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SOLDIER CREEK COAL CO.

Telephone (801) 637-6360

P.O. Box I
Price, Utah 84501

September 16, 1985

RECEIVED

SEP 20 1985

DIVISION OF OIL
GAS & MINING

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

Re: Final Abatement Plans for NOV N85-4-15-1
Soldier Canyon MIne ACT/007/018

Dear Mr. Braxton:

Enclosed you will find thirteen (13) copies of our final submittal for NOV N85-4-15-1. The necessary changes, per the Division's request as stated in a September 3, 1985 letter, have been made.

Please insert this abatement plan at the end of Section 2.11, Reference and Correspondence, of our Mining and Reclamation Plan.

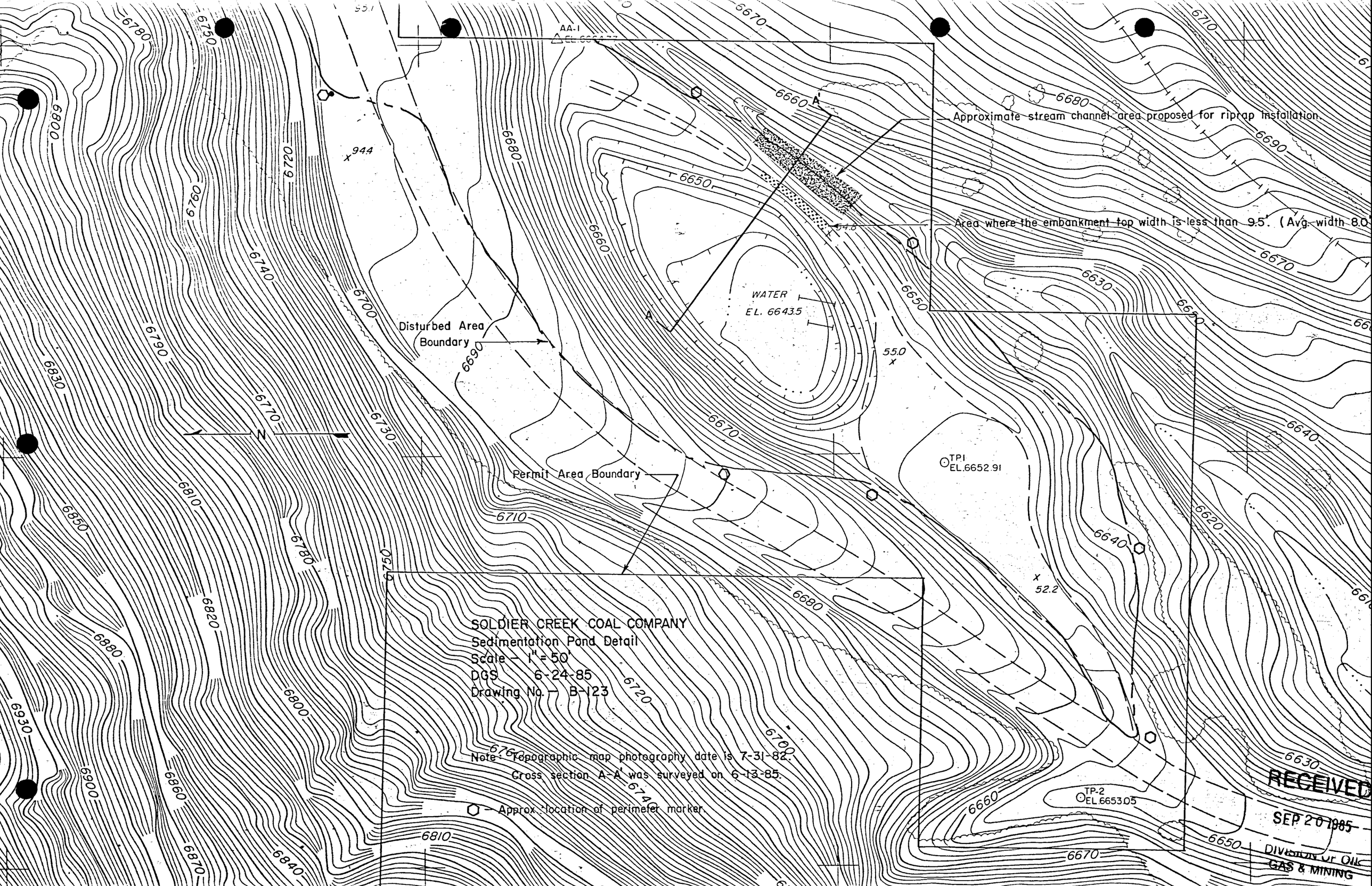
Sincerely,

SOLDIER CREEK COAL COMPANY

J.T. Paluso

J.T. Paluso
Chief Engineer

FILE COPY


AA-1
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
A
A'
N
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
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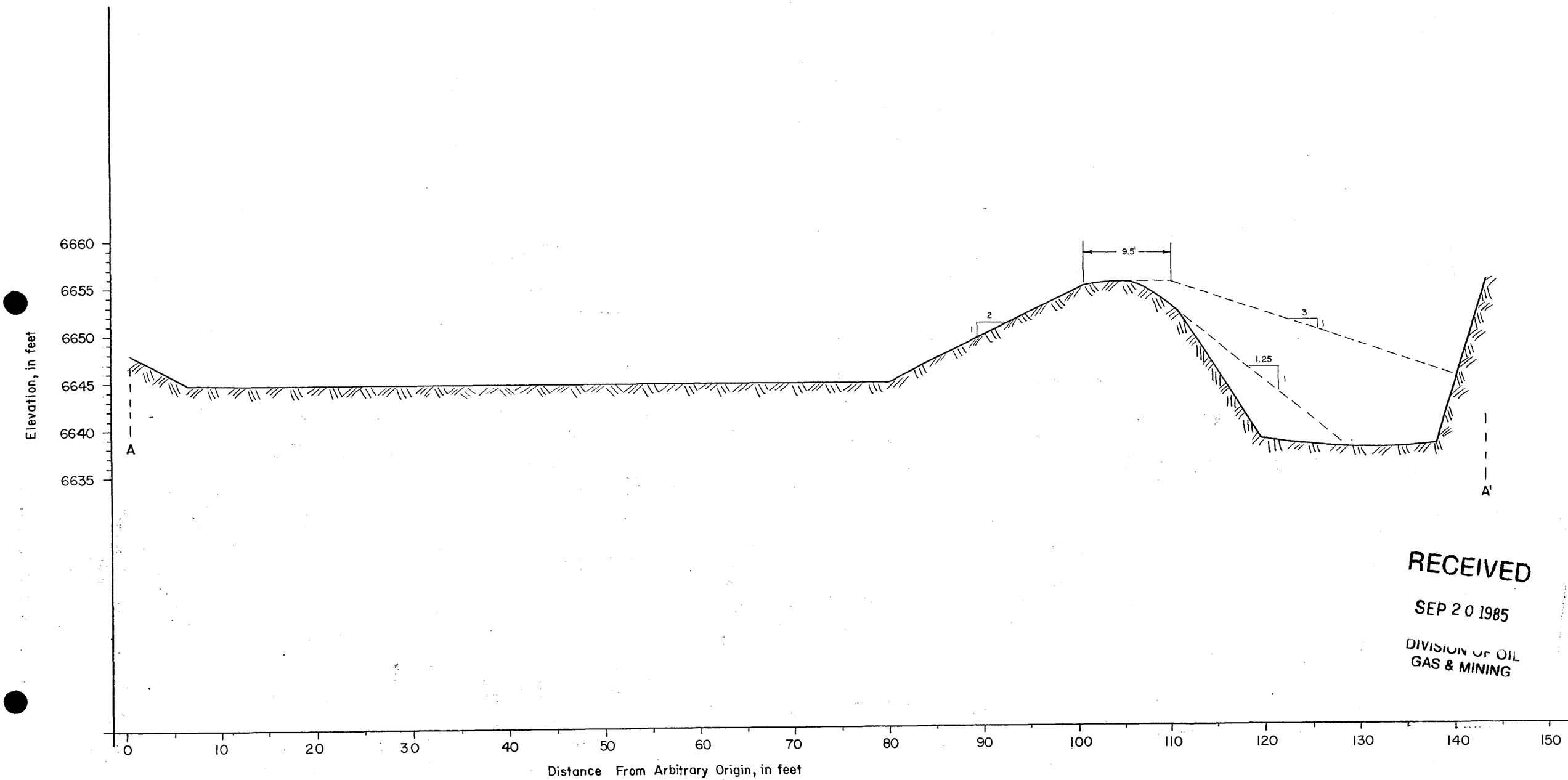

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Figure 1. Cross Section of Sedimentation Pond & Soldier Creek Channel

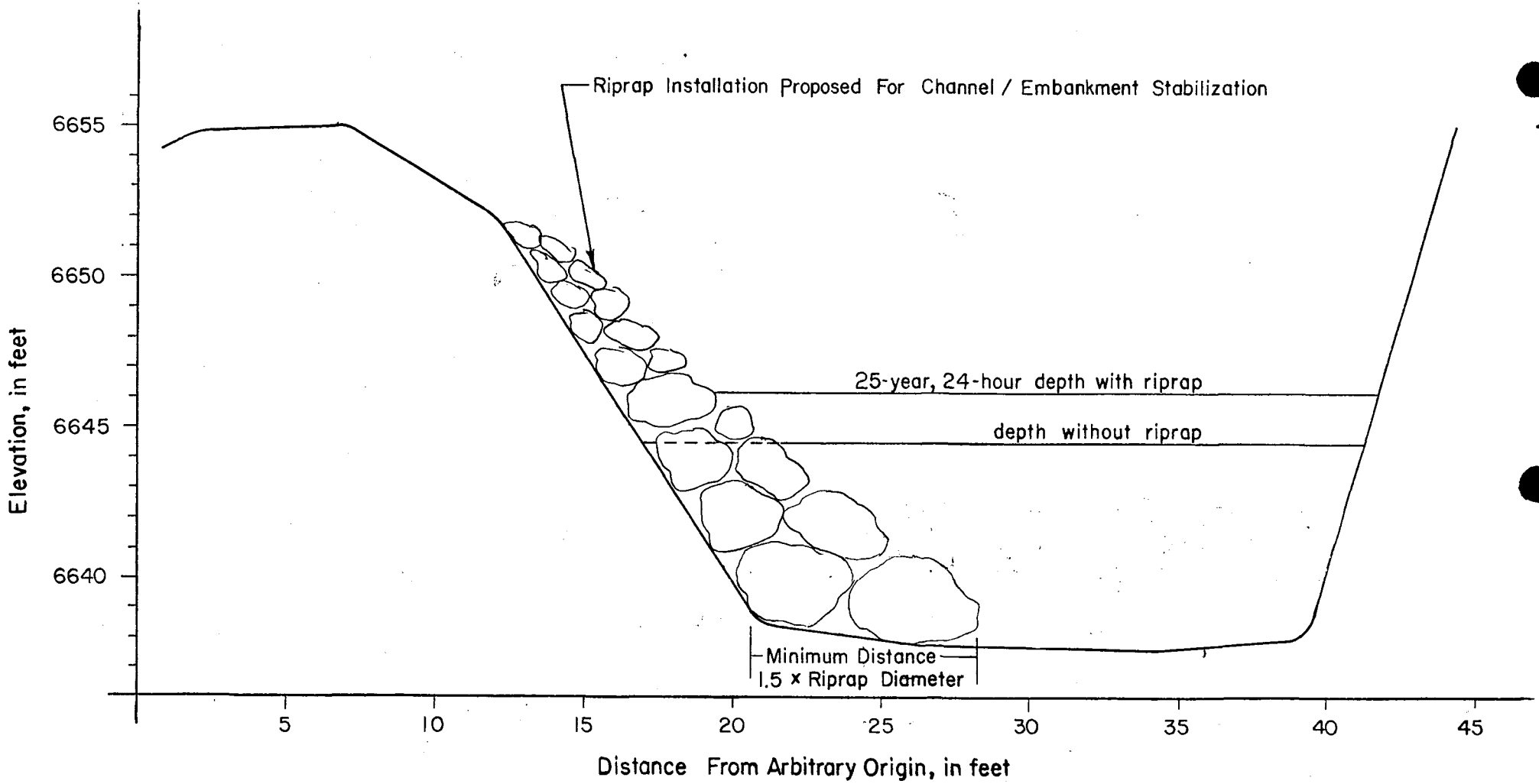

Figure 2. Cross Section Detail of Soldier Creek Channel

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.

Riprap Design

$$V = \frac{Q}{A} \frac{1,579 \text{ cfs}}{133.4 \text{ ft}^2} = 11.84 \text{ fps}$$

Using the Bureau of Reclamation method for erosion control, the recommended size of riprap for this velocity should be 20 inches in diameter. The riprap will be composed of a well graded mixture to insure a well-keyed densely placed installation.

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

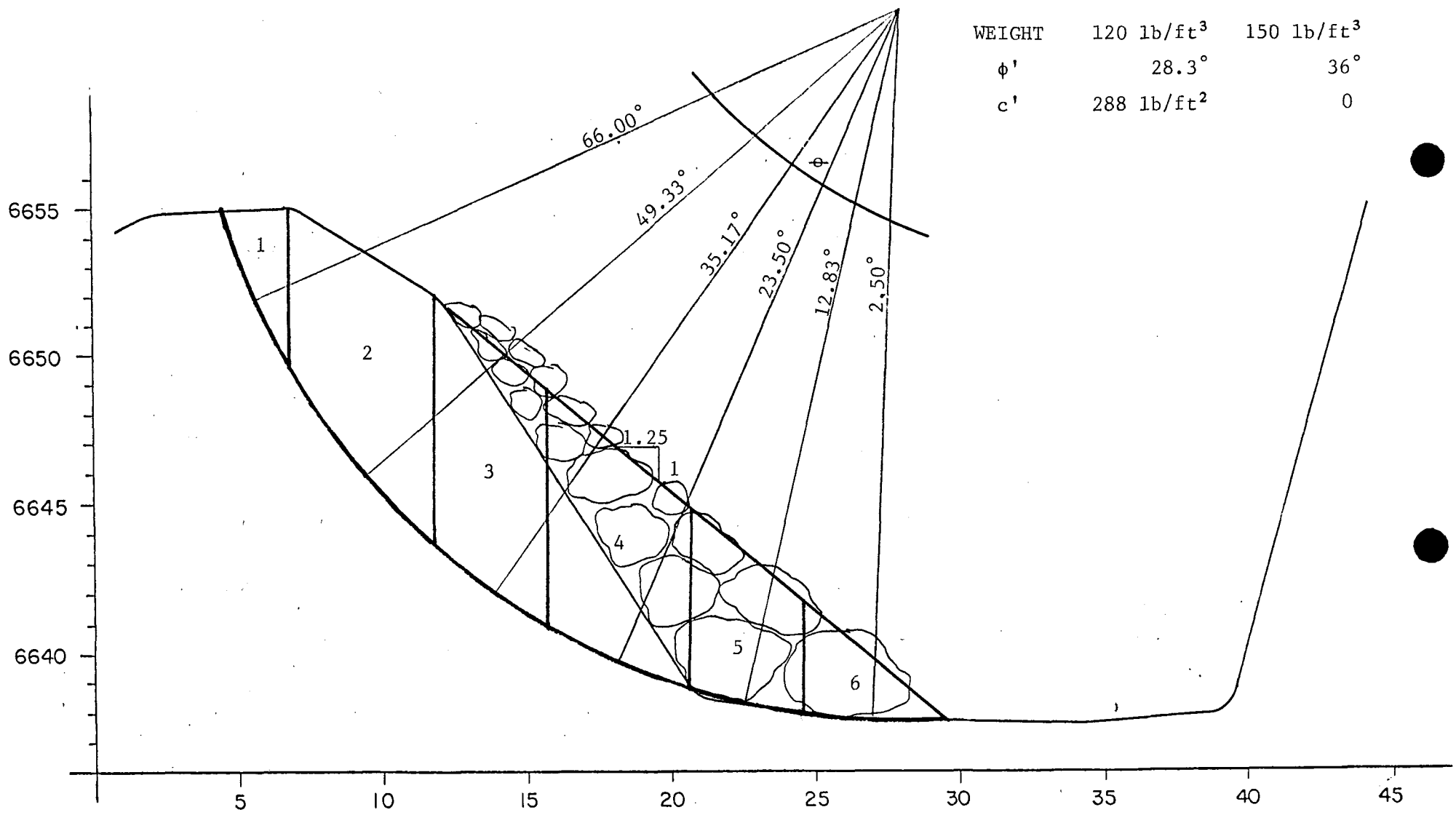

Figure 3

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

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

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

$$F = 2.19$$