3	45.9
% Silt/Clay	31.2	23.6
Available Water Capacity @1/2 ATM, %	12.48	14.51
Available Water Capacity @15 ATM, %	7.26	8.33

Rex Henderson

Illustration 10.6.5-4

11-22-88
SC3
Pipeline Area

#3 Disturbed soil - 0.0-36"
gravelly sandy loam to loam
10YR 5/4 yellowish brown - Moist
disturbed, slightly plastic,
slightly - moderately calcareous,
cobbles - "Bulk Sample"

#4 Disturbed Soil - 0.0 - 36"
gravelly sandy loam to loam
10YR 5/3 brown, disturbed
Moist, slightly plastic, moderately
- calcareous, "Bulk sample"

Illustration 10.6.5-5

11-22-88
SC3
Portal Canyon

1-1 0.0"-4.0" A Horizon
Gravelly sandy loam,
25% gravel, 55% sand,
platy structure, soft, very
friable, slightly plastic,
many fine roots, moderately
calcareous ~~[illegible]~~ brown
(10YR 4/3), slightly moist -
abrupt wavy boundary

1-2 4.0"-19.0" - C - gravelly
sandy loam with 20% cobbles,
subangular blocky, soft,
friable, fine and medium roots,
moderately calcareous, slightly
plastic ~~[illegible]~~ brown (10YR 5/3)

19.0" Bedrock -

50% rock outcrops in area

Illustration 10.6.5-6

11-22-88
SC3

2-1 0.0-2.0" A- gravelly sandy loam - eroded, few fine roots - 25% gravel, 50% [illegible] weak platy structure, soft, very friable, few fine pore slightly calcareous brown 10 YR 5/3, slightly plastic abrupt boundary.

2-2 2.0"-12.0" C- Gravelly Sandy loam - moist, many fine-medium roots, slightly plastic, soft, very friable, slightly calcareous, 10 YR 5/3 brown -

R- 12" Sandstone

VEGETATION OF THE INTAKE & PORTAL DEVELOPMENT AREAS OF THE SOLDIER CREEK COAL MINE

by
Patrick D. Collins, Ph.D.

Two general areas were visited on November 22, 1988 for the Soldier Creek Coal Company that were proposed to be disturbed by development of the intake and portal areas on the mine site. These two areas were called the "Portal Gulch Area" and the "Gas Line Area". The purpose of this report is to provide a general description of the plant communities that exist within the boundaries of these two areas.

PORTAL GULCH AREA

The Portal Gulch area lies on the east side of Soldier Creek Canyon. The study area designated as proposed disturbance was approximately 5 acres. Elevation of the area lies between 6,700 ft and 6,850 ft above sea level. A small drainage with a general east to west flow direction dissected the area. The drainage did not, however, support a well developed riparian community probably due to the lack of adequate moisture requirements. Average slope of this area was approximately 30 degrees.

Because of a variety of slopes and exposures, there were small areas that supported different plant species as dominants. Generally, the Portal Gulch Area could be described as coniferous forests on the south side of the drainage (north-facing slopes) with sagebrush/grass, oak and mountain brush communities on the north side of the drainage (south-facing slopes). More specifically, in decreasing order of importance by total area, the major plant communities that existed within the boundaries of the Portal Gulch proposed disturbance area were: 1) Douglas Fir/White Fir, 2) Big Sagebrush/Salina Wildrye, 3) Scrub Oak/Salina Wildrye, and 4) Mountain Brush communities.

Several of the dominant plant species of the entire Portal Gulch area are listed below:

TREES AND SHRUBS

Abies concolor	White Fir
Acer grandidentatum	Big-toothed Maple
Amelanchier utahensis	Utah Serviceberry
Artemisia tridentata	Big Sagebrush
Brickellia microphylla	Brickellia
Chrysothamnus nauseosus	Rubber Rabbitbrush
Chrysothamnus viscidiflorus	Low Rabbitbrush
Ephedra viridis	Mormon Tea
Gutierrezia sarothrae	Broom Snakeweed
Juniperus osteresperma	Utah Juniper
Juniperus scopulorum	Rocky Mountain Juniper
Lonicera utahensis	Utah Honeysuckle

Pinus edulis	Pinyon Pine
Pseudotsugo menziesii	Douglas Fir
Quercus gambelii	Gambel's Oak
Symphoricarpos oreophilus	Snowberry
FORBS	
Artemisia ludovicina	Louisiana Sagebrush
Hackelia patens	Stickseed
Penstemon spp.	Penstemon
Smilacina racemosa	False Solomon's Seal
Solidago spp.	Goldenrod
Tragopogon dubius	Goat's Beard
GRASSES	
Bromus carinatus	Mountain Bromegrass
Elymus salinus	Salina Wildrye
Poa spp.	Bluegrass
Stipa hymenoides	Indian Ricegrass

Reference Area

A reference area was marked off to the east of the proposed disturbed Portal Gulch Area. This area had similar topography, slopes and exposure when compared to the proposed disturbed area. The reference area also supports the similar vegetation communities including: 1) Douglas Fir/White Fir, 2) Big Sagebrush/Salina Wildrye, 3) Scrub Oak/Salina Wildrye, and 4) Mountain Brush communities.

GAS LINE AREA

The vegetation of the Pipeline area existed predominantly on west-facing slopes. The slopes had sandstone outcrops with most of the vegetative cover supported between. The lower slopes of the Pipeline Area had been disturbed previously by roads and other activities. The major plant communities of the area were 1) Mountain Brush and 2) Pinyon/Juniper communities and seemed to be a transition zone between the two community types. Elevation of the Pipeline Area lies between 6,700 ft and 6,780 ft above sea level. Total acreage of the Pipeline Area was approximately 4 acres.

Dominant plant species that exist in the Pipeline area are listed below.

TREES AND SHRUBS	
Amalanchier utahensis	Utah Serviceberry
Artemisia nova	Black Sagebrush
Artemisia tridentata	Big Sagebrush
Berberis repens	Oregon Grape
Cercocarpus montanus	Mountain Mahogany
Chrysothamnus nauseosus	Rubber Rabbitbrush
Ephedra viridus	Mormon Tea
Juniperus osteosperma	Utah Juniper
Pinus edulis	Pinyon Pine
Pseudotsugo menziesii	Douglas Fir
Quercus gambelii	Gambel's Oak

FORBS	
Artemisia ludoviciana	Louisiana Sagebrush
Erigeron spp.	Fleabane
Senecio multilobatus	Groundsel
Solidago sp.	Goldenrod

GRASSES	
Agropyron cristatum	Crested Wheatgrass
Elymus salinus	Salina Wildrye
Stipa hymenoides	Indian Ricegrass

Reference Area

An reference area had apparently been previously marked and approved by the State of Utah, Division of Oil, Gas & Mining for this proposed disturbed area. I did not visit this site, however.

VEGETATION OF THE PROPOSED COUNTY ROAD REALIGNMENT FOR THE SOLDIER CREEK MINE SITE

Methods

An on-site survey of the plant communities that will be affected by the proposed disturbance from the county road realignment project was conducted on June 28, 1990. Qualitative data were taken from the site by walking the the proposed disturbance area in a systematic pattern to search for threatened or endangered plant species and to adequately describe the vegetative communities to be affected.

Study Area

The study area was located north of the mine site between a substation on the north and the 9 ft. (diameter) underground culvert on the south. A creek that had been previously disturbed by the present roadway was located on the west side of the study area. The study site had an area of approximately 2,500 square ft. Elevation ranged between 6,750 ft and 6,800 ft above sea level.

The Plant Community

The plant community that would be affected seemed to be a

transition zone between mountain brush and pinyon/juniper types. Therefore, the dominant woody species were: pinyon pine, Utah juniper, Gambel oak and serviceberry. Dominant grass species included slender wheatgrass, Indian ricegrass and needle-and-thread grass. No threatended or endangered plant species were observed on the site. A list of the plant species observed are listed below.

TREES & SHRUBS

Amelanchier utahensis	Serviceberry
Artemisia tridentata	Big sagebrush
Artemisia nova	Black sagebrush
Cercocarpus ledifolius	Mountain mohagony
Chrysothamnus nauseosus	Rubber rabbitbrush
Chrysothamnus viscidiflorus	Low rabbitbrush
Juniperus osteosperma	Utah juniper
Juniperus scopulorum	Rocky Mtn. juniper
Opuntia polyacantha	Prickly pear cactus
Pinus edulis	Pinyon pine
Populus angustifolia	Narrowleaf cottonwood
Quercus gambellii	Gambel oak
Rhus trilobata	Squawbush
Rosa woodsii	Wood's rose
Sambucus caerulea	Blue elderberry
Symphoricarpos oreophilus	Snowberry

FORBS

Calochortus nuttallii	Sego lily
Eriogonum umbellatum	Sulfer buckwheat
Gilia aggregata	Scarlet gilia
Glycyrrhiza lepidota	Licorice
Penstemon eatonii	Eaton penstemon
Penstemon sp.	Penstemon

GRASSES

Elymus trachycaulus	Slender wheatgrass
Stipa comata	Needle-and-thread
Stipa hymenoides	Indian ricegrass

Illustration 10.2.8-1

Norman H. Bangerter
Governor

Dee C. Hansen
Executive Director

Timothy H. Provan
Division Director

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

JUN 2 1989

June 15, 1989

Mr. Reid W. Olsen
Soldier Creek Coal Company
Soldier Canyon Mine
P.O. Box I
Price, Utah 84501

Attention: Tom Paluso and Chris Allen

Dear Rick:

Subject: Soldier Canyon Mine/Wildlife Mitigation

In regards to wildlife mitigation associated with the Soldier Canyon Coal Mine, the following is offered for your consideration.

The existing approved mine plan identified a potential for loss of 22.2 acres of critical valued deer winter range. Already completed construction of sewage lagoons and long-term development plans for a waste-rock disposal area account for this acreage. Another 4.2 acres of winter range (this includes 1.5 acres of riparian habitat) will be lost in association with the proposed potential for 26.4 acres of damage to deer winter range.

Mitigation for these winter range losses is expected. As you know, Utah's Division of Oil, Gas & Mining and the Bureau of Land Management are the regulatory agencies concerning such mitigation. Based upon experience with rangeland enhancements, it is our opinion that three acres need to be improved for each acre damaged to mitigate for long-term (life of Mine) forage losses on deer winter range. Thus, 79.2 acres of rangeland improvement needs to be accomplished. The 1.5 acres of riparian habitat along Soldier Creek are included in the total loss for deer winter range. At abandonment of the facility this 600 foot long area will need to be reestablished as a riparian habitat.

The Division, in cooperation with the Bureau of Land Management, Utah Department of Transportation and Carbon County, is currently planning a large acreage pinyon/juniper chaining. This rangeland conversion lies on BLM, as well as State land, and is designed to improve forage conditions on mule deer winter range in the Soldier Creek area (parts of Sec. 31, 32 and 33, T13 S, R 12 E and parts of Sec. 4, 5 and 6, T 14 S, R 12 E, Carbon County, Utah).

An equal opportunity employer

Mr. Richard M. Olsen
June 15, 1989
Page 2

The rangelands to be treated are an extension of the winter forage use area that the Mine will damage. This project has potential to be enlarged to accommodate the Mine's mitigation needs and will be completed during the fall season of 1989. Costs will amount to $60 per acre.

Rick, the Division has discussed the Mine's mitigation needs with BLM and DOGM. It is concurred that economic participation by the Mine resulting in an extension of the aforementioned cooperative project by 79.2 acres would adequately fulfill your mitigation requirements for lost deer winter range. Administration of this large acreage chaining is being coordinated by the Division. If Soldier Creek Coal Company (Soldier Canyon Mine) is interested in participating to fulfill mitigation needs, a remittance of $4,752 to the Division of Wildlife Resources is needed.

Thank you for your interest and concern relative to Utah's wildlife resource.

Sincerely,

Timothy H. Provan
Director

ILLUSTRATION 10.2.8-2

Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Timothy H. Provan
Division Director

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

AUG 1 1989
SC
ENTERED

August 2, 1989

Mr. Reid W. Olsen
Soldier Creek Coal Company
Soldier Canyon Mine
P.O. Box I
Price, UT 84501

Attn: Tom Paluso

Dear Rick:

The Division is in receipt of your check (No. 18015) for $4,752 that serves as total wildlife/habitat mitigation for mining projects identified in my June 15, 1989 correspondence. As you know, this project has been fully discussed with the Bureau of Land Management, as well as the Division of Oil, Gas and Mining. Both concur on the impacts and mitigation. I will provide a copy of this correspondence to both agencies as notice that Soldier Creek Coal Company's wildlife/habitat requirements have been fulfilled.

The pinyon/juniper rangeland conversion, of which 79.2 acres will be treated on behalf of the company, will occur this fall.

Rick, I want to extend a special "thank you" to Soldier Creek Coal Company from the Division. The other cooperators in this project (Bureau of Land Management, Utah Department of Transportation, Utah Division of State Lands and Forestry, Utah Division of Oil, Gas & Mining, as well as Carbon County) are each appreciative of the Company's participation. There is no doubt that Utah's wildlife resource, particularly the mule deer herd, will benefit from all of us pooling our resources to accomplish this project.

Sincerely,

Timothy H. Provan
Director

SC3 Revised 01/07/91

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Illustration 10.9.1-1

State of Utah
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

Norman H. Bangerter
Governor
Suzanne Dandoy, M.D., M.P.H.
Executive Director
Kenneth L. Alkema
Director

Bureau of Air Quality
1950 West North Temple
P.O. Box 16690
Salt Lake City, Utah 84116-0690
(801) 536-4000
(801) 536-4099 FAX

BAQE-293-91

MAY 08

May 1, 1991

Johnny Pappas
Environmental Coordinator
Soldier Creek Coal Co.
P.O. Box 1
Price, Utah 84501

Re: Intent to Approve New Coal Handling Facility, and Waste Rock Disposal Site
Carbon County CDS B

Dear Mr. Pappas:

The notice of intent for the above-referenced project has been evaluated and has been found to be consistent with the requirements of the Utah Air Conservation Rules (UACR) and the Utah Air Conservation Act. Air pollution producing sources and/or their air control facilities may not be constructed, installed, established, or modified prior to the issuance of an approval order by the Executive Secretary of the Utah Air Conservation Committee.

A notice of intent to issue an approval order will be published in the Salt Lake Tribune on May 9, 1991. A 30-day period following the publishing date will be allowed during which the proposal and evaluation of the impact on air quality will be available for public review and comment. If within 15 days of publication of the notice anyone so requests, a hearing will be held. Any comments received during the 30-day period and the hearing, if held, will be evaluated. The intent to approve or the conditions of approval may be modified as a result of those comments. Unless modified, the approval order would be based upon the following conditions:

1. Soldier Creek Coal Company, with offices located in Price, Utah, shall install and operate the coal handling facility (preparation plant) in Soldier Canyon according to the information submitted in the notice of intent dated January 4, 1991. A copy of this approval order shall be posted on site and shall be available to the employees who operate the air emission producing equipment. All employees who operate the air emission producing equipment shall receive instruction as to their responsibilities in operating the equipment in compliance with all conditions.

2. The approved installations shall consist of the following equipment:

   A. 4th North Conveyor Belt
   B. Transfer House, and all Crushing/Classifying equipment therein
   C. Coal Silo Conveyor Belt
   D. (2) 6,000 ton Coal Storage Silos
   E. (3) Underground Vibrating Feeders

F. Reclaim Conveyor Belt
G. Coal Preparation Plant, and all equipment therein
H. Refuse Bin Conveyor Belt
I. Refuse Loadout Bin
J. Truck Bin Conveyor Belt
K. (2) Coal Truck Loadout Bins

3. This approval order shall replace the approval order dated September 4, 1986.

4. Visible emissions from any point or fugitive emission source associated with the installation or control facilities shall not exceed 20% opacity. Opacity observations of emissions from stationary sources shall be conducted in accordance with 40 CFR 60, Appendix A, Method 9. Visible emissions from mobile sources and intermittent sources shall use procedures similar to Method 9, but the requirement for observations to be made at 15 second intervals over a six minute period shall not apply.

5. Coal production shall not exceed 3.5 million tons per year without prior approval in accordance with Section 3.1, UACR. Compliance with the annual limitation shall be determined on a rolling 12-month total. Based on the first day of each month a new 12-month total shall be calculated using the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. Records of production shall be made available to the Executive Secretary or his representative upon request and shall include a period of two years ending with the date of the request. Production shall be determined by examining weigh scale records of coal trucked off site. The records shall be kept on a daily basis.

6. All unpaved roads and other unpaved operational areas which are used by mobile equipment shall be water sprayed and/or chemically treated to reduce fugitive dust. Control is required at all times (24 hours per day every day) for the duration of the project/operation. The application rate of water shall be a minimum of 0.25 gallons per square yard. Application shall be made at least once every two hours during all times the installation is in use unless daily rainfall exceeds .10 of an inch or unless the road is in a muddy/damp/moist condition or unless it is covered with snow or unless the ambient temperature is below freezing. If chemical treatment is to be used, the plan must be approved by the Executive Secretary. Records of water treatment shall be kept for all periods when the plant is in operation. The records shall include the following items:

A. Date
B. Number of treatments made, dilution ratio, and quantity
C. Rainfall received, if any, and approximate amount
D. Time of day treatments were made

Records of treatment shall be made available to the Executive Secretary upon request and shall include a period of two years ending with the date of the request. The haul road length shall

not exceed 0.8 miles without prior approval in accordance with Section 3.1, UACR. The speed of vehicles on the haul road shall not exceed 25 miles per hour without prior approval in accordance with Section 3.1, UACR.

7. The haul roads servicing both the coal and refuse loadout bins shall be paved and shall be periodically swept or sprayed clean as dry conditions warrant or as determined necessary by the Executive Secretary. Records of cleaning of paved road shall be made available to the Executive Secretary or his representative upon request and shall include a period of two years prior to the date of request.

8. Fugitive emissions shall be minimized at the following points either by the application of water sprays, or by their enclosure:

   A. All crushers
   B. All screens
   C. All conveyor transfer points and drop points

   Water sprays shall operate whenever dry conditions warrant or as determined necessary by the Executive Secretary.

9. In addition to the requirements of this approval order, all applicable provisions of 40 CFR 60, NSPS, Subparts A and Y apply to this installation.

10. For sources which are subject to NSPS, visible emission observations which are performed during the initial compliance inspection shall consist of 30 observations of six minutes each in accordance with 40 CFR 60, Appendix A, Method 9. It is the responsibility of the owner/operator of the source to supply these observations to the Executive Secretary. A certified observer must be used for these observations. Emission points which are subject to NSPS shall include the following:

    A. Coal Processing and Conveying Equipment
    B. Coal Storage Systems (except for open storage piles)
    C. Coal Transfer and Loading Systems

11. The moisture content of the coal shall be maintained at a value of no less than 5.0% by weight. The moisture content shall be tested if directed by the Executive Secretary using the appropriate ASTM method.

12. The open storage piles shall be watered to minimize generation of fugitive dusts as dry conditions warrant or as determined necessary by the Executive Secretary.

13. Eighteen months from the date of this approval order the Executive Secretary shall be notified in writing of the status of construction of this project unless the construction is complete and operation has commenced.

14. All records referenced in this approval order or in an applicable NSPS, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or his representative upon request.

15. All installations and facilities authorized by this approval order shall be adequately and properly maintained.

16. The Executive Secretary shall be notified in writing upon start-up of the installation, as an initial compliance inspection is required.

Any future modifications to the equipment approved by this order must also be approved in accordance with Section 3.1.1, UACR.

This approval order in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including the Utah Air Conservation Rules.

Annual emissions for this source (the entire plant) are currently calculated at the following values:

A. 32.8 tons/yr for particulate
B. 21.9 tons/yr for PM_{10}
C. 3.97 tons/yr for SO_2
D. 36.4 tons/yr for NO_x
E. 1.68 tons/yr for VOC
F. 15.7 tons/yr for CO
G. 0.98 tons/yr for Aldehydes

These calculations are for the purposes of determining the applicability of PSD and nonattainment area major source requirements of the UACR. They are not to be used for purposes of determining compliance.

1. Soldier Creek Coal Company, with offices located in Price, Utah, shall install and operate the Waste Rock Disposal Site according to the information submitted in the notice of intent dated January 4, 1991. A copy of this approval order shall be posted on site and shall be available to the employees who operate the air emission producing equipment. All employees who operate the air emission producing equipment shall receive instruction as to their responsibilities in operating the equipment in compliance with the appropriate and relevant conditions.

2. The approved installations shall consist of the following equipment:

   A. Waste Rock Disposal Area
   B. Associated Haul Road

3. Visible emissions from any point or fugitive emission source associated with the installation or control facilities shall not exceed 20% opacity. Opacity observations of emissions from stationary sources shall be conducted in accordance with 40 CFR 60, Appendix A, Method 9. Visible emissions from mobile sources and intermittent sources shall use procedures similar to Method 9, but the requirement for observations to be made at 15 second intervals over a six minute period shall not apply.

4. All unpaved roads and other unpaved operational areas which are used by mobile equipment shall be water sprayed and/or chemically treated to reduce fugitive dust. Control is required at all

times (24 hours per day every day) for the duration of the project/operation. The application rate of water shall be a minimum of 0.25 gallons per square yard. Application shall be made at least once every two hours during all times the installation is in use unless daily rainfall exceeds .10 of an inch or unless the road is in a muddy/damp/moist condition or unless it is covered with snow or unless the ambient temperature is below freezing. If chemical treatment is to be used, the plan must be approved by the Executive Secretary. Records of water treatment shall be kept for all periods when the plant is in operation. The records shall include the following items:

A. Date
B. Number of treatments made, dilution ratio, and quantity
C. Rainfall received, if any, and approximate amount
D. Time of day treatments were made

Records of treatment shall be made available to the Executive Secretary upon request and shall include a period of two years ending with the date of the request. The haul road length shall not exceed 0.75 miles without prior approval in accordance with Section 3.1, UACR. The speed of vehicles on the haul road shall not exceed 15 miles per hour without prior approval in accordance with Section 3.1, UACR.

5. The storage area shall be watered to minimize generation of fugitive dusts as dry conditions warrant or as determined necessary by the Executive Secretary.

6. Eighteen months from the date of this approval order the Executive Secretary shall be notified in writing of the status of construction of this project unless the construction is complete and operation has commenced.

7. All installations and facilities authorized by this approval order shall be adequately and properly maintained.

8. The Executive Secretary shall be notified in writing upon start-up of the installation, as an initial compliance inspection is required.

Any future modifications to the equipment approved by this order must also be approved in accordance with Section 3.1.1, UACR.

This approval order in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including the Utah Air Conservation Rules.

Annual emissions for this source (the entire plant) are currently calculated at the following values:

A. 22.0 tons/yr for particulate
B. 10.3 tons/yr for PM_{10}

These calculations are for the purposes of determining the applicability of PSD and nonattainment area major source requirements of the UACR. They are not to be used for purposes of determining compliance.

Johnny Pappas
May 1, 1991
Page 6

Please review and, if you have any comments on these conditions, respond by letter prior to the close of the comment period.

The Bureau of Air Quality is authorized to charge a fee for reimbursement of the actual costs incurred in the issuance of approval orders. Unless public comments are received which require additional work, the fee for this approval order will be $1500.00. Once the comment period is up, you will be notified as to whether there are comments and regarding payment of the approval order fee.

Sincerely,

Montie R. Keller

Montie R. Keller, Manager
Technical Evaluation Section
Bureau of Air Quality

MRK:BR:cw

cc: EPA Region VIII, Mike Owens
Southeastern Utah District Health Department