0021

ACT/007/018
#3

SOLDIER CREEK COAL CO.

Telephone (801) 637-6360

P.O. Box I
Price, Utah 84501

June 27, 1985

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JUL 01 1985
DIVISION OF OIL
GAS & MINING

Mr. Lowell P. Braxton
Division of Oil, Gas and Mining
355 W. North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180

Dear Mr. Braxton:

Re: NOV N85-4-15-1
Soldier Canyon Mine
ACT/007/018

In response to your letter dated May 30, 1985, Soldier Creek Coal Company has made the decision to stabilize the sediment pond embankment which is in question. The following information is being submitted to substantiate this position.

1. Contour map of the sediment pond.

2. Detailed section through the pond. (Figure 1)

3. Proposed riprap installation drawing. (Figure 2)

4. Slope stability analysis of the stabilized pond embankment. (Figure 3)

5. Stream flow depth calculations due to a 25-year, 24-hour event.

Reconstruction of the crest width to 9.5 feet and resloping of the outslope to 3:1, as required by regulations, is not practical. The outslope would extend into Soldier Creek and not allow sufficient area to accommodate peak flows - refer to Figure 1.

Due to the high embankment safety factor and limited construction space, Soldier Creek Coal Company would like to request relief from embankment width requirement UMC 817.46(l) and outslope regulation UMC 817.46(m).

The addition of riprap will not change reclamation costs. Existing material will be utilized to the maximum extent possible. This will also help to improve flow characteristics of the creek.

Monitoring of the stabilized embankment will be done on a quarterly basis. These inspections will be made during the quarterly sediment pond inspection.

Your prompt attention to this problem would be greatly appreciated as we would like to start construction during the summer.

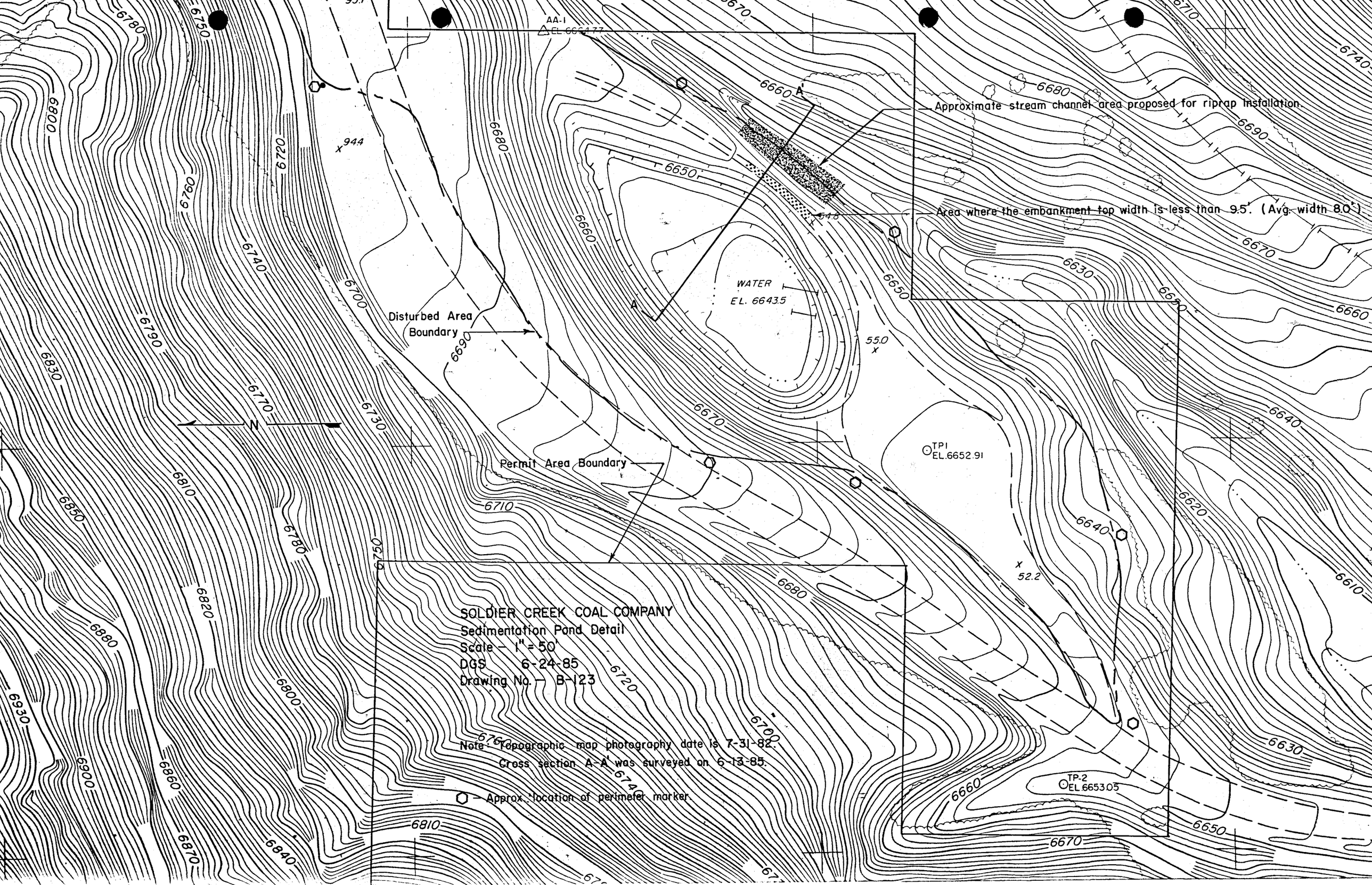
Sincerely,

SOLDIER CREEK COAL COMPANY

J.T. Paluso

J.T. Paluso
Chief Engineer

JTP:pp
Enclosures


AA-1
EL. 6664.77
Approximate stream channel area proposed for riprap installation.
Area where the embankment top width is less than 9.5'. (Avg. width 8.0')
WATER
EL. 6643.5
Disturbed Area Boundary
Permit Area Boundary
TP1
EL.6652.91
TP-2
EL.6653.05
SOLDIER CREEK COAL COMPANY
Sedimentation Pond Detail
Scale – 1" = 50'
DGS 6-24-85
Drawing No. – B-123
Note: Topographic map photography date is 7-31-82.
Cross section A-A' was surveyed on 6-13-85.
– Approx. location of perimeter marker
N

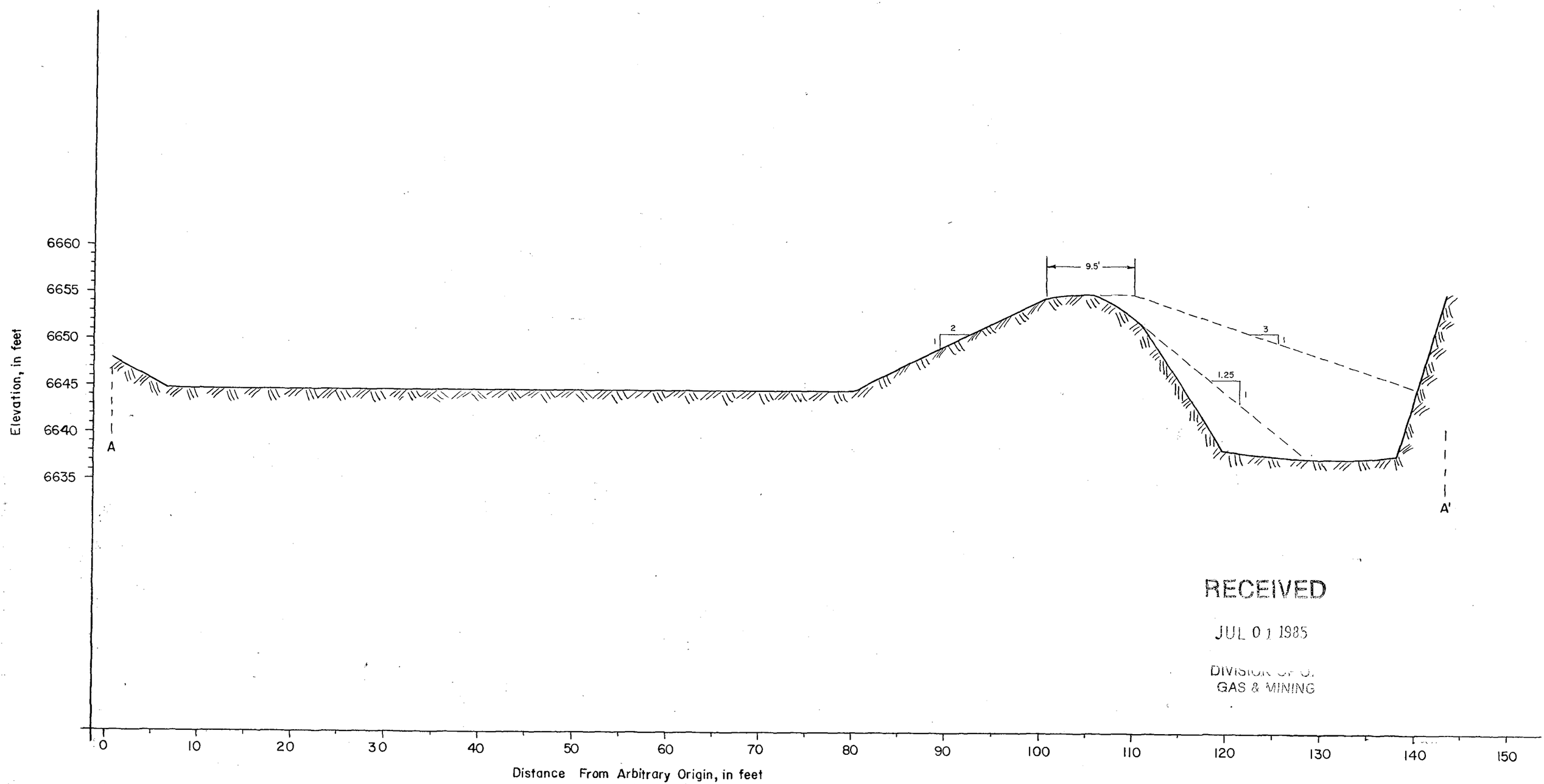


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Figure 1. Cross Section of Sedimentation Pond 8 Soldier Creek Channel

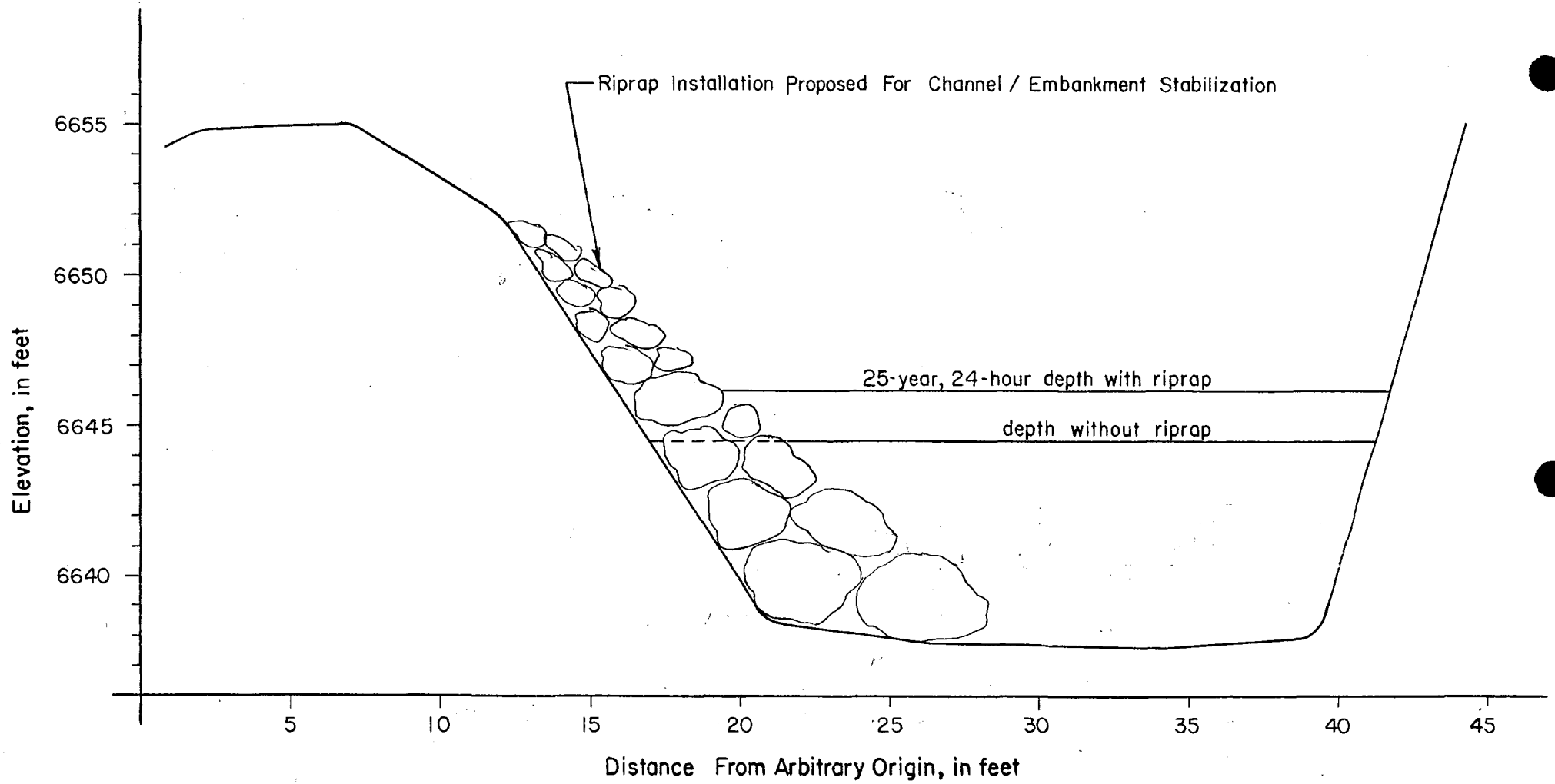

Figure 2. Cross Section Detail of Soldier Creek Channel

Depth of Flow Calculations

Open channel flow can be determined by the Chezy-Manning formula which is as follows:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

Where

Q = flow in cfs
n = roughness coefficient
A = area in ft^2
R = hydraulic radius in ft = $\frac{\text{area}}{\text{wetted perimeter}}$
S = slope

Using a detailed stream channel cross section (see Figures 1 & 2), as well as known values for S and n, A and R can be determined by trial and error for various values of Q. The depth of flow which is directly proportional to A and R can also be determined.

Depth of Flow for Existing Stream Channel

If Q = 1,579 cfs for a 25-year, 24-hour storm*
S = 0.04
n = 0.067

Then A = 134.6 ft^2
R = 4.2 ft
Depth of Flow = 6.3 ft

Depth of Flow with Proposed Riprap Installed

If Q = 1,579 cfs for a 25-year, 24-hour storm*
S = 0.04
n = 0.067

Then A = 133.4 ft^2
R = 4.2 ft
Depth of Flow = 8.0 ft

*The peak flow of Soldier Creek during a 25-year, 24-hour storm was determined by Vaughn Hansen Associates. A copy of their computer printout of the hydrograph is enclosed.

SOLDIER CREEK
at
SOLDIER CANYON MINE

25 YR - 24 HR

AREA= 10232.0 ACRES
AVERAGE BASIN SLOPE= 34.0 PERCENT
INCREMENT OF RAINFALL EXCESS= .28 HOURS
CURVE NUMBER=75.0
DESIGN STORM= 2.30 INCHES
STORM DURATION= 24.0 HOURS
HYDRAULIC LENGTH= 31500. FEET

TP= 1.1109 HOURS QPCFS= 6965.26 CFS QPIN= .6751 INCHES C3= 3.3276
ITERATIONS= 8

TIME HOURS	ACCUMULATED RAINFALL INCHES	RUNOFF INCHES	RAINFALL EXCESS INCHES	UNIT HYDROGRAPH CFS	OUTFLOW HYDROGRAPH CFS
0.00	0.0000	0.0000	0.0000	0.0	0.00
.28	.0101	0.0000	0.0000	0.0	0.00
.55	.0191	0.0000	0.0000	0.0	0.00
.83	.0229	0.0000	0.0000	0.0	0.00
1.10	.0281	0.0000	0.0000	0.0	0.00
1.37	.0356	0.0000	0.0000	0.0	0.00
1.65	.0425	0.0000	0.0000	0.0	0.00
1.92	.0489	0.0000	0.0000	0.0	0.00
2.20	.0570	0.0000	0.0000	0.0	0.00
2.48	.0659	0.0000	0.0000	0.0	0.00
2.75	.0724	0.0000	0.0000	0.0	0.00
3.03	.0791	0.0000	0.0000	0.0	0.00
3.30	.0892	0.0000	0.0000	0.0	0.00
3.58	.0987	0.0000	0.0000	0.0	0.00
3.85	.1063	0.0000	0.0000	0.0	0.00
4.13	.1156	0.0000	0.0000	0.0	0.00
4.40	.1270	0.0000	0.0000	0.0	0.00
4.68	.1351	0.0000	0.0000	0.0	0.00
4.95	.1415	0.0000	0.0000	0.0	0.00
5.23	.1530	0.0000	0.0000	0.0	0.00
5.50	.1656	0.0000	0.0000	0.0	0.00
5.78	.1757	0.0000	0.0000	0.0	0.00
6.05	.1863	0.0000	0.0000	0.0	0.00
6.33	.1990	0.0000	0.0000	0.0	0.00
6.60	.2116	0.0000	0.0000	0.0	0.00
6.88	.2243	0.0000	0.0000	0.0	0.00
7.15	.2376	0.0000	0.0000	0.0	0.00
7.43	.2515	0.0000	0.0000	0.0	0.00
7.70	.2636	0.0000	0.0000	0.0	0.00
7.98	.2750	0.0000	0.0000	0.0	0.00
8.25	.2898	0.0000	0.0000	0.0	0.00
8.53	.3053	0.0000	0.0000	0.0	0.00
8.80	.3243	0.0000	0.0000	0.0	0.00

25 YR - 24 HR (cont'd)

9.08	.3436	0.0000	0.0000	0.0	0.00
9.35	.3639	0.0000	0.0000	0.0	0.00
9.62	.3852	0.0000	0.0000	0.0	0.00
9.90	.4080	0.0000	0.0000	0.0	0.00
10.17	.4348	0.0000	0.0000	0.0	0.00
10.45	.4639	0.0000	0.0000	0.0	0.00
10.72	.5023	0.0000	0.0000	0.0	0.00
11.00	.5428	0.0000	0.0000	0.0	0.00
11.27	.6023	0.0000	0.0000	0.0	0.00
11.55	.7383	.0015	.0015	644.9	.97
11.82	1.2190	.0785	.0770	3348.7	54.70
12.10	1.5580	.1881	.1096	6003.7	337.55
12.37	1.6491	.2236	.0356	6964.1	862.60
12.65	1.7160	.2513	.0276	6363.5	1340.50
12.92	1.7628	.2713	.0200	5000.3	1579.44
13.20	1.8004	.2878	.0165	3540.5	1578.70
13.47	1.8346	.3030	.0153	2322.9	1427.85
13.75	1.8618	.3154	.0124	1437.8	1220.06
14.02	1.8883	.3276	.0122	850.1	1013.84
14.30	1.9136	.3395	.0118	484.2	838.46
14.57	1.9368	.3505	.0110	267.5	702.96

SLOPE STABILITY ANALYSIS

(SLICE METHOD)

Given:

Assume Saturated Conditions

	Soil	Rock
WEIGHT	120 lb/ft³	150 lb/ft³
ϕ'	28.3°	36°
c'	288 lb/ft²	0

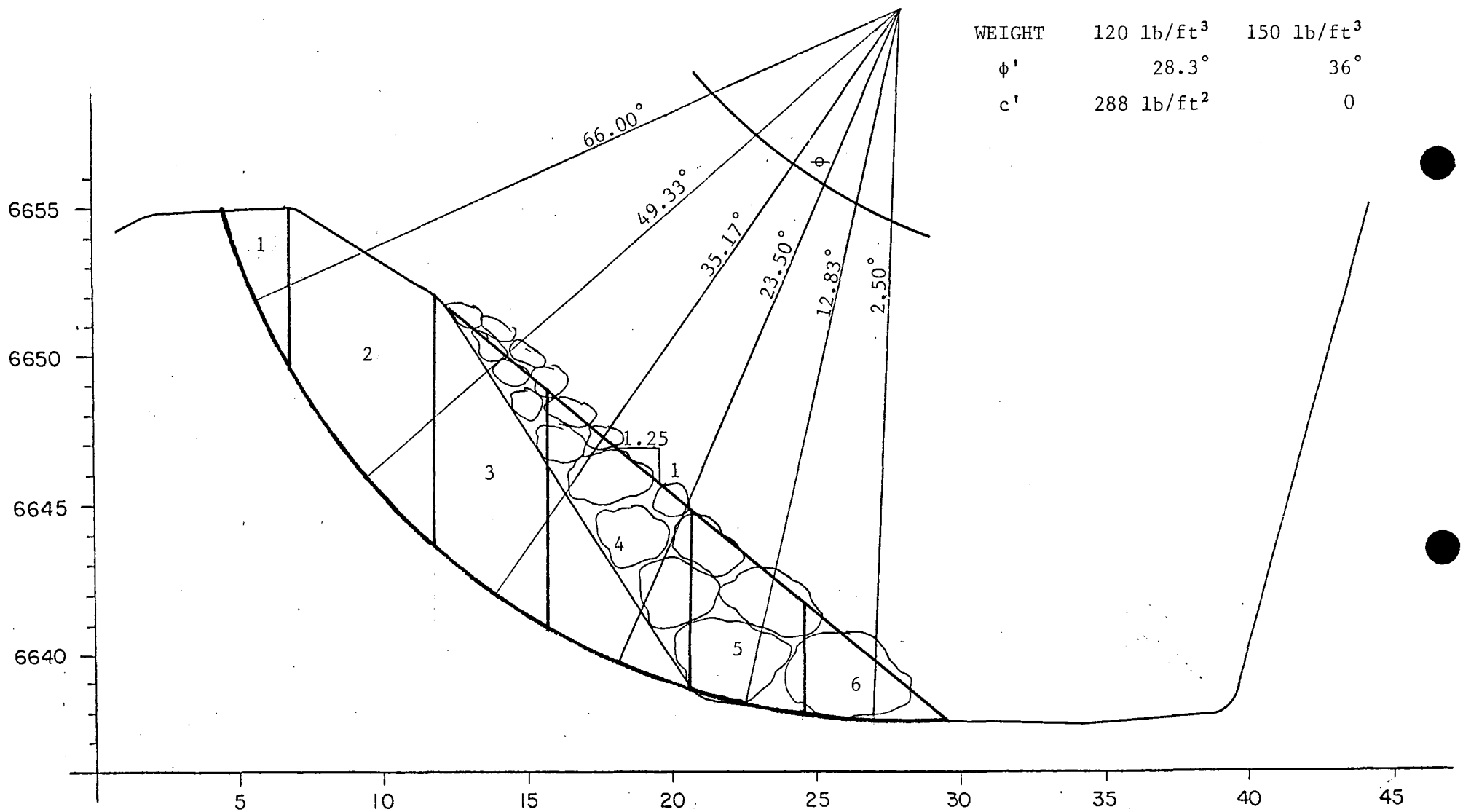

Figure 3

SUMMARY OF COMPUTATIONS

Slice	W (lb)	sinθ	cosθ	T= w sinθ	N= w cosθ	C= c'b/cosθ	U= ub/cosθ	N-U Clay	N-U Rock
1	821	.914	.407	750	334	4387	0	334	
2	4437	.758	.652	3363	2893	3578	387	2506	
3	4212	.576	.818	2426	3445	1690	183	3262	
4	5156	.399	.917	2057	4728	1696	0	4728	
5	3120	.222	.975	693	3042	0			3042
6	1538	.044	.999	68	1537	0			1537
Sums				9357		11351		10830	4579

W = total weight of slice (soil plus water)
U = total hydrostatic force on the bottom of the slice
C = total cohesion force acting on the bottom of the slice
N = total normal force acting on the bottom of the slice
T = the total driving force exerted by each slice
F = the safety factor
ϕ' = angle of internal function
u = average unit pore water pressure (.433 lb/in^2 maximum)
c' = unit cohesion
b = length of the bottom of the slice

$$F = \frac{\sum(C + (N-U)\tan\phi')}{\sum W \sin\theta}$$

$$F = \frac{11351 + 10830(.538) + 4579(.727)}{9357}$$

$$F = 2.19$$