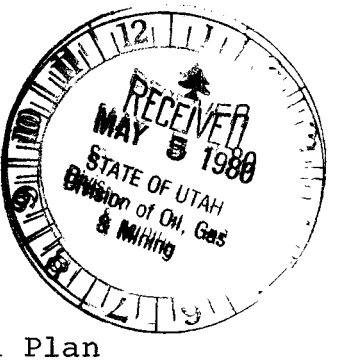
File Copy

RUNOFF CONTROL PLAN
SEDIMENTATION POND DESIGN

Soldier Creek Coal Company
HIDDEN VALLEY MINE
P.O. Box A&
Price, Utah 84501

Soldier Creek Coal Company
HIDDEN VALLEY MINE
Telephone 801 - 637-4429
P.O. Box AS
Price, Utah 84501

May 2, 1980



Mr. Ronald W. Daniels
Coordinator of Mined Land Development
Division of Oil, Gas, and Mining
1588 West North Temple
Salt Lake City, Utah 84116

Re: Runoff Control Plan
Sedimentation Pond Design
Hidden Valley Mine
ACT/015/022

Dear Mr. Daniels:

Enclosed please find three copies of the "Runoff Control Plan Sedimentation Pond Design" as requested by your letter dated October 29, 1979. This report adequately describes the sedimentation pond final design and runoff control measures for Hidden Valley Mine.

It is our intention to start construction of the portal area sedimentation control facilities as soon as possible. In order to expedite this work, a copy of this report is being delivered to the Division of Water Rights and the Division of Environmental Health.

Your expediency in handling this matter would be greatly appreciated. If you have further questions, please feel free to contact us.

Very truly yours,

SOLDIER CREEK COAL COMPANY
Hidden Valley Mine

J. T. Paluso

J. T. Paluso
Project Engineer

JTP:dt
Enclosure

cc: Steve McNeal - Division of Environmental Health
Bob Morgan - Division of Water Rights

SOLDIER CREEK COAL COMPANY

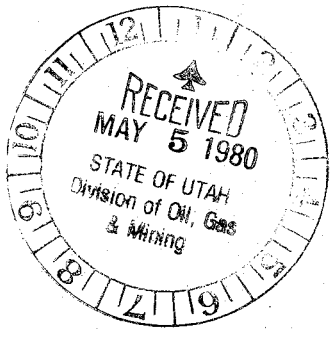
HIDDEN VALLEY MINE

RUNOFF CONTROL PLAN
SEDIMENTATION POND DESIGN

Submitted to the

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah

May 1980



Prepared by:

Soldier Creek Coal Company
Hidden Valley Mine
P.O. Box AS
Price, Utah 84501

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SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE

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Introduction

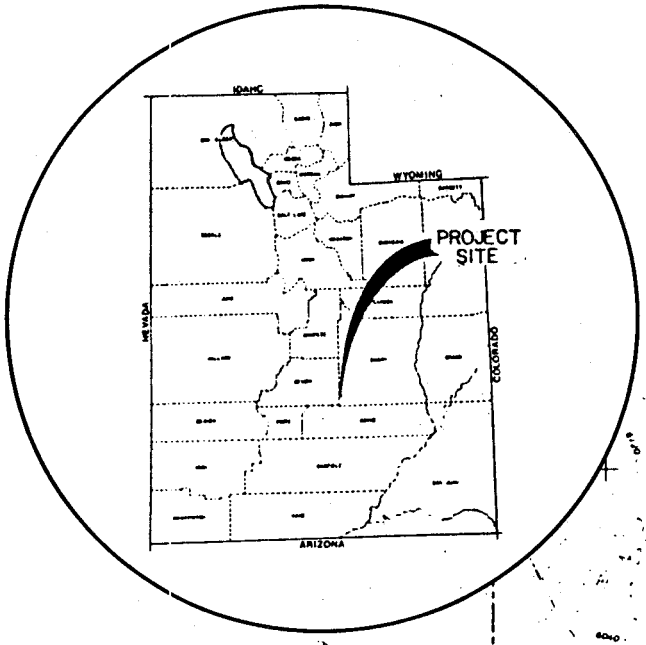
It is the intent of Soldier Creek Coal Company, a division of California Portland Cement Company, to develop a new underground coal mine. This mine is located approximately seven miles southwest of Emery, Utah, in the Emery Coal Field (see Figure 1). The estimated production of this mine will be approximately 500,000 tons per year.

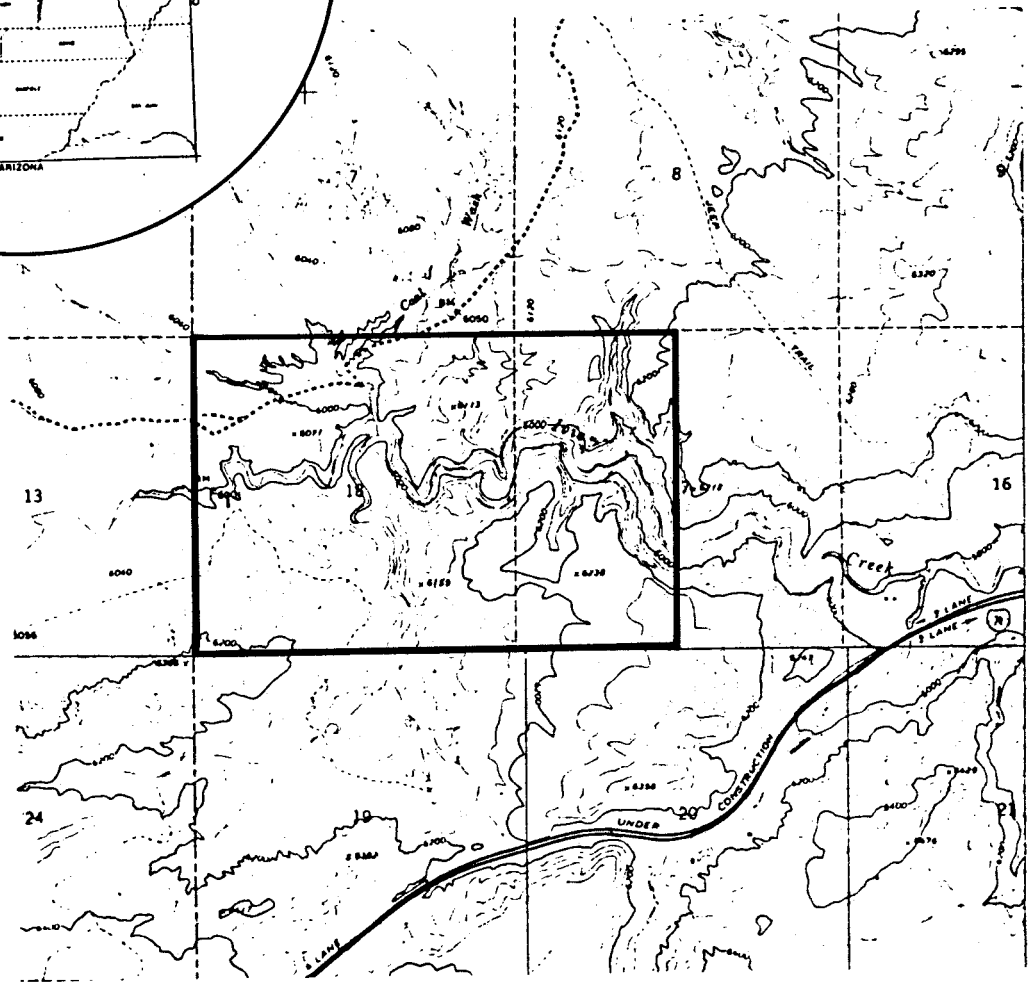
Recent regulations controlling the surface effects of underground coal mining, require the prevention of additional contributions of suspended solids to stream flow, or runoff outside the permit area. Pursuant to these regulations, all surface drainage from a disturbed area shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility. Such runoff containment will be necessary for three major disturbed areas proposed for the development of Hidden Valley Mine.

On September 7, 1979, a Surface Mining and Reclamation Plan, under the Interim Program, was submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and

HIDDEN VALLEY MINE SITE

Township 23 South, Range 6 East
Salt Lake Base and Meridian
Section 18 & the West 1/2 of Section 17





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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
NONE	HIDDEN VALLEY MINE LOCATION	A-005

Figure 1
Page 2

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DGS	2-18-80				

Mining. Included in the Surface Mining and Reclamation Plan was a proposed runoff control plan which contained preliminary calculations and designs of the required sedimentation ponds. Soldier Creek Coal Company respectfully submits the following information as the final detailed design plans for the proposed sedimentation ponds.

Methods

The Soil Conservation Service (1972), has quantified precipitation runoff volume, from a particular rainfall event, by the runoff curve number technique. According to the curve number methodology, the algebraic and hydrologic relations between soil, moisture, soil-cover conditions, and rainfall can define total runoff by the following equations:

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

and

$$S = \frac{1000}{CN} - 10$$

Where Q is the direct runoff in inches; P is the rainfall in inches; S is the maximum potential difference between P and Q at the beginning of the storm; and CN is the dimensionless expression of S referred to as the curve number. Curve number values were chosen using information from the SCS (1972) and personal judgement following field observations. Values of P were obtained for selected durations from Richardson (1971) as reported for the town of Emery (see Table 1).

Estimates of the peak discharge to be expected from various precipitation events were determined using the Utah State Department of Transportation, Small Area Runoff Method. The following equation gives the relation used:

Station: Emery
Latitude: 38° 55'

Elevation: 6200
Longitude: 111° 15'

DURATION

RETURN PERIOD (years)	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.15	.23	.29	.40	.50	.53	.56	.64	.71	.78
2	.17	.26	.32	.45	.57	.62	.67	.80	.91	1.03
5	.19	.29	.37	.51	.65	.74	.83	1.04	1.23	1.43
10	.21	.32	.40	.56	.71	.82	.93	1.20	1.44	1.69
25	.25	.39	.49	.68	.86	1.00	1.13	1.45	1.74	2.04
50	.28	.43	.55	.76	.96	1.12	1.27	1.64	1.97	2.32
100	.30	.47	.59	.82	1.04	1.22	1.39	1.82	2.20	2.60

Table 1. Estimated precipitation depth, in inches, for various return periods and durations (from Richardson, 1971).

$$Q_f = Q_c \times LF \times FF$$

Where Q_f is the design discharge in C.F.S.; Q_c is the discharge relationship between topography, rainfall intensity, and drainage area; LF is the land factor determined by terrain characteristics; and FF is the frequency factor determined by dividing the design frequency rainfall intensity by the 25-year intensity.

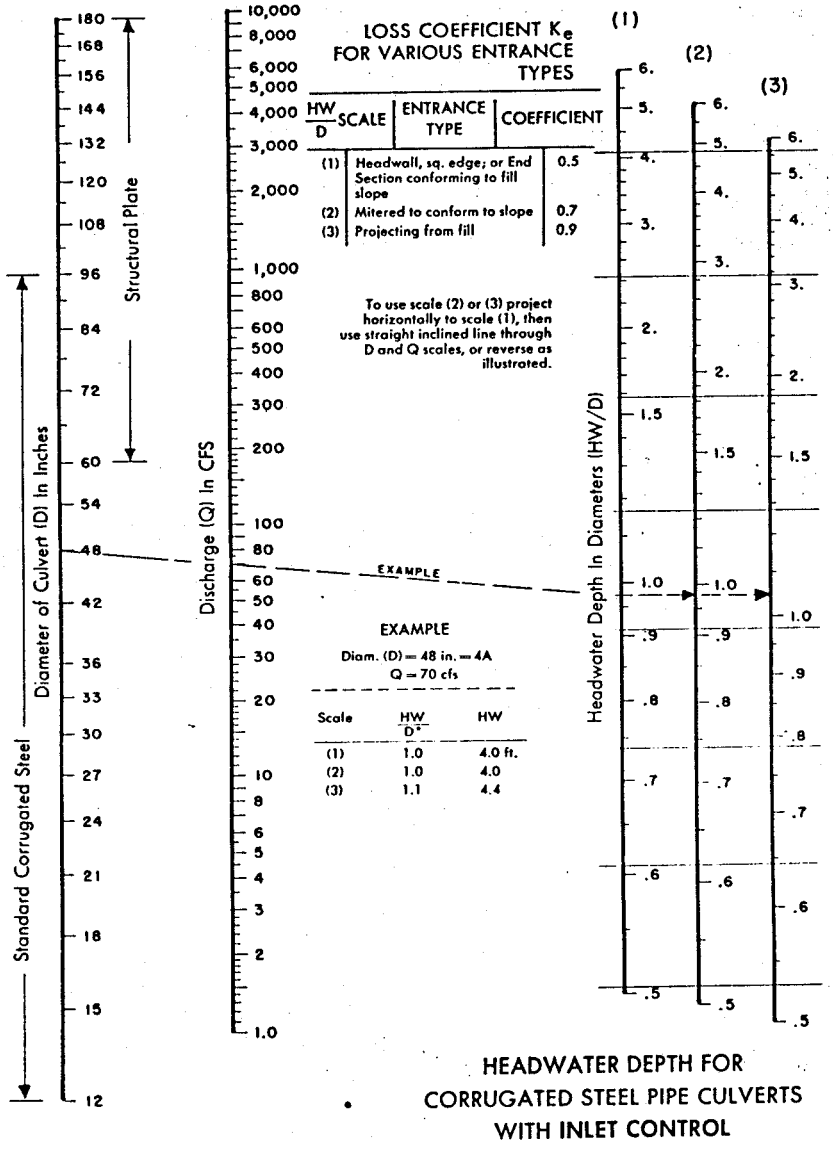
Culvert diameters were determined using the calculated peak discharge and an inlet control nomograph for corrugated steel pipe culverts (see Figure 2). Inlet control conditions were assumed for all culverts.

Emergency spillways and dewatering devices using vertical risers were designed using the relationship between the elevation of the impounded storage and the desired rate of discharge. Three different flow conditions can control the discharge in a drop-inlet conduit system. Weir flow, orifice flow, or full pipe flow can be the controlling factor. Actual flow is the smallest of the three possible flow conditions.

Weir flow was determined according to USBR (1974), by the following equation:

$$Q = CLH^{1.5}$$

Where Q is the discharge or rate of flow in cubic feet per



HEADWATER DEPTH FOR CORRUGATED STEEL PIPE CULVERTS WITH INLET CONTROL

Fig. 2. Inlet control nomograph (American Iron and Steel Institute 1971)

second; L is the effective length of the entrance crest or circumference of the vertical riser; H is the total head above the riser inlet; and C is the coefficient which depends on the shape of the entrance and the head above the riser inlet.

According to King and Brater (1963), C for sharp crested weirs can be calculated as follows:

$$C = 3.22 + 0.44 \frac{H}{P}$$

Where H is as previously defined; and P is the height of the weir.

Orifice flow was determined using the following formula suggested by USBR (1974):

$$Q = \left(\frac{R \; Ha^{\frac{1}{4}}}{0.204} \right)^2$$

Where Q is the discharge or rate of flow in cubic feet per second; R is the radius of the opening in feet; and Ha is equal to the difference between the water surface and the elevation under consideration.

Pipe flows were determined using the following relationship:

$$Q = A \left(\frac{H_T \; 2g}{(f \; L/D + \Sigma K_L + 1)} \right)^{\frac{1}{2}}$$

Where Q is the discharge flow in cubic feet per second; A is the cross-sectional area of the opening in square feet; H_T is the head or elevation difference between the storage surface and the effective surface at discharge; g is the

acceleration due to gravity; f is the friction factor for the culvert material; L is the length of the culvert; D is the diameter of the culvert; and ΣK_L is the summation of head losses associated with the inlet, valves, constrictions and directional changes.

Open channel flow was estimated using the Manning equation which states:

$$Q = \frac{1.49}{n} AR^{.67}s^{.5}$$

Where Q is the discharge in cubic feet per second; n is Manning's coefficient of channel roughness; A is the cross-sectional area of flow in square feet; R is the hydraulic radius in feet, defined as the area of flow divided by the wetted perimeter of the channel; and s is the slope of the channel in feet per foot.

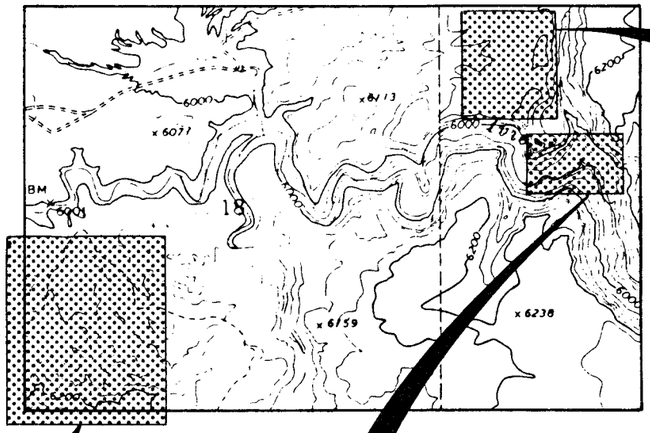
GENERAL DESIGN INFORMATION

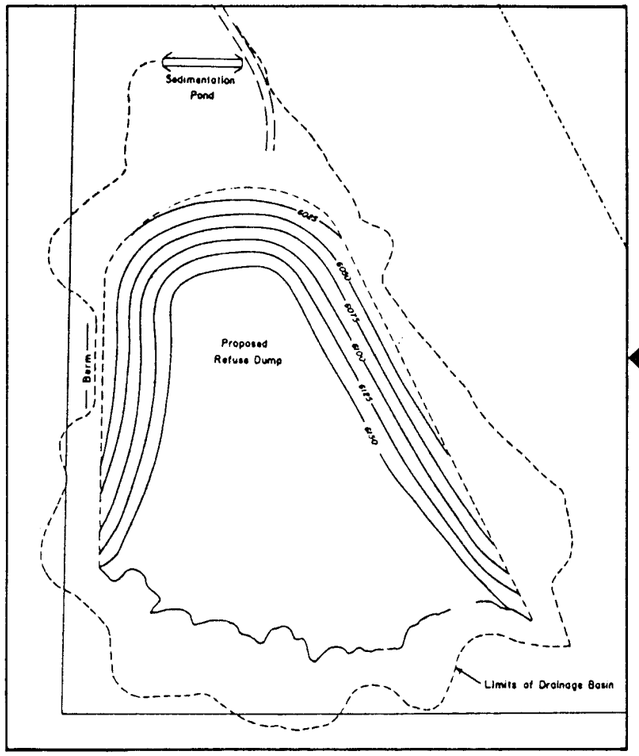
The proposed development of Hidden Valley Mine will require three areas of major surface disturbance. All drainage from these areas will be passed through a sedimentation pond to prevent any additional contribution of suspended solids to the natural drainage. The location of these disturbed areas with respect to the Hidden Valley Mine property is shown in Figure 3. Also shown in Figure 3 is the proposed sedimentation pond location relative to the drainage basin affected. A more detailed illustration of the proposed disturbed areas are presented later in their respective sections.

A typical dewatering decant assembly and drop-inlet spillway are shown in Figures 4 and 5 respectively. These designs will be appropriately incorporated into the sedimentation pond design plans for Hidden Valley Mine. Specific details concerning culvert diameters and inlet elevations for individual ponds are presented later in this report.

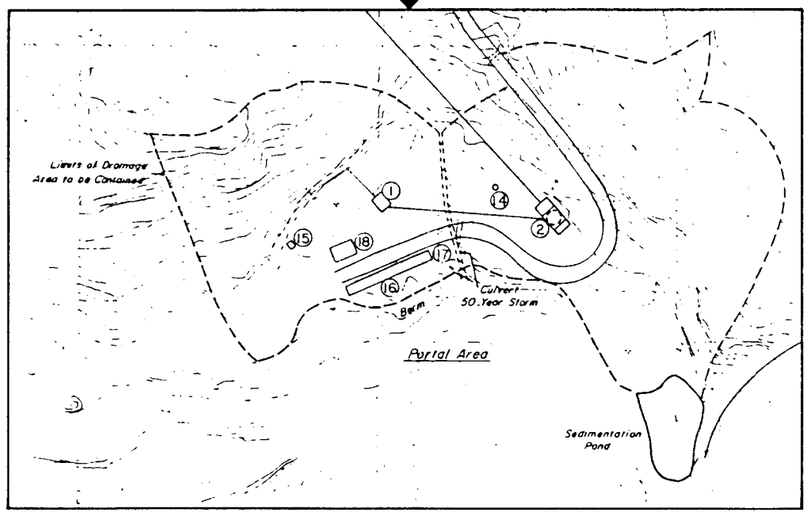
The vertical risers of these structures will be equipped with an anti-vortex device and trash rack (see Figure 6). This assembly will also function as an oil skimming device. The design specifications are indicated in Figure 6.

HIDDEN VALLEY MINE

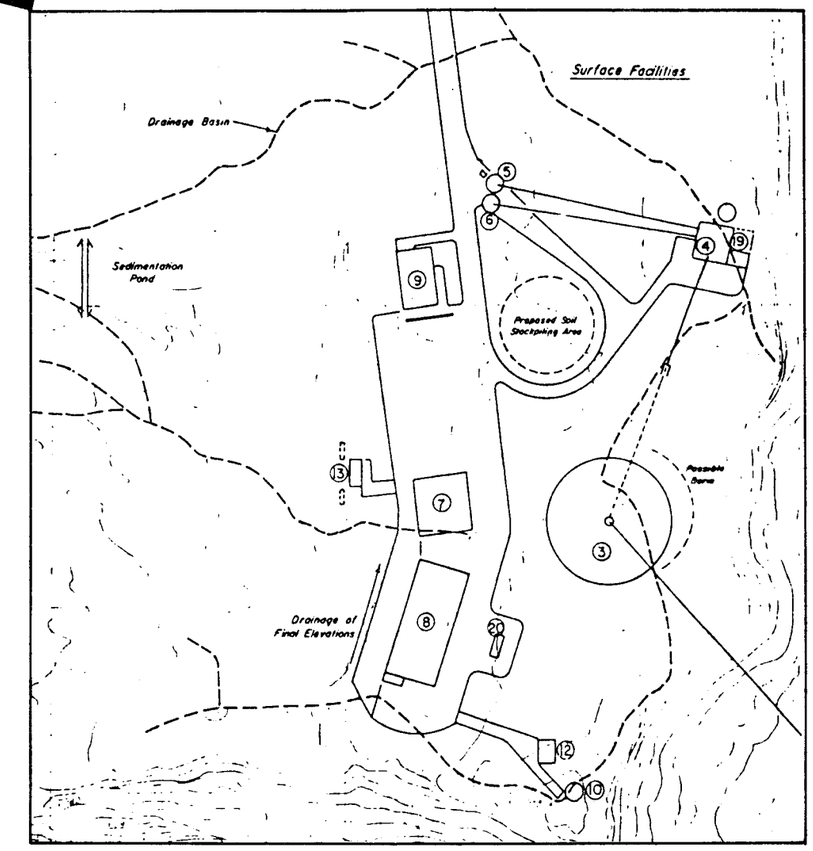




Refuse Disposal Area
Drainage 59.0 Acres



Portal Area - Drainage 4.3 Acres



Surface Facility Area - Drainage 18.6 Acres

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE: NONE	TITLE: DRAINAGE & GENERAL LOCATION OF PROPOSED SEDIMENTATION PONDS		DRAWING NO. B-014 Figure 3 Page 11
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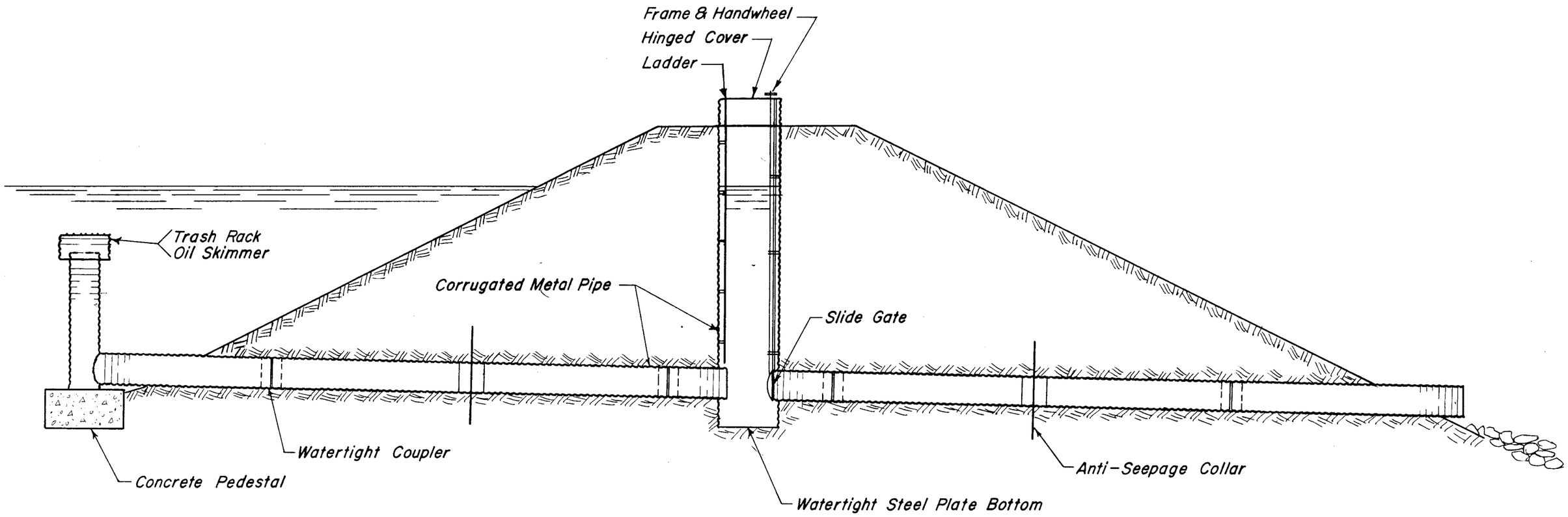
Typical Dewatering Decant Assembly for Small Dams



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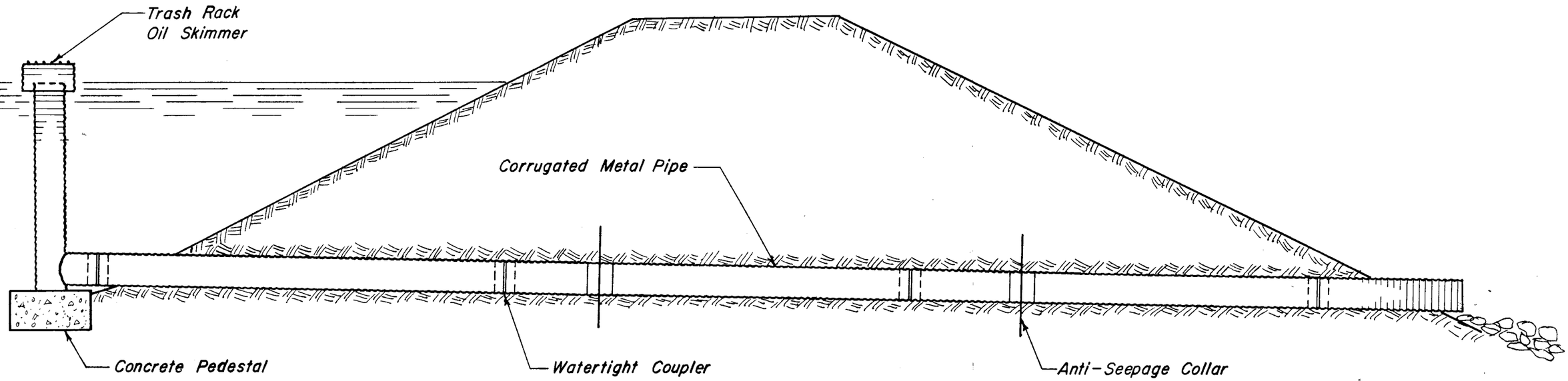
HIDDEN VALLEY MINE

SCALE: 1" = 5'		TITLE: Typical Dewatering Decant Assembly				DRAWING NO. B-008
DRAWN BY DGS	DATE 1·22·80	CHECKED	DATE	APPROVED	DATE	Figure 4, Pg. 12

Typical Drop–Inlet Spillway for Small Dams



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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1" = 5'	Typical Drop–Inlet Spillway	B-009

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All pipes passing through the sedimentation pond embankment will require anti-seepage collars. Design specifications for these collars will be in accordance to Figure 7.

The slide gate recommended for the dewatering decant assembly is shown in Figure 8. This slide gate will be locked in a closed position and all discharge will be controlled by a responsible individual.

Riprap will be installed at discharge points, where necessary, to prevent any additional erosion and to minimize disturbance.

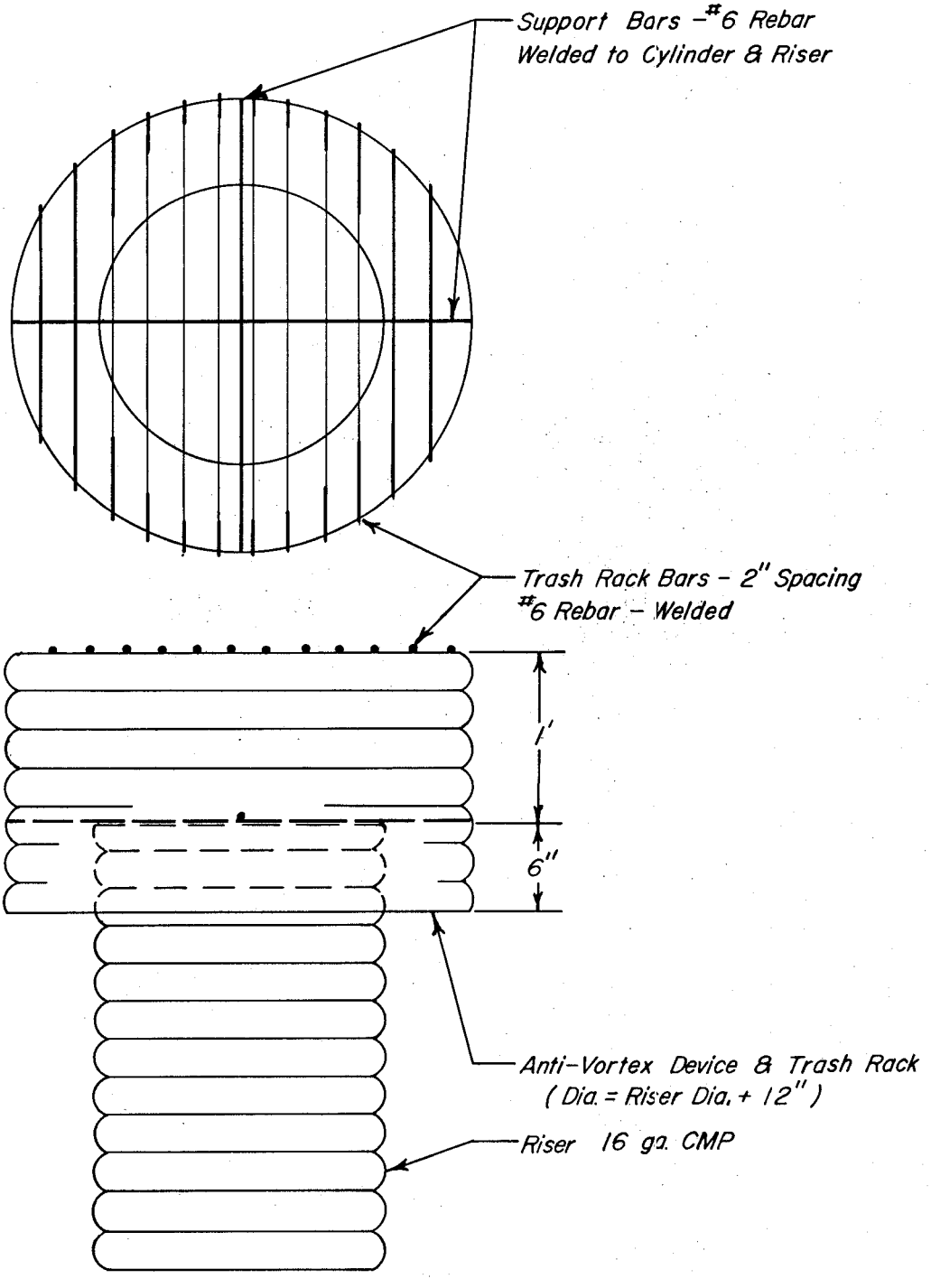
All discharge from the proposed sedimentation ponds at Hidden Valley Mine will be in accordance to the required N.P.D.E.S. permit. Application for this discharge permit has been submitted to the United States Environmental Protection Agency. Hidden Valley Mine's application has been acknowledged and assigned the following serial number:

UT - 0023701

The EPA has indicated that as of mid-April 1980, this application will be open for a thirty day public review period. If no adverse comments are received during this period, the issuance of the permit should follow shortly.

All disturbed areas not directly required for mining operations shall be revegetated or appropriately stabilized. This includes the outslope of all sedimentation pond embankments.

Seed mixture, mulching, and soil treatment will be in accordance to an approved reclamation plan.



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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Anti-Vortex Device & Trash Rack	A-004

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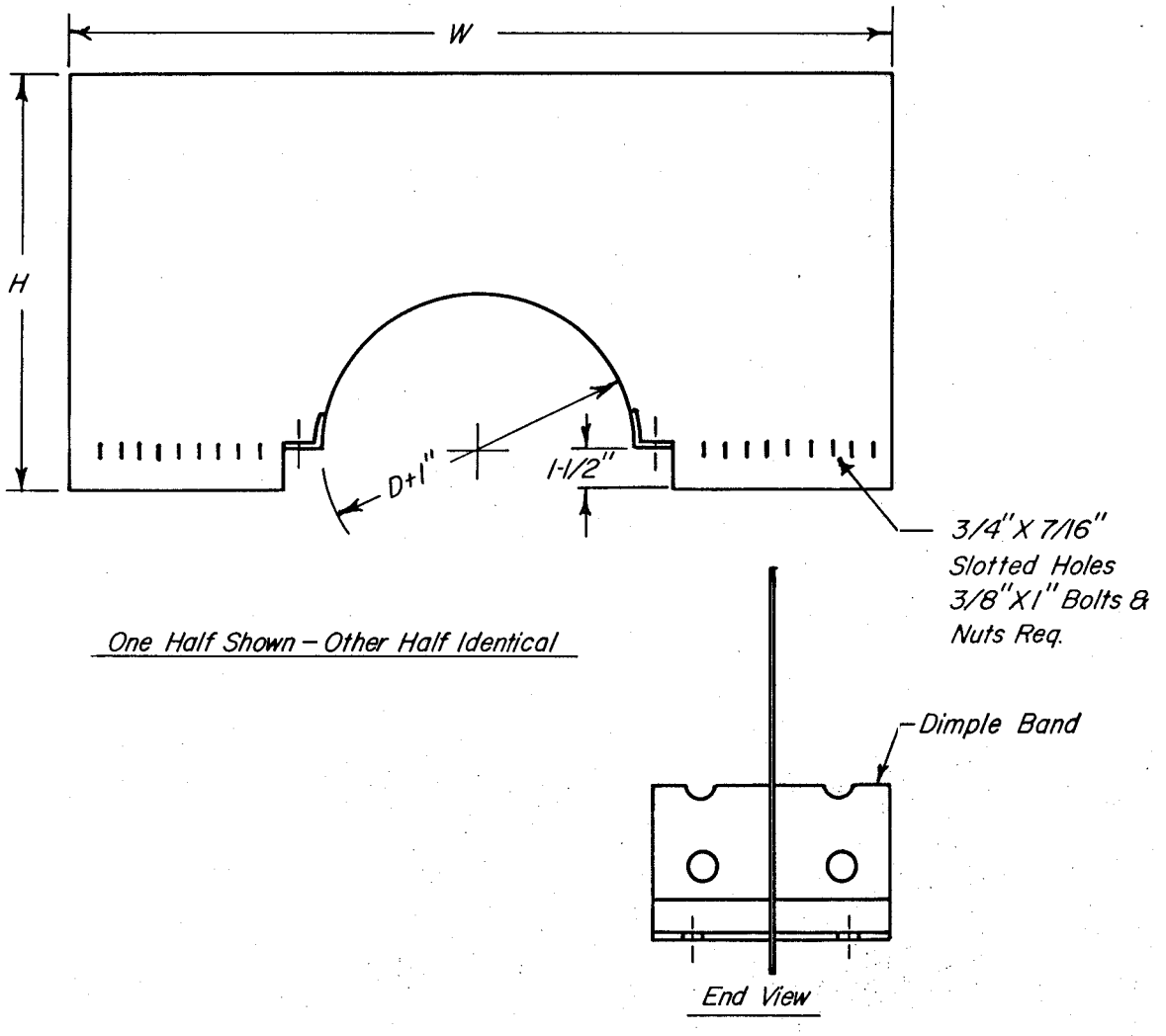
DGS	2-12-80				

Figure 6
Page 16

Pipe Dia. in.	Metal Ga.	W in.	H in.
12	16	64	32
18	16	69.25	35
24	14	72	38
36	12	88	44
42	12	93.25	47
48	12	96	50



(From ARMCO Drawing No. - Type I)

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Cut-Off Wall for Hel-Cor Pipe	A-003

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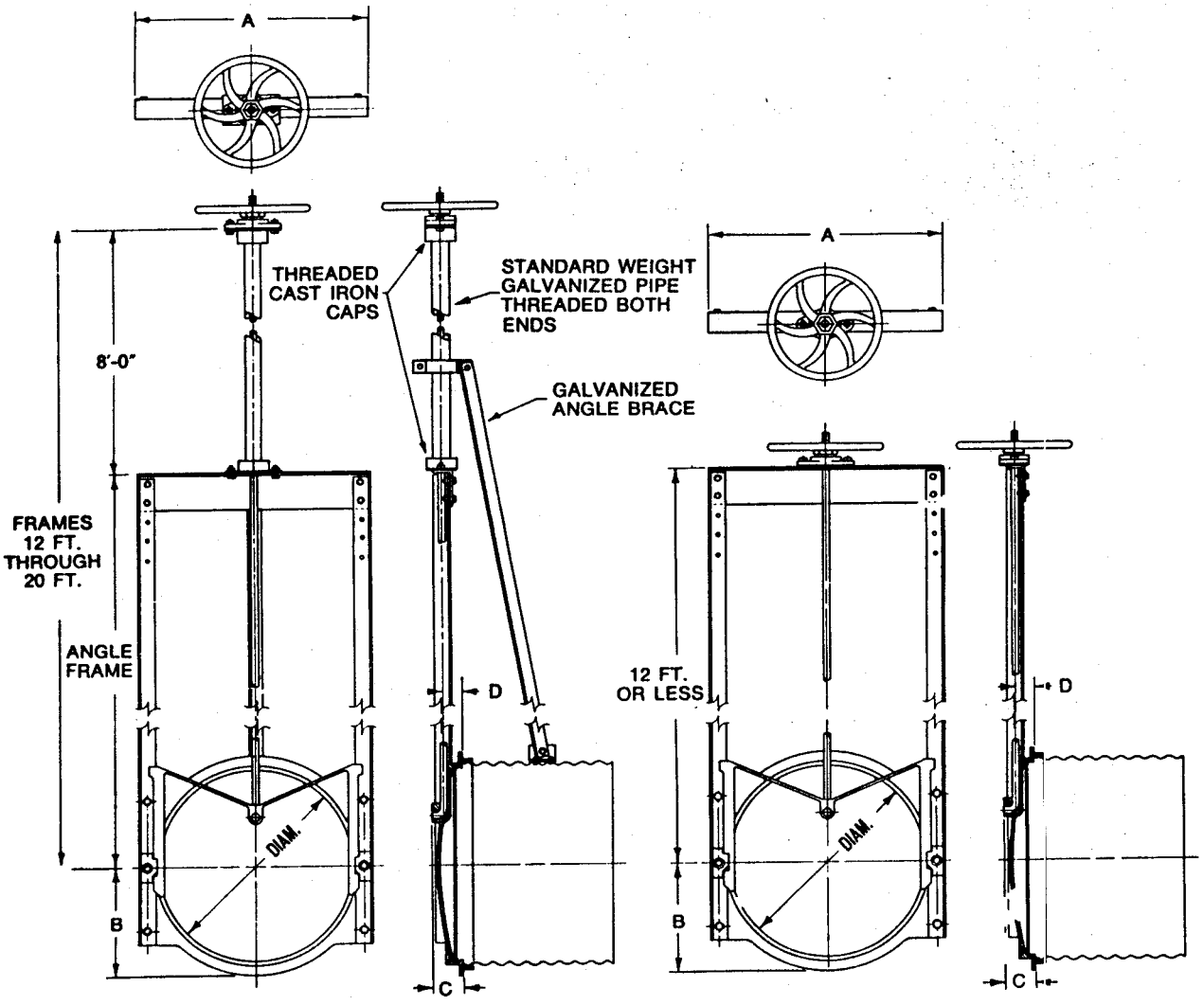
DGS	2-11-80				



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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Armco Model 101C Slide Gate	A-008

Figure 8
Page 18

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DGS	4-11-80				

SURFACE FACILITY AREA - SEDIMENTATION POND DESIGN

General

The major structures proposed for the surface facility area include a preparation plant, shop, warehouse, change house, administration building, and truck loading facilities. The relationship between these facilities and the natural drainage basin is shown in Figure 9. This natural drainage basin will be utilized wherever possible to ensure proper drainage to the sedimentation pond. Only minimal topographic change will be required for total runoff containment of all the disturbed areas.

The proposed surface facility sedimentation pond will receive runoff from approximately 18.6 acres. It has been determined that 2.2 acre-ft. of containment is adequate for this area. Further design details and supporting calculations are presented later in this section.

Sedimentation Pond Embankment

A plan and cross-sectional view of the proposed sedimentation pond embankment is presented as Figures 10 and 11 respectively. It is proposed that native material in the immediate vicinity be used for the construction of this embankment.

Soils in this area have been classified as being in the

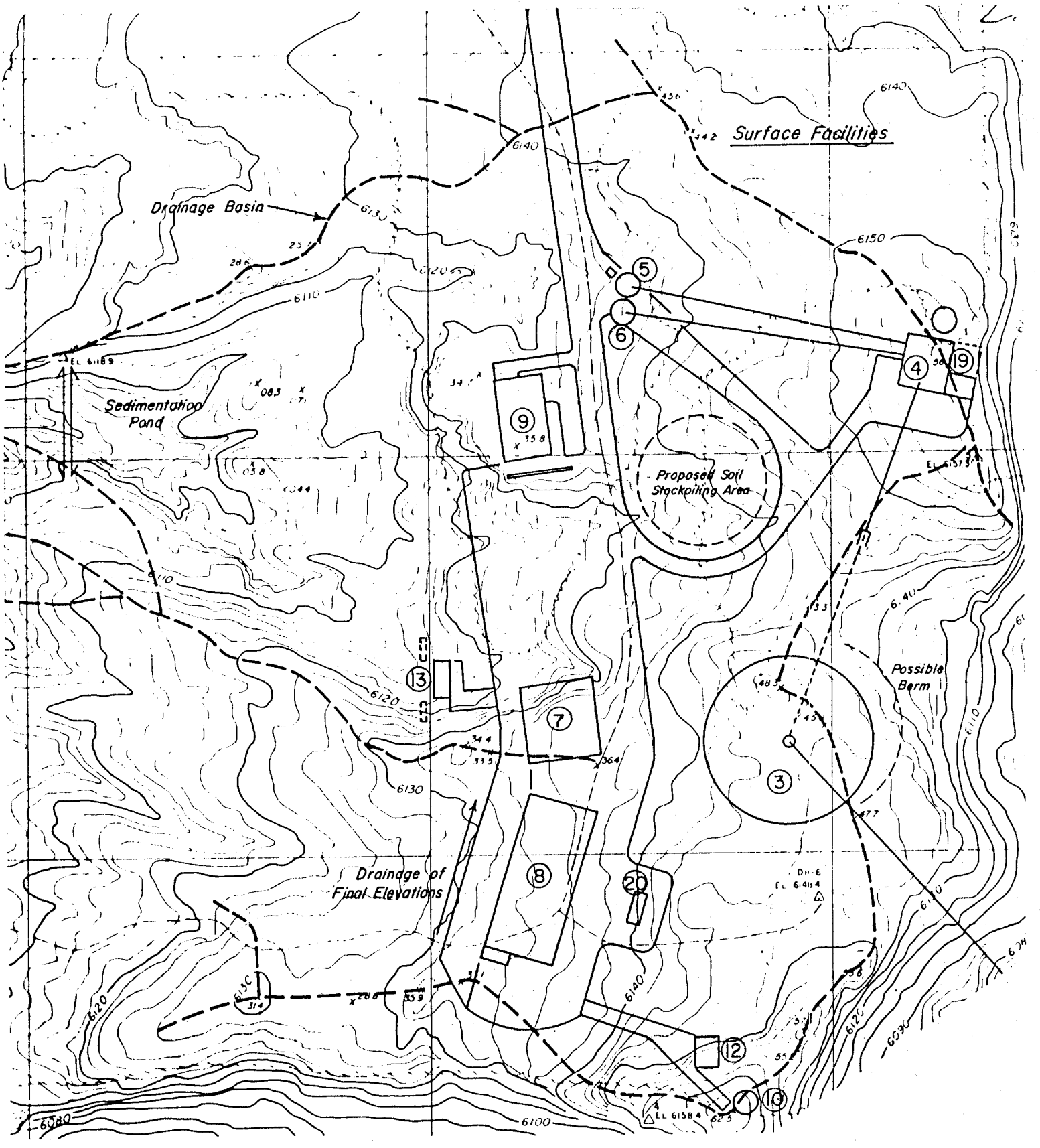


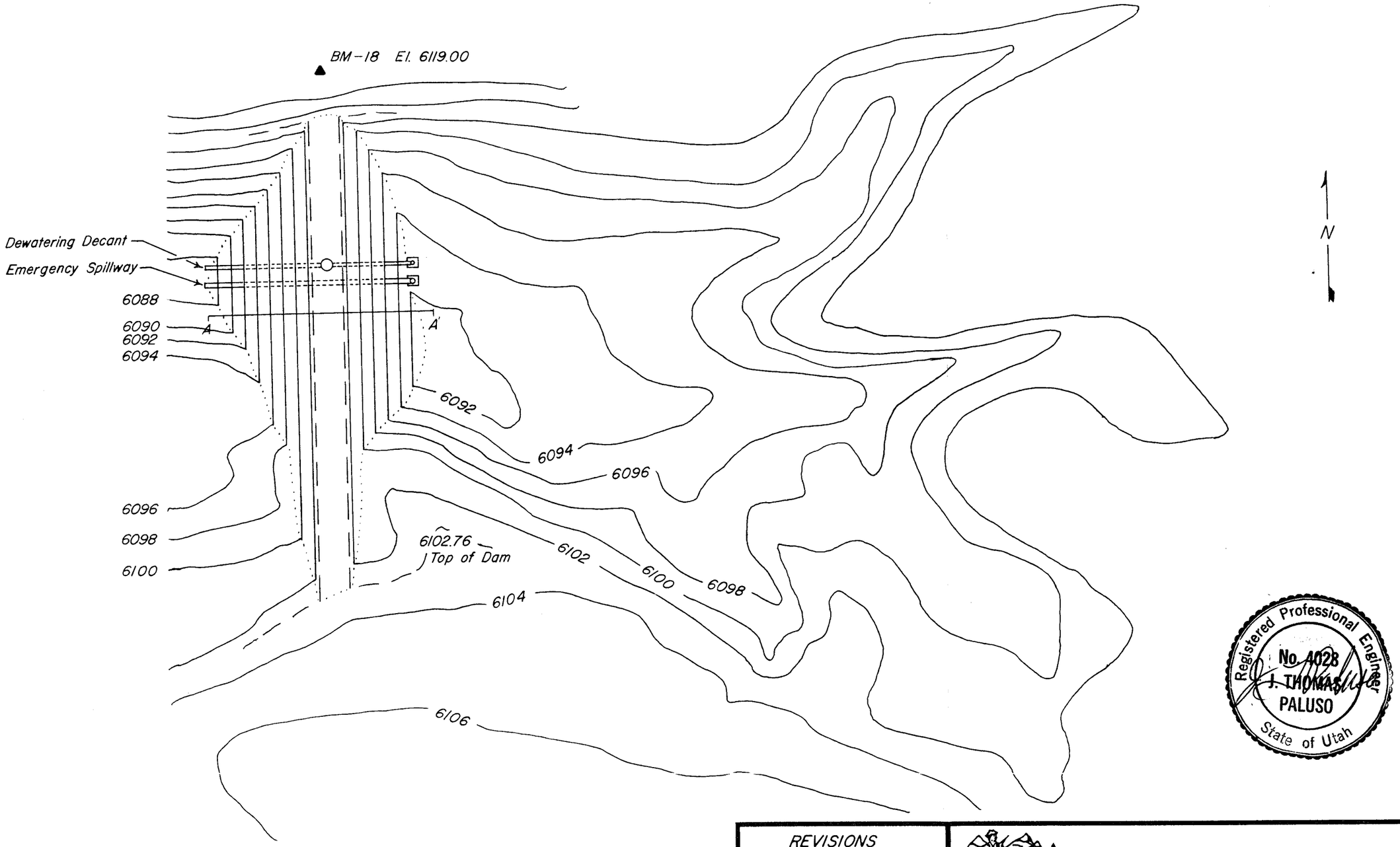
Figure 9 - Surface Facility Area - Drainage Basin 18.6 acres.

Castle Valley series (SCS, 1978). They consist of a sandy loam material that weathered from sandstone and interbedded shale. The estimated Unified Soils Classification is SM.

According to Sherard, et al., (1963, pg. 269), SM soils when placed as a well-constructed, rolled-earth embankment, with moisture-density control will be semipervious to impervious. The coefficient of permeability will range from 0.1 to 500 ft. per year. Relative shear strength of the soil is high and the resistance to piping is medium to low. These soil qualities are more than adequate for embankment construction considering the small volume of water to be impounded.

All soil removal within the surface facility area will be in accordance to an approved reclamation plan. Only excess surficial material, not directly required for reclamation, will be used for embankment construction.

Prior to construction the entire embankment foundation shall be cleared of organic matter and thoroughly scarified. The embankment will then be constructed in layers compatible to the compaction equipment to be used. The material will be compacted to a minimum density of 95 percent of the maximum dry density as determined by the appropriate AASHO T-99 Test Methods. Rocks larger than six inches and organic matter shall not be used in construction.



Registered Professional Engineer
No. 4028
J. THOMAS PALUSO
State of Utah

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
3" = 100'	Surface Facility Sedimentation Pond	B-010 Revised From B-001
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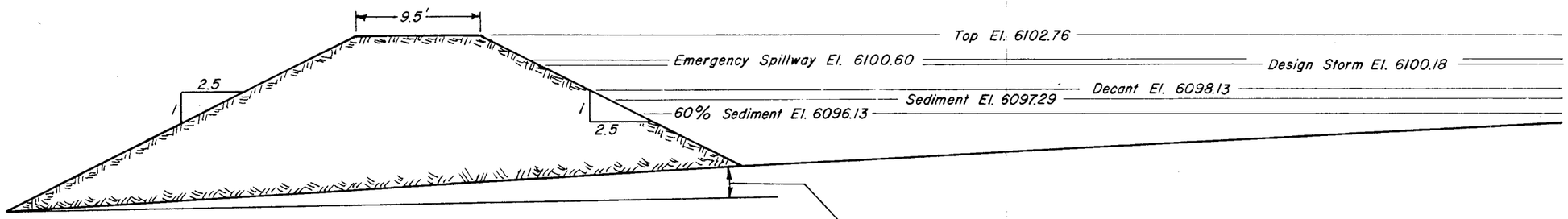
CROSS SECTION A-A'



Prior to construction the entire embankment foundation shall be cleared of organic matter and scarified.

Average cross-sectional slope of the proposed embankment foundation is approximately 2%.

Registered Professional Engineer
No. 4028
J. THOMAS PALUSO
State of Utah

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1" = 10'	Surface Facility Sedimentation Pond	B-011

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DGS	1-24-80				

Figure 11, Pg. 23

Computations and Specifications

(Surface Facility Area)

Drainage Area - 18.6 acres
Area Disturbed - 9.0 acres

Direct Runoff - (Curve Number Method)
CN = 90
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.84 inches

Total Runoff Volume = area x direct runoff
= (18.6 acres) x (0.84 inches)
= 1.30 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (9)
= 0.90 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (0.9 acre - ft.) + (1.30 acre - ft.)
= 2.20 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area $Ft.^2$	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
6092	1,028	0.02				0.00
			0.07	2	0.14	
6094	5,289	0.12				0.14
			0.18	2	0.36	
6096	10,282	0.24				0.50
			0.31	2	0.62	
6098	16,598	0.38				1.12
			0.48	2	0.95	
6100	24,823	0.57				2.07
			0.71	2	1.43	
6102	37,309	0.86				3.50
			1.06	2	2.11	
6104	54,495	1.25				5.61

Elevation vs. Storage

(See Figure 11)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	6096.13	0.54
Sediment Volume	6097.29	0.90
Dewatering Decant Inlet	6098.13	1.18
Ten Year Event Plus Sediment	6100.18	2.20
Emergency Spillway Inlet	6100.60	2.50
Spillway Headwater @ 0.66 ft.	6101.26	2.97
Freeboard @ 1.00 ft.	6102.26	3.77
Top of Dam plus 0.50 ft. for settlement	6102.76	4.30

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.8
Area = 18.6 acres
Qc = 5.4 cfs
FF = 1
LF = 1.5

$Q_{25\ yr}$ = Qc x LF x FF
= (5.4 cfs) x (1.5) x (1)
= 8.1 cfs

Emergency spillway diameter = 18 in. (C.M.P.)
Vertical riser diameter = 18 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

Dewatering Decant Design

(See Figure 4)

Dewatering decant diameter = 12 in. (C.M.P.)
Vertical riser diameter = 12 in. (C.M.P.)
Slide gate assembly - Vertical riser = 48 in. (C.M.P.)
Slide gate - Armco 101C, 12 inch diameter.
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

PORTAL AREA - SEDIMENTATION POND DESIGN

General

The major structures proposed for the mine portal area include a crushing station, rock dust bin, mine ventilation fan, and storage sheds. The relationship between these facilities and the natural drainage is shown in Figure 12. It is proposed that portions of this natural drainage be diverted around the disturbed areas.

The portal area sedimentation pond will be of incised construction, with its total drainage area being approximately 4.3 acres. The containment required for this area has been determined to be 0.63 acre-ft. Further design details and supporting calculations are presented later in this section.

Runoff Diversion

In order to achieve the desired drainage for the portal area, Hidden Valley Mine proposes a system of culverts and diversions. The two major diversions and the drainage to be affected is shown in Figure 12.

The runoff diversion above the A-seam portal shall be accomplished by an existing bench-cut and the proposed access road. Their intersection forms a runoff collection point for drainage from approximately 3 acres. Runoff will be conveyed from this point directly to Ivie Creek by means of an 18" culvert.

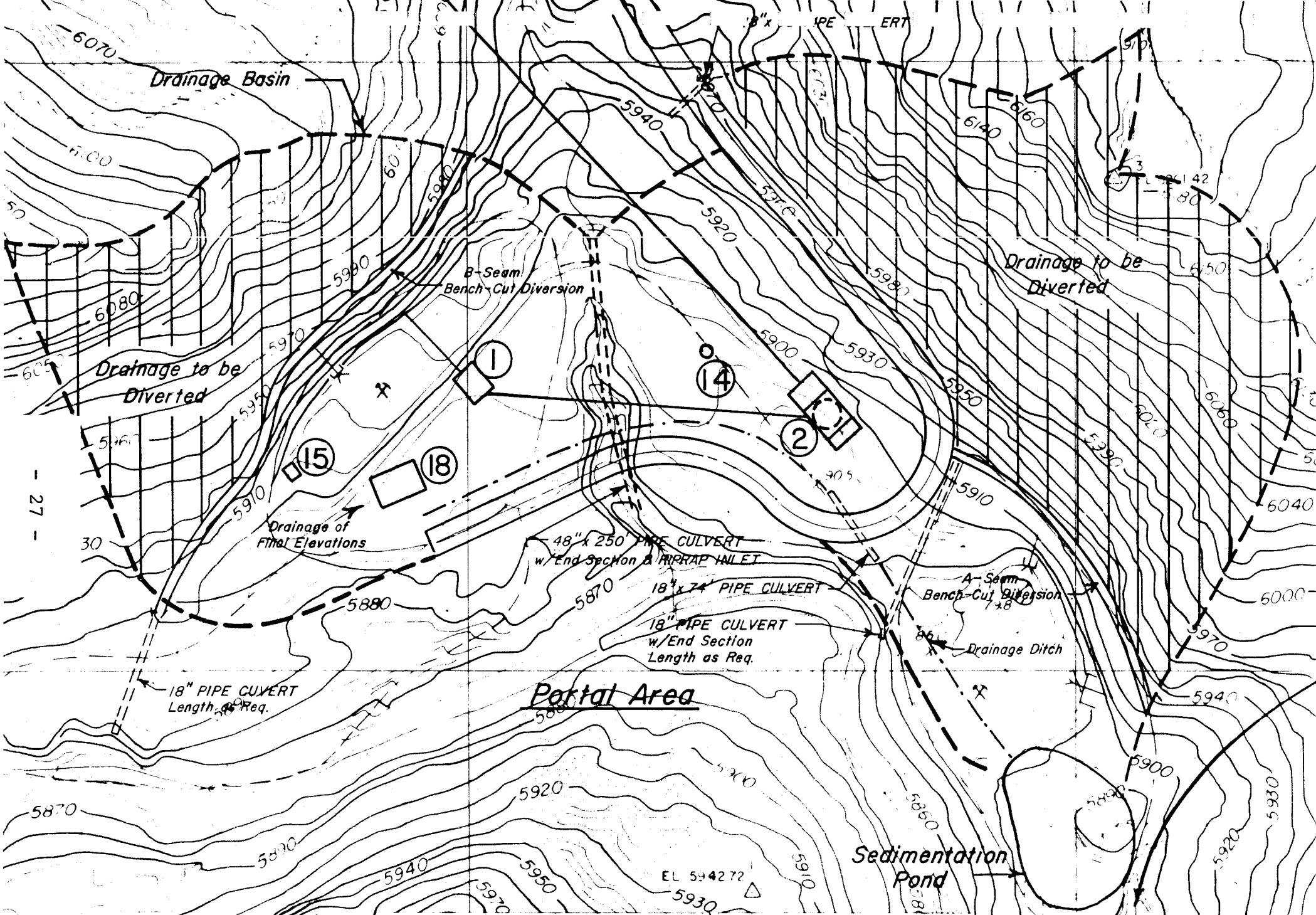


Figure 12. Portal Area - Proposed Drainage.

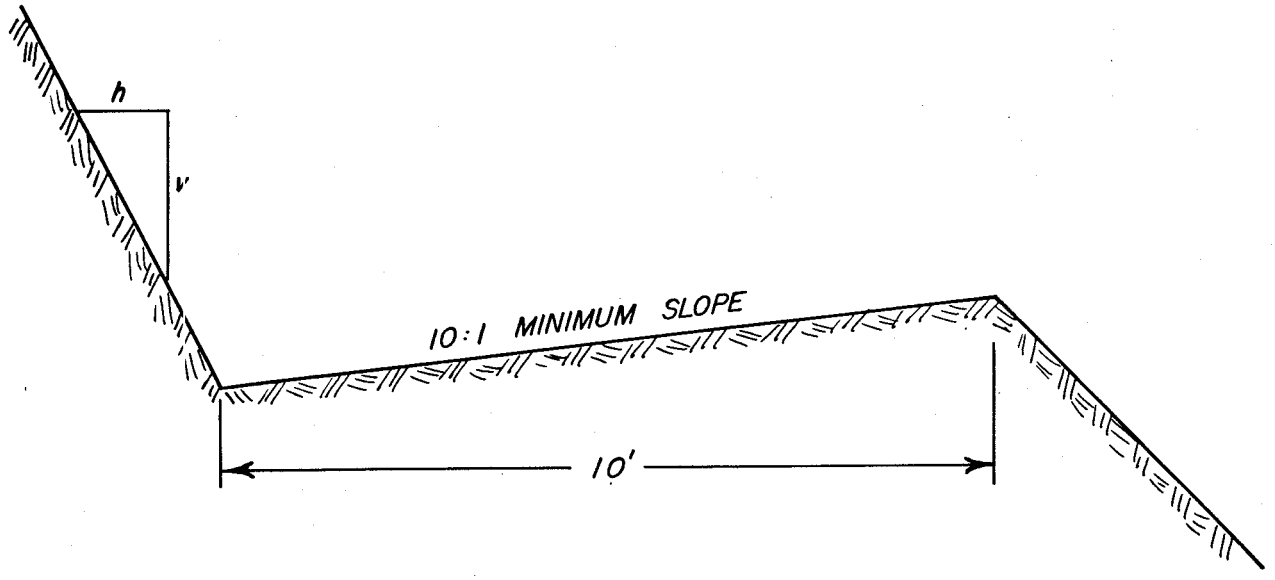
The proposed drainage diversion above the B-seam portals shall be accomplished by the construction of a bench-cut. Drainage from this area, approximately 1.5 acres, will be diverted directly into Ivie Creek.

The cross-sectional design specifications for the bench-cut diversions are shown in Figure 13. These diversions shall be constructed in a manner to safely pass the peak runoff from a precipitation event with a 10-year recurrence interval. Diversion shall be maintained in a manner which prevents additional contributions of suspended solids. Riprap, detention basins, and straw dikes may be used, where necessary, to reduce runoff velocities, and trap additional sediment.

Sedimentation Pond

A plan and cross-sectional view of the proposed portal area sedimentation pond is presented as Figures 14 and 15 respectively. This pond will be incised construction.

The portal area sedimentation pond will receive drainage from approximately 4.3 acres. This will require a containment volume of only 0.63 acre-ft. Due to this limited containment, the installation of a dewatering decant assembly is unnecessary. State regulations specifying the minimum distance between discharge mechanics and sediment elevations make a discharge structure impractical. However, if the need



1/2 h : 1v FOR CUTS IN ROCK

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Bench-Cut Diversion Cross-Sectional View	A-009
		Figure 13
		Page 29

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to discharge treated water should ever arise, a pump will be made available for this purpose.

Soils within the portal area consist of a sandy loam which are comparable to those found in the surface facility area (See Surface Facility Area - Sedimentation Pond Design). This area was previously disturbed during exploration work leaving little topsoil in place. Therefore, no topsoil stockpiles are proposed for the portal area.

Drainage within the portal area shall be conveyed to the sedimentation pond by open ditches. Natural drainage is towards the proposed access road which partially determines the southern boundary of the disturbed area. A collection ditch will be located adjacent to the outslope of the access road. Runoff shall then be channeled through a culvert passing through the road fill material. Another drainage ditch will then lead directly into the sedimentation pond (see Figure 12).

If necessary, to prevent excessive deterioration due to erosion, open ditches shall be appropriately lined with riprap.

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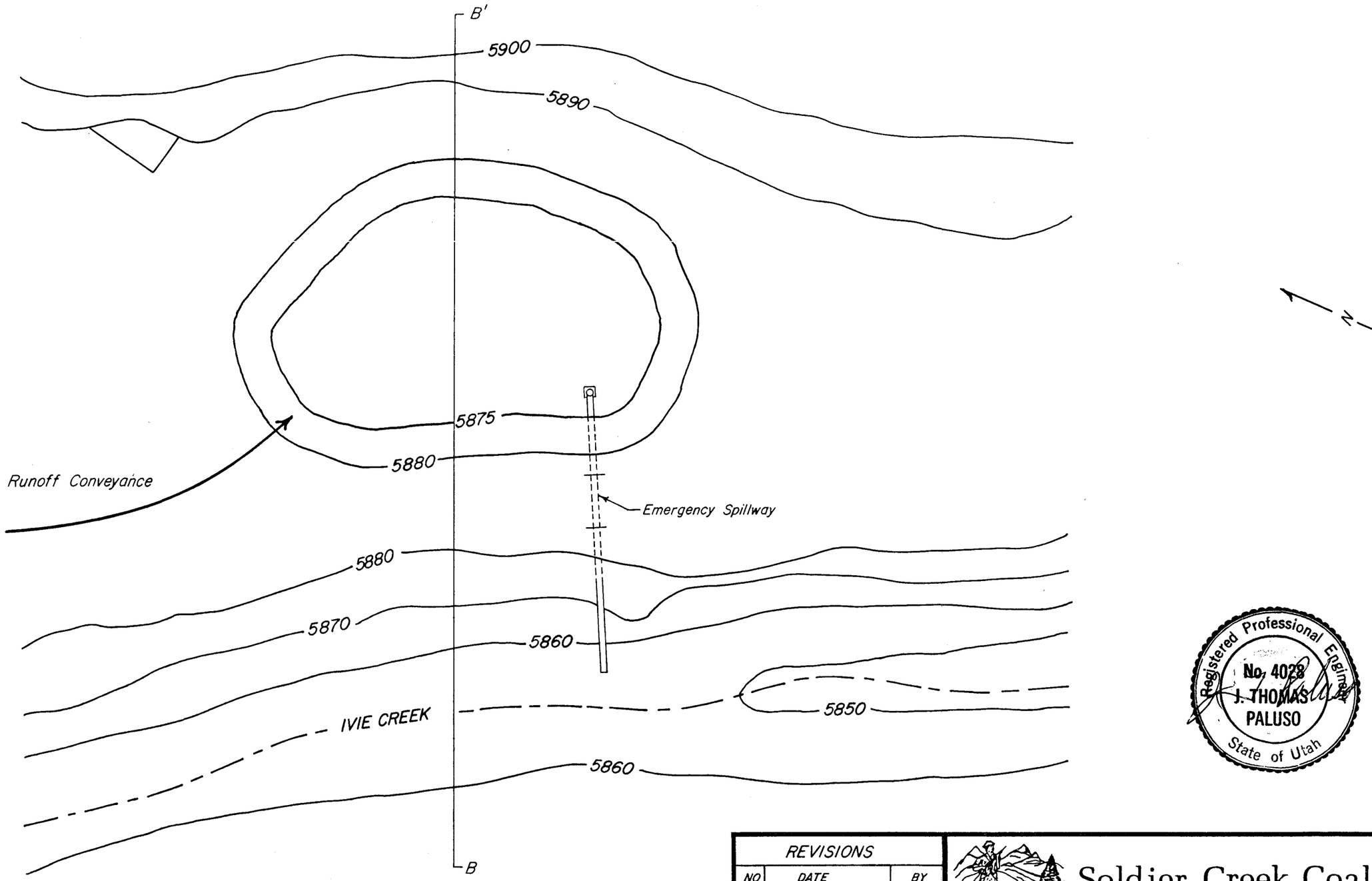

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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1"=30'	Portal Area Sedimentation Pond	B-015

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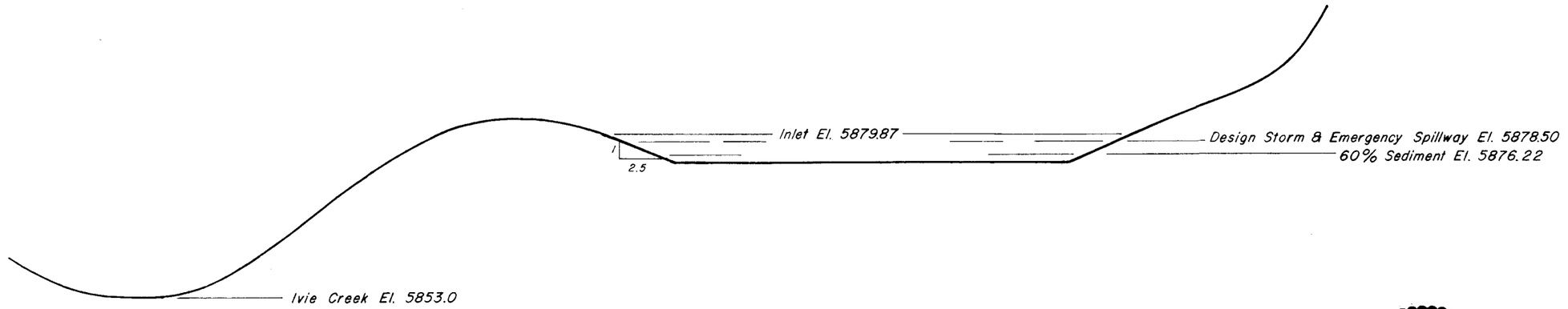
DGS	3-14-80				

Figure 14
Page 31

CROSS SECTION B-B'



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HIDDEN VALLEY MINE

SCALE: 1"=20'		TITLE: Portal Area Sedimentation Pond			DRAWING NO. B-016
DRAWN BY DGS	DATE 4-25-80	CHECKED	DATE	APPROVED	DATE

Figure 15
Page 32

Computations and Specifications

(Portal Area)

Drainage Area - 4.3 acres
Area Disturbed - 3.7 acres

Direct Runoff - (Curve Number Method)
CN = 88
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.72 inches

Total Runoff Volume = area x direct runoff
= (4.3 acres) x (0.72 inches)
= 0.26 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (3.7)
= 0.37 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (0.37 acre - ft.) + 0.26 acre - ft.)
= 0.63 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area Ft.^{2}	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
5875	6050	0.14				0.00
			0.18	5	0.90	
5880	9800	0.22				0.90

Elevation vs. Storage

(See Figure 15)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	5876.22	0.22
Sediment Volume	5877.06	0.37
Ten Year Event Plus Sediment	5878.50	0.63
Emergency Spillway Inlet	5878.50	0.63
Spillway Headwater @ 0.37 ft.	5878.87	0.70
Freeboard @ 1.00 ft.	5879.87	0.88
Inlet Elevation	5879.87	0.88

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.08
Area = 4.3 acres
Qc = 1.70 cfs
FF = 1
LF = 2.0

$Q_{25\ yr}$ = Qc x LF x FF
= (1.70 cfs) x (2.0) x (1)
= 3.4 cfs

Emergency spillway diameter = 18 in. (C.M.P.)
Vertical riser diameter = 18 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

REFUSE DISPOSAL AREA - SEDIMENTATION POND DESIGN

General

In order to provide a consistant, marketable product, coal preparation will be required at Hidden Valley Mine. Such coal preparation will produce several million tons of reject material over the life of the mine. It is proposed that this refuse material be disposed of within the SW¼ of section 18 (see Figure 3).

Pursuant to recent regulations, a sedimentation pond is required for the refuse disposal area. This pond will receive surface runoff from approximately 59.0 acres. The natural topography will be utilized almost entirely to achieve the desired drainage. Figure 16 illustrates the sedimentation pond location in relation to the drainage basin and the projected limits of the refuse material.

The required containment volume for the refuse disposal area sedimentation pond has been determined to be 7.0 acre-ft. This is for total containment of a 10-year, 24-hour precipitation event, plus the required sediment storage volume. Supportive calculations and additional design details are presented later in this section.

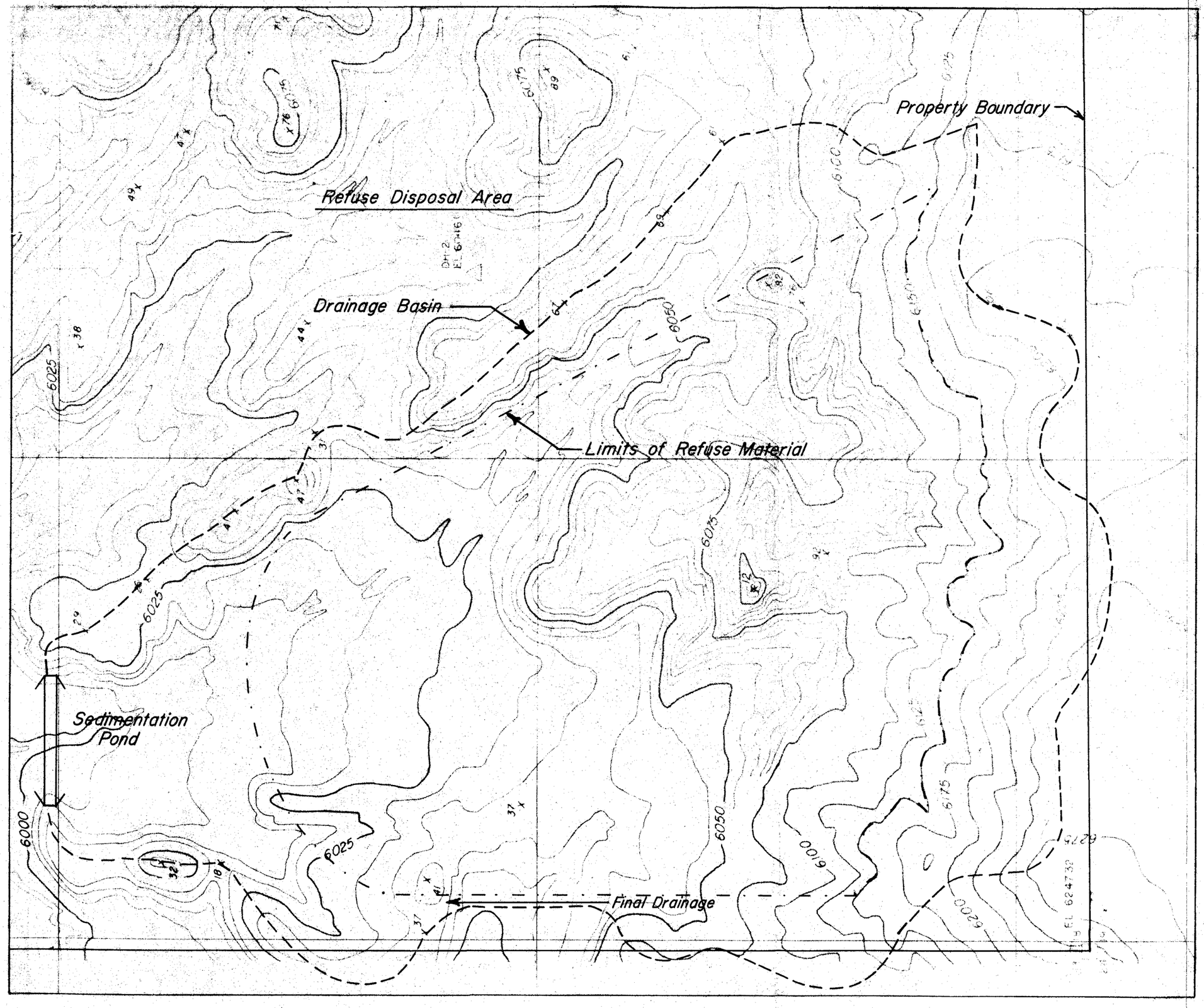


Figure 16. Refuse Disposal Area Drainage Detail.

Sedimentation Pond Embankment

A plan and cross-sectional view of the proposed sedimentation pond embankment is presented as Figures 17 and 18 respectively. It is proposed that material in the immediate vicinity be used for embankment construction.

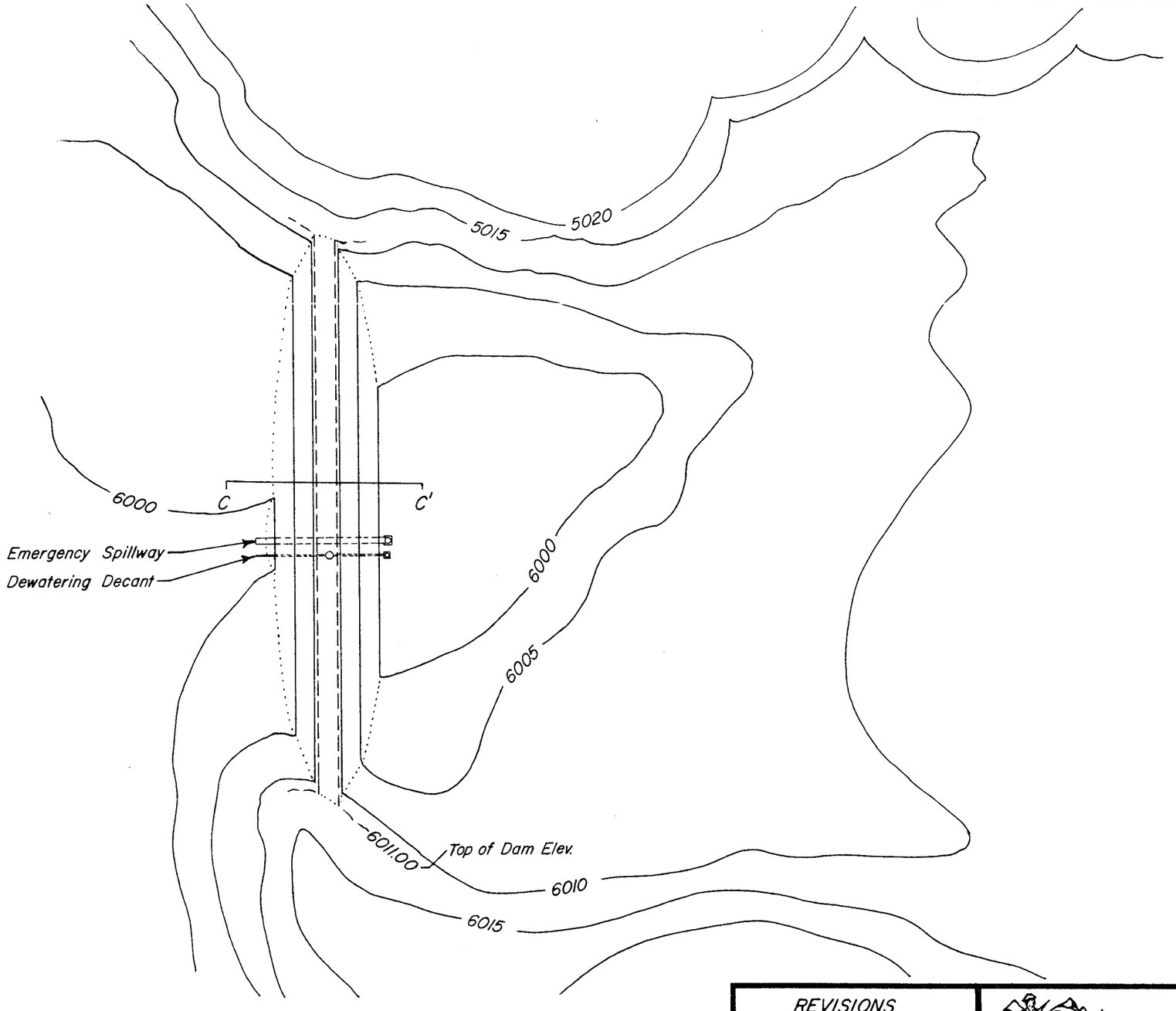
The Soils Conservation Service (1978) has classified the soils in the proposed embankment area as being in the Ravola series. They are a result of alluvium washed from shale and sandstone. The estimated Unifed Soils Classification is CL.

According to Sherard, et al., (1963, pg. 269), the embankment properties of CL soils when placed as a well-constructed, rolled-earth embankment, with moisture-density control will be impervious. The probable range of permeability is 0.01 to 1.0 feet per year. This soil also has a high resistance to piping and the relative shear strength is medium.

All soil removal within the refuse disposal area will be in accordance to an approved reclamation plan. Only excess surficial material, not directly required for reclamation, will be used for embankment construction.

Prior to construction the entire embankment foundation shall be cleared of organic matter and thoroughly scarified. The embankment will then be constructed in layers compatible

to the compaction equipment to be used. The material will be compacted to a minimum density of 95 percent of the maximum dry density as determined by the appropriate AASHO T-99 Test Methods. Rocks larger than six inches and organic matter shall not be used in construction.



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State of Utah

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1" = 60'	Refuse Area Sedimentation Pond	B-012

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DGS	2-19-80				

Figure 17
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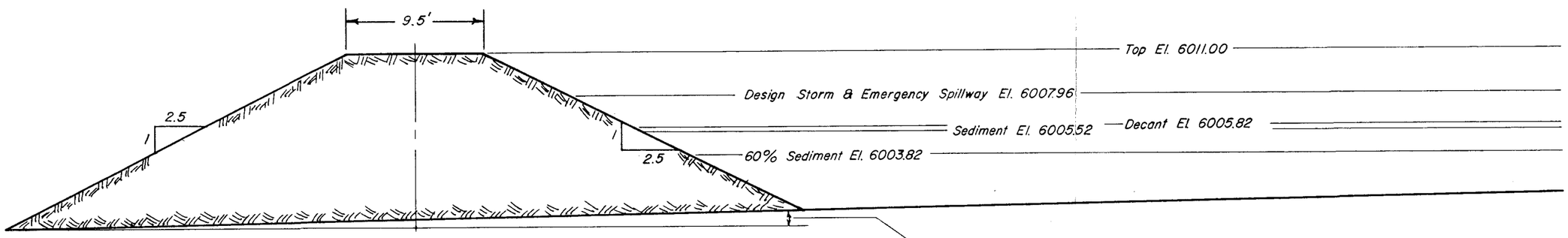
CROSS SECTION C-C'



Prior to construction the entire embankment foundation shall be cleared of organic matter and scarified.

Average cross-sectional slope of the proposed embankment foundation is approximately 1%.

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State of Utah

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HIDDEN VALLEY MINE

SCALE: 1" = 8'	TITLE: Refuse Area Sedimentation Pond	DRAWING NO. B-013
DRAWN BY DGS / DATE 2-20-80	CHECKED / DATE / APPROVED / DATE	Figure 18 Page 40

Computations and Specifications

(Refuse Disposal Area)

Drainage Area - 59.0 acres
Area Disturbed - 35.0 acres

Direct Runoff - (Curve Number Method)
CN = 88
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.72 inches

Total Runoff Volume = area x direct runoff
= (59.0 acres) x (0.72 inches)
= 3.54 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (35)
= 3.50 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (3.50 acre - ft.) + (3.54 acre - ft.)
= 7.04 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area Ft.^{2}	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
6000	15,300	0.35				0.00
			0.55	5	2.75	
6005	32,300	0.74				2.75
			1.45	5	7.25	
6010	93,800	2.15				10.00
			3.44	5	17.20	
6015	206,000	4.73				27.20

Elevation vs. Storage

(See Figure 17)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	6003.82	2.10
Sediment Volume	6005.52	3.50
Dewatering Decant Inlet	6005.82	3.94
Ten Year Event Plus Sediment	6007.96	7.04
Emergency Spillway Inlet	6007.96	7.04
Spillway Headwater @ 1.55 ft.	6009.51	9.29
Freeboard @ 1.00 ft.	6010.51	11.75
Top of Dam plus 0.50 ft. for settlement	6011.01	13.47

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.17
Area = 59.0 acres
Qc = 28.0 cfs
FF = 1
LF = 2.5

$Q_{25\ yr}$ = Qc x LF x FF
= (28.0 cfs) x (2.5) x (1)
= 70.0 cfs

Emergency spillway diameter = 42 in. (C.M.P.)
Vertical riser diameter = 42 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

Dewatering Decant Design

(See Figure 4)

Dewatering decant diameter = 12 in. (C.M.P.)
Vertical riser diameter = 12 in. (C.M.P.)
Slide gate assembly - Vertical riser = 48 in. (C.M.P.)
Slide gate - Armco 101C, 12 inch diameter.
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

References

American Iron and Steel Institute, 1971. Handbook of Steel Drainage and Highway Construction Products. Second Edition, Washington, D.C.

King, H. W. and Brater, E. F., 1963. Handbook of Hydraulics. McGraw-Hill Book Company.

Mining Enforcement and Safety Administration, (MESA). Engineering and Design Manual, Coal Refuse Disposal Facilities. U.S. Department of the Interior, Washington, D.C.

Richardson, A. E., 1971. Estimated Return Periods for Short-Duration Precipitation in Utah. Utah State University, Department of Soils and Biometeorology. Bulletin No. 1, Logan, Utah.

Sherard, J. L., R. J. Woodward, S. F. Gizienski, and W. A. Clevenger, 1963. Earth and Earth-Rock Dams. John Wiley and Sons, Inc.

U. S. Bureau of Reclamation, 1974. Design of Small Dams. A Water Resources Technical Publication, U. S. Department of the Interior. Revised Reprint.

U. S. Soil Conservation Service, 1972. "Hydrology" National Engineering Handbook, Section 4. U. S. Department of Agriculture.

U. S. Soil Conservation Service, 1978. Soil Survey and Interpretation of the Coal Creek - Emery Portion of the Price and Emery County Areas.

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RUNOFF CONTROL PLAN
SEDIMENTATION POND DESIGN

Soldier Creek Coal Company
HIDDEN VALLEY MINE
P.O. Box AS
Price, Utah 84501

SOLDIER CREEK COAL COMPANY

HIDDEN VALLEY MINE

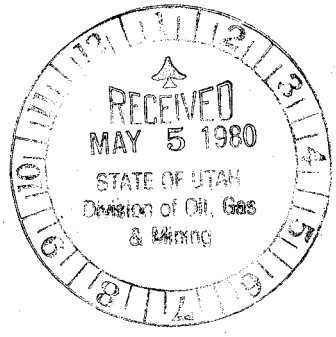
RUNOFF CONTROL PLAN

SEDIMENTATION POND DESIGN

Submitted to the

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1588 West North Temple
Salt Lake City, Utah

May 1980



Prepared by:

Soldier Creek Coal Company
Hidden Valley Mine
P.O. Box AS
Price, Utah 84501

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SOLDIER CREEK COAL COMPANY
HIDDEN VALLEY MINE

RUNOFF CONTROL PLAN
Sedimentation Pond Design

Introduction

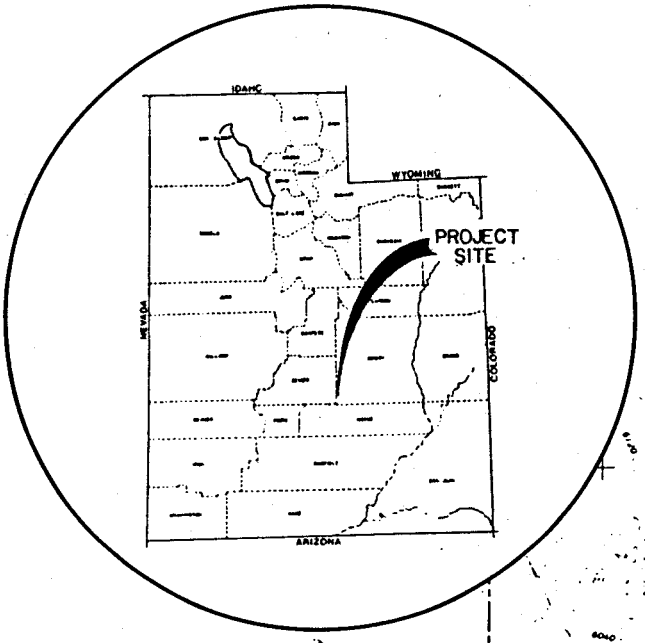
It is the intent of Soldier Creek Coal Company, a division of California Portland Cement Company, to develop a new underground coal mine. This mine is located approximately seven miles southwest of Emery, Utah, in the Emery Coal Field (see Figure 1). The estimated production of this mine will be approximately 500,000 tons per year.

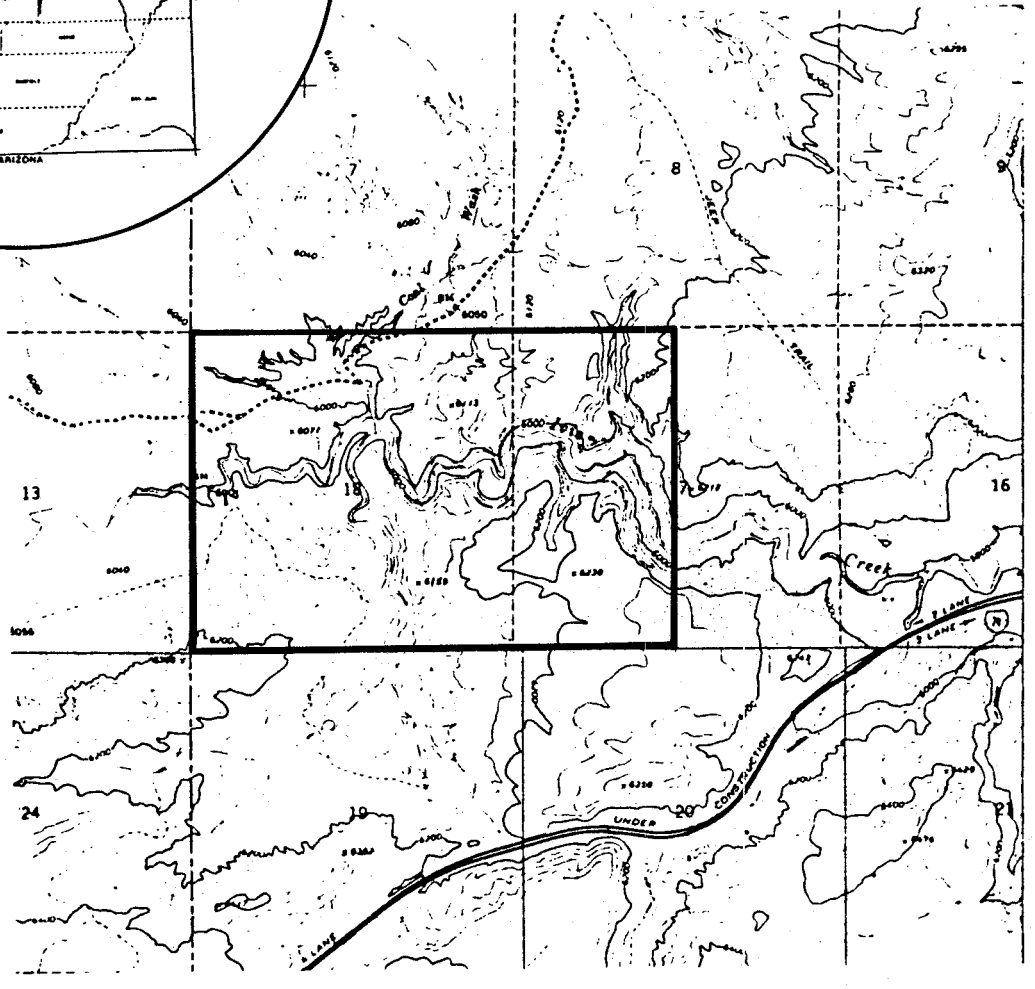
Recent regulations controlling the surface effects of underground coal mining, require the prevention of additional contributions of suspended solids to stream flow, or runoff outside the permit area. Pursuant to these regulations, all surface drainage from a disturbed area shall be passed through a sedimentation pond, a series of sedimentation ponds, or a treatment facility. Such runoff containment will be necessary for three major disturbed areas proposed for the development of Hidden Valley Mine.

On September 7, 1979, a Surface Mining and Reclamation Plan, under the Interim Program, was submitted to the State of Utah, Department of Natural Resources, Division of Oil, Gas, and

HIDDEN VALLEY MINE SITE

Township 23 South, Range 6 East
Salt Lake Base and Meridian
Section 18 & the West 1/2 of Section 17





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HIDDEN VALLEY MINE

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Figure 1
Page 2

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Mining. Included in the Surface Mining and Reclamation Plan was a proposed runoff control plan which contained preliminary calculations and designs of the required sedimentation ponds. Soldier Creek Coal Company respectfully submits the following information as the final detailed design plans for the proposed sedimentation ponds.

Methods

The Soil Conservation Service (1972), has quantified precipitation runoff volume, from a particular rainfall event, by the runoff curve number technique. According to the curve number methodology, the algebraic and hydrologic relations between soil, moisture, soil-cover conditions, and rainfall can define total runoff by the following equations:

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

and

$$S = \frac{1000}{CN} - 10$$

Where Q is the direct runoff in inches; P is the rainfall in inches; S is the maximum potential difference between P and Q at the beginning of the storm; and CN is the dimensionless expression of S referred to as the curve number. Curve number values were chosen using information from the SCS (1972) and personal judgement following field observations. Values of P were obtained for selected durations from Richardson (1971) as reported for the town of Emery (see Table 1).

Estimates of the peak discharge to be expected from various precipitation events were determined using the Utah State Department of Transportation, Small Area Runoff Method. The following equation gives the relation used:

Station: Emery
Latitude: 38° 55'

Elevation: 6200
Longitude: 111° 15'

DURATION

RETURN PERIOD (years)	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.15	.23	.29	.40	.50	.53	.56	.64	.71	.78
2	.17	.26	.32	.45	.57	.62	.67	.80	.91	1.03
5	.19	.29	.37	.51	.65	.74	.83	1.04	1.23	1.43
10	.21	.32	.40	.56	.71	.82	.93	1.20	1.44	1.69
25	.25	.39	.49	.68	.86	1.00	1.13	1.45	1.74	2.04
50	.28	.43	.55	.76	.96	1.12	1.27	1.64	1.97	2.32
100	.30	.47	.59	.82	1.04	1.22	1.39	1.82	2.20	2.60

Table 1. Estimated precipitation depth, in inches, for various return periods and durations (from Richardson, 1971).

$$Q_f = Q_c \times LF \times FF$$

Where Q_f is the design discharge in C.F.S.; Q_c is the discharge relationship between topography, rainfall intensity, and drainage area; LF is the land factor determined by terrain characteristics; and FF is the frequency factor determined by dividing the design frequency rainfall intensity by the 25-year intensity.

Culvert diameters were determined using the calculated peak discharge and an inlet control nomograph for corrugated steel pipe culverts (see Figure 2). Inlet control conditions were assumed for all culverts.

Emergency spillways and dewatering devices using vertical risers were designed using the relationship between the elevation of the impounded storage and the desired rate of discharge. Three different flow conditions can control the discharge in a drop-inlet conduit system. Weir flow, orifice flow, or full pipe flow can be the controlling factor. Actual flow is the smallest of the three possible flow conditions.

Weir flow was determined according to USBR (1974), by the following equation:

$$Q = CLH^{1.5}$$

Where Q is the discharge or rate of flow in cubic feet per

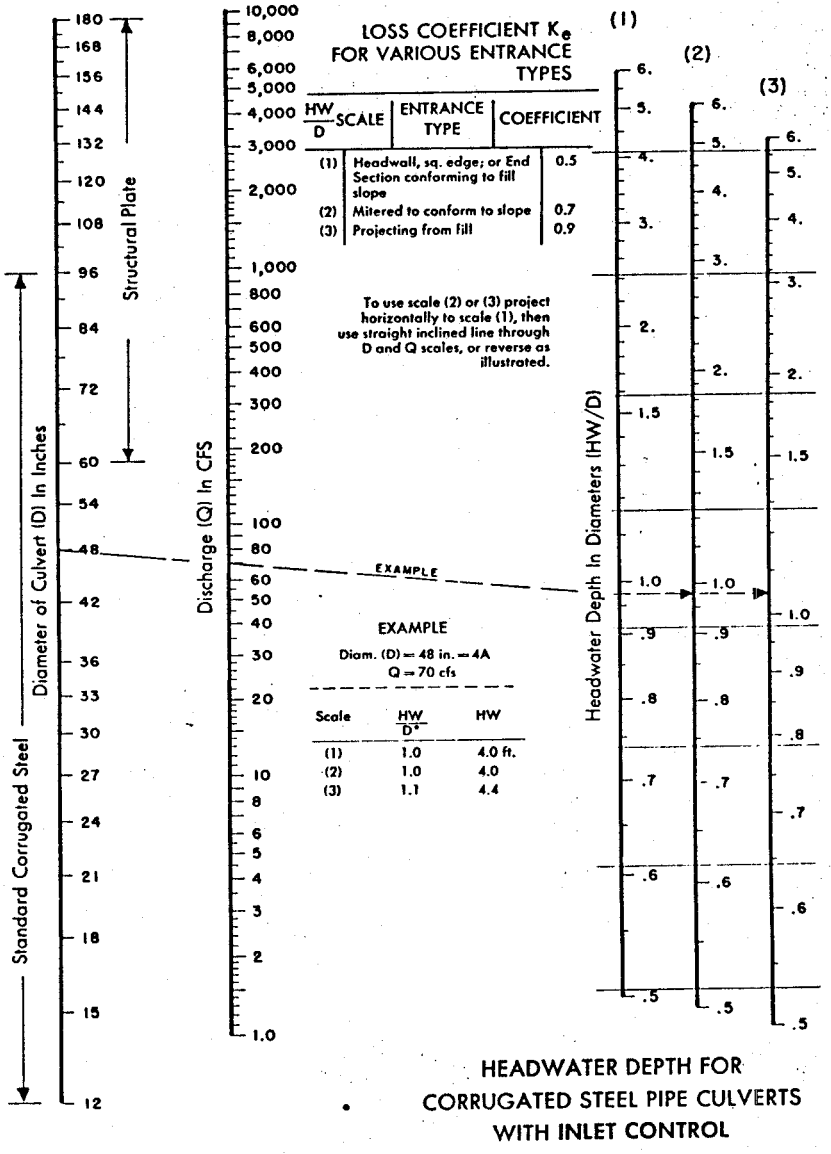


Fig. 2. Inlet control nomograph (American Iron and Steel Institute 1971)

second; L is the effective length of the entrance crest or circumference of the vertical riser; H is the total head above the riser inlet; and C is the coefficient which depends on the shape of the entrance and the head above the riser inlet.

According to King and Brater (1963), C for sharp crested weirs can be calculated as follows:

$$C = 3.22 + 0.44 \frac{H}{P}$$

Where H is as previously defined; and P is the height of the weir.

Orifice flow was determined using the following formula suggested by USBR (1974):

$$Q = \left(\frac{R \, Ha^{\frac{1}{4}}}{0.204} \right)^2$$

Where Q is the discharge or rate of flow in cubic feet per second; R is the radius of the opening in feet; and Ha is equal to the difference between the water surface and the elevation under consideration.

Pipe flows were determined using the following relationship:

$$Q = A \left(\frac{H_T \, 2g}{(f \, L/D + \Sigma K_L + 1)} \right)^{\frac{1}{2}}$$

Where Q is the discharge flow in cubic feet per second; A is the cross-sectional area of the opening in square feet; H_T is the head or elevation difference between the storage surface and the effective surface at discharge; g is the

acceleration due to gravity; f is the friction factor for the culvert material; L is the length of the culvert; D is the diameter of the culvert; and ΣK_L is the summation of head losses associated with the inlet, valves, constrictions and directional changes.

Open channel flow was estimated using the Manning equation which states:

$$Q = \frac{1.49}{n} AR^{.67}s^{.5}$$

Where Q is the discharge in cubic feet per second; n is Manning's coefficient of channel roughness; A is the cross-sectional area of flow in square feet; R is the hydraulic radius in feet, defined as the area of flow divided by the wetted perimeter of the channel; and s is the slope of the channel in feet per foot.

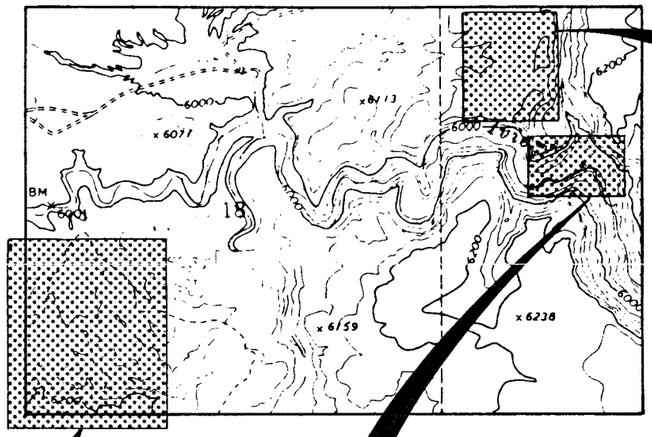
GENERAL DESIGN INFORMATION

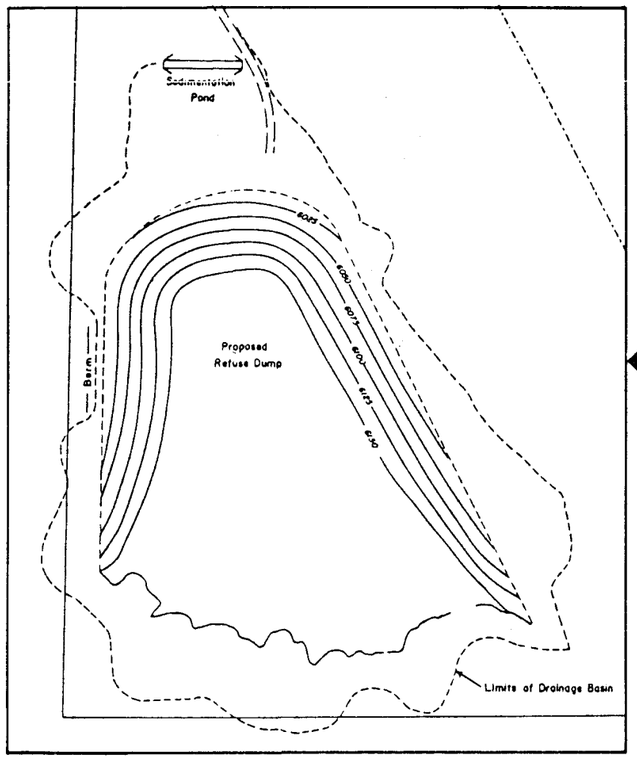
The proposed development of Hidden Valley Mine will require three areas of major surface disturbance. All drainage from these areas will be passed through a sedimentation pond to prevent any additional contribution of suspended solids to the natural drainage. The location of these disturbed areas with respect to the Hidden Valley Mine property is shown in Figure 3. Also shown in Figure 3 is the proposed sedimentation pond location relative to the drainage basin affected. A more detailed illustration of the proposed disturbed areas are presented later in their respective sections.

A typical dewatering decant assembly and drop-inlet spillway are shown in Figures 4 and 5 respectively. These designs will be appropriately incorporated into the sedimentation pond design plans for Hidden Valley Mine. Specific details concerning culvert diameters and inlet elevations for individual ponds are presented later in this report.

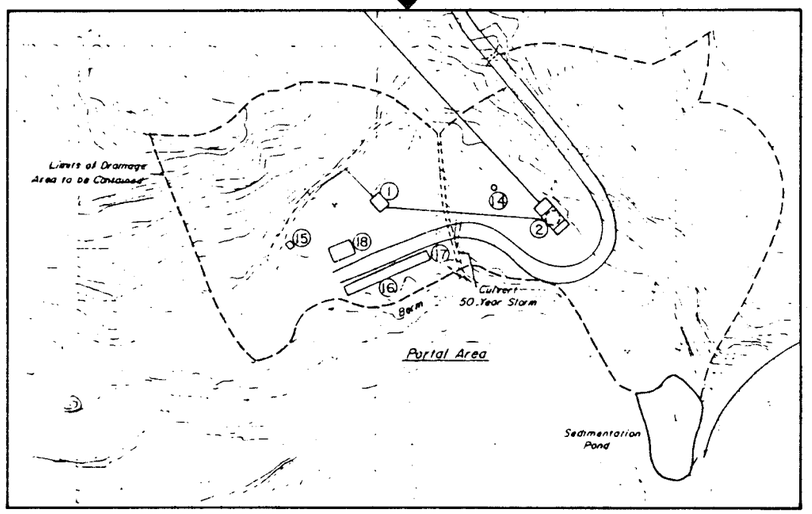
The vertical risers of these structures will be equipped with an anti-vortex device and trash rack (see Figure 6). This assembly will also function as an oil skimming device. The design specifications are indicated in Figure 6.

HIDDEN VALLEY MINE

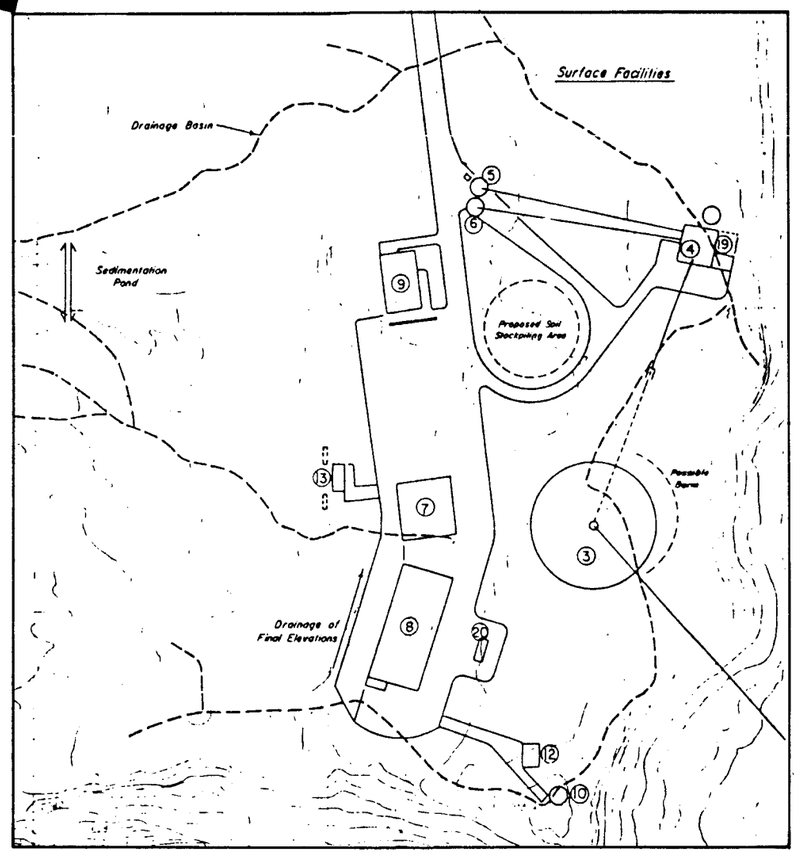




Refuse Disposal Area
Drainage 59.0 Acres



Portal Area - Drainage 4.3 Acres



Surface Facility Area - Drainage 18.6 Acres

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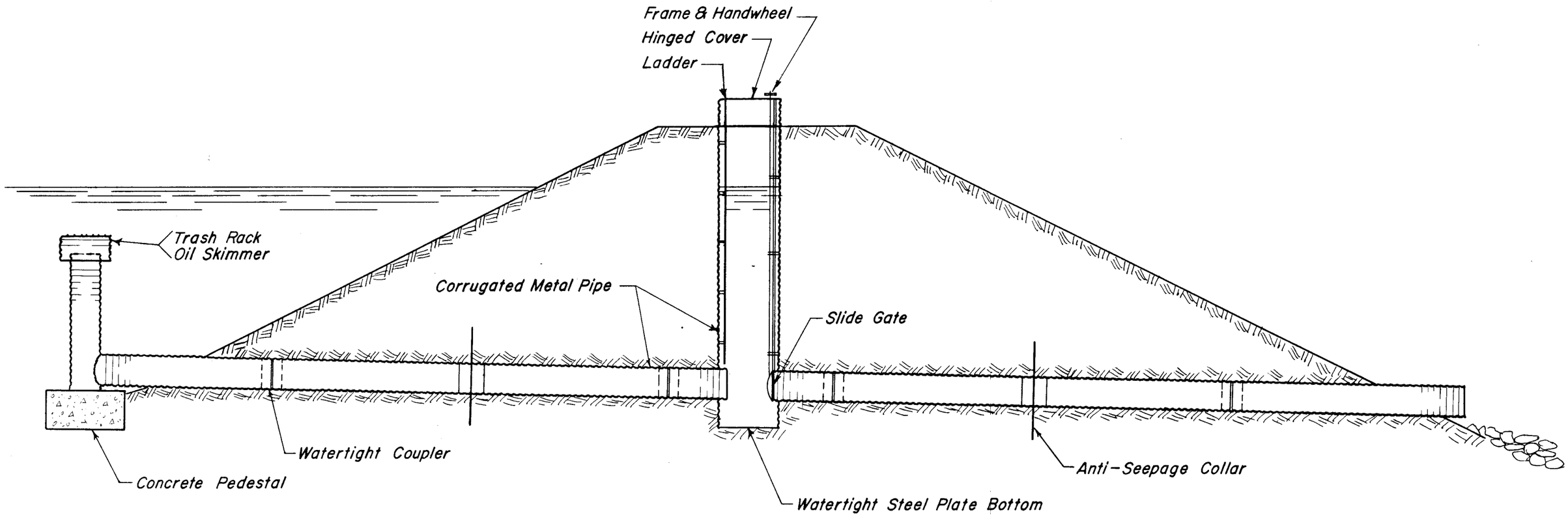
Typical Dewatering Decant Assembly for Small Dams



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Soldier Creek Coal Company

HIDDEN VALLEY MINE

TITLE: Typical Dewatering Decant Assembly

DRAWING NO. B-008

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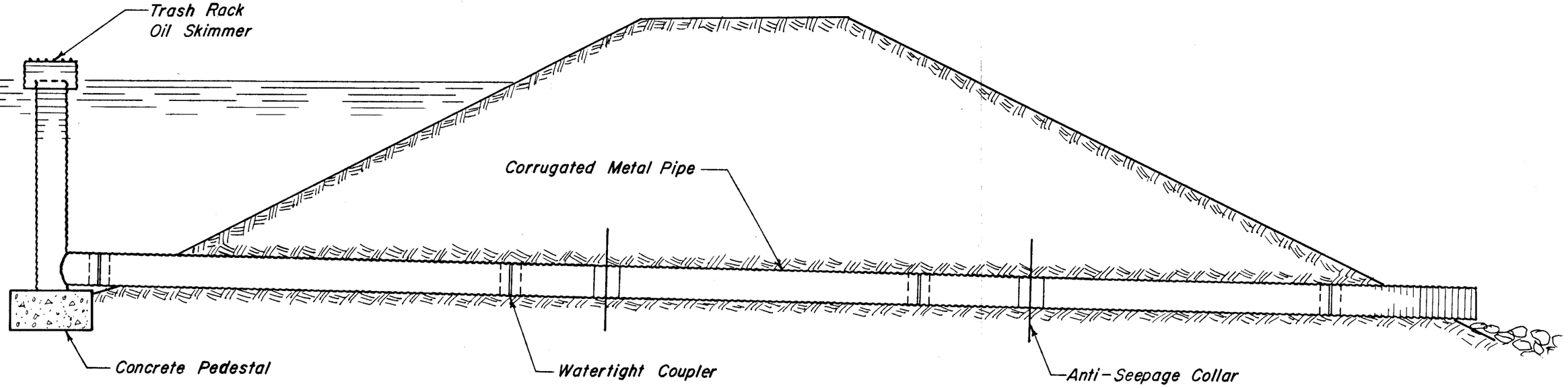
MONSEN ENG. 100 12-78 MC8822e

Typical Drop–Inlet Spillway for Small Dams



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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1" = 5'	Typical Drop–Inlet Spillway	B-009

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DGS	1·22·80				

All pipes passing through the sedimentation pond embankment will require anti-seepage collars. Design specifications for these collars will be in accordance to Figure 7.

The slide gate recommended for the dewatering decant assembly is shown in Figure 8. This slide gate will be locked in a closed position and all discharge will be controlled by a responsible individual.

Riprap will be installed at discharge points, where necessary, to prevent any additional erosion and to minimize disturbance.

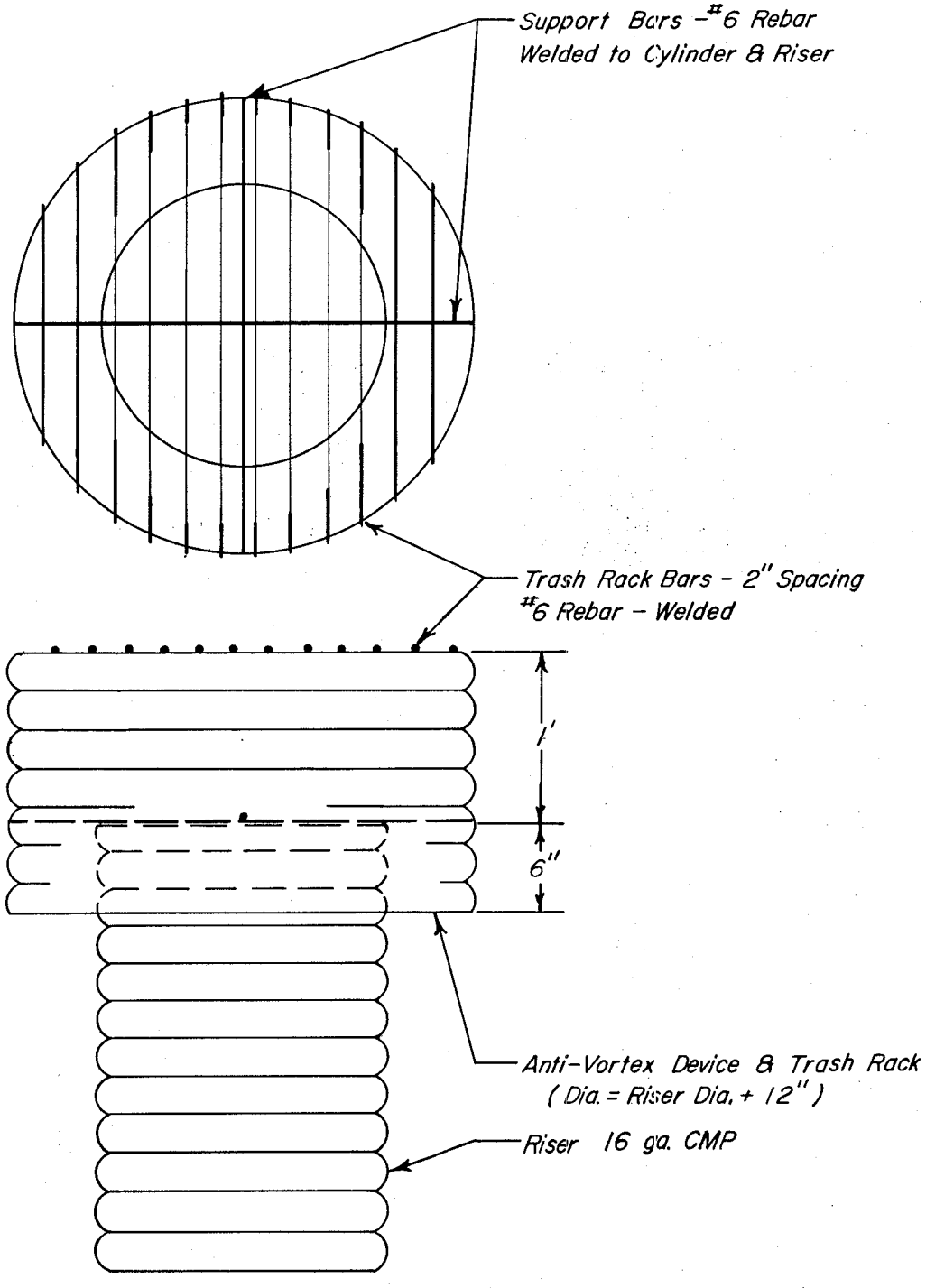
All discharge from the proposed sedimentation ponds at Hidden Valley Mine will be in accordance to the required N.P.D.E.S. permit. Application for this discharge permit has been submitted to the United States Environmental Protection Agency. Hidden Valley Mine's application has been acknowledged and assigned the following serial number:

UT - 0023701

The EPA has indicated that as of mid-April 1980, this application will be open for a thirty day public review period. If no adverse comments are received during this period, the issuance of the permit should follow shortly.

All disturbed areas not directly required for mining operations shall be revegetated or appropriately stabilized. This includes the outslope of all sedimentation pond embankments.

Seed mixture, mulching, and soil treatment will be in accordance to an approved reclamation plan.



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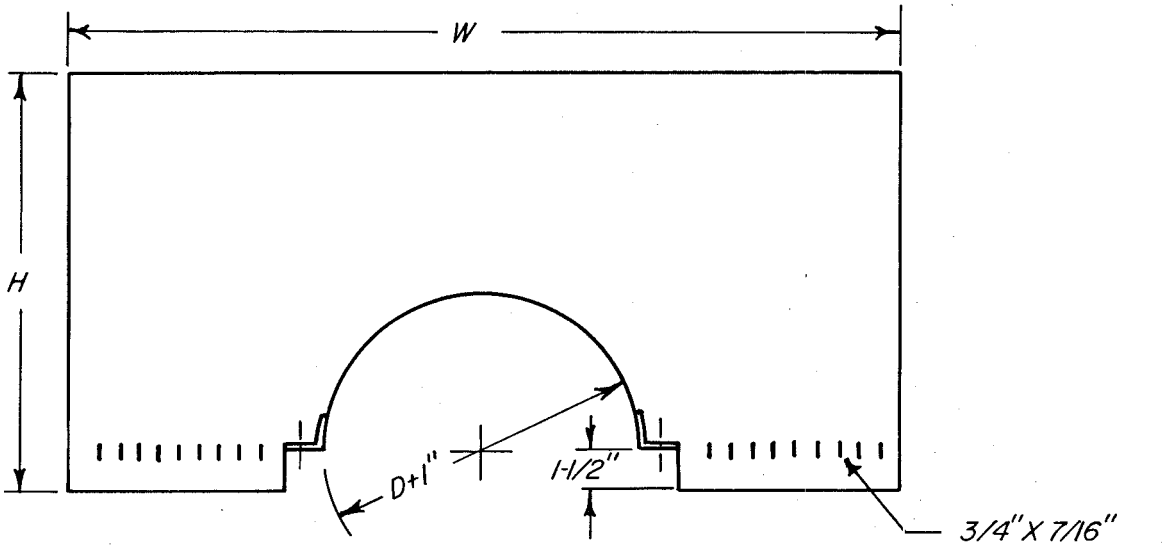
HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Anti-Vortex Device & Trash Rack	A-004

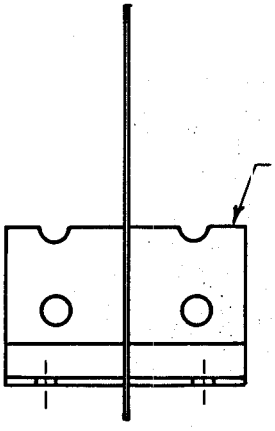
Figure 6
Page 16

DRAWN BY	DATE	CHECKED	DATE	APPROVED	DATE
DGS	2-12-80				

Pipe Dia. in.	Metal Ga.	W in.	H in.
12	16	64	32
18	16	69.25	35
24	14	72	38
36	12	88	44
42	12	93.25	47
48	12	96	50



One Half Shown – Other Half Identical



End View

(From ARMCO Drawing No. - Type I)

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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Cut-Off Wall for Hel-Cor Pipe	A-003

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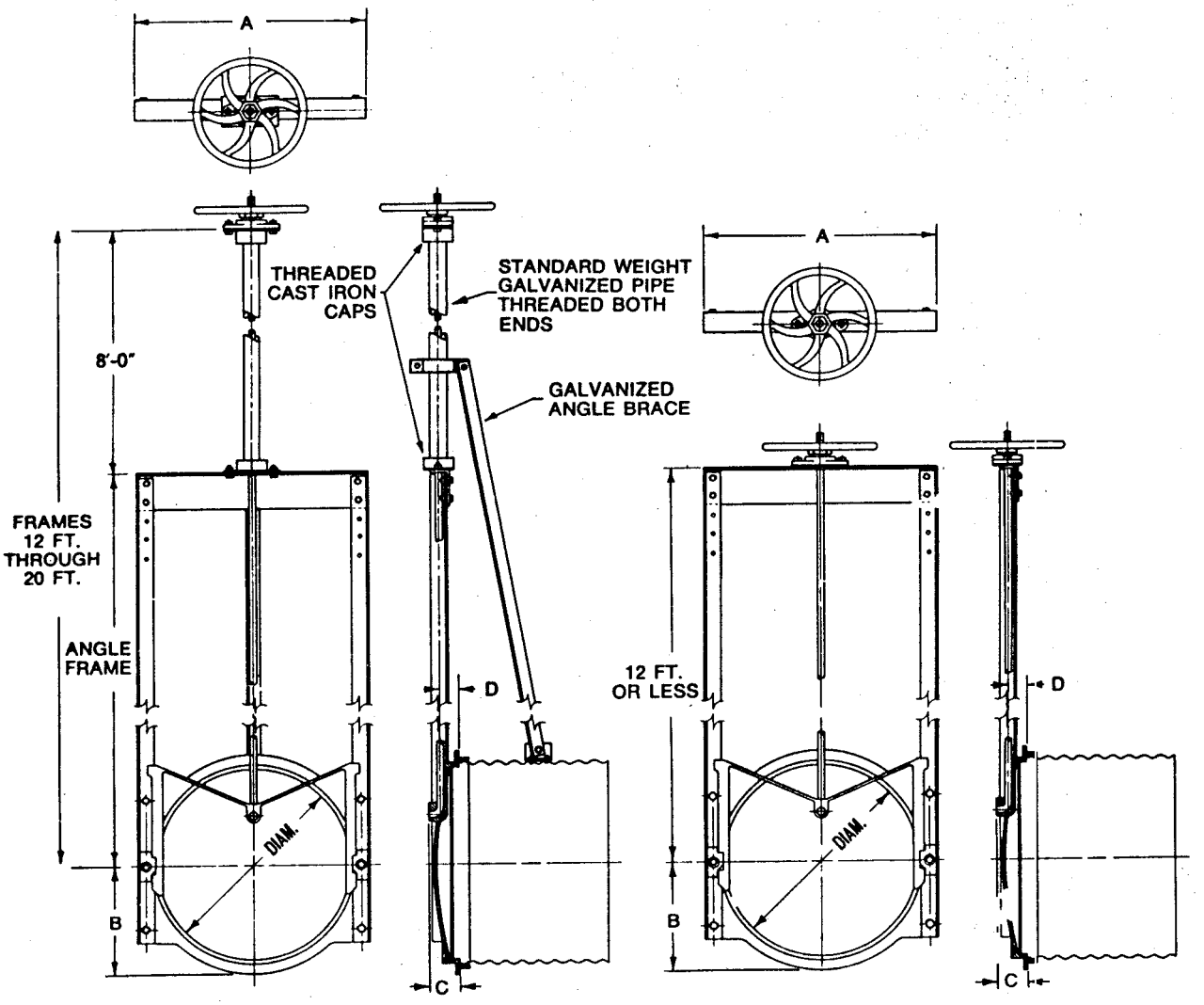
DGS	2-11-80				



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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Armco Model 101C Slide Gate	A-008

Figure 8
Page 18

DRAWN BY	DATE	CHECKED	DATE	APPROVED	DATE
DGS	4-11-80				

SURFACE FACILITY AREA - SEDIMENTATION POND DESIGN

General

The major structures proposed for the surface facility area include a preparation plant, shop, warehouse, change house, administration building, and truck loading facilities. The relationship between these facilities and the natural drainage basin is shown in Figure 9. This natural drainage basin will be utilized wherever possible to ensure proper drainage to the sedimentation pond. Only minimal topographic change will be required for total runoff containment of all the disturbed areas.

The proposed surface facility sedimentation pond will receive runoff from approximately 18.6 acres. It has been determined that 2.2 acre-ft. of containment is adequate for this area. Further design details and supporting calculations are presented later in this section.

Sedimentation Pond Embankment

A plan and cross-sectional view of the proposed sedimentation pond embankment is presented as Figures 10 and 11 respectively. It is proposed that native material in the immediate vicinity be used for the construction of this embankment.

Soils in this area have been classified as being in the

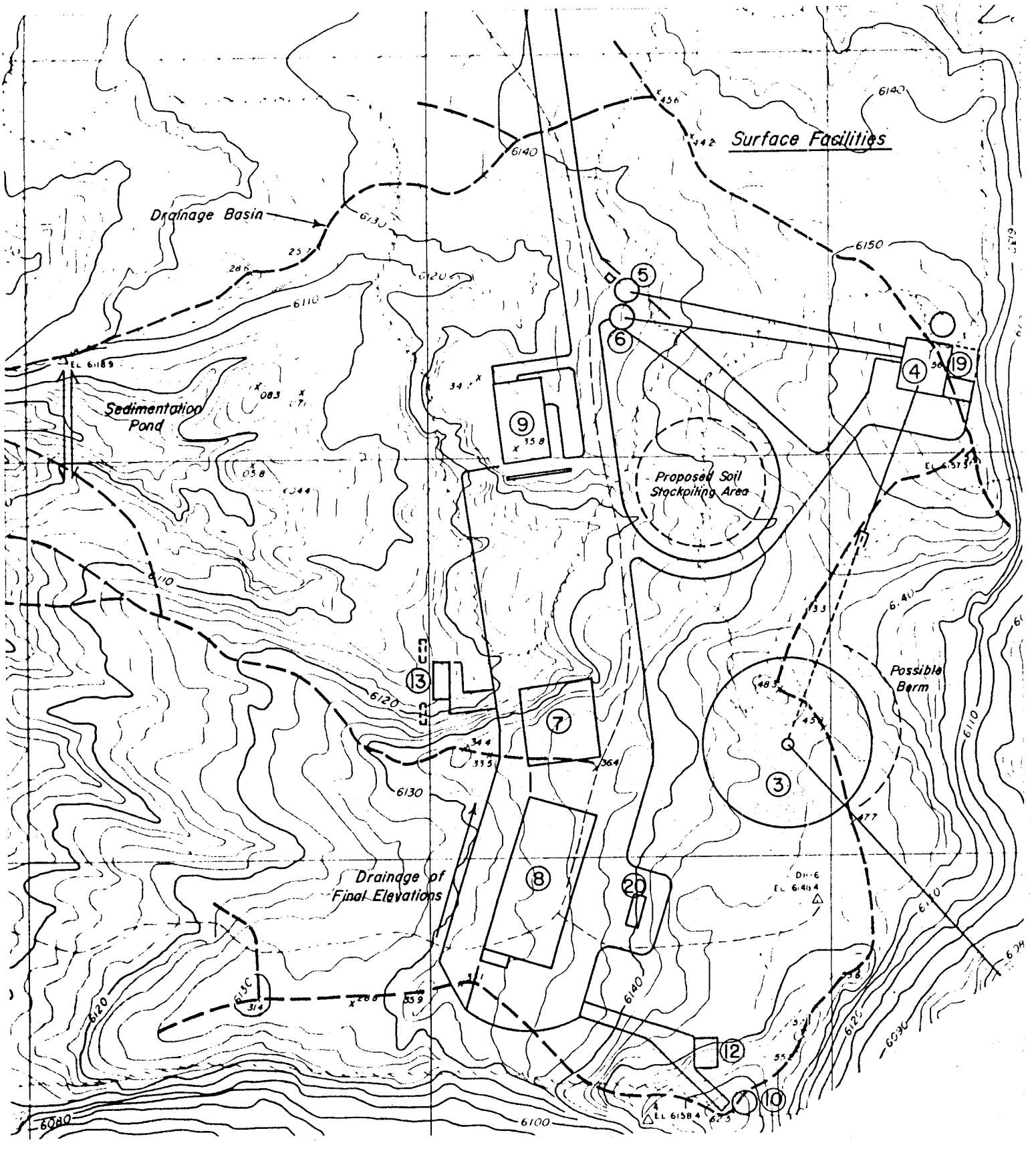


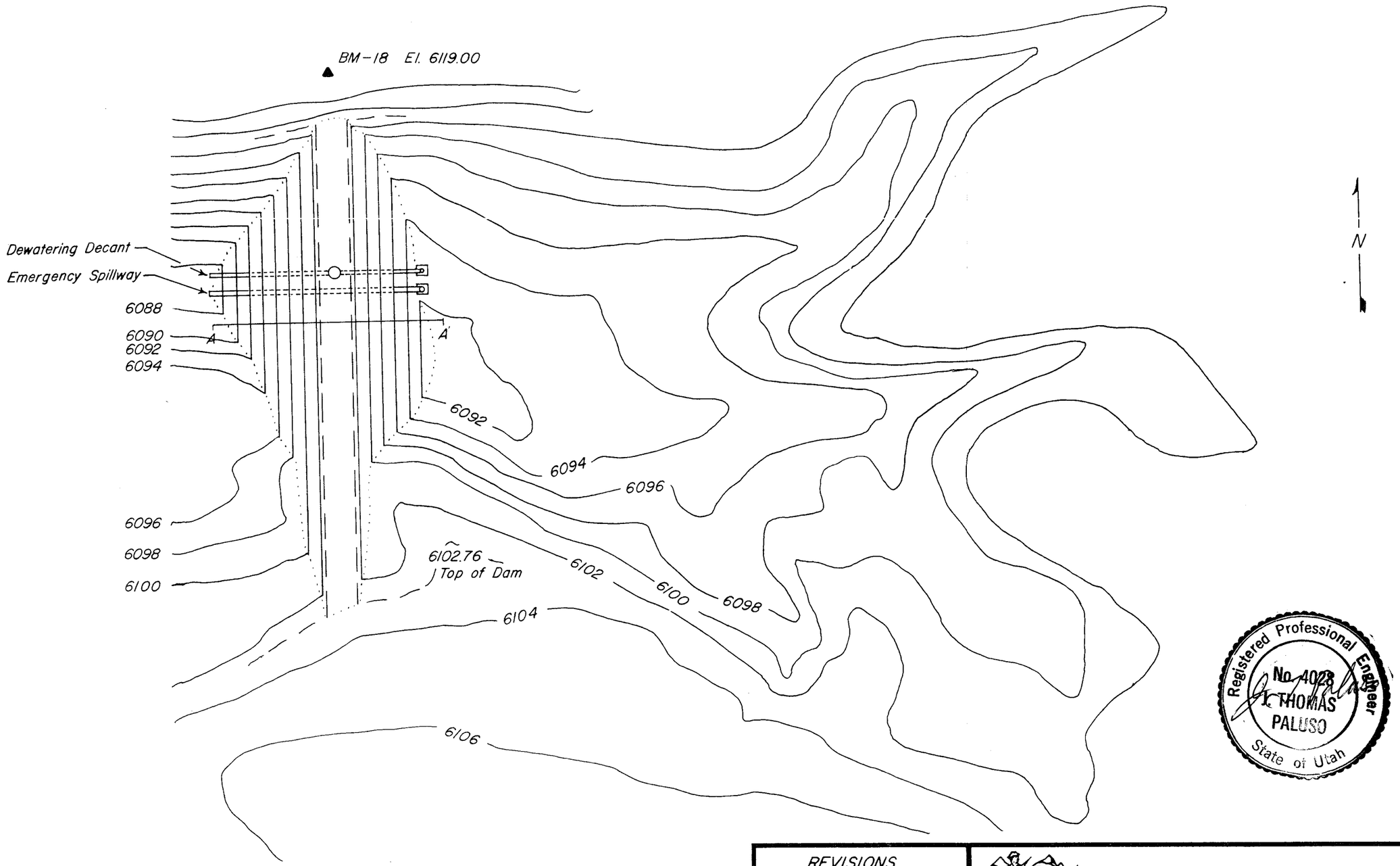
Figure 9 - Surface Facility Area - Drainage Basin 18.6 acres.

Castle Valley series (SCS, 1978). They consist of a sandy loam material that weathered from sandstone and interbedded shale. The estimated Unified Soils Classification is SM.

According to Sherard, et al., (1963, pg. 269), SM soils when placed as a well-constructed, rolled-earth embankment, with moisture-density control will be semipervious to impervious. The coefficient of permeability will range from 0.1 to 500 ft. per year. Relative shear strength of the soil is high and the resistance to piping is medium to low. These soil qualities are more than adequate for embankment construction considering the small volume of water to be impounded.

All soil removal within the surface facility area will be in accordance to an approved reclamation plan. Only excess surficial material, not directly required for reclamation, will be used for embankment construction.

Prior to construction the entire embankment foundation shall be cleared of organic matter and thoroughly scarified. The embankment will then be constructed in layers compatible to the compaction equipment to be used. The material will be compacted to a minimum density of 95 percent of the maximum dry density as determined by the appropriate AASHO T-99 Test Methods. Rocks larger than six inches and organic matter shall not be used in construction.



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State of Utah

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HIDDEN VALLEY MINE

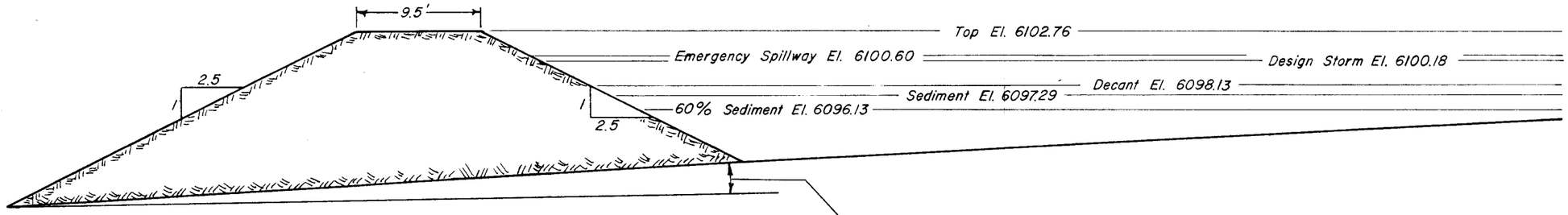
SCALE:	TITLE:	DRAWING NO.
3" = 100'	Surface Facility Sedimentation Pond	B-010 Revised From B-001

DRAWN BY	DATE	CHECKED	DATE	APPROVED	DATE
DGS	1·23·80				

Figure 10, Pg. 22

MONSEN ENG R0 12-78 MC8822•

CROSS SECTION A-A'



Prior to construction the entire embankment foundation shall be cleared of organic matter and scarified.

Average cross-sectional slope of the proposed embankment foundation is approximately 2%.

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HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1" = 10'	Surface Facility Sedimentation Pond	B-011

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DGS	1·24·80				

Figure 11, Pg. 23

Computations and Specifications

(Surface Facility Area)

Drainage Area - 18.6 acres
Area Disturbed - 9.0 acres

Direct Runoff - (Curve Number Method)
CN = 90
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.84 inches

Total Runoff Volume = area x direct runoff
= (18.6 acres) x (0.84 inches)
= 1.30 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (9)
= 0.90 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (0.9 acre - ft.) + (1.30 acre - ft.)
= 2.20 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area $Ft.^2$	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
6092	1,028	0.02				0.00
			0.07	2	0.14	
6094	5,289	0.12				0.14
			0.18	2	0.36	
6096	10,282	0.24				0.50
			0.31	2	0.62	
6098	16,598	0.38				1.12
			0.48	2	0.95	
6100	24,823	0.57				2.07
			0.71	2	1.43	
6102	37,309	0.86				3.50
			1.06	2	2.11	
6104	54,495	1.25				5.61

Elevation vs. Storage

(See Figure 11)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	6096.13	0.54
Sediment Volume	6097.29	0.90
Dewatering Decant Inlet	6098.13	1.18
Ten Year Event Plus Sediment	6100.18	2.20
Emergency Spillway Inlet	6100.60	2.50
Spillway Headwater @ 0.66 ft.	6101.26	2.97
Freeboard @ 1.00 ft.	6102.26	3.77
Top of Dam plus 0.50 ft. for settlement	6102.76	4.30

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.8
Area = 18.6 acres
Qc = 5.4 cfs
FF = 1
LF = 1.5

$Q_{25\ yr}$ = Qc x LF x FF
= (5.4 cfs) x (1.5) x (1)
= 8.1 cfs

Emergency spillway diameter = 18 in. (C.M.P.)
Vertical riser diameter = 18 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

Dewatering Decant Design

(See Figure 4)

Dewatering decant diameter = 12 in. (C.M.P.)
Vertical riser diameter = 12 in. (C.M.P.)
Slide gate assembly - Vertical riser = 48 in. (C.M.P.)
Slide gate - Armco 101C, 12 inch diameter.
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

PORTAL AREA - SEDIMENTATION POND DESIGN

General

The major structures proposed for the mine portal area include a crushing station, rock dust bin, mine ventilation fan, and storage sheds. The relationship between these facilities and the natural drainage is shown in Figure 12. It is proposed that portions of this natural drainage be diverted around the disturbed areas.

The portal area sedimentation pond will be of incised construction, with its total drainage area being approximately 4.3 acres. The containment required for this area has been determined to be 0.63 acre-ft. Further design details and supporting calculations are presented later in this section.

Runoff Diversion

In order to achieve the desired drainage for the portal area, Hidden Valley Mine proposes a system of culverts and diversions. The two major diversions and the drainage to be affected is shown in Figure 12.

The runoff diversion above the A-seam portal shall be accomplished by an existing bench-cut and the proposed access road. Their intersection forms a runoff collection point for drainage from approximately 3 acres. Runoff will be conveyed from this point directly to Ivie Creek by means of an 18" culvert.

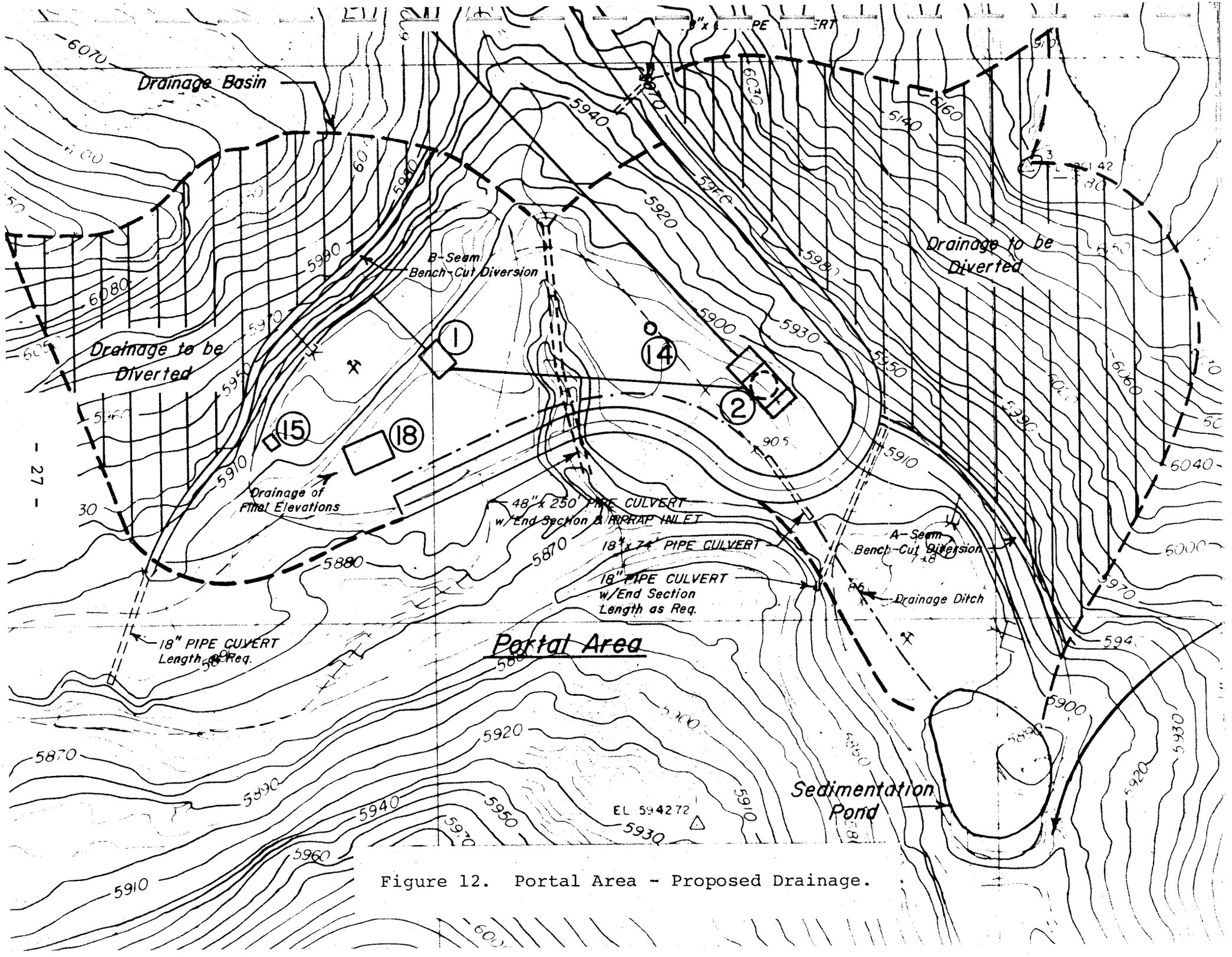


Figure 12. Portal Area - Proposed Drainage.

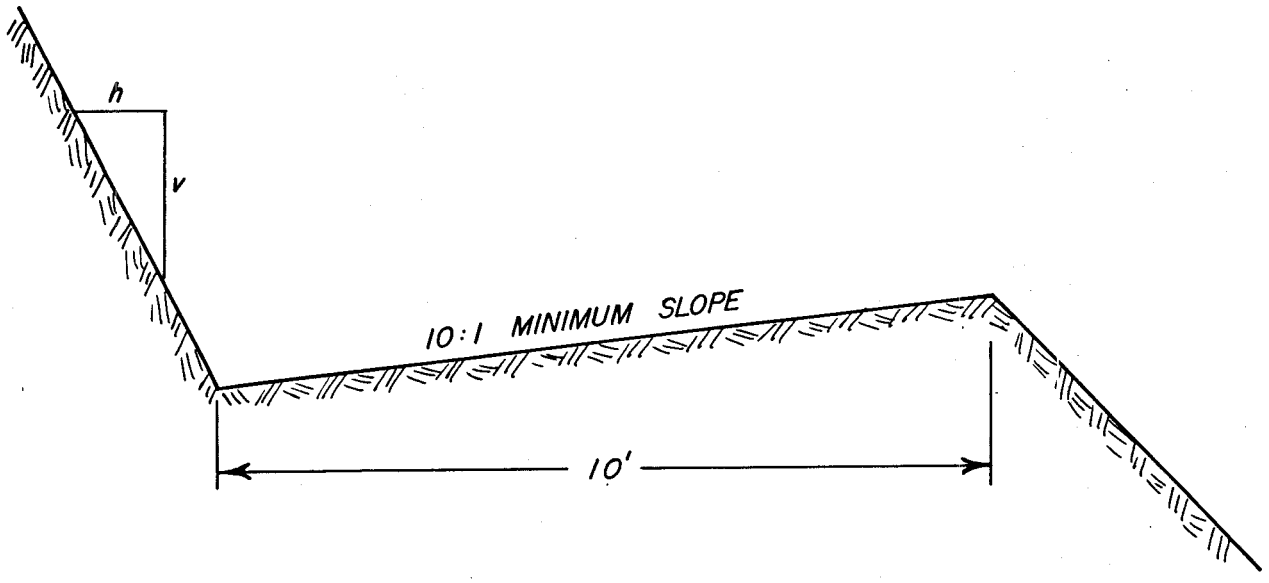
The proposed drainage diversion above the B-seam portals shall be accomplished by the construction of a bench-cut. Drainage from this area, approximately 1.5 acres, will be diverted directly into Ivie Creek.

The cross-sectional design specifications for the bench-cut diversions are shown in Figure 13. These diversions shall be constructed in a manner to safely pass the peak runoff from a precipitation event with a 10-year recurrence interval. Diversion shall be maintained in a manner which prevents additional contributions of suspended solids. Riprap, detention basins, and straw dikes may be used, where necessary, to reduce runoff velocities, and trap additional sediment.

Sedimentation Pond

A plan and cross-sectional view of the proposed portal area sedimentation pond is presented as Figures 14 and 15 respectively. This pond will be incised construction.

The portal area sedimentation pond will receive drainage from approximately 4.3 acres. This will require a containment volume of only 0.63 acre-ft. Due to this limited containment, the installation of a dewatering decant assembly is unnecessary. State regulations specifying the minimum distance between discharge mechanics and sediment elevations make a discharge structure impractical. However, if the need



1/2 h : 1v FOR CUTS IN ROCK

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
As Shown	Bench-Cut Diversion Cross-Sectional View	A-009
		Figure 13
		Page 29

DRAWN BY	DATE	CHECKED	DATE	APPROVED	DATE
DGS	4·25·80				

to discharge treated water should ever arise, a pump will be made available for this purpose.

Soils within the portal area consist of a sandy loam which are comparable to those found in the surface facility area (See Surface Facility Area - Sedimentation Pond Design). This area was previously disturbed during exploration work leaving little topsoil in place. Therefore, no topsoil stockpiles are proposed for the portal area.

Drainage within the portal area shall be conveyed to the sedimentation pond by open ditches. Natural drainage is towards the proposed access road which partially determines the southern boundary of the disturbed area. A collection ditch will be located adjacent to the outslope of the access road. Runoff shall then be channeled through a culvert passing through the road fill material. Another drainage ditch will then lead directly into the sedimentation pond (see Figure 12).

If necessary, to prevent excessive deterioration due to erosion, open ditches shall be appropriately lined with riprap.

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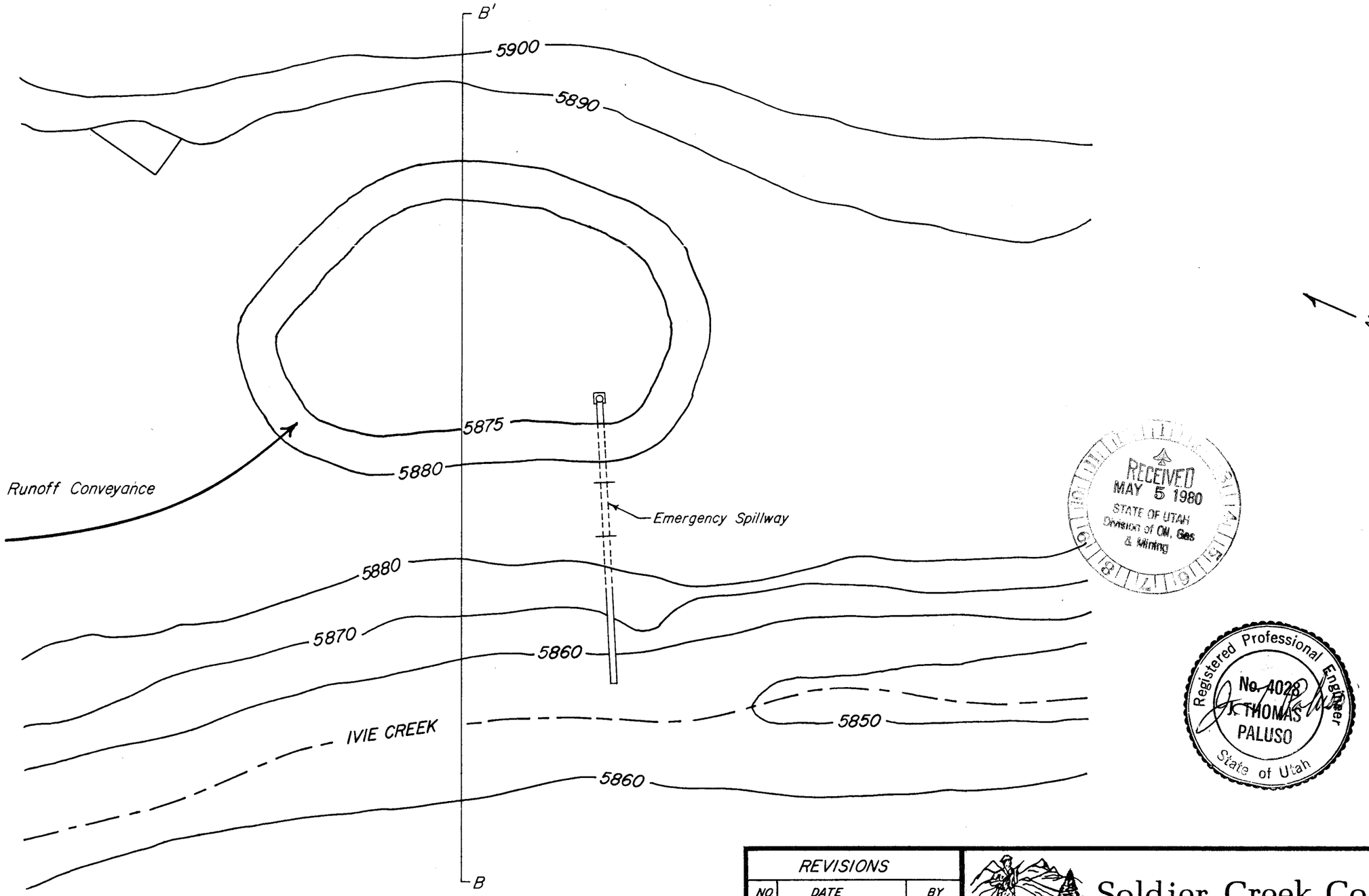

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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:	TITLE:	DRAWING NO.
1"=30'	Portal Area Sedimentation Pond	B-015

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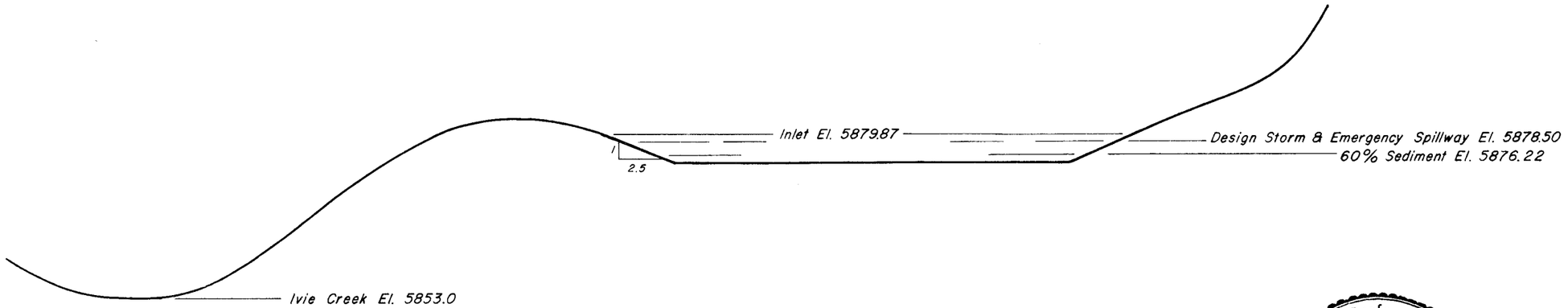
CROSS SECTION B-B'



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Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE: 1"=20'	TITLE: Portal Area Sedimentation Pond				DRAWING NO. B-016
DRAWN BY DGS	DATE 4-25-80	CHECKED	DATE	APPROVED	DATE

Figure 15
Page 32

Computations and Specifications

(Portal Area)

Drainage Area - 4.3 acres
Area Disturbed - 3.7 acres

Direct Runoff - (Curve Number Method)
CN = 88
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.72 inches

Total Runoff Volume = area x direct runoff
= (4.3 acres) x (0.72 inches)
= 0.26 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (3.7)
= 0.37 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (0.37 acre - ft.) + 0.26 acre - ft.)
= 0.63 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area Ft.^{2}	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
5875	6050	0.14				0.00
			0.18	5	0.90	
5880	9800	0.22				0.90

Elevation vs. Storage

(See Figure 15)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	5876.22	0.22
Sediment Volume	5877.06	0.37
Ten Year Event Plus Sediment	5878.50	0.63
Emergency Spillway Inlet	5878.50	0.63
Spillway Headwater @ 0.37 ft.	5878.87	0.70
Freeboard @ 1.00 ft.	5879.87	0.88
Inlet Elevation	5879.87	0.88

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.08
Area = 4.3 acres
Qc = 1.70 cfs
FF = 1
LF = 2.0

$Q_{25\ yr}$ = Qc x LF x FF
= (1.70 cfs) x (2.0) x (1)
= 3.4 cfs

Emergency spillway diameter = 18 in. (C.M.P.)
Vertical riser diameter = 18 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

REFUSE DISPOSAL AREA - SEDIMENTATION POND DESIGN

General

In order to provide a consistant, marketable product, coal preparation will be required at Hidden Valley Mine. Such coal preparation will produce several million tons of reject material over the life of the mine. It is proposed that this refuse material be disposed of within the SW¼ of section 18 (see Figure 3).

Pursuant to recent regulations, a sedimentation pond is required for the refuse disposal area. This pond will receive surface runoff from approximately 59.0 acres. The natural topography will be utilized almost entirely to achieve the desired drainage. Figure 16 illustrates the sedimentation pond location in relation to the drainage basin and the projected limits of the refuse material.

The required containment volume for the refuse disposal area sedimentation pond has been determined to be 7.0 acre-ft. This is for total containment of a 10-year, 24-hour precipitation event, plus the required sediment storage volume. Supportive calculations and additional design details are presented later in this section.

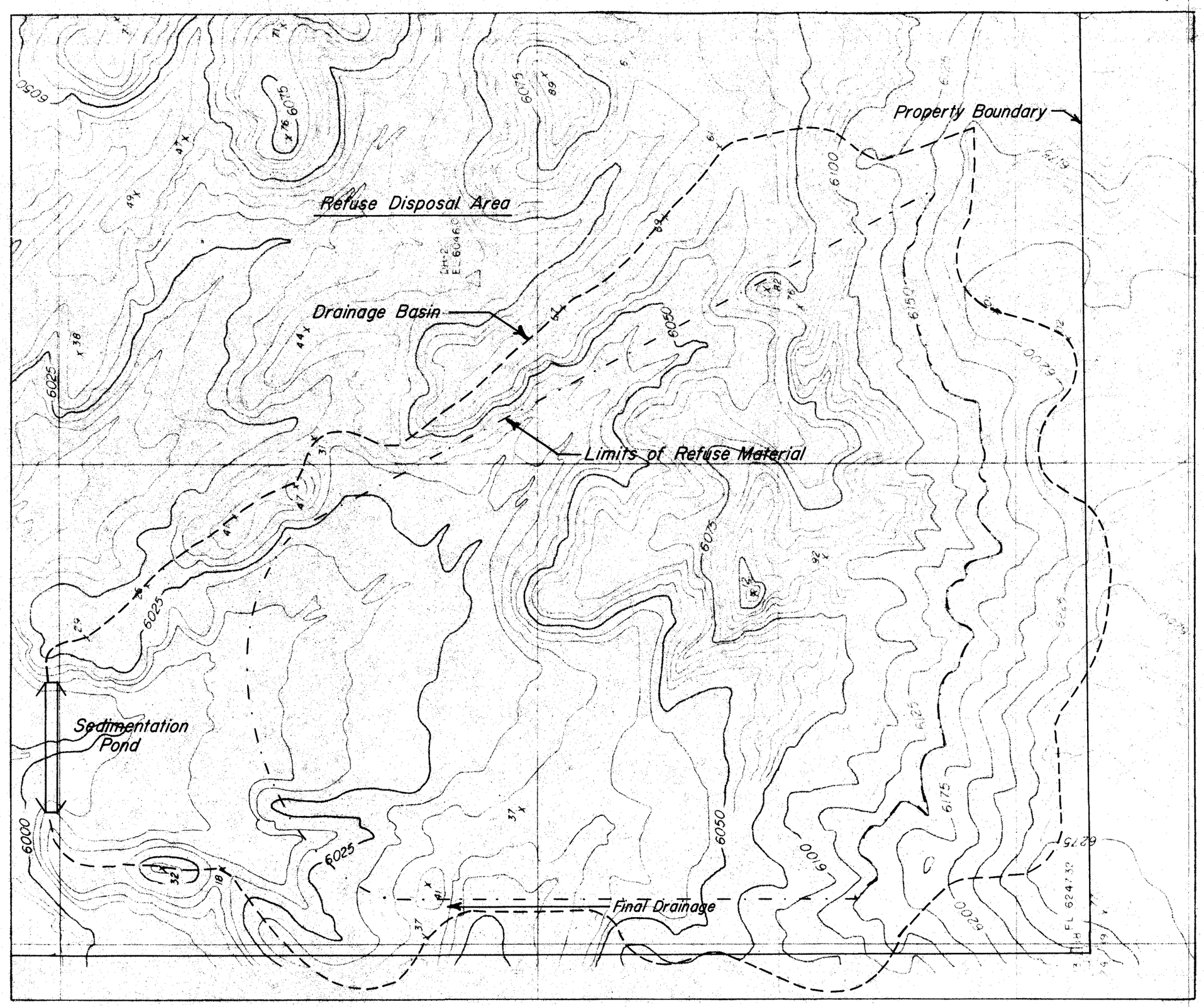

Figure 16. Refuse Disposal Area Drainage Detail.

Sedimentation Pond Embankment

A plan and cross-sectional view of the proposed sedimentation pond embankment is presented as Figures 17 and 18 respectively. It is proposed that material in the immediate vicinity be used for embankment construction.

The Soils Conservation Service (1978) has classified the soils in the proposed embankment area as being in the Ravola series. They are a result of alluvium washed from shale and sandstone. The estimated Unifed Soils Classification is CL.

According to Sherard, et al., (1963, pg. 269), the embankment properties of CL soils when placed as a well-constructed, rolled-earth embankment, with moisture-density control will be impervious. The probable range of permeability is 0.01 to 1.0 feet per year. This soil also has a high resistance to piping and the relative shear strength is medium.

All soil removal within the refuse disposal area will be in accordance to an approved reclamation plan. Only excess surficial material, not directly required for reclamation, will be used for embankment construction.

Prior to construction the entire embankment foundation shall be cleared of organic matter and thoroughly scarified. The embankment will then be constructed in layers compatible

to the compaction equipment to be used. The material will be compacted to a minimum density of 95 percent of the maximum dry density as determined by the appropriate AASHO T-99 Test Methods. Rocks larger than six inches and organic matter shall not be used in construction.

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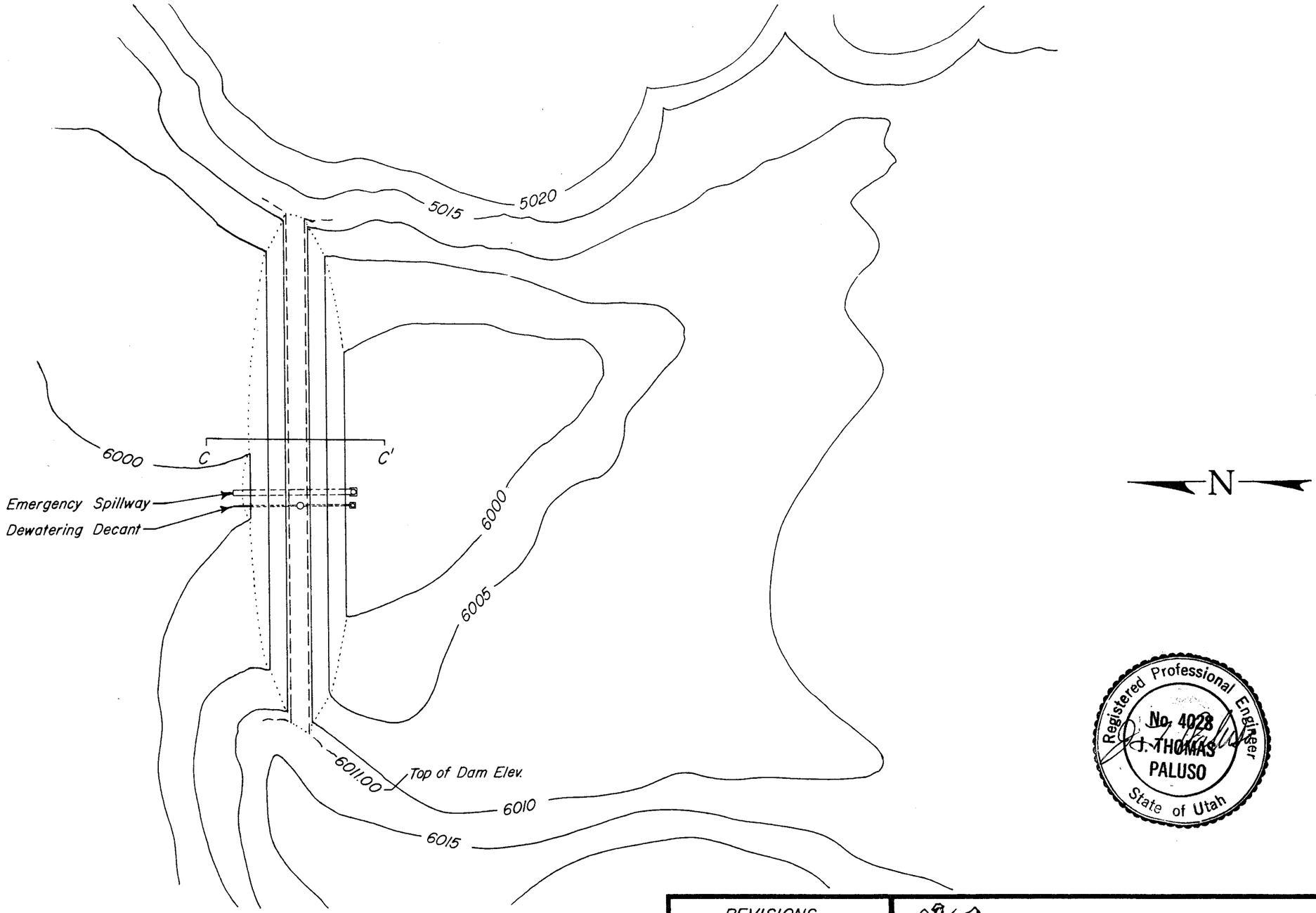

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------- Limits of Dam Embankment

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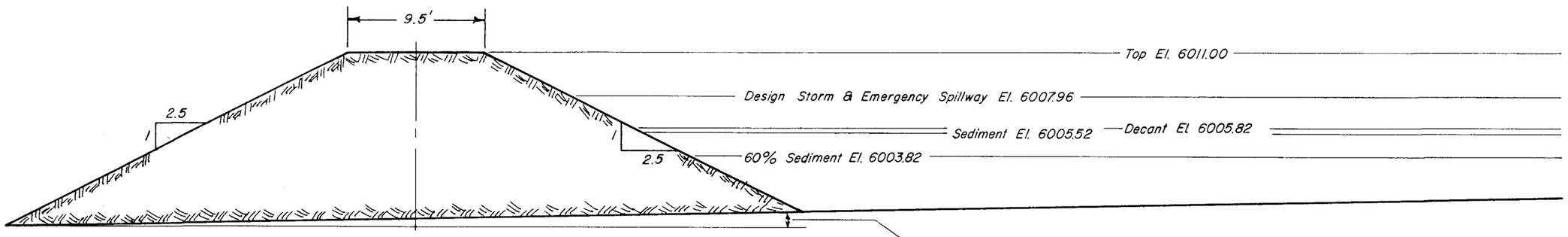
Soldier Creek Coal Company

HIDDEN VALLEY MINE

SCALE:		TITLE:				DRAWING NO.
1" = 60'		Refuse Area Sedimentation Pond				B-012
DRAWN BY	DATE	CHECKED	DATE	APPROVED	DATE	Figure 17
DGS	2-19-80					Page 39

MONSEN ENG. 100 12-78 MC8822●

CROSS SECTION C-C'



Prior to construction the entire embankment foundation shall be cleared of organic matter and scarified.

Average cross-sectional slope of the proposed embankment foundation is approximately 1%.

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HIDDEN VALLEY MINE

SCALE: 1" = 8'		TITLE: Refuse Area Sedimentation Pond				DRAWING NO. B-013
DRAWN BY DGS	DATE 2-20-80	CHECKED	DATE	APPROVED	DATE	Figure 18 Page 40

Computations and Specifications

(Refuse Disposal Area)

Drainage Area - 59.0 acres
Area Disturbed - 35.0 acres

Direct Runoff - (Curve Number Method)
CN = 88
P = 1.69 inches (10-Year, 24-Hour Event)
Direct Runoff = 0.72 inches

Total Runoff Volume = area x direct runoff
= (59.0 acres) x (0.72 inches)
= 3.54 acre - ft.

Sediment Volume Required = (0.1 acre - ft.) per disturbed acre
= (0.1 acre - ft.) x (35)
= 3.50 acre - ft.

Total Volume Required = Sediment Volume + Runoff Volume
= (3.50 acre - ft.) + (3.54 acre - ft.)
= 7.04 acre - ft.

STORAGE COMPUTATIONS

Elev.	Area Ft.^{2}	Area Acres	Avg. Area Acres	Interval Ft.	Storage acre-ft.	Acc. Storage acre-ft.
6000	15,300	0.35				0.00
			0.55	5	2.75	
6005	32,300	0.74				2.75
			1.45	5	7.25	
6010	93,800	2.15				10.00
			3.44	5	17.20	
6015	206,000	4.73				27.20

Elevation vs. Storage

(See Figure 17)

	Elevation	Acc. Storage acre - ft.
60% of Sediment Volume	6003.82	2.10
Sediment Volume	6005.52	3.50
Dewatering Decant Inlet	6005.82	3.94
Ten Year Event Plus Sediment	6007.96	7.04
Emergency Spillway Inlet	6007.96	7.04
Spillway Headwater @ 1.55 ft.	6009.51	9.29
Freeboard @ 1.00 ft.	6010.51	11.75
Top of Dam plus 0.50 ft. for settlement	6011.01	13.47

Emergency Spillway Design

(See Figure 5)

Peak Flow - Using the Utah Department of Transportation design methods for a 25 year recurrence interval.

K value = 0.17
Area = 59.0 acres
Qc = 28.0 cfs
FF = 1
LF = 2.5

$Q_{25\ yr}$ = Qc x LF x FF
= (28.0 cfs) x (2.5) x (1)
= 70.0 cfs

Emergency spillway diameter = 42 in. (C.M.P.)
Vertical riser diameter = 42 in. (C.M.P.)
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

Dewatering Decant Design

(See Figure 4)

Dewatering decant diameter = 12 in. (C.M.P.)
Vertical riser diameter = 12 in. (C.M.P.)
Slide gate assembly - Vertical riser = 48 in. (C.M.P.)
Slide gate - Armco 101C, 12 inch diameter.
Trash rack assembly required as per Figure 6.
Two anti-seepage collars required as per Figure 7.

References

American Iron and Steel Institute, 1971. Handbook of Steel Drainage and Highway Construction Products. Second Edition, Washington, D.C.

King, H. W. and Brater, E. F., 1963. Handbook of Hydraulics. McGraw-Hill Book Company.

Mining Enforcement and Safety Administration, (MESA). Engineering and Design Manual, Coal Refuse Disposal Facilities. U.S. Department of the Interior, Washington, D.C.

Richardson, A. E., 1971. Estimated Return Periods for Short-Duration Precipitation in Utah. Utah State University, Department of Soils and Biometeorology. Bulletin No. 1, Logan, Utah.

Sherard, J. L., R. J. Woodward, S. F. Gizienski, and W. A. Clevenger, 1963. Earth and Earth-Rock Dams. John Wiley and Sons, Inc.

U. S. Bureau of Reclamation, 1974. Design of Small Dams. A Water Resources Technical Publication, U. S. Department of the Interior. Revised Reprint.

U. S. Soil Conservation Service, 1972. "Hydrology" National Engineering Handbook, Section 4. U. S. Department of Agriculture.

U. S. Soil Conservation Service, 1978. Soil Survey and Interpretation of the Coal Creek - Emery Portion of the Price and Emery County Areas.