Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 1
DESCRIPTION OF THE WORST-CASE RECLAMATION SCENARIO

This is a 175-acre mountain-top-removal site from which six seams of coal will be removed (see Figures B-6 through B-9 at end of worksheets). The spoil will be stored both in temporary and permanent storage. Spoil material is composed of 90% sandstone and 10% shale. The permanent storage will be in two durable rock valley fills neither of which encroaches on streams. The temporary spoil storage will be adjacent to the working face of the highwall. The spoil above the 2,975-foot elevation will be stored in the valley fills while the spoil below elevation 2,975 will be temporarily stored, as shown on attached drawings, and graded over the disturbed mine area for positive drainage.

The worst-case reclamation scenario occurs when the mining of the lower seams (A & B) just begins. At this point, approximately 1,400 feet of highwall is exposed above the B through E seams. It is assumed that all work activities on both hollow fills are current except for spreading topsoil and revegetation. Hollow fills are approximately one-half their designed capacity at this point.

The following sections discuss the reclamation plan for the worst-case scenario.

1. **Structure Removal**

   No buildings are planned for the site; however, three 40-foot storage trailers will need to be removed.

2. **Earth Moving Activities**

   The first step of the earthmoving activities is backfilling of the open highwall. Approximately 1,400 feet of highwall length is exposed at the D-seam level. This highwall will be eliminated by blasting a portion of it to an acceptable grade and pushing the blast material and the stored spoil to reclaim the highwall. Spoil is stored adjacent to the base of the exposed highwall. Prior to topsoil redistribution, the spoil storage areas adjacent to the highwall must be graded to final contours.

   For the road areas, the main road will be permanent. The access road to the ponds will be removed when the ponds are removed.

   Ponds are to be removed by grading the pond berms to original drainage contours.

3. **Revegetation and Topsoil Redistribution**

   Topsoil will be redistributed by loaders and trucks and will be graded by dozers. It is assumed that 140 acres will require topsoil distribution. This includes the mined area and hollow fills. A 6-inch depth amounts to 112,933 cubic yards of topsoil requiring replacement. It is assumed that the topsoil will need to be hauled 650 feet up a 5 percent

WORKSHEET 1 (continued)
DESCRIPTION OF THE WORST-CASE RECLAMATION SCENARIO

grade to the mined area and 600 feet down a 5 percent grade to the hollow-fills. Assume that the trucks will spread 50 percent of the topsoil in dumping and the remaining 50 percent is spread by dozers.

The areas that require re-vegetation and topsoil redistribution are listed below.

Area	Re-vegetation	Topsoil Redistribution
Mining	58.2 Ac	58.2 Ac
Hollow-fill A	37.8 Ac	37.8 Ac
Hollow-fill B	35.6 Ac	35.6 Ac
Basins	4.6 Ac	4.6 Ac
Basin Access Road	1.3 Ac	1.3 Ac
Explosive Area	2.5 Ac	2.5 Ac
	140 Ac	140 Ac

It is assumed that all areas will be re-vegetated using the same type of seed mix recommended in the mining plan and no tree planting will be conducted.

4. Other Reclamation Activities

a. Ponds will need to be maintained and pumped prior to removal.

b. The haul-road is permanent and will need to be maintained until reclamation is complete.

c. Drilling and blasting the high-wall to an acceptable grade is required.

Assumptions: Mining, reclamation and hollowfill construction has progressed as planned.

NOTE: *Worksheets 4A, 7, 11A, 11B, 12, 17* and *18* are not applicable to this example.

Data Source(s): Permit Application.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 2
STRUCTURE DEMOLITION AND DISPOSAL COSTS

Structures to be demolished:

Item	Construction Material	Volume (cubic feet)	Unit Cost Basis ($)	Demolition Cost ($)
		Subtotal		$0

Other items to be demolished (paved roads, conveyors, utility poles, rail spurs, etc.):

Remove 40-foot storage trailers - 3 each @ $500 each = $1,500.

Subtotal = $ 1,500

Debris Handling and Disposal Costs:

Subtotal = $ 0

TOTAL DEMOLITION AND DISPOSAL = $ 1,500

Data Source(s): Permit Application.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 3
MATERIAL HANDLING PLAN SUMMARY

Earthmoving Activity	Volume (LCY)	Origin	Destination	Haul Distance (ft)	Grade * (%)	Equipment To Be Used
1. Grade spoil, ½ blasted rock, into pit	39,638	Highwall	Highwall	140	(-)30	D9R with SU-Blade
2. Grade spoil from temporary storage highwall	63,519	Storage	Highwall	100	30	D9R with SU-Blade
3. Grade temporary spoil storage area	18,563	Storage	Storage Area	100	0	D9R with SU-Blade
4. Load topsoil	53,724	Storage	Trucks			992G Loader
5. Haul topsoil	53,724	Storage	Mined Area	650	5	773D Truck
6. Load topsoil	59,209	Storage	Trucks			992G Loader
7. Haul topsoil	59,209	Storage	A, B Hollow-fill	600	(-)5	773D Truck
8. Spread topsoil	56,467	Site	Disturbed Area	100	15	D9R with SU-Blade
9. Remove ponds	11,500	Berm	Pond	100	0	D9R with SU-Blade
10. Remove pond access roads	1,407	Fill Areas	Cut Areas	100	(-)5	D9R with SU-Blade
11. Final grading	140 ac**				30**	D6R with S-Blade

* Record grade resistance (% grade) here.
** 98.9 ac (58.2 ac + [(37.8 ac + 35.6 ac)/2]) are steep slopes of hollow fills and the regraded, reduced highwall area (30% grade); the remaining 45.1 acres are contour graded (0% grade).

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 4B
EARTHWORK QUANTITY

1. **Grade blasted material. Assume ½ of the material is casted in blasting.**
   Material Volume = ½ (½ x 58' x 32.95' x 1400' ÷ 27 ft^3 /yd^3) = 24,774 yd^3x 1.60 swell = 39,638 yd^3

2. **Grade spoil peaks in temporary storage to highwall at lower seams. (See Figure B-8 at end of worksheets.)**

   Material Volume = 2 levels x ½ (35' x 35') x 1400' ÷ 27 ft^3/yd^3 = 63,519 yd^3

3. **Grade temporary spoil pile left after high-wall back-filled.**

   Material Volume = 1.0' (Depth) x 358' (Area) x 1400 ÷ 27 ft^3/yd^3 = 18,563 yd^3

4. **Load and haul topsoil.**

   Material Volume/hollow fill A & B = 73.4 ac x 43,560 ft2/ac x 0.5 ft ÷ 27 ft^3/yd^3 = 59,209 yd^3

   Material Volume/Mining, Basins, Ponds, etc. = 66.6 ac x 43,560 ft^2 /ac x 0.5 ft ÷ 27 ft^3/yd^3 = 53,724 yd^3

5. **Spread topsoil. Assume ½ of topsoil is spread by trucks; ½ by dozers.**

   Material Volume = 112,933 yd^3 ÷ 2 = 56,467 yd^3

6. **Pond removal. Remove ponds by grading to original contours.**

Pond	Volume	Area
021	6.8 ac-ft	35,625 ft^2
022	11.9	63,000
023	6.8	35,625
024	3.3	21,000
Totals	28.8 ac-ft	155,250 ft^2

   Estimate Volume as a 2-ft depth over pond area.
   Material Volume = 155,250 ft^2 x 2 ft ÷ 27 ft^3/yd^3 = 11,500 yd^3

7. **Pond access road removal.**
   Material Volume = 3,800 ft x 10 ft x l ft ÷ 27 ft^3/yd^3 = 1,407 yd^3

Data Source(s): Permit Application.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5A
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade spoil, ½-blasted rock, into open pit.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
The dozer is used to push ½ of blasted rock into the open pit. The material will be pushed 140 feet down (-) 30% effective grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x .70 (material factor) x .83 (efficiency factor) x 1.25 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .49

Net Hourly Production = 950 (normal hourly production) LCY/hr x .49 (operating adjustment factor) = 466 LCY/hr

Hours Required = 39,638 (volume to be moved) LCY ÷ 466 (net hourly production) LCY/hr = 85 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90

** Normal dozing with straight and U-blades use 1.00.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5B
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade spoil from temporary storage to open pit.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
The dozer is used to push spoil 100 feet up a + 30% effective grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x .70 (material factor) x .83 (efficiency factor) x 1.25 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .49

Net Hourly Production = 1,250 (normal hourly production) LCY/hr x .49 (operating adjustment factor) = 613 LCY/hr

Hours Required = 63,519 (volume to be moved) LCY ÷ 613 (net hourly production) LCY/hr = 104 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90

** Normal dozing with straight and U-blades use 1.00.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5C
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade temporary spoil storage area to final reclaimed contours.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
The dozer is used to grade spoil by pushing 100 feet at a 0% effective grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x .70 (material factor) x .83 (efficiency factor) x 1.00 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .39

Net Hourly Production = 1,250 (normal hourly production) LCY/hr x .39 (operating adjustment factor) = 488 LCY/hr

Hours Required = 18,563 (volume to be moved) LCY ÷ 488 (net hourly production) LCY/hr = 38 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90

** Normal dozing with straight and U-blades use 1.00.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5D
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Spread topsoil.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
The dozer is used to spread topsoil 100 feet up a + 15% effective grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.20 (material factor) x .83 (efficiency factor) x .75 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .50

Net Hourly Production = 1,250 (normal hourly production) LCY/hr x .50 (operating adjustment factor) = 625 LCY/hr

Hours Required = 56,467 (volume to be moved) LCY ÷ 625 (net hourly production) LCY/hr = 90 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90

** Normal dozing with straight and U-blades use 1.00.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5E
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Remove ponds by grading each berm to original contours.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer will push pond berm 100 feet to original drainage contours over mostly flat (0%) grades.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.20 (material factor) x .83 (efficiency factor) x 1.00 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .67

Net Hourly Production = 1,250 (normal hourly production) LCY/hr x .67 (operating adjustment factor) = 838 LCY/hr

Hours Required = 11,500 (volume to be moved) LCY ÷ 838 (net hourly production) LCY/hr = 14 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90

** Normal dozing with straight and U-blades use 1.00.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 5F
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Remove access road to ponds.

Characterization of Dozer Used (type, size, etc.):
D9R with SU-blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer used to grade road and ditches to original contours. Push distance, 100 feet, (-)5% effective grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.10 (material factor) x .83 (efficiency factor) x 1.1 (grade factor)

x .90 (weight correction factor*) x 1.00 (production method/blade factor**) x 1.00 (visibility factor) x 1.00 (elevation factor**) = .68

Net Hourly Production = 1,250 (normal hourly production) LCY/hr x .68 (operating adjustment factor) = 850 LCY/hr

Hours Required = 1,407 (volume to be moved) LCY ÷ 850 (net hourly production) LCY/hr = 2.0 hr

* Weight Factor = 2,300 lb/yd^3 ÷ 2,550 lb/yd^3 = 0.90.

** Normal dozing with straight and U-blades use 1.00.

Total Dozer Hours from all *Worksheets 5A - F*: 85 + 104 + 38 + 90 + 14 + 2 = 333.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 6
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE--GRADING

Earthmoving Activity:
Final grading

Characterization of Dozer Used (type, size, etc.):
D6R - 11 ft. wide straight (S) blade (effective width with blade overlap = 10 ft.)

Description of Dozer Use (% grade, effective blade width, operating speed, etc.):
1. Grading backfilled spoil on 98.9 acres of steeper slopes at 30% grade but backtracking up-slope for net 0%; 2. Contour grading of backfill and disturbed areas on 45.1 acres at 0% grade.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.0 (material factor) x .83 (efficiency factor) x 1.00 (grade factor)

x 1.00 (weight correction factor) x 1.00 (production method/blade factor) x 1.00 (visibility factor) x 1.00 (elevation factor) = .62

Hourly Production = 3.0 (average speed) mi/hr x 10 (effective blade width) ft x 5,280 ft/mi x 1 ac/43,560 ft^2

= 3.6 ac/hr

Net Hourly Production = 3.6 (hourly production) ac/hr x .62 (operating adjustment factor) = 2.23 ac/hr

Hours Required = 144 (area to be graded) ac ÷ 2.23 (net hourly production) ac/hr = 65 hr

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 8A
PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE

Earthmoving Activity:
Load topsoil on trucks to be hauled to mined area.

Characterization of Loader Use (type, size, etc.):
992G with Large Standard Spade-edge, 16 CY rock bucket, 15.3 ft. dump clearance

Description of Loader Use (origin, destination, grade, haul distance, etc.):
Load topsoil in storage area.

Productivity Calculations:

Cycle time = _____ (haul time (loaded)) min + _____ (return time (empty)) min + .7 (basic cycle time) min = .7 min

Net Bucket Capacity = 16.0 (heaped bucket capacity) LCY x 1.0 (bucket fill factor *) = 16.0 LCY

Hourly Production = 16.0 (net bucket capacity) LCY ÷ .7 (cycle time) min x .75 (efficiency factor) x 60 min/hr = 1,029 LCY/hr

Hours Required = 53,724 (volume to be moved) LCY ÷ 1,029 (hourly production) LCY/hr = 52 hr**

* See loader section of equipment manual.

** NOTE: Use 57 hours to match trucks (see *Worksheet 9A*).

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 8B
PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE

Earthmoving Activity:
Load topsoil on trucks to be hauled to mined area.

Characterization of Loader Use (type, size, etc.):
992G with Large Standard Spade-edge, 16 CY rock bucket, 15.3 ft. dump clearance

Description of Loader Use (origin, destination, grade, haul distance, etc.):
Load topsoil in storage area.

Productivity Calculations:

Cycle time = _____ (haul time (loaded)) min + _____ (return time (empty)) min + .7 (basic cycle time) min = .7 min

Net Bucket Capacity = 16.0 (heaped bucket capacity) LCY x 1.0 (bucket fill factor *) = 16.0 LCY

Hourly Production = 16.0 (net bucket capacity) LCY ÷ .7 (cycle time) min x .75 (efficiency factor) x 60 min/hr = 1,029 LCY/hr

Hours Required = 59,209 (volume to be moved) LCY ÷ 1,029 (hourly production) LCY/hr = 58 hr

* See loader section of equipment manual.

NOTE: Total Loader Hours from *Worksheets 8A* and *B* = 57 + 58 = 115

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 9A
PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE

Earthmoving Activity:
Haul topsoil from temporary storage to mined area.

Characterization of Truck Use (type, size, etc.):
777D Truck struck capacity = 60.1 CY, heaped capacity = 78.6 CY, 69.35 CY average capacity

Description of Truck Use (origin, destination, grade, haul distance, capacity, etc.):
Haul topsoil from storage to disturbed area. Haul and return distance are both 650 feet over + 5% effective grade.

Productivity Calculations:

No. Loader Passes/Truck = 69.35 (truck capacity *) LCY ÷ 16.0 (loader bucket net capacity) LCY = 4 (round down to nearest whole number) passes

Net Truck Capacity = 16.0 (loader bucket net capacity) LCY x 4 (no. loader passes/truck) = 64 LCY

Loading Time/Truck = .7 (loader cycle time (from *Worksheet 8* or *10*)) min x 4 (no. loader passes/truck) = 2.8 min

Truck Cycle Time = .9 (haul time) min + .45 (return time) min + 2.8 (loading time) min + 2.0 (dump and maneuver time) min = 6.15 min

No. Trucks Required = 6.15 (truck cycle time) min ÷ 2.8 (total loading time) min = 2.20 (use 2) trucks

Production Rate = 64 (net truck capacity) LCY x 2 (no. trucks) ÷ 6.15 (truck cycle time) min = 20.8 LCY/min

Hourly Production = 20.8 (production rate) LCY/min x 60 min/hr x .75 (efficiency factor) = 936 LCY/hr

Hours Required = 53,724 (volume to be moved) LCY ÷ 936 (hourly production) LCY/hr = 57 hr

* Use the average of the struck and heaped capacities.

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 9B
PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE

Earthmoving Activity:
Haul topsoil from temporary storage to Hollowfills A and B.

Characterization of Truck Use (type, size, etc.):
777D Truck struck capacity = 60.1 CY, heaped capacity = 78.6 CY, 69.35 CY average capacity.

Description of Truck Use (origin, destination, grade, haul distance, capacity, etc.):
Haul topsoil from storage to disturbed area. Haul distance is 600 ft. over (-) 5% effective grade; return is 600 ft. at 0% effective grade.

Productivity Calculations:

No. Loader Passes/Truck = 69.35 (truck capacity *) LCY ÷ 16.0 (loader bucket net capacity) LCY = 4 (round down to nearest whole number) passes

Net Truck Capacity = 16.0 (loader bucket net capacity) LCY x 4 (no. loader passes/truck) = 64 LCY

Loading Time/Truck = .7 (loader cycle time (from *Worksheet 8* or *10*)) min x 4 (no. loader passes/truck) = 2.8 min

Truck Cycle Time = .27** (haul time) min + .45 (return time) min + 2.8 (loading time) min + 2.0 (dump and maneuver time) min = 5.52 min

No. Trucks Required = 5.52 (truck cycle time) min ÷ 2.8 (total loading time) min = 1.97 (use 2) trucks

Production Rate = 64 (net truck capacity) LCY x 2 (no. trucks) ÷ 5.52 (truck cycle time) min = 23.2 LCY/min

Hourly Production = 23.2 (production rate) LCY/min x 60 min/hr x .75 (efficiency factor) = 1,044 LCY/hr

Hours Required = 59,209 (volume to be moved) LCY ÷ 1,044 (hourly production) LCY/hr = 57 (use 58 to match loader) hr

* Use the average of the struck and heaped capacities.
** 600 ft / (25 MPH X 88 FPM/MPH) = .27 min.

NOTE: Total Truck Hours from *Worksheets 9A* and *B* = 57 + 58 = 115

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 29.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 13
SUMMARY CALCULATION OF EARTHMOVING COSTS

Equipment *	Ownership & Operation Cost ($/hr)	Labor Cost ($/hr)	Total Hours Required **	Total Cost *** ($)
D9R-SU Dozer	113.22	14.56	333	42,551
D6R-S Dozer	45.79	14.56	333	20,097
992G Loader	216.78	15.56	115	26,719
777D Truck	170.07	12.90	115	21,042
777D Truck	170.07	12.90	115	21,042
			Grand Total	$131,451

* Include all necessary attachments and accessories for each item of equipment. Also, add support equipment such as water wagons and graders to match total project time as appropriate.

** Account for multiple units in truck and/or scraper teams.

*** To compute Total Cost: Add Ownership & Operation Cost and Labor Cost columns then multiply by Total Hours Required column.

Data Source(s): PRIMEDIA Information, Inc., Cost Reference Guide for Construction Equipment, 1999.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 14
REVEGETATION COSTS

Name and Description of Area To Be Revegetated:
All disturbed acreage requires seeding; no tree planting.

Description of Revegetation Activities:
Hydroseeding will be used because of the steep slope conditions.

Cost Calculation for Individual Revegetation Activities:

Initial Seeding

140 ac (area to be seeded) x ($ 180 /ac (seedbed preparation) + $ 720 /ac (seeding, fertilizing & mulching)) = $ 126,000

Planting Trees and Shrubs

_____ ac (area to be planted) x ($ _____ /ac (planting) + $ _____ /ac (herbicide treatment)) = $ _____

Reseeding

140 ac (area to be seeded & unreleased disturbed areas) x .50 (failure rate*) x ($ 180 /ac (seedbed preparation) + $ 720 /ac (seeding, fertilizing & mulching)) = $ 63,000

Replanting Trees and Shrubs

_____ ac (area to be planted & unreleased disturbed areas) x _____ (failure rate*) x ($ _____ /ac (planting) + $ _____ /ac (herbicide treatment)) = $ _____

Other Necessary Revegetation Activities

(Examples of other activities that may be necessary include soil sampling, irrigation, and rill and gully repair. Describe each activity and provide a cost estimate with documentation. Use additional worksheets if necessary.)

Other Costs: $_____

TOTAL REVEGETATION COST = $ 189,000

* **Assumes a 50% failure rate for reseeding based on historic AML costs.**

Data Source(s): Permit Application; Historic AML Costs.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 15A
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Description of Reclamation, Repair or Pollution Abatement Activity:

Maintenance, pumping, and treatment of ponds.

Assumptions:

Volume = 28.8 ac-ft.

Cost Estimate Calculations:

28.8 ac-ft x 43,560 ft^2 /ac. x \$0.15/10 ft^3 = \$18,818

TOTAL COSTS = \$ 18,818

Other Documentation or Notes:
(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

Data Source(s): Permit Application; Historic AML Costs.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 15B
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Description of Reclamation, Repair or Pollution Abatement Activity:

Haul road maintenance during reclamation.

Assumptions:

Haul road = 3.5 ac.

Cost Estimate Calculations:

3.5 ac x $600 per ac = $2,100

TOTAL COSTS = $ 2,100

Other Documentation or Notes:
(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

Data Source(s): Permit Application; Historic AML Costs.

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 15C
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Descriptions of Reclamation, Repair or Pollution Abatement Activity*:

Drilling and blasting

Assumptions:

Quantities - See *Worksheet 15D*

Drill - (D75KS) = $ 197.28/hr
Driller Cost = $20.65/hr
Blaster Cost = $22.65/hr
Drilling Hours Required = 185.5 hrs

Cost Estimate Calculations:

	(Ownership Cost)	(Driller Cost)	(Blaster Cost)	
Drilling Cost =	(185.5 hr x $197.28/hr)	+ (185.5 hr x $20.65/hr)	+ (185.5 hr x $22.65/hr)	=
	$36,595	+$3,831	+ $4,202	= $44,628

3 Drill bits - $2,094/ea = $6,282**
Explosives - $0.2024/1b x 33,540 lb = $6,788**
Blasting caps - $3.30ea X 936 holes = $3,088

** 1986 costs adjusted for inflation: Drill bits cost = $1,500 X (5997/4294.75) = $2,094; Explosives cost= $0.145 X 1.396 = $0.2024/lb.

TOTAL = $ $60,786

Other Documentation or Notes:
(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

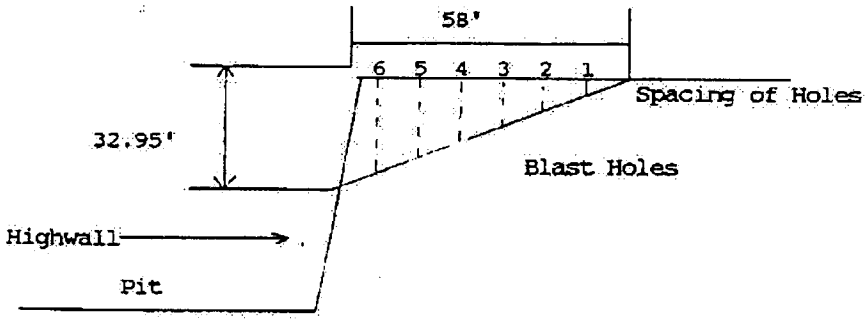
See next page.

GRAND TOTAL FROM WORKSHEETS 15A, B and C = $18,818 + $2,100 + $60,786 = $81,704

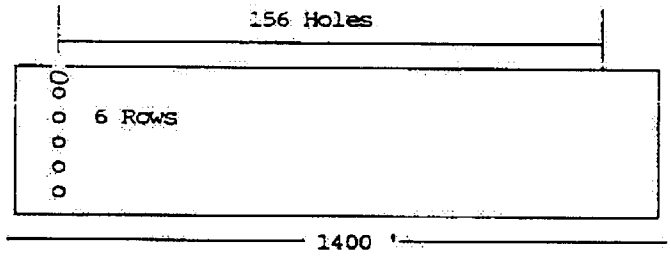
Data Source(s): Dodge, Construction Cost Guide, 1986; PRIMEDIA Information, Inc., Cost Reference Guide for Construction Equipment, 1999; R.S. Means, Building Construction Cost Data, 1998; E. I. duPont deMemours & Co., Blaster's Handbook the Engineering News Record website (www.enr.com).

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 15C (continued)
OTHER RECLAMATION ACTIVITY COSTS



Drill Hole	1	2	3	4	5	6	Total
Distance to Highwall Face (in feet)	54	45	36	27	18	9	
Drill Hole Depth (feet)	5	10.2	15.3	20.5	25.6	30.7	107
Explosive in Column (lbs.)	10	21	31	42	52	63	219



Total No./Holes = 1,400 ft ÷ 9 ft = 156 Holes x 6 Rows = 936 Holes

Total Feet of Drilling Required:
107 ft/6 holes x 156 = 1 6,692 ft
Avg. Drilling Rate = 1.5 ft/min
Time = 16,692 ft ÷ 1.5 ft/min ÷ 60 min/hr
= 185.5 hr

Total Amount of Explosives Required:
215 lb /6 holes x 156 = 33,540 lbs

Project: Mountain Top Example
Date: 12/02/99
Prepared By: R.R. Bond

WORKSHEET 16
RECLAMATION BOND SUMMARY SHEET

1.	Total Facility and Structure Removal Costs	$ 1,500	
2.	Total Earthmoving Costs	$ 131,451	
3.	Total Revegetation Costs	$ 189,000	
4.	Total Other Reclamation Activities Costs	$ 81,704	
5.	Total Direct Costs (sum of Lines 1 through 4)	$ 403,655	
6.	*Inflated Total Direct Costs* (Line 5 x inflation factor *)		$ 448,703
7.	Mobilization/Demobilization (5 % of Line 6) (1% to 10% of Line 6)	$ 22,435	
8.	Contingencies (5 % of Line 6) (3% to 5% of Line 6)	$ 22,435	
9.	Engineering Redesign Fee (6 % of Line 6) (2.5% to 6% of Line 6)	$ 26,922	
10.	Contractor Profit/ Overhead (26 % of Line 6) (see Graph 1)	$ 116,663	
11.	Project Management Fee (3.6 % of Line 6) (see Graph 2)	$ 16,153	
12.	*Total Indirect Costs* (sum of Lines 7 through 11)		$ 204,608
13.	GRAND TOTAL BOND AMOUNT (sum of Lines 6 and 12)		$ 653,310 (round to $ 653,000)

---

* Inflation factor = $\frac{\text{ENR Construction Cost Index (CCI) for current mo/yr}}{\text{ENR CCI for mo/yr 5 years prior to current mo/yr}} = \frac{6008}{5405} = 1.1116$

Identify current month/year used in formula above: 4/99
Identify prior month/year used in formula above: 4/94

ENR = *Engineering News Record*, McGraw-Hill Construction Information Group, New York, NY; http://www.enr.com.

Formula assumes permit term or time until next bond adequacy evaluation is 5 years. Adjust timeframe as necessary.

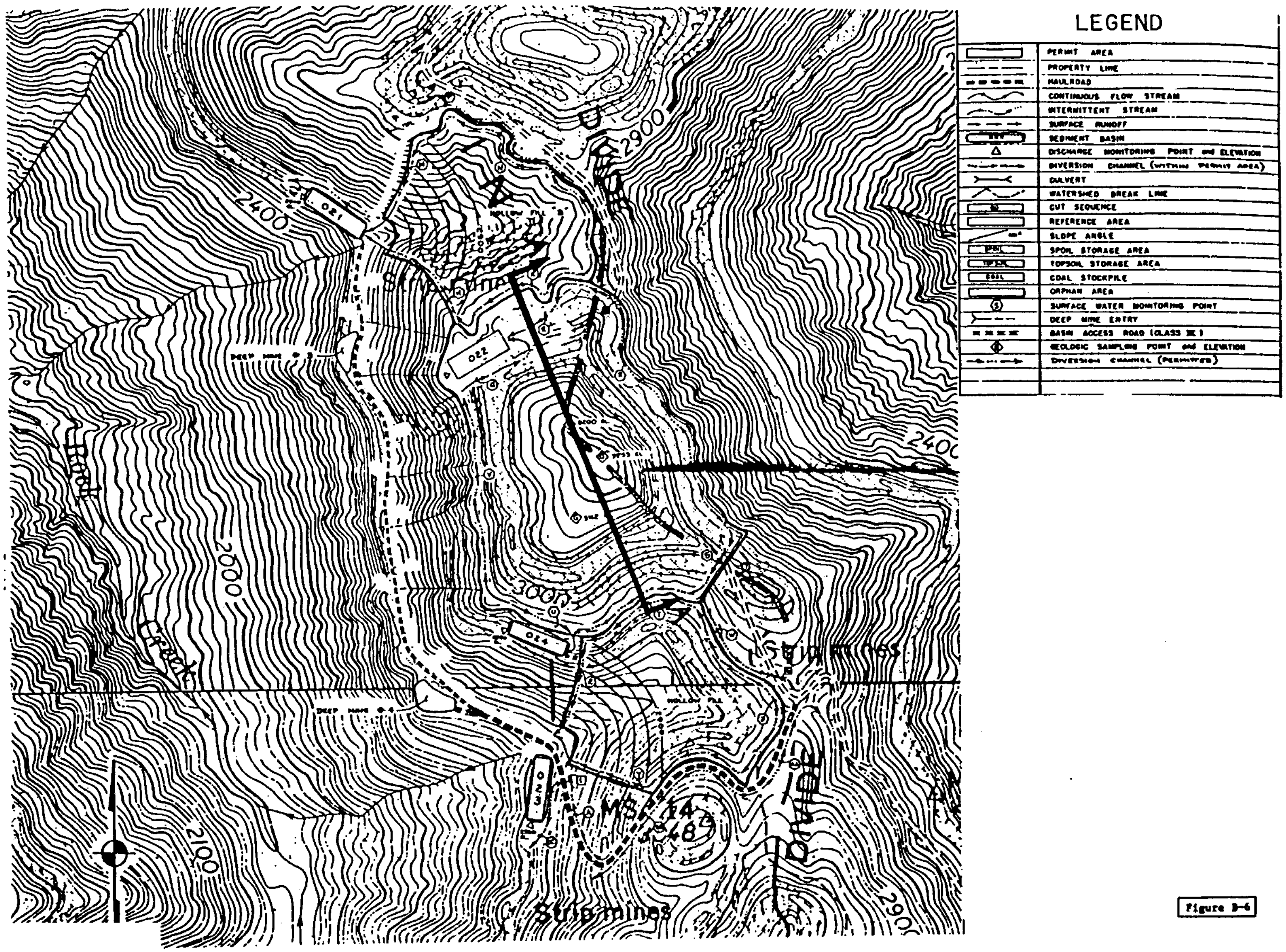

LEGEND
PERMIT AREA
PROPERTY LINE
HAULROAD
CONTINUOUS FLOW STREAM
INTERMITTENT STREAM
SURFACE RUNOFF
SEDIMENT BASIN
DISCHARGE MONITORING POINT and ELEVATION
DIVERSION CHANNEL (WITHIN PERMIT AREA)
CULVERT
WATERSHED BREAK LINE
CUT SEQUENCE
REFERENCE AREA
SLOPE ANGLE
SPOIL STORAGE AREA
TOPSOIL STORAGE AREA
COAL STOCKPILE
ORPHAN AREA
SURFACE WATER MONITORING POINT
DEEP MINE ENTRY
BASIN ACCESS ROAD (CLASS III)
GEOLOGIC SAMPLING POINT and ELEVATION
DIVERSION CHANNEL (PERIMETER)
2400
2900
2000
2100
3000
Rock
Creek
Strip mines
Divide
021
022
024
023

Figure B-6

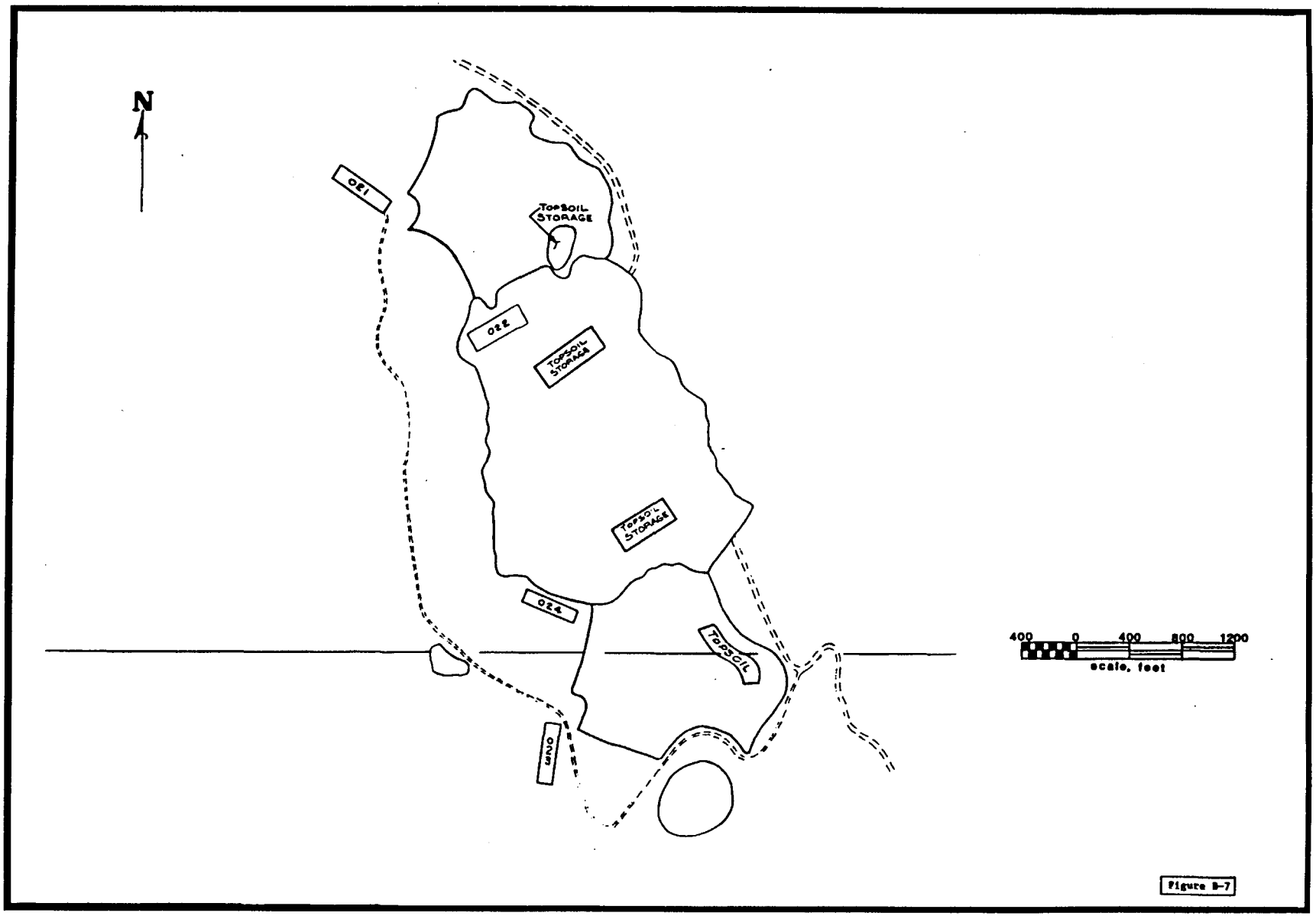
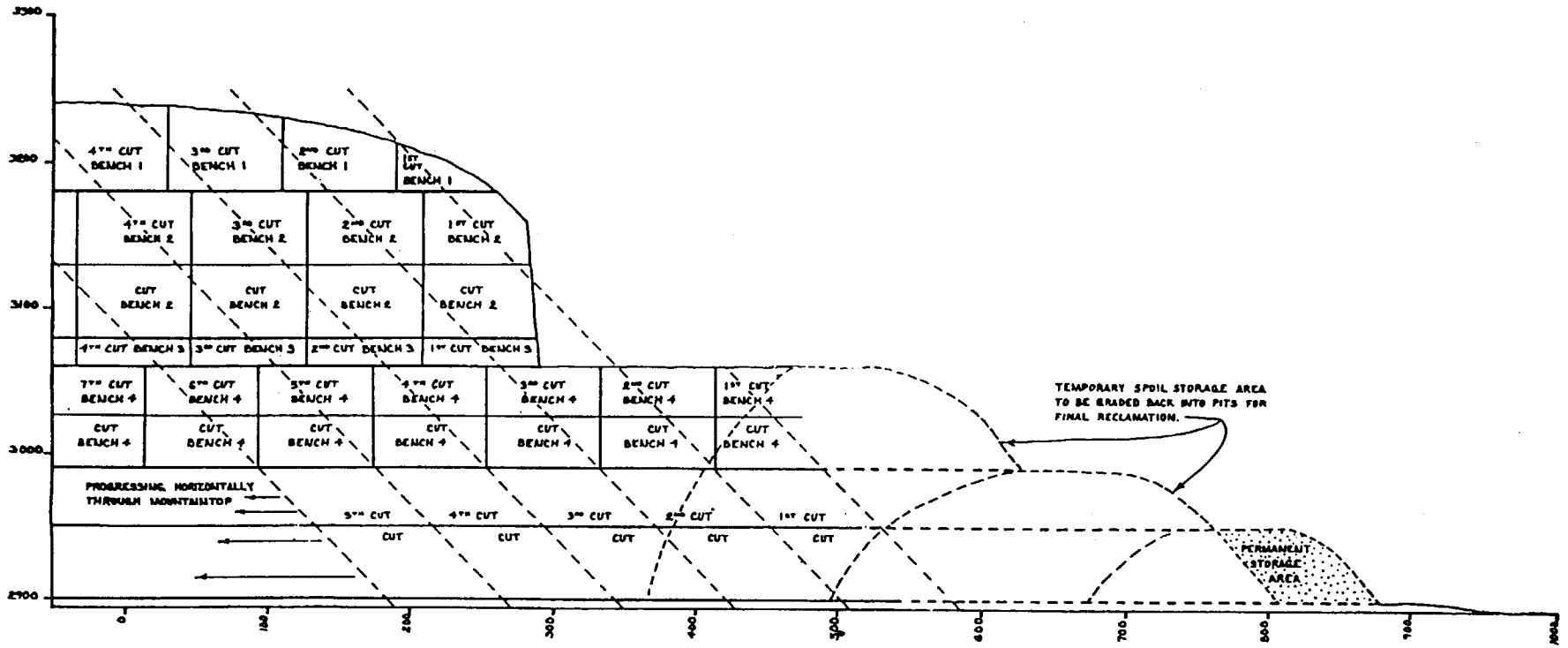
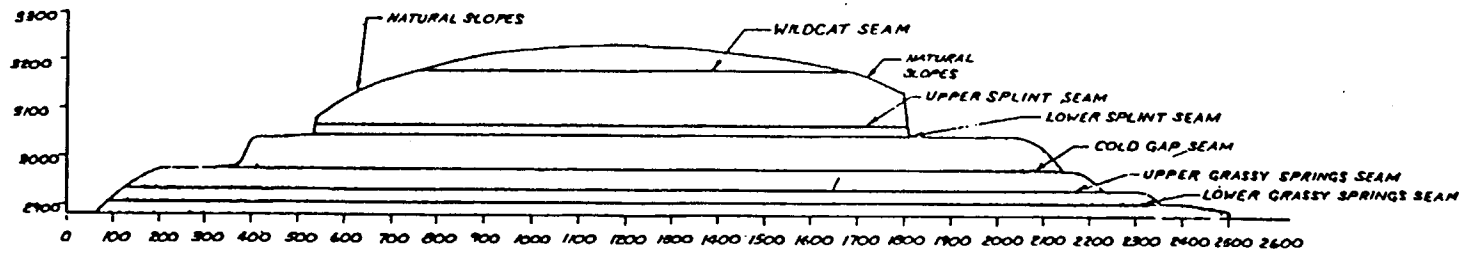

N
OZ1
TOPSOIL STORAGE
OZ2
TOPSOIL STORAGE
TOPSOIL STORAGE
OZ4
TOPSOIL
OZ3
400 0 400 800 1200
scale, feet

Figure B-7

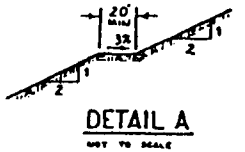


LOCATION & SEQUENCE OF CUTS

Figure B-8

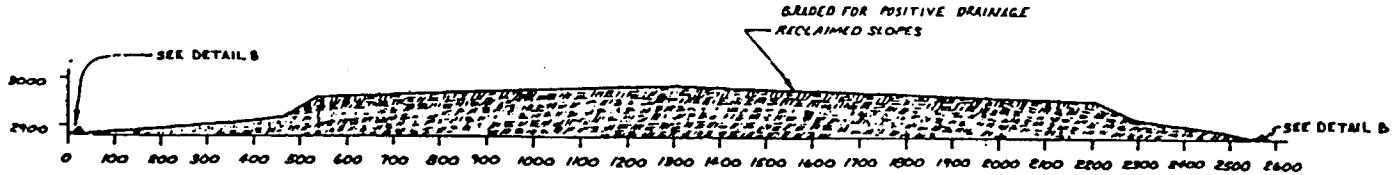


PRE-MINING AREA SECTION "A-A"



DETAIL A

DETAIL B



POST MINING AREA SECTION "A-A"

Figure B-9

BOND AMOUNT COMPUTATION

Applicant: Processing Plant Example

Permit Number: Example No. 5 **Permitted Acreage:** 31.0

Bonding Scheme (permit area, incremental, cumulative): permit area

If Incremental:

Increment Number: _____

Increment Acreage: _____

If Cumulative:

Acres previously authorized for disturbance: _____

New acres proposed for disturbance: _____

Type of Operation: Coal Processing

Location: USA

Prepared by: P. T. Bond

Date: 12/02/99

Total Bond Amount: $ 226,000

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 1
DESCRIPTION OF THE WORST-CASE RECLAMATION SCENARIO

The coal-processing operation consists of a processing plant, a rail loading facility, and a refuse disposal area. The processing/loading site covers a disturbed area of approximately 9 acres, and the refuse disposal site covers approximately 22 acres. (Figures B-10 through B-13 pertain to this example and can be found at the end of the worksheets.)

The processing/loading operation consists of: a raw coal stockpile, an underground conveyor to the plant, the processing plant, and conveyors from the plant to the refuse stockpile and the clean coal silo/stockpile. Support structures for the operation include: scale house/office, scale, and shop building. Surface drainage control structures include diversion ditches, two storage basins that supply water to the plant, and sedimentation pond No. 001.

Refuse from the processing operation is transported via a public road a distance of approximately 1.4 miles to the refuse disposal area. The refuse disposal site is an abandoned surface coal mine. The spoil from the abandoned mine is salvaged, segregated, stored along the perimeter of the refuse area, and used as a topsoil substitute to cover the refuse. Refuse is compacted in lifts, and topsoil substitute is graded to cover the completed lifts with 4 feet of material. Sedimentation pond No. 002 provides surface drainage control for the refuse disposal site.

Reclamation of the area includes removal of all structures from the processing/loading site. Waste coal and contaminated soil will be excavated and transported to the refuse disposal area. The surface of the site will be ripped to loosen and mix the compacted soil prior to seed-bed preparation. The site will be returned to its approximate original contour and vegetated with herbaceous species, achieving a condition capable of supporting an industrial post-mining land use. The refuse disposal area will be covered with the topsoil substitute and vegetated with species that will stabilize the site and provide wild life enhancement, achieving an undeveloped post-mining land use.

When it has been determined that vegetation has been successfully established and the surface drainage control structures are no longer required, the storage basins and sedimentation pond No. 001 will be back-filled and eliminated, and the sites vegetated. Sedimentation pond No. 002 will be eliminated, a rock-lined channel will be constructed on the pond site, and the adjacent terrain will be vegetated.

Data Source(s): **Permit Application.**

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 1 (continued)
DESCRIPTION OF THE WORST-CASE RECLAMATION SCENARIO

1. **Earthmoving**

Waste coal and contaminated soil:	**Soil will be removed to a depth of 6 inches from the three stockpile areas that total 1.4 acres. With 15 percent final swell volume, total volume is 1,300 cubic yards.**
Topsoil substitute material:	**Material salvaged for final lift area at refuse disposal site; 0.86-acre surface area with depth of 4 feet, plus 15 percent final swell volume, yields total volume of 6,400 cubic yards.**
Storage basins and sediment pond No. 001:	**Pond No. 001 embankment contains 5,000 cubic yards; the material excavated from the basins and comprising the berms will be used to fill the basins; basin No. I volume is 313 cubic yards; basin No. 2 volume is 333 cubic yards; with 15 percent final swell volume, total volume is 6,500 cubic yards.**
Area to be ripped:	**Two acres of a 9-acre processing/loading site is vegetated and will not be re-disturbed; remaining 7 acres will be ripped.**

2. **Re-vegetation**

Processing/loading site:	**Seven acres will require re-vegetation.**
Refuse disposal site:	**Maximum resistance will occur with final lift; concurrent reclamation will have resulted in 17 acres of a 22-acre site with vegetation; remaining 5 acres will require revegetation.**

3. **Other Reclamation Activity**

Sediment pond No. 002:	**Embankment will be graded and eliminated during construction of rock-lined drainage channel.**
Treating and Dewatering ponds' basins/ponds:	**Volume of water to be removed is total of basins' and volumes at normal pool level.**

Basin No. I	**8,450 ft^3**
Basin No. 2	**9,000 ft^3**
Pond No. 001	**214,751 ft^3**
Pond No. 002	**463,914 ft^3**
	696,115 ft^3

NOTE: Worksheets 4B, 10, 11A, 11B, 12, 17 and 18 are not applicable to this example.

Data Source(s): Permit Application.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 2
STRUCTURE DEMOLITION AND DISPOSAL COSTS

Structures to be demolished:

Item	Construction Material	Volume (cubic feet)	Unit Cost Basis ($/ft)	Demolition Cost ($)
1. Plant	Steel beams; metal siding and roofing	200,000	0.17	34,000
2. Scale house/office	Wood frame; asphalt siding and roofing	5,600	0.17	952
3. Scale	Wood frame; asphalt siding and roofing	750	0.17	128
4. Shop building	Wood frame; metal siding; asphalt roofing	8,100	0.17	1,377
			Subtotal	$36,457

Other items to be demolished (paved roads, conveyors, utility poles, rail spurs, etc.):

Conveyor Systems: Structural steel supports for elevated units; underground units enclosed in metal pipes; total length of conveyor system is 790 linear feet.

790 LF x $16 / 1 LF = $12,640

Subtotal = $ 12,640

Debris Handling and Disposal Costs:

Lump-sum cost includes demolition of concrete block foundation of plant and concrete silo, grading of rubble into the underground conveyor excavations, and removal/disposal of culvert.
Lump sum = $6,000

Subtotal = $ 6,000

TOTAL DEMOLITION AND DISPOSAL = $ 55,097

Data Source(s): Means *Site Work and Landscape Cost Data*, 1998; AML data; conveyor demolition cost developed from crew and equipment composition and cost data from Means *Building Construction Cost Data.*

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 3
MATERIAL HANDLING PLAN SUMMARY

Earthmoving Activity	Volume (LCY)	Origin	Destination	Haul Distance (ft)	Grade * (%)	Equipment To Be Used
1. Excavate coal waste	1,300	Coal stockpile pad	Coal stockpile pad	50	0	D7R-SU w/ 3-shank ripper
2. Load coal waste	1,300	Site	Site	50	0	988 F
3. Haul coal waste	1,300	Site	Site	50	0	769D
4. Grade coal waste	1,300	Site	Site	50	0	D6R-S
5. Rip surface of site; 7 acres					0	D7R-SU W/3-shank ripper
6. Final grading of site; 7 acres					0	D6R-S
7. Grade topsoil substitute	6,400	Site	Site	150	0	D7R-SU W/3-shank ripper
8. Grade and remove pond No. 001 and storage basins	6,500	Embankments	Basins and Pond	100	0	D7R-SU W/3-shank ripper
9. Grade and remove pond No. 002 and construct channel						See *Worksheet 15A*

*Record grade resistance (% grade) here.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 5A
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Excavate 6-inch layer of coal waste and contaminated soil from the 1.4-acre stockpile area. Volume of material is 1,300 LCY.

Characterization of Dozer Used (type, size, etc.):
D7R with SU-blade dozer and 3-shank ripper

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer will excavate and pile material for loading; the average push distance is 50 feet and the effective grade is 0 percent. The material weight is 2,300 lb/CY.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x .80 (material factor) x .83 (efficiency factor) x 1.0 (grade factor) x

1.0 * (weight correction factor) x 1.0 ** (production method/blade factor) x 1.0 (visibility factor) x 1.0 (elevation factor) = .50

Net Hourly Production = 1,050 (normal hourly production) LCY/hr x .50 (operating adjustment factor) = 525 LCY/hr

Hours Required = 1,300 (volume to be moved) LCY ÷ 525 (net hourly production) LCY/hr = 3 hr

* Weight Factor = 2,300 lb/CY / 2,300 lb/CY = 1.00

** Normal dozing with SU-blade use 1.00

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 28.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 5B
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade waste/soil at refuse site to blend with contour of fill. Volume of material is 1,300 LCY.

Characterization of Dozer Used (type, size, etc.):
D6R with S-blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer will grade material to blend with refuse and achieve final contour of fill; the average push distance is 50 feet and the effective grade is 0 percent. The material weight is 2,300 lb/CY.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.20 (material factor) x .83 (efficiency factor) x 1.0 (grade factor) x

1.0 * (weight correction factor) x 1.0 ** (production method/blade factor) x 1.0 (visibility factor) x 1.0 (elevation factor) = .75

Net Hourly Production = 450 (normal hourly production) LCY/hr x .75 (operating adjustment factor) = 337.5 LCY/hr

Hours Required = 1,300 (volume to be moved) LCY ÷ 337.5 (net hourly production) LCY/hr = 4 hr

* Weight Factor = 2,300 lb/CY / 2,300 lb/CY = 1.00

** Normal dozing with S-blade use 1.00

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 28.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 5C
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade topsoil substitute to distribute over refuse and achieve final contour. Volume of material is 6,400 LCY.

Characterization of Dozer Used (type, size, etc.):
D6R with S-blade.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer will grade material to achieve 4-foot depth over 0.86-acre surface of the refuse fill; the average push distance is 150 feet and the effective grade is 0 percent. The material weight is 2,550 lb/CY.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.20 (material factor) x .83 (efficiency factor) x 1.0 (grade factor) x

0.9* (weight correction factor) x 1.0** (production method/blade factor) x 1.0 (visibility factor) x 1.0 (elevation factor) = .67.

Net Hourly Production = 525 (normal hourly production) LCY/hr x .67 (operating adjustment factor) = 352 LCY/hr.

Hours Required = 6,400 (volume to be moved) LCY ÷ 352 (net hourly production) LCY/hr = 18 hrs.

* Weight Factor = 2,300 lb/CY / 2,550 lb/CY = 0.90

** Normal dozing with S-blade use 1.00

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 28.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 5D
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE

Earthmoving Activity:
Grade embankment material to backfill storage basins and pond 001. Volume of material is 6,500 LCY.

Characterization of Dozer Used (type, size, etc.):
D7R with SU-blade and 3-shank ripper.

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.):
Dozer will grade embankment material to fill excavations; the average push distance is 100 feet and the effective grade is 0 percent. The material weight is 2,550 lb/CY.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.00 (material factor) x .83 (efficiency factor) x 1.00 (grade factor) x

0.90* (weight correction factor) x 1.00** (production method/blade factor) x 1.00 (visibility factor) x 1.00 (elevation factor) = .56

Net Hourly Production = 750 (normal hourly production) LCY/hr x .56 (operating adjustment factor) = 420 LCY/hr

Hours Required = 6,500 (volume to be moved) LCY ÷ 420 (net hourly production) LCY/hr = 16 hr

* Weight Factor = 2,300 lb/CY / 2,550 lb/CY = 0.90

** Normal dozing with SU-blade use 1.00

Data Source(s): Permit Application; Caterpillar Performance Handbook, Edition 28.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 6
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE--GRADING

Earthmoving Activity:
Final grading.

Characterization of Dozer Used (type, size, etc.):
D6R with 11-foot wide S-blade

Description of Dozer Use (% grade, effective blade width, operating speed, etc.):
Grading along contour (0% grade) to smooth coal refuse moved by truck and loader team and to eliminate rills and gullies prior to topsoil replacement.

Productivity Calculations:

Operating Adjustment Factor = .75 (operator factor) x 1.00 (material factor) x .83 (efficiency factor) x 1.00 (grade factor) x

1.00 (weight correction factor) x 1.00 (production method/blade factor) x 1.00 (visibility factor) x 1.00 (elevation factor) = .623

Hourly Production = 3.0 (average speed) mi/hr x 11.0 (effective blade width) ft x 5,280 ft/mi x 1 ac/43,560 ft² = 4 ac/hr

Net Hourly Production = 4 (hourly production) ac/hr x .623 (operating adjustment factor) = 2.49 ac/hr

Hours Required = 12.0 (area to be graded) ac ÷ 2.49 (net hourly production) ac/hr = 8 hr

* Effective blade width = 11.0 ft. - 1.0 ft. (blade overlap) = 10.0 ft.

Data Source(s): Permit Application.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 7
PRODUCTIVITY AND HOURS REQUIRED FOR RIPPER-EQUIPPED DOZER USE

Ripping Activity:
Characterization of Dozer and Ripper Use:
D7R with SU-blade and 3-shank, parallelogram ripper

Description of Ripping (ripping depth, cut spacing, cut length, and material to be ripped):
Dozer will rip surface area of 304,920 square feet. The average cut length is 200 feet, ripping depth is 2 feet, and ripping width is 9.75 feet. (3 ripper shanks with a 39" spacing and 39" gap between passes. Pass width = 3 x 39" / 12"/ 1 ft. = 9.75 feet.)

Productivity Calculation:

Cycle time = (200 (cut length) ft ÷ 88 ft/min (speed) + .3 (fixed turn time*) min = 2.6 min/pass

Passes/hour = 60 min/hr ÷ 2.6 (cycle time) min/pass x .83 (efficiency factor) = 19.2 passes/hr

Volume cut per pass = (2.0 (tool penetration) ft x 9.75 (cut spacing) ft x 200 (cut length) ft) ÷ 27 ft^3/yd^3 = 144.4 BCY/pass

Hourly Production = 144.4 BCY/pass x 19.2 passes/hr = 2,772.5 BCY/hr

Hours Required = 22,587 (bank volume to be to be ripped**) BCY ÷ 2,772.5 (hourly production) BCY/hr = 8.0 hr

* Fixed turn time depends on dozer. 0.25 min/turn is used.

** Calculate separate dozer hauling of ripped material in each lift on *Worksheet 5.* Use swell factor to convert from bank to loose cubic yards.

Data Source(s): Permit Application.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 8
PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE

Earthmoving Activity:
Load excavated waste coal and contaminated soil for haul to refuse area. Volume of material is 1,300 cubic yards.

Characterization of Loader Use (type, size, etc.):
988F loader with an 8 CY rock bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.):
Loader will load material for haul.

Productivity Calculations:

Cycle time = 0 (haul time (loaded)) + 0 (return time (empty)) + .65 (basic cycle time) = .65 min

Net Bucket Capacity = 8.0 (heaped bucket capacity) LCY x .85 (bucket fill factor*) = 6.8 LCY

Hourly Production = 6.8 (net bucket capacity) LCY ÷ .65 (cycle time) min x .75 (efficiency factor) x 60 min/hr = 470.8 LCY/hr

Hours Required = 1,300 (volume to be moved) LCY ÷ 470.8 (hourly production) LCY/hr = 3 hrs

* See loader section of equipment manual.

Data Source(s): Permit Application.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 9
PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE

Earthmoving Activity:
Haul waste coal and contaminated soil to refuse disposal site. Volume of material is 1,300 cubic yards.

Characterization of Truck Use (type, size, etc.)
769D truck with a 21.2 CY struck and 30.7 CY heaped capacity = 26 CY average capacity.

Description of Truck Use (origin, destination, grade, haul distance, capacity, etc.):
Trucks will haul material from processing/loading site to disposal site, a haul distance of 1.4 miles (7,400 ft). The effective grade for the haul is 4%; the effective grade for the return is 4%.

Productivity Calculations:

No. Loader Passes/Truck = 26 (truck capacity *) LCY ÷ 6.8 (loader bucket net capacity) LCY = 3.8 (use 4) passes

Net Truck Capacity = 6.8 (loader bucket net capacity) LCY x 4 (no. loader passes/truck) = 27.2 LCY

Loading Time/Truck = .65 (loader cycle time (from *Worksheet 8*)) min x 4 (no. loader passes/truck) = 2.6 min

Truck Cycle Time = 3.36 (haul time) + 2.4 (return time) + 2.6 (total loading time) + 2.0 (dump and maneuver time) = 10.36 min

Number of Trucks Required = 10.36 (truck cycle time) min ÷ 2.6 (total loading time) min = 4 trucks

Production Rate = 27.2 (net truck capacity) LCY x 4 (no. of trucks) ÷ 10.36 (truck cycle time) min = 10.5 LCY/min

Hourly Production = 10.5 (production rate) LCY/min x 60 min/hr x .75 (efficiency factor) = 472.6 LCY/hr

Hours Required = 1,300 (volume to be moved) LCY ÷ 472.6 (hourly production) LCY/hr = 3 hr

* Normally the average of the struck and heaped capacities.

Haul Time: 7400 ft/ (25 MPH x 88 fpm/MPH) = 3.36 minutes
Return Time: 7400 ft/ (35 MPH x 88 fpm /MPH) = 2.4 minutes

Data Source(s): Permit Application.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 13
SUMMARY CALCULATION OF EARTHMOVING COSTS

Equipment *	Ownership & Operation Cost ($/hr)	Labor Cost ($/hr)	Total Hours Required **	Total Cost *** ($)
D7R-SU with ripper	76.62	14.56	29	44,446
D6R-S	45.79	14.56	30	1,811
988F	100.90	15.56	3	349
769D	86.09	12.90	3	297
769D	86.09	12.90	3	297
769D	86.09	12.90	3	297
769D	86.09	12.90	3	297
			Grand Total	$47,794

* Include all necessary attachments and accessories for each item of equipment. Also, add support equipment such as water wagons and graders to match total project time as appropriate.

** Account for multiple units in truck and/or scraper teams.

*** To compute Total Cost: Add Ownership & Operation Cost and Labor Cost columns then multiply by Total Hours Required column.

Data Source(s): PRIMEDIA Information, Inc., Cost Reference Guide, 1999.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 14
REVEGETATION COSTS

Name and Description of Area To Be Revegetated:
Seven acres of processing/loading site and 5 acres of refuse site.

Description of Revegetation Activities:
Seedbed preparation; liming; seeding and mulching; shrub-planting pattern will cover total area at one acre; 50% reseeding failure rate assumed and 20% plant failure assumed.

Cost Calculation for Individual Revegetation Activities:

Initial Seeding

12 ac x ($ 180 /ac + $ 720 /ac) = $ 10,800
area to be seeded; seedbed preparation; seeding, fertilizing & mulching

Planting Trees and Shrubs

1 ac x ($ 270 /ac + $ 100 /ac) = $ 370
area to be planted; planting; herbicide treatment

Reseeding

12 ac x .50 x ($ 180 /ac + $ 720 /ac) = $ 5,400
area to be seeded & unreleased disturbed areas; failure rate*; seedbed preparation; seeding, fertilizing & mulching

Replanting Trees and Shrubs

1 ac x .20 x ($ 270 /ac + $ 100 /ac) = $ 74
area to be planted & unreleased disturbed areas; failure rate*; planting; herbicide treatment

Other Necessary Revegetation Activities

(Examples of other activities that may be necessary include soil sampling, irrigation, and rill and gully repair. Describe each activity and provide a cost estimate with documentation. Use additional worksheets if necessary.)

Other Costs: $_____

TOTAL REVEGETATION COST = $ 16,644

*** See description of revegetation above. Based on AML contract data.**

Data Source(s): AML Contract Data.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 15A
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Description of Reclamation, Repair or Pollution Abatement Activity:

Grade to eliminate embankment of sediment pond No. 002 and construction of rock-lined drainage channel. Channel will be 300 feet long.

Assumptions:

Unit cost includes elimination of embankment.

Cost Estimate Calculations:

Dozer cost = $16.20 per LF
$16.20/LF x 300 LF = $4,860

TOTAL COSTS = $ 4,860 .

Other Documentation or Notes:
(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

Data Source(s): Permit Application; AML Data.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 15B
OTHER RECLAMATION ACTIVITY COSTS

(Subsidence damage repair costs, water supply replacement costs, funds required to support long-term treatment of unanticipated acid or ferruginous mine drainage, etc.)

Description of Reclamation, Repair or Pollution Abatement Activity:

Basins and sedimentation ponds are acidic and require treatment. Treat basins and ponds prior to de-watering.

Assumptions:

Water volume is total of structures normal capacity; 696,000 cubic feet.

Cost Estimate Calculations:

Combined treatment and de-watering cost is $0.15 per 10 cubic feet.
$0.15/cu ft x 696,000 cu ft/10 cu ft = 10,440

TOTAL COSTS = $ 10,440 .

Other Documentation or Notes:
(Include additional sheets, maps, calculations, etc., as necessary to document estimate.)

Data Source(s): Permit Application; AML Data.

Project: Processing Plant Example
Date: 12/2/99
Prepared by: P.T. Bond

WORKSHEET 16
RECLAMATION BOND SUMMARY SHEET

1.	Total Facility and Structure Removal Costs	$ 55,097	
2.	Total Earthmoving Costs	$ 47,794	
3.	Total Revegetation Costs	$ 16,644	
4.	Total Other Reclamation Activities Costs	$ 15,300	
5.	Total Direct Costs (sum of Lines 1 through 4)	$ 138,835	
6.	*Inflated Total Direct Costs* (Line 5 x inflation factor *)		$ 149,883
7.	Mobilization/Demobilization (5 % of Line 6) (1% to 10% of Line 6)	$ 7,494	
8.	Contingencies (5 % of Line 6) (3% to 5% of Line 6)	$ 7,494	
9.	Engineering Redesign Fee (5 % of Line 6) (2.5% to 6% of Line 6)	$ 7,494	
10.	Contractor Profit/ Overhead (30 % of Line 6) (see Graph 1)	$ 44,965	
11.	Project Management Fee (5.7 % of Line 6) (see Graph 2)	$ 8,543	
12.	*Total Indirect Costs* (sum of Lines 7 through 11)		$ 75,990
13.	GRAND TOTAL BOND AMOUNT (sum of Lines 6 and 12)		$ 225,873 (round to $226,000)

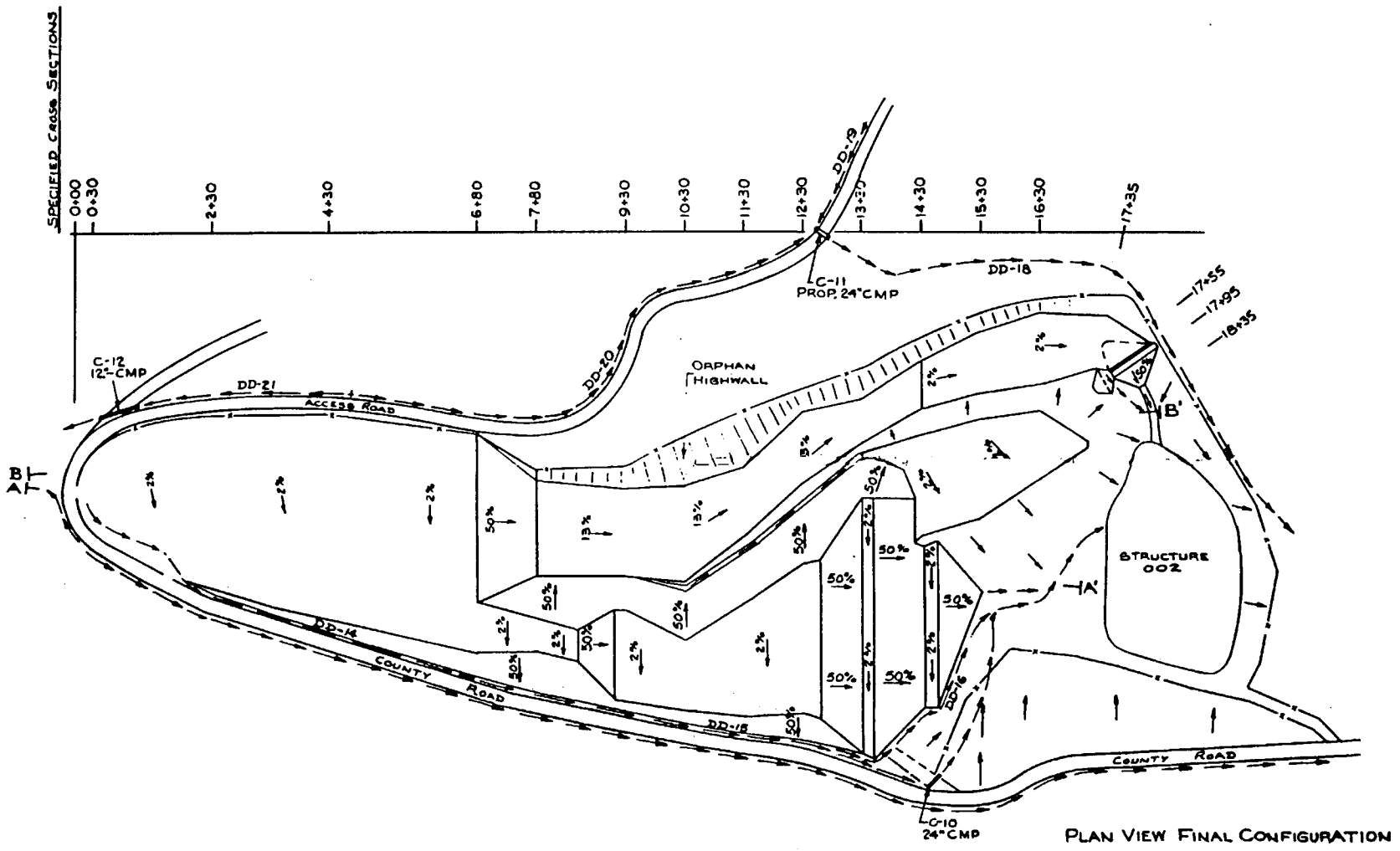
---

* Inflation factor = ENR Construction Cost Index (CCI) for current mo/yr** / ENR CCI for mo/yr 5 years prior to current mo/yr*** = 6008 / 5405 = 1.1116.

Identify current month/year used in formula above: 4/99
Identify prior month/year used in formula above: 4/94

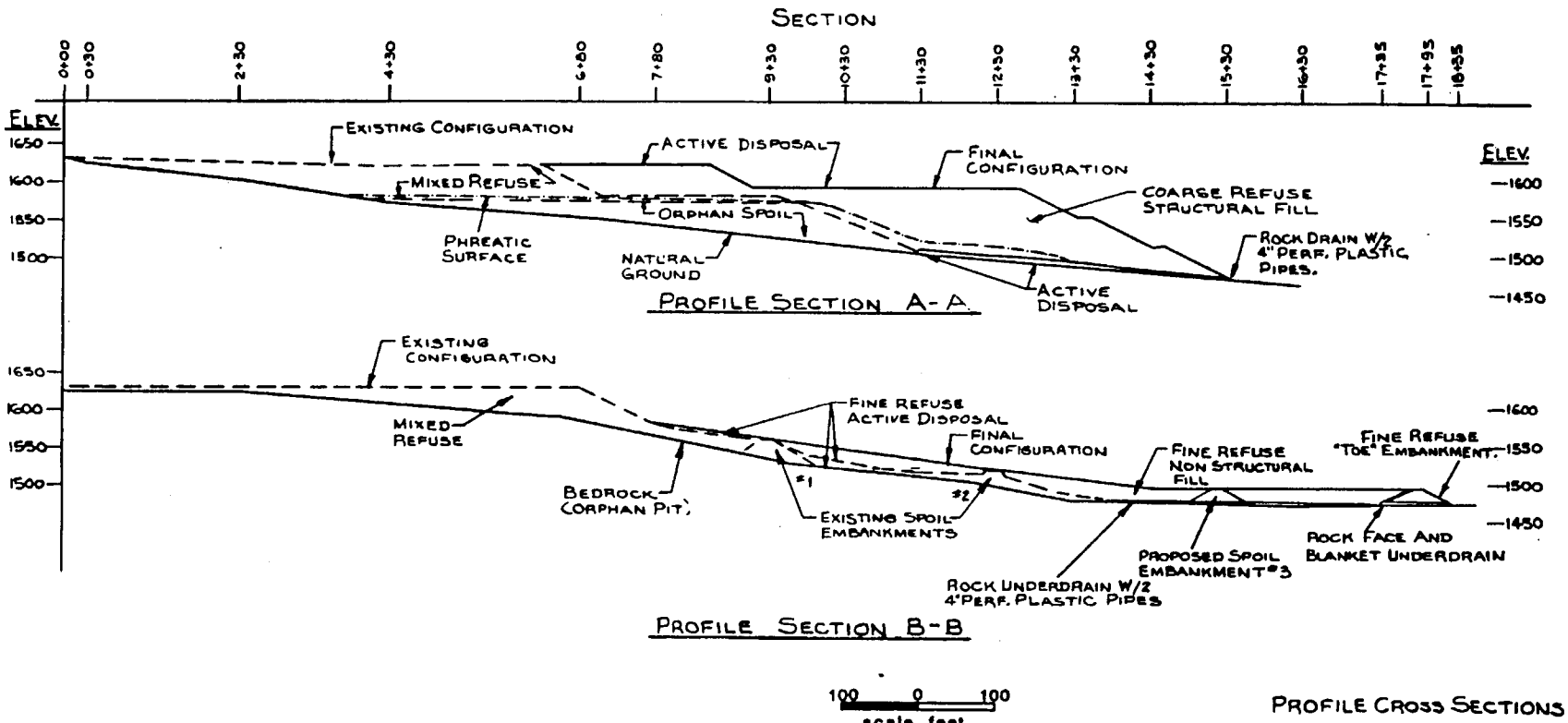
ENR = *Engineering News Record*, McGraw-Hill Construction Information Group, New York, NY; http://www.enr.com.

Formula assumes permit term or time until next bond adequacy evaluation is 5 years. Adjust timeframe as necessary.



PLAN VIEW FINAL CONFIGURATION
REFUSE AREA #1

Figure B-10



PROFILE CROSS SECTIONS
REFUSE AREA #1

Figure B-11

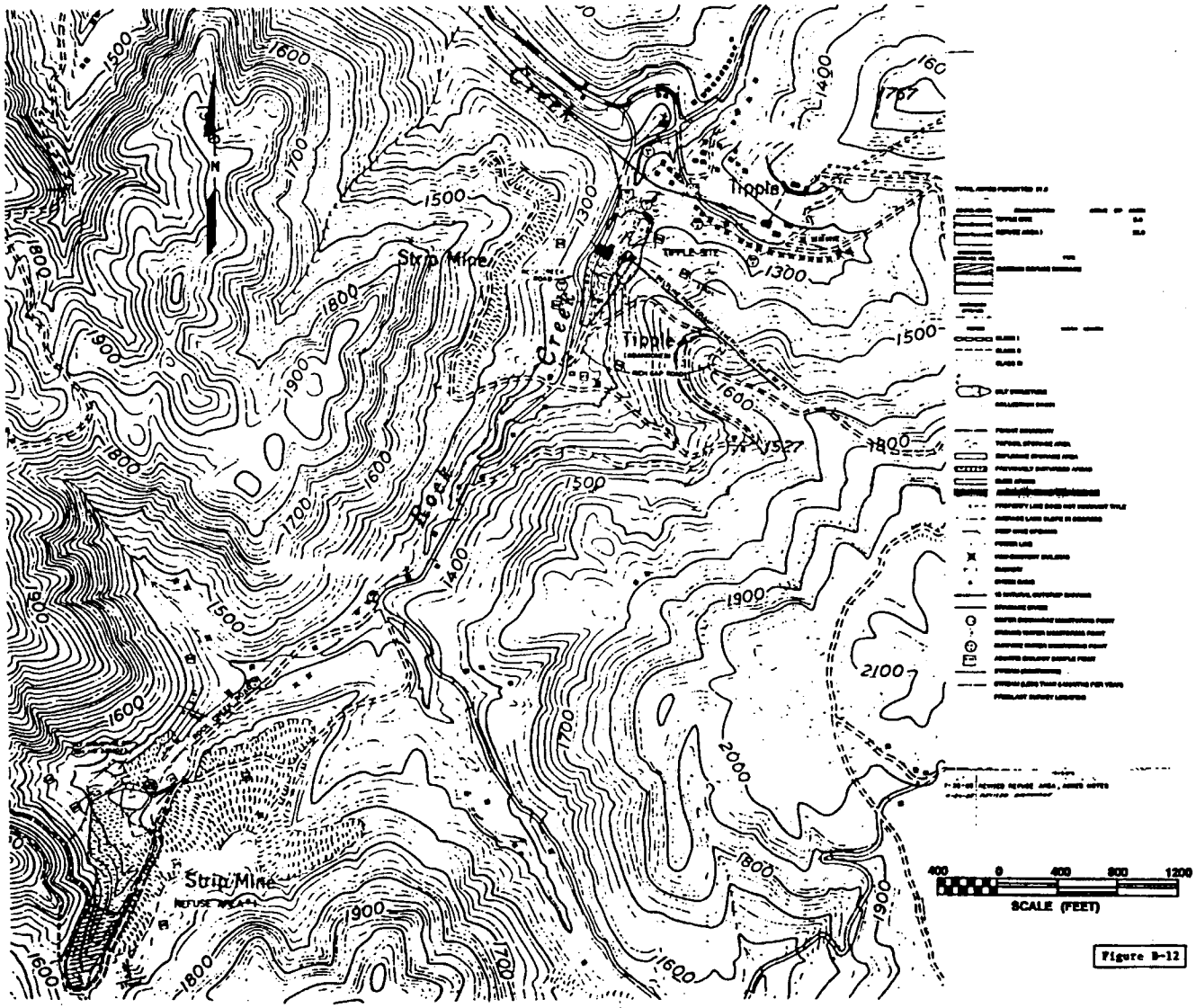

Strip Mine
Tipple
Tipple
Strip Mine
Creek
Creek
Road
1500
1600
1700
1800
1900
2000
2100
1400
1300
1527
SCALE (FEET)
400
0
400
800
1200

Figure B-12

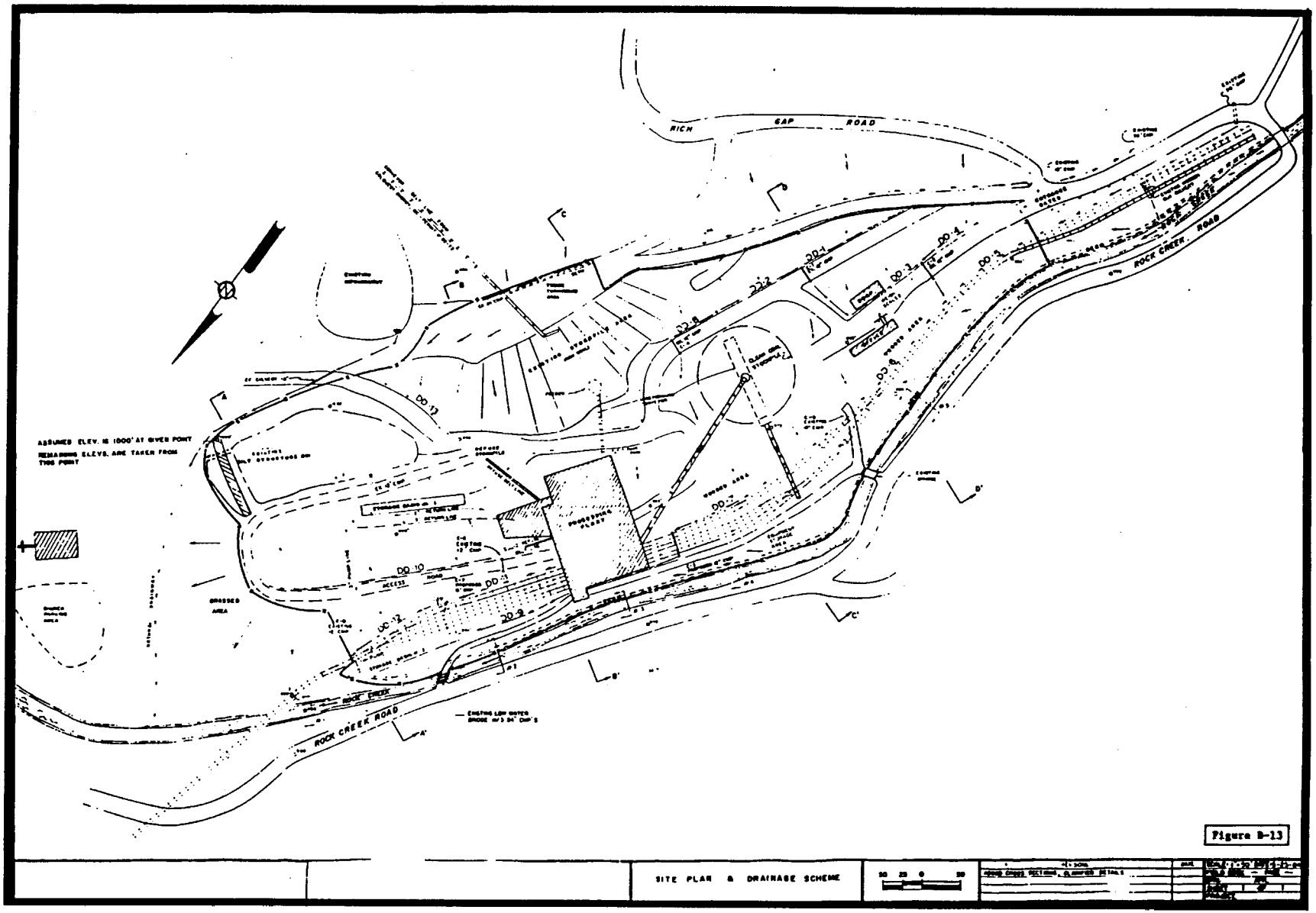

RICH GAP ROAD
ROCK CREEK ROAD
ROCK CREEK ROAD
ASSUMED ELEV. IS 1000' AT RIVER POINT
REMAINING ELEVS. ARE TAKEN FROM THIS POINT
PROCESSING PLANT
OFFICE
GRASSED AREA
SITE PLAN & DRAINAGE SCHEME

Figure B-13