

SECTION 50

BONDING

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SECTION 50

BONDING

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SECTION 50

BONDING

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
50.1-1	NNP Post-Mining Configuration Bond Scenario 2025
50.1-2	NNP Bond Surface Configuration Bond Scenario 2025
50.4-1	NNP Regrade Blocks & Cut and Fill Contours Bond Scenario 2025
50.4-2	NNP Topdressing Removal and Replacement Plan Bond Scenario 2025

SECTION 50

BONDING

LIST OF APPENDICES

APPENDIX

NUMBER

APPENDIX TITLE

50.A	Detailed NNP Reclamation Bond Calculation
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SECTION 50

BONDING

LIST OF REVISIONS DURING PERMIT TERM

REV.		DATE
NUMBER	REVISION DESCRIPTION	APPROVED

SECTION 50 BONDING

50.1 Bond Scheme

The determination of the reclamation bond is an estimate of the maximum foreseeable reclamation cost that the Regulatory Authority would incur in the event of bond forfeiture by Navajo Transitional Energy Company (NTEC) during the permit term. Areas bonded under this permit area include those areas which will be disturbed in the process of recovering coal from the No Name Permit (NNP) permit area and those areas required to construct facilities or infrastructure that support the production activities. The reclamation costs and procedures detailed in Section 51 Reclamation Schedule apply only for determining the bond amount at year 2025 and are not necessarily meant to represent current or future operational practices. Direct costs are calculated in Worksheets 2 through 15 and are totaled in Worksheet 16 in Appendix 50.A. Indirect costs are applied as percentages of the direct cost in Worksheet 16 to determine a total bond cost.

50.1.1 Maximum Reclamation Liability during the Permit Term

During the permit term, the reclamation liabilities will be greatest at the end of the five-year term. Given that NTEC will open the initial mining areas in No Name during this permit term and will progress pit development throughout the permit term while not yet disturbing sufficient acreage to facilitate significant reclamation activities, the cumulative disturbance will reach the maximum late in the permit term. Throughout the five-year term, strip progression results in an increase in disturbed land, increased pit depths, and slight increases in pit lengths.

The amount of mining (stripping) disturbance to occur during the permit term is related to strip progression and timing, which is presented on Exhibits 50.1-1 through 50.1-2. The bond scenario presented here does not necessarily match the strip progression timing shown in the permit term disturbance exhibits. This is due to the remaining uncertainty regarding actual start dates for the mining (stripping) operations, which are ultimately a function of the timing of the first coal requirements from the customer. In order to address this uncertainty and ensure that NTEC will be sufficiently bonded over the first permit term, the maximum likely amount of mining (stripping) disturbance has been considered for the bond scenario. In other words, this is a conservative bond scenario and NTEC is unlikely to disturb the acreage indicated in the bond scenario.

50.2 Extended-Liability Bond Areas

NTEC does not have any extended liability bond areas associated with NNP; therefore, this section is not applicable.

50.3 Bonding of Facilities Used in Common

Facilities and infrastructure within NNP but related to the NTEC, which are currently considered in NTEC Navajo Mine's bond amount, will be separated from the Navajo Mine bond and incorporated into the NNP bond by minor revision after the approval of this permit.

50.4 Reclamation Cost Estimate

50.4.1 Reclamation Costs

Reclamation costs are calculated as shown in Appendix 50.A, Worksheets 1 through 16. The methods and format used in this calculation are consistent with the guidance contained in the *OSM Handbook for Calculation of Reclamation Bond Amounts* (OSM 2000). A summary of the reclamation bond amount is presented in Table 50.4-1.

Reclamation liabilities attributable to NNP permit areas will occur as scheduled in Exhibits 50.1-1 through 50.1-2 and will be stripped to their lowest economically recoverable coal seam. Reclamation activities will consist of the following:

- 1) Facility demolition and removal,
- 2) Earthmoving – primary and secondary regrade, topdressing, mitigation,
- 3) Revegetation, and
- 4) Miscellaneous

50.4.1.1 Facility Demolition and Removal

Facility demolition and removal of all existing permit structures on the mine site includes the industrial complexes; water pipelines, intakes, and loadouts; electric power lines; explosive stores; coal facilities; water control structures; transportation facilities; and miscellaneous structures. A summary of demolition unit costs is presented in Table 50-A-1, Appendix 50.A.

All permit structures are tabulated in Worksheet 2 (Appendix 50.A). Structure dimensions and related materials quantities are taken from design drawings and material take-off sheets, while unit costs are from Table 50-A-1, Appendix 50.A. The resulting costs are totaled in Worksheet 16, Item 1 (Appendix 50.A).

50.4.1.2 Earthmoving

A post-mining "snapshot" of each area was projected for year 2030, as shown in the bond post-mining configuration (PMC) map, Exhibit 50.1-1.

The bond final surface configuration (BSC) selected for the initial permit term is to return the disturbed areas as close as possible to the pre-mining topography. Due to the relatively small area disturbed during the initial term, especially within the mining pits, and due to the fact that most of the mining disturbance

occurs on uplands west of Pinabete Arroyo, there is little value in developing a BSC using those methods (Natural Regrade) used to develop the approximate original contour AOC for the entirety of the Area 4 South mining limits.

To achieve BSC (Exhibit 50.1-2), PMC topography in these areas was altered to create reclaimed surfaces falling as close as practical to the pre-mining topography. The BSC surfaces maintain 6.5h: 1v maximum final interior slopes, 4h: 1v maximum out slopes, balance cut and fill volumes, and ensure positive drainage.

The next design step was to subtract a computerized grid of the PMC from the BSC using Vulcan software. The result is a cut-fill contours map (Exhibit 50.4-1) with the cut areas shown as thick contours, and the fill areas shown as thin contours. The cut and fill areas are then subdivided into polygons and the cut and fills are balanced by taking extra cut to polygons that require fill. The result is the cut-fill blocks map (Exhibit 50.4-1).

The Vulcan software gives the volume and centroid of each block. The centroids are used to calculate haulage distances and grades, except in the case of deep pits and ramps where haulage is assumed to be to the crest where the material can be pushed over the edge. The haulage profiles and grades are weight averaged by volume to give an average distance and grade for each equipment type.

All bond earthmoving activities are tabulated in Worksheet 3 as follows:

Worksheet 5	Dozers
Worksheet 8	Loaders
Worksheet 9	Trucks
Worksheet 11	Scrapers
Worksheet 12	Graders
Worksheet 15	Drilling and Blasting of Highwalls

Quantities from these worksheets are used as input to Worksheets 5 through 12, where equipment hours are calculated. Worksheet 13 uses these hours to calculate earthmoving costs. The earthmoving costs are totaled in Worksheet 16, Item 2. In addition to regrade activities, earthmoving includes spoil mitigation, topdressing placement, and concrete disposal.

Once regrading and/or facilities removal activities have been completed in an area, required suitable root zone mitigation and/or topdressing material is placed on these areas (Exhibit 50.4-2).

Suitable spoil and regolith/topdressing material (either stockpiled or in situ) are used to complete the 4-ft suitable root zone material requirements on spoil surfaces. Stockpiled and/or in-situ regolith/topdressing

material is used to complete the topdressing material depth requirement on all reclaimed surfaces. Refer to Section 36 Post-Reclamation Soil for additional information regarding root zone material and topdressing replacement requirements.

50.4.1.2.1 Equipment Selection

Large earthmoving equipment was selected assuming that a competent, qualified contractor will be doing the reclamation work using their own equipment.

50.4.1.2.2 Equipment Productivity and Costs

Reclamation activities will take place with a 20-shift-per-week schedule. Equipment ownership and operating costs are tabulated in Table 50-A-23 (Appendix 50.A). Equipment operator wage rates are listed in Table 50-A-24 (Appendix 50.A).

For haul routes greater than 600 ft, scrapers are more economical than dozers. For haul routes greater than 3,000 ft, dump trucks are more economical than scrapers. Dozers are assumed to work alone with no support equipment other than a lowboy for transport. Truck and scraper fleets both require load and dump dozers, and half-time water truck and grader for haul road maintenance. All fleets are assigned light plants for night work. Fuel and lube trucks are included in the fuel costs (Table 50-A-23 in Appendix 50.A).

Productivities for each particular activity are calculated in Worksheets 5 through 12 (Appendix 50.A), using the material properties and haulage profile pertaining to the task.

50.4.1.3 Revegetation

After regrading, the bonded areas will be graded with graders and then these areas and facilities areas will be topdressed as noted in previously. After topdressing, revegetation activities will commence. This involves seeding, crimping, mulching, and irrigation as described in Section 37 Post-Reclamation Vegetation. Costs are noted in Appendix 50.A, Worksheet 14.

50.4.1.4 Miscellaneous

No miscellaneous costs were required for the initial permit term bond scenario.

50.4.3 Indirect Reclamation Costs

Mobilization and demobilization costs are assumed to be 1% of the direct costs, since the reclamation project would be very large. Contingencies are 5% of the direct costs; the engineering redesign fee, the contractor profit and overhead, and the reclamation fee are set at 1.8%, 15.0%, and 3.9% of direct costs respectively, per agreement with OSM staff.

50.4.2 Total Performance Bond Cost

The total performance bond cost is the sum of the direct and indirect costs and is shown in Worksheet 16, Appendix 50.A.

Table 50.4-1 Summary of NNP Reclamation Bond Amount

			2024 Estimate	
1	Total facility and structure removal costs	\$	0	
2	Total earthmoving costs	\$	3,111,412	
3	Total revegetation costs	\$	835,944	
4	Total other reclamation activities costs	\$	0	
5	Subtotal: Total Direct Costs		\$	3,947,357
6	Mobilization and demobilization (at 1.0% of Item 5)	1.0%	\$	39,474
7	Contingencies (at 5.0% of item 5)	5.0%	\$	78,947
8	Engineering redesign fee (at 1.8 of Item 5)	1.8%	\$	71,052
9	Contractor profit and overhead (at 15.0% of Item 5)	15.0%	\$	592,104
10	Reclamation management fee (at 3.9% of Item 5)	3.9%	\$	153,947
Total Bond Amount 2024			\$	4,882,881
2025 Adjusted			\$	5,554,938

Appendix 50.A

Bond Calculation Worksheets and Tables

Worst Case Bond Scenario 2025

APPENDIX 50.A
BOND CALCULATION WORKSHEETS AND TABLES
WORST CASE BOND SCENARIO 2025

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**BOND CALCULATION WORKSHEETS
WORST CASE BOND SCENARIO**

Updated September 2025

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT
BOND AMOUNT CALCULATION

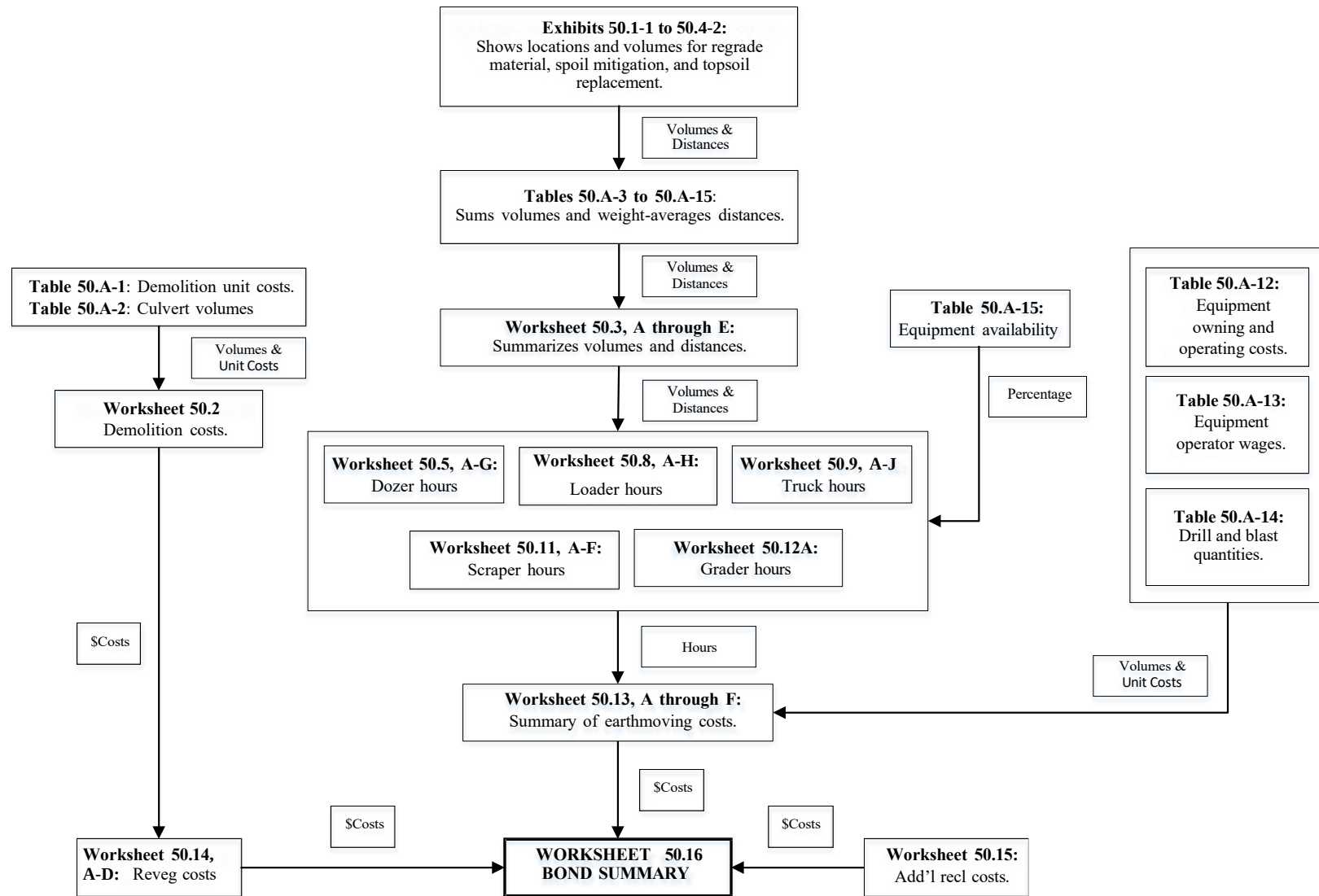


Figure 50.A-1 Worksheet Flow Diagram

Worksheets

2025 No Name Bond Worksheets

Project No Name Mine

Date September 2025

WORKSHEET 50.1

DESCRIPTION OF WORST CASE BONDING SCENARIO

Determination of Maximum Reclamation Requirements

The point at which reclamation liabilities were the greatest occurred during the five-year permit term that ended in 2030. The worst case scenario for the No Name pit represented in this bond estimate included the maximum length of pit in the permit area with the Boxcut and topsoil removal. Unit cost will utilize the Navajo Mine 2024 updated cost for demolition, equipment, seeding and mulching and labor.

Dozers will be utilized to push the maximum amount of material into the pits. Any material the dozers cannot move in a cost effective manner will be moved by scrapers or truck/loader fleets. Any areas that do not pass the spoil sampling tests will be mitigated by one of the approved methods in the permit prior to topsoil placement. For the purpose of this reclamation bond calculation, the mitigation rates utilized for regraded areas is 10.8% for No Name. After all spoil is regraded, final pits will be shaped to their final contours, and mitigation material will be placed where required; topsoil will be placed, revegetation will occur with an assumed 20% failure rate and the mine facilities will be removed. Facility areas will be mitigated as required and topsoiled, at this time no facilities are planned in the No Name. The mine will be ready to begin phased bond release with the ultimate goal of total bond release.

WORKSHEET NO.50.2

STRUCTURE DEMOLITION AND DISPOSAL COST SUMMARY

Structure							Buildings / Utilities / Other Structures				Floors, Surfaces & Walls				Footings					
							Volume [ft3]	Ref	Unit Cost	Cost	Area [ft2]	Ref	Unit Cost	Cost	Length [ft]	Ref	Unit Cost	Cost		
No Name																				
Buildings - Above Concrete	Length (ft)	Width (ft)	Area (sf)	Height (ft)	#	Construction														
							-	4	-	\$0										
							-	1	-	\$0										
							-	1	-	\$0										
							-	1	-	\$0										
							-	1	-	\$0										
							-	1a	-	\$0										
							-	1	-	\$0										
							-	1	-	\$0										
							-	1a	-	\$0										
							-	1	-	\$0										
							-	5a	-	\$0										
							-	1a	-	\$0										
							-	2a	-	\$0										
							-	1a	-	\$0										
							-	1	-	\$0										
Concrete - Footings	Length (ft) on Long Axis	Length (ft) on Short Axis			#	Construction														
																	-	12a	-	\$0
																	-	12a	-	\$0
																	-	15a	-	\$0
																	-	12a	-	\$0
																	-	12a	-	\$0
																	-	12a	-	\$0
																	-	12a	-	\$0
																	-	15a	-	\$0
																	-	12a	-	\$0
																	-	15a	-	\$0
																	-	13a	-	\$0
																	-	12a	-	\$0
																	-	15a	-	\$0
																	-	12a	-	\$0
																	-	12a	-	\$0
																	-	12a	-	\$0

WORKSHEET NO.50.2																		
STRUCTURE DEMOLITION AND DISPOSAL COST SUMMARY																		
Structure							Buildings / Utilities / Other Structures				Floors, Surfaces & Walls				Footings			
							Volume [ft3]	Ref	Unit Cost	Cost	Area [ft2]	Ref	Unit Cost	Cost	Length [ft]	Ref	Unit Cost	Cost
Concrete - Floors, Surfaces & Walls	Length (ft)	Width (ft)	Area (sf)		#	Construction												
											- 8b	-	\$0					
											- 8b	-	\$0					
											- 11	-	\$0					
											- 9b	-	\$0					
											- 9b	-	\$0					
											- 8b	-	\$0					
											- 8b	-	\$0					
											- 11	-	\$0					
											- 9b	-	\$0					
											- 11	-	\$0					
											- 10a	-	\$0					
											- 8b	-	\$0					
											- 11	-	\$0					
											- 8b	-	\$0					
											- 8b	-	\$0					
Concrete/Asphalt - Aprons & Driveways	Length (ft)	Width (ft)	Area (sf)		#	Construction												
											- 28	-	\$0					
											- 28	-	\$0					
											- 28	-	\$0					
											- 29	-	\$0					
											- 11	-	\$0					
											- 9b	-	\$0					
											-	-						
											-	-						
											-	-						
											- 11	-	\$0					
											-	-						
											- 11	-	\$0					
- 8b	-	\$0																
Concrete - CSBF Below Grade	Height (ft)	Width (ft)	Area (sf)	Thick (ft)	#	Construction												
											- 50a	-	\$0					
											- 21	-	\$0					
											- 50	-	\$0					
Utilities			Length (lf)			Construction	Length (lf)											
											- 25	-	\$0					
											- 25	-	\$0					
											- 32	-	\$0					
											- 26	-	\$0					

WORKSHEET NO.50.2																		
STRUCTURE DEMOLITION AND DISPOSAL COST SUMMARY																		
Structure							Buildings / Utilities / Other Structures				Floors, Surfaces & Walls				Footings			
							Volume [ft3]	Ref	Unit Cost	Cost	Area [ft2]	Ref	Unit Cost	Cost	Length [ft]	Ref	Unit Cost	Cost
Other Structures	Length (ft)	Width (ft)	Area (sf)	Capacity (gal)	#	Construction												
							-	24	-	\$0								
							-	24	-	\$0								
							-	20	-	\$0								
							-	31	-	\$0								
							-	11	-	\$0								
							-	11	-	\$0								
							-	28	-	\$0								
							-	28	-	\$0								
							-	28	-	\$0								
							-	28	-	\$0								
							-	28	-	\$0								
							-	71	-	\$0								
							-	31	-	\$0								
							Conveyors	Length (ft)	Width (ft)	Area (sf)								
							-	33	-	\$0								
							-	29	-	\$0								
							-	11	-	\$0								
TOTAL DEMOLITION COST																	\$0	

WORKSHEET NO. 50-3

MATERIAL HANDLING SUMMARY SHEET

	Description	Quantity	Swell Factor	Adjusted Quantity	Push/Haul Distance [ft]	Push/Haul Grade [%]	Equipment
Acty	NO NAME Permit						
1	Drill & Blast	0 BCY					DMM2
2	Grading - Dozer	2,974,765 LCY	1	2,974,765 LCY	284	-5.0%	D11R
3	Grading - Loader/Truck	0 LCY	1	0 LCY	0	0.0%	992G/777D
4	Grading - Scrapers	160,857 LCY	1	160,857 LCY	1,502	0.0%	637G
5	Topsoil - Loader/Truck	315,764 BCY	1.142	360,602 LCY	9,242	4.0%	992G/777D
6	Topsoil - Scrapers	0 BCY	1.142	0 LCY	0	0.0%	637G
7	Mitigation - Loader/Truck	148,715 BCY	1.142	169,832 LCY	9,242	4.0%	992G/777D
8	Mitigation - Scrapers	0 BCY	1.142	0 LCY	0	0.0%	637G
9	Revegetation	242 ac.					
10							
22	Other						
23	Backfill Ponds	11,263 BCY	1.142	12,862 LCY	200	0.00%	D11R
24	Regrade Haul Roads	0 LCY	1	0 LCY	0	0.00%	992G/777D
25		0 LCY	1	0 LCY	0	0.00%	D11R
26	Backfill Pinabete Diversion	0 BCY	1.142	0 LCY	0	0.00%	992G/777D
27	Regrade Truck Dump Area	0 LCY	1	0 LCY	0	0.00%	992G/777D
28	Regrade Haul Roads	0 BCY	1.142	0 LCY	0	0.00%	637G
29	Road Ripping No Name Project	1 ac.					16H
30							
31							
32	Intentionally Left Blank	0			100	1.00%	
33	Grading Topsoil Areas	0			100	1.00%	16H
34	Revegetation Roads No Name Project	1 ac.					
35							
36							
37							
38							
39							
40							

Swell factor = 1.142 Weighted Average Between In-Situ and Stockpile Swells

WORKSHEET NO. 5A																		
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE																		
Earthmoving Activity:																		
2	Grading - Dozer																	
Characterization of Dozer Used (type, size, etc.) ³																		
Caterpillar D11R, Universal blade																		
Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)																		
-5.0% grade on average 284 ft typical dozer push distance 2,700 Loose clay and sand density [lb/yd ³]																		
Productivity Calculations ³ :																		
Operating Adjustment Factor	=	0.9	*	1.0	*	0.8	*	1.1	*	0.9	*	0.9	*	1.0	*	1.1	=	0.7
		operator factor		material factor		work hour factor		grade factor		weight correction factor		visibility factor		elevation factor		production factor		
Net Hourly Production	=	0.7	*	1,110 LCY/hr	=	768 LCY/hr												
		operating adjustment factor		Normal Hourly Production														
Hours Required ²	=	2,974,765 LCY	/	768 LCY/hr	=	3,875.8 hrs												
		volume to be moved ¹		net hourly production														

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5B	
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE	
Earthmoving Activity:	
23	Backfill Ponds
Characterization of Dozer Used (type, size, etc.) ³	
Caterpillar D11R, Universal blade	
Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)	
0.0% grade on average 200 ft typical dozer push distance 2,700 Loose clay and sand density [lb/yd ³]	
Productivity Calculations ³ :	
Operating Adjustment Factor	$= \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6$
Net Hourly Production	$= \frac{0.6}{\text{operating adjustment factor}} * \frac{1,510 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 949 \text{ LCY/hr}$
Hours Required ²	$= \frac{12,862 \text{ LCY}}{\text{volume to be moved}^1} / \frac{949 \text{ LCY/hr}}{\text{net hourly production}} = 13.6 \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5C**PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Dozer Used (type, size, etc.)³

Caterpillar D11R, Universal blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)

1.0% grade on average

100 ft typical dozer push distance

2,700 Loose clay and sand density [lb/yd³]Productivity Calculations³:

$$\text{Operating Adjustment Factor} = \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6$$

$$\text{Net Hourly Production} = \frac{0.6}{\text{operating adjustment factor}} * \frac{2,690 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5D**PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Dozer Used (type, size, etc.)³

Caterpillar D11R, Universal blade

Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)

1.0% grade on average
 100 ft typical dozer push distance
 2,700 Loose clay and sand density [lb/yd³]

Productivity Calculations³:

$$\text{Operating Adjustment Factor} = \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6$$

$$\text{Net Hourly Production} = \frac{0.6}{\text{operating adjustment factor}} * \frac{2,690 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5E	
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE	
Earthmoving Activity:	
32	Intentionally Left Blank
Characterization of Dozer Used (type, size, etc.) ³	
Caterpillar D11R, Universal blade	
Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)	
1.0% grade on average 100 ft typical dozer push distance 2,700 Loose clay and sand density [lb/yd ³]	
Productivity Calculations ³ :	
$ \begin{array}{l} \text{Operating} \\ \text{Adjustment} \\ \text{Factor} \end{array} = \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6 $	
$ \begin{array}{l} \text{Net Hourly} \\ \text{Production} \end{array} = \frac{0.6}{\text{operating adjustment factor}} * \frac{2,690 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 1,657 \text{ LCY/hr} $	
$ \begin{array}{l} \text{Hours} \\ \text{Required}^2 \end{array} = \frac{\text{volume to be moved}^1}{\text{LCY}} / \frac{1,657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs} $	

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5F PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE									
Earthmoving Activity:									
32	Intentionally Left Blank								
Characterization of Dozer Used (type, size, etc.) ³									
Caterpillar D11R, Universal blade									
Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)									
1.0% grade on average 100 ft typical dozer push distance 2,700 Loose clay and sand density [lb/yd ³]									
Productivity Calculations ³ :									
Operating Adjustment Factor $= \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6$ Net Hourly Production $= \frac{0.6}{\text{operating adjustment factor}} * \frac{2,690 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 1,657 \text{ LCY/hr}$ Hours Required² $= \frac{\text{- LCY}}{\text{volume to be moved}^1} / \frac{1,657 \text{ LCY/hr}}{\text{net hourly production}} = \text{- hrs}$									

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 5G									
PRODUCTIVITY AND HOURS REQUIRED FOR DOZER USE									
Earthmoving Activity:									
32	Intentionally Left Blank								
Characterization of Dozer Used (type, size, etc.) ³									
Caterpillar D11R, Universal blade									
Description of Dozer Use (origin, destination, grade, haul distance, material, etc.)									
1.0% grade on average 100 ft typical dozer push distance 2,700 Loose clay and sand density [lb/yd ³]									
Productivity Calculations ³ :									
$ \begin{array}{l} \text{Operating} \\ \text{Adjustment} \\ \text{Factor} \end{array} = \frac{0.9}{\text{operator factor}} * \frac{1.0}{\text{material factor}} * \frac{0.8}{\text{work hour factor}} * \frac{1.0}{\text{grade factor}} * \frac{0.9}{\text{weight correction factor}} * \frac{0.9}{\text{visibility factor}} * \frac{1.0}{\text{elevation factor}} * \frac{1.1}{\text{production factor}} = 0.6 $									
$ \begin{array}{l} \text{Net Hourly} \\ \text{Production} \end{array} = \frac{0.6}{\text{operating adjustment factor}} * \frac{2,690 \text{ LCY/hr}}{\text{Normal Hourly Production}} = 1,657 \text{ LCY/hr} $									
$ \begin{array}{l} \text{Hours} \\ \text{Required}^2 \end{array} = \frac{\text{- LCY}}{\text{volume to be moved}^1} / \frac{1,657 \text{ LCY/hr}}{\text{net hourly production}} = \text{- hrs} $									

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8A**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

3 Grading - Loader/Truck

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

0.90 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{0.90}{\text{bucket fill factor}} = 13.5 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{13.5 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,038 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{1,038 \text{ LCY/hr}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8B**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

7 Mitigation - Loader/Truck

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

0.90 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{1.05}{\text{bucket fill factor}} = 15.8 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{15.8 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,212 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{169,832 \text{ LCY}}{\text{volume to be moved}^1} / \frac{1,212 \text{ LCY/hr}}{\text{net hourly production}} = 140 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8C**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

5 Topsoil - Loader/Truck

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

1.05 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{1.05}{\text{bucket fill factor}} = 15.8 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{15.8 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,212 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{360,602 \text{ LCY}}{\text{volume to be moved}^1} / \frac{1,212 \text{ LCY/hr}}{\text{net hourly production}} = 298 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8D**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

0.95 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{0.95}{\text{bucket fill factor}} = 14.3 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{14.3 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,096 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{\text{volume to be moved}^1} / \frac{1,096 \text{ LCY/hr}}{\text{net hourly production}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8E**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

1.05 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{1.05}{\text{bucket fill factor}} = 15.8 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{15.8 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,212 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{1,212 \text{ LCY/hr}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8F**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

1.05 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{1.05}{\text{bucket fill factor}} = 15.8 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{15.8 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,212 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{1,212 \text{ LCY/hr}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8G**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

1.05 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{1.05}{\text{bucket fill factor}} = 15.8 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{15.8 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,212 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{1,212 \text{ LCY/hr}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8H	
PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE	
Earthmoving Activity:	
32	Intentionally Left Blank
Characterization of Loader Used (type, size, etc.) ³	
Caterpillar 992G with 15 CYD Bucket	
Description of Loader Use (origin, destination, grade, haul distance, etc.)	
Load Caterpillar 777D Trucks 0.95 Bucket Fill Factor 15 Rated Bucket Capacity [LCY]	
Productivity Calculations ³	
$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$	
$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{0.95}{\text{bucket fill factor}} = 14.3 \text{ LCY}$	
$\text{Net Hourly Production} = \frac{14.3 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,096 \text{ LCY/hr}$	
$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{1,096 \text{ LCY/hr}} = 0 \text{ hrs}$	

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8H**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

0.95 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\quad}{\text{loaded haul time}} + \frac{\quad}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{0.95}{\text{bucket fill factor}} = 14.3 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{14.3 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,096 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\quad - \text{LCY}}{\text{volume to be moved}^1} / \frac{1,096 \text{ LCY/hr}}{\text{net hourly production}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 8H**PRODUCTIVITY AND HOURS REQUIRED FOR LOADER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Loader Used (type, size, etc.)³

Caterpillar 992G with 15 CYD Bucket

Description of Loader Use (origin, destination, grade, haul distance, etc.)

Load Caterpillar 777D Trucks

0.88 Bucket Fill Factor

15 Rated Bucket Capacity [LCY]

Productivity Calculations³

$$\text{Cycle Time} = \frac{\text{loaded haul time}}{\text{loaded haul time}} + \frac{\text{empty haul time}}{\text{empty haul time}} + \frac{0.65 \text{ min}}{\text{basic cycle time}} = 0.65 \text{ min}$$

$$\text{Net Bucket Capacity} = \frac{15 \text{ LCY}}{\text{heaped bucket capacity}} * \frac{0.88}{\text{bucket fill factor}} = 13.2 \text{ LCY}$$

$$\text{Net Hourly Production} = \frac{13.2 \text{ LCY}}{\text{net bucket capacity}} / \frac{0.65 \text{ min}}{\text{cycle time}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 1,015 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{\text{volume to be moved}^1} / \frac{1,015 \text{ LCY/hr}}{\text{net hourly production}} = 0 \text{ hrs}$$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9A PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
3 Grading - Loader/Truck	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
- ft. average haul distance 0.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{13.5 \text{ LCY}}{\text{loader bucket net capacity}} = 5.0 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.65 \text{ min}}{\text{loader cycle time}} * \frac{5}{\text{loader passes per truck}} = 3.2 \text{ min}$ $\text{Number of Trucks Required} = \frac{4.2 \text{ min}}{\text{truck cycle time}} \div \frac{3.2 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{16 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 792 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{13.5 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{5}{\text{loader passes per truck}} = 67 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.0 \text{ min}}{\text{haul time}} + \frac{- \text{ min}}{\text{return time}} + \frac{3.2 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 4.2 \text{ min}$ $\text{Production Rate} = \frac{67 \text{ LCY}}{\text{net truck capacity}} \div \frac{4.2 \text{ min}}{\text{cycle time}} = 15.8 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{- \text{ LCY}}{\text{volume to be moved}^1} \div \frac{792 \text{ LCY/hr}}{\text{hourly production}} = - \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9B PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
7 Mitigation - Loader/Truck	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
9,242 ft. average haul distance 4.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} / \frac{13.5 \text{ LCY}}{\text{loader bucket net capacity}} = 5 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{5}{\text{loader passes per truck}} = 3.2 \text{ min}$ $\text{Number of Trucks Required} = \frac{12.2 \text{ min}}{\text{truck cycle time}} / \frac{3.2 \text{ min}}{\text{truck loading time}} = 3 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{5 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 274 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{5}{\text{loader passes per truck}} = 67 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{5.2 \text{ min}}{\text{haul time}} + \frac{2.8 \text{ min}}{\text{return time}} + \frac{3.2 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 12.2 \text{ min}$ $\text{Production Rate} = \frac{67 \text{ LCY}}{\text{net truck capacity}} / \frac{12.2 \text{ min}}{\text{cycle time}} = 5.5 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{169,832 \text{ LCY}}{\text{volume to be moved}^1} / \frac{274 \text{ LCY/hr}}{\text{hourly production}} = 621 \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9C PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
5 Topsoil - Loader/Truck	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
9,242 ft. average haul distance 4.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min}$ $\text{Number of Trucks Required} = \frac{11.6 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 4 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{5 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 272 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 63 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{5.2 \text{ min}}{\text{haul time}} + \frac{2.8 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 11.6 \text{ min}$ $\text{Production Rate} = \frac{63 \text{ LCY}}{\text{net truck capacity}} \div \frac{11.6 \text{ min}}{\text{cycle time}} = 5.4 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{360,602 \text{ LCY}}{\text{volume to be moved}^1} \div \frac{272 \text{ LCY/hr}}{\text{hourly production}} = 1,328 \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9D PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min}$ $\text{Number of Trucks Required} = \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{15 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 773 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 57 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min}$ $\text{Production Rate} = \frac{57 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 15.5 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{- \text{LCY}}{\text{volume to be moved}^1} \div \frac{773 \text{ LCY/hr}}{\text{hourly production}} = - \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9E PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\begin{aligned} \text{Loader Passes Per Truck} &= \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes} \\ \\ \text{Loading Time Per Truck} &= \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min} \\ \\ \text{Number of Trucks Required} &= \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)} \\ \\ \text{Hourly Production} &= \frac{17 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 854 \text{ LCY/hr} \end{aligned}$	$\begin{aligned} \text{Net Truck Capacity} &= \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 63 \text{ LCY} \\ \\ \text{Truck Cycle Time} &= \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min} \\ \\ \text{Production Rate} &= \frac{63 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 17.1 \text{ LCY/min} \\ \\ \text{Hours Required}^2 &= \frac{- \text{LCY}}{\text{volume to be moved}^1} \div \frac{854 \text{ LCY/hr}}{\text{hourly production}} = - \text{ hrs} \end{aligned}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9F PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\begin{aligned} \text{Loader Passes Per Truck} &= \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes} \\ \\ \text{Loading Time Per Truck} &= \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min} \\ \\ \text{Number of Trucks Required} &= \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)} \\ \\ \text{Hourly Production} &= \frac{17 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 854 \text{ LCY/hr} \end{aligned}$	$\begin{aligned} \text{Net Truck Capacity} &= \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 63 \text{ LCY} \\ \\ \text{Truck Cycle Time} &= \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min} \\ \\ \text{Production Rate} &= \frac{63 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 17.1 \text{ LCY/min} \\ \\ \text{Hours Required}^2 &= \frac{- \text{LCY}}{\text{volume to be moved}^1} \div \frac{854 \text{ LCY/hr}}{\text{hourly production}} = - \text{ hrs} \end{aligned}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9G PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min}$ $\text{Number of Trucks Required} = \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{17 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 854 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{16 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 63 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min}$ $\text{Production Rate} = \frac{63 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 17.1 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{\boxed{} \text{ LCY}}{\text{volume to be moved}^1} \div \frac{854 \text{ LCY/hr}}{\text{hourly production}} = \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9H PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min}$ $\text{Number of Trucks Required} = \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{15 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 773 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 57 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min}$ $\text{Production Rate} = \frac{57 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 15.5 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{- \text{LCY}}{\text{volume to be moved}^1} \div \frac{773 \text{ LCY/hr}}{\text{hourly production}} = - \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9I PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity:	
32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³	
Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.):	
100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} = 4 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{4}{\text{loader passes per truck}} = 2.6 \text{ min}$ $\text{Number of Trucks Required} = \frac{3.7 \text{ min}}{\text{truck cycle time}} \div \frac{2.6 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{15 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 773 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{14 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{4}{\text{loader passes per truck}} = 57 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{2.6 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 3.7 \text{ min}$ $\text{Production Rate} = \frac{57 \text{ LCY}}{\text{net truck capacity}} \div \frac{3.7 \text{ min}}{\text{cycle time}} = 15.5 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{\text{volume to be moved}^1}{\text{work hour factor}} = \text{ - hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 9J PRODUCTIVITY AND HOURS REQUIRED FOR TRUCK USE	
Earthmoving Activity: 32 Intentionally Left Blank	
Characterization of Truck Used (type, size, etc.) ³ Caterpillar 777D 55 Struck Capacity [LCY] 79 Heaped Capacity [LCY] 67 Adjusted Capacity (Average of Struck and Heaped) [LCY]	
Description of Truck Use (origin, destination, grade, haul distance, truck capacity, etc.): 100 ft. average haul distance 1.0% Grade (Loaded) 3.0% Rolling Resistance	
Productivity Calculation ³	
$\text{Loader Passes Per Truck} = \frac{67 \text{ LCY}}{\text{truck capacity}} \div \frac{13 \text{ LCY}}{\text{loader bucket net capacity}} = 5 \text{ passes}$ $\text{Loading Time Per Truck} = \frac{0.7 \text{ min}}{\text{loader cycle time}} * \frac{5}{\text{loader passes per truck}} = 3.3 \text{ min}$ $\text{Number of Trucks Required} = \frac{4.3 \text{ min}}{\text{truck cycle time}} \div \frac{3.3 \text{ min}}{\text{truck loading time}} = 1 \text{ trucks (round down)}$ $\text{Hourly Production} = \frac{15 \text{ LCY/min}}{\text{production rate}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} = 761 \text{ LCY/hr}$	$\text{Net Truck Capacity} = \frac{13 \text{ LCY}}{\text{loader bucket net capacity}} * \frac{5}{\text{loader passes per truck}} = 66 \text{ LCY}$ $\text{Truck Cycle Time} = \frac{0.1 \text{ min}}{\text{haul time}} + \frac{0.0 \text{ min}}{\text{return time}} + \frac{3.3 \text{ min}}{\text{loading time per truck}} + \frac{1.0 \text{ min}}{\text{dump and maneuver time}} = 4.3 \text{ min}$ $\text{Production Rate} = \frac{66 \text{ LCY}}{\text{net truck capacity}} \div \frac{4.3 \text{ min}}{\text{cycle time}} = 15.2 \text{ LCY/min}$ $\text{Hours Required}^2 = \frac{\boxed{} \text{ LCY}}{\text{volume to be moved}^1} \div \frac{761 \text{ LCY/hr}}{\text{work hour factor}} = \text{ hrs}$

Data Sources:

- 1) Volume to be moved from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11A**PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE**

Earthmoving Activity:

4 Grading - Scrapers

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]34 Heaped Capacity [yd³]29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

1,502 ft. average haul distance

0.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.9 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.7 \text{ min}}{\text{return trip time}} = 3.2 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{3.2 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 906 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{160,857 \text{ LCY}}{\text{volume to be handled}^1} / \frac{906 \text{ LCY/hr}}{\text{net hourly production}} = 177 \text{ hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11B**PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]34 Heaped Capacity [yd³]29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

100 ft. average haul distance

1.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{ - LCY}}{\text{volume to be handled}^1} / \frac{1657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11C**PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]34 Heaped Capacity [yd³]29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

100 ft. average haul distance

1.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{ - LCY}}{\text{volume to be handled}^1} / \frac{1657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11D

PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]

34 Heaped Capacity [yd³]

29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

100 ft. average haul distance

1.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{ - LCY}}{\text{volume to be handled}^1} / \frac{1657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11E**PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]34 Heaped Capacity [yd³]29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

100 ft. average haul distance

1.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{ - LCY}}{\text{volume to be handled}^1} / \frac{1657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11F PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE	
Earthmoving Activity:	
32	Intentionally Left Blank
Characterization of Scraper Used (type, size, etc.) ³	
Caterpillar 637G Scrapers Push-Pull Pair 24 Struck Capacity [yd ³] 34 Heaped Capacity [yd ³] 29 Adjusted Capacity (Average of Struck and Heaped) [yd ³]	
Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)	
100 ft. average haul distance 1.0% Grade (Loaded) 3% Rolling Resistance	
Productivity Calculations ³ : $\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$	
$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$	
$\text{Hours Required}^2 = \frac{\text{ - LCY}}{\text{volume to be handled}^1} / \frac{1657 \text{ LCY/hr}}{\text{net hourly production}} = \text{ - hrs}$	

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 11F**PRODUCTIVITY AND HOURS REQUIRED FOR SCRAPER USE**

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Scraper Used (type, size, etc.)³

Caterpillar 637G Scrapers Push-Pull Pair

24 Struck Capacity [yd³]34 Heaped Capacity [yd³]29 Adjusted Capacity (Average of Struck and Heaped) [yd³]

Description of Scraper Use (origin, destination, grade, haul distance, material, etc.)

100 ft. average haul distance

1.0% Grade (Loaded)

3% Rolling Resistance

Productivity Calculations³:

$$\text{Cycle Time}^3 = \frac{1.0 \text{ min}}{\text{load time per pair}} + \frac{0.1 \text{ min}}{\text{loaded trip time}} + \frac{0.6 \text{ min}}{\text{maneuver and spread time}} + \frac{0.1 \text{ min}}{\text{return trip time}} = 1.8 \text{ min}$$

$$\text{Net Hourly Production} = \frac{29 \text{ LCY}}{\text{adjusted capacity}} * \frac{50 \text{ min/hr}}{\text{work hour factor}} / \frac{1.8 \text{ min}}{\text{cycle time}} * \frac{2}{\text{number of scrapers}} = 1,657 \text{ LCY/hr}$$

$$\text{Hours Required}^2 = \frac{\text{volume to be handled}^1 \text{ - LCY}}{1657 \text{ LCY/hr}} = \text{ - hrs}$$

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 12A	
PRODUCTIVITY AND HOURS FOR MOTOR GRADER USE -- GRADING	
Earthmoving Activity:	
29 Road Ripping No Name Project	
Characterization of Grader Used (type, size capacity, etc.) ³	
Caterpillar 16H	
Description of Grader Route (push distance,% blade effective length, operating speed, etc.):	
9.75 Ripper width [ft]	
Productivity Calculations ³ :	
Contour Grading:	
$\text{Hourly Productivity} = \frac{3.4 \text{ mi/hr}}{\text{speed}} \times \frac{9.75 \text{ ft.}}{\text{effective blade width}} \times \frac{5,280 \text{ ft/mi}}{\text{conversion factor}} \div \frac{43,560 \text{ ft}^2/\text{ac}}{\text{conversion factor}} \times \frac{0.83}{\text{work hour factor}} \times \frac{0.90}{\text{availability}} = 3.0 \text{ ac / hr}$	$\text{Hours Required} = \frac{0 \text{ ac}}{\text{acreage to be graded}^1} \div \frac{2.99 \text{ ac/hr}}{\text{hourly productivity}} = 0 \text{ hr}$
Scarification:	
$\text{Hourly Productivity} = \frac{1.25 \text{ mi/hr}}{\text{work speed}} \times \frac{9.75 \text{ ft.}}{\text{scarifier width}} \times \frac{5,280 \text{ ft/mi}}{\text{conversion factor}} \div \frac{43,560 \text{ ft}^2/\text{ac}}{\text{conversion factor}} \times \frac{0.83}{\text{work hour factor}} \times \frac{0.90}{\text{availability}} = 1.1 \text{ ac / hr}$	$\text{Hours Required} = \frac{1 \text{ ac}}{\text{acreage to be ripped}^1} \div \frac{1.10 \text{ ac/hr}}{\text{hourly productivity}} = 1 \text{ hr}$
$\text{Total Hours Required}^2 = \frac{0 \text{ hr}}{\text{grading hours required}} + \frac{1 \text{ hr}}{\text{scarification hours required}} = 1 \text{ hr}$	

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

WORKSHEET NO. 12B	
PRODUCTIVITY AND HOURS FOR MOTOR GRADER USE -- GRADING	
Earthmoving Activity:	
33 Grading Topsoil Areas	
Characterization of Grader Used (type, size capacity, etc.) ³	
Caterpillar 16H	
Description of Grader Route (push distance,% blade effective length, operating speed, etc.):	
11.9 Ripper width [ft]	
Productivity Calculations ³ :	
Contour Grading:	
$\text{Hourly Productivity} = \frac{3.4 \text{ mi/hr}}{\text{speed}} \times \frac{11.90 \text{ ft.}}{\text{effective blade width}} \times \frac{5,280 \text{ ft/mi}}{\text{conversion factor}} \div \frac{43,560 \text{ ft}^2/\text{ac}}{\text{conversion factor}} \times \frac{0.83}{\text{work hour factor}} \times \frac{0.90}{\text{availability}} = 3.7 \text{ ac / hr}$	$\text{Hours Required} = \frac{243 \text{ ac}}{\text{acreage to be graded}^1} \div \frac{3.65 \text{ ac/hr}}{\text{hourly productivity}} = 67 \text{ hr}$
Scarification:	
$\text{Hourly Productivity} = \frac{1.25 \text{ mi/hr}}{\text{work speed}} \times \frac{9.75 \text{ ft.}}{\text{scarifier width}} \times \frac{5,280 \text{ ft/mi}}{\text{conversion factor}} \div \frac{43,560 \text{ ft}^2/\text{ac}}{\text{conversion factor}} \times \frac{0.83}{\text{work hour factor}} \times \frac{0.90}{\text{availability}} = 1.1 \text{ ac / hr}$	$\text{Hours Required} = \frac{- \text{ ac}}{\text{acreage to be ripped}^*} \div \frac{1.10 \text{ ac/hr}}{\text{hourly productivity}} = - \text{ hr}$
$\text{Total Hours Required}^2 = \frac{67 \text{ hr}}{\text{grading hours required}} + \frac{0 \text{ hr}}{\text{scarification hours required}} = 67 \text{ hr}$	

Data Sources:

- 1) Acres from Worksheet 3
- 2) Hours required go to Worksheet 13
- 3) Caterpillar Performance Handbook, Edition 43

*No Ripping on Topsoiled Areas

WORKSHEET NO. 13A						
SUMMARY CALCULATION OF EARTHMOVING COSTS - Dozers						
Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
² Grading - Dozer	D11R Dozer	100%	(\$ 511 + \$ 21)	*	3,876 =	\$ 2,060,114
²³ Backfill Ponds	D11R Dozer	100%	(\$ 511 + \$ 21)	*	14 =	\$ 7,202
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
³² Intentionally Left Blank	D11R Dozer	100%	(\$ 511 + \$ 21)	*	- =	\$ -
Total Cost = \$ 2,067,316						

Equipment and Accesory Identification

- 1) Caterpillar D11R with Universal Blade

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 5

WORKSHEET NO. 13B						
SUMMARY CALCULATION OF EARTHMOVING COSTS - Loaders						
Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
3 Grading - Loader/Truck	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
7 Mitigation - Loader/Truck	992G Loader	100%	(\$ 348 + \$ 18)	*	140 = \$	51,414
	16M Grader	50%	(\$ 208 + \$ 19)	*	70 = \$	15,928
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	140 = \$	35,238
	Water Truck	50%	(\$ 175 + \$ 16)	*	70 = \$	13,371
5 Topsoil - Loader/Truck	992G Loader	100%	(\$ 348 + \$ 18)	*	298 = \$	109,166
	16M Grader	50%	(\$ 208 + \$ 19)	*	149 = \$	33,819
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	298 = \$	74,821
	Water Truck	50%	(\$ 175 + \$ 16)	*	149 = \$	28,390
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
Total Cost =						\$ 362,146

Equipment and Accesory Identification

- 1) Caterpillar 992G Loader with standard 15 cubic yard bucket
Caterpillar 16M Grader, standard blade, road maintenance time = 1/2 loader time
Caterpillar D9R Dozer with Semi-Universal Blade time = loader time
10,000 gal. Water truck, road maintenance time = 1/2 loader time

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 8 and Note 1 above

WORKSHEET NO. 13C						
SUMMARY CALCULATION OF EARTHMOVING COSTS - Loaders						
Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank	992G Loader	100%	(\$ 348 + \$ 18)	*	- = \$	-
	16M Grader	50%	(\$ 208 + \$ 19)	*	- = \$	-
	D9R Dozer	100%	(\$ 230 + \$ 21)	*	- = \$	-
	Water Truck	50%	(\$ 175 + \$ 16)	*	- = \$	-
Total Cost = \$						-

Equipment and Accesory Identification

- 1) Caterpillar 992G Loader with standard 15 cubic yard bucket
Caterpillar 16M Grader, standard blade, road maintenance time = 1/2 loader time
Caterpillar D9R Dozer with Semi-Universal Blade time = loader time
10,000 gal. Water truck, road maintenance time = 1/2 loader time

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 8 and Note 1 above

WORKSHEET NO. 13D							
SUMMARY CALCULATION OF EARTHMOVING COSTS - Trucks							
	Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
3	Grading - Loader/Truck	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
7	Mitigation - Loader/Truck	777F Truck	100%	(\$ 244 + \$ 16)	*	621 =	\$ 160,850
5	Topsoil - Loader/Truck	777F Truck	100%	(\$ 244 + \$ 16)	*	1,328 =	\$ 344,049
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
32	Intentionally Left Blank	777F Truck	100%	(\$ 244 + \$ 16)	*	- =	\$ -
Total Cost =							\$ 504,899

Equipment and Accesory Identification

- 1) Caterpillar 777F Dump Truck, mechanical drive, standard bed

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 9

WORKSHEET NO. 13E						
SUMMARY CALCULATION OF EARTHMOVING COSTS - Scrapers						
Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
4 Grading - Scrapers	631E Scraper	100%	(\$ 411 + \$ 18)	*	177 =	\$ 76,177
	631E Scraper	100%	(\$ 411 + \$ 18)	*	177 =	\$ 76,177
	16M Grader	13%	(\$ 208 + \$ 19)	*	22 =	\$ 5,042
	Water Truck	13%	(\$ 175 + \$ 16)	*	22 =	\$ 4,233
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	16M Grader	13%	(\$ 208 + \$ 19)	*	- =	\$ -
	Water Truck	13%	(\$ 175 + \$ 16)	*	- =	\$ -
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	16M Grader	13%	(\$ 208 + \$ 19)	*	- =	\$ -
	Water Truck	13%	(\$ 175 + \$ 16)	*	- =	\$ -
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	16M Grader	13%	(\$ 208 + \$ 19)	*	- =	\$ -
	Water Truck	13%	(\$ 175 + \$ 16)	*	- =	\$ -
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- =	\$ -
	16M Grader	13%	(\$ 208 + \$ 19)	*	- =	\$ -
	Water Truck	13%	(\$ 175 + \$ 16)	*	- =	\$ -
Total Cost =						\$ 161,628

Equipment and Accesory Identification

- 1) Caterpillar 631E Scraper Push-Pull Pair
Caterpillar 16M Grader, standard blade, road maintenance time = 1/8 scraper time
10,000 gal. Water truck, road maintenance time = 1/8 scraper time

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 8 and Note 1 above

WORKSHEET NO. 13F						
SUMMARY CALCULATION OF EARTHMOVING COSTS - Scrapers						
Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- = \$	-
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- = \$	-
	16M Grader	13%	(\$ 208 + \$ 19)	*	- = \$	-
	Water Truck	13%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank	631E Scraper	100%	(\$ 411 + \$ 18)	*	- = \$	-
	631E Scraper	100%	(\$ 411 + \$ 18)	*	- = \$	-
	16M Grader	13%	(\$ 208 + \$ 19)	*	- = \$	-
	Water Truck	13%	(\$ 175 + \$ 16)	*	- = \$	-
32 Intentionally Left Blank						
32 Intentionally Left Blank						
32 Intentionally Left Blank						
Total Cost = \$						-

Equipment and Accesory Identification

- 1) Caterpillar 992G Loader with standard 15 cubic yard bucket
Caterpillar 16M Grader, standard blade, road maintenance time = 1/8 scraper time
10,000 gal. Water truck, road maintenance time = 1/8 scraper time

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 8 and Note 1 above

WORKSHEET NO. 13G

SUMMARY CALCULATION OF EARTHMOVING COSTS - Motor Graders

Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
29 Road Ripping No Name Project	16M Grader, ripping	100%	(\$ 215 + \$ 19)	*	1 =	\$ 273
33 Grading Topsoil Areas	16M Grader	100%	(\$ 208 + \$ 19)	*	67 =	\$ 15,149
Total Cost =						\$ 15,422

Equipment and Accessory Identification

- 1) Caterpillar 16M Motor Grader with Ripper Blade

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total Hours Required from Worksheet 12

WORKSHEET NO. 13H

SUMMARY CALCULATION OF EARTHMOVING COSTS - Drilling

Project	Equipment Type ¹	Ratio	Equipment Unit Costs [\$/hr] ²	Labor Costs [\$/hr] ³	Total Hours Required ⁴	Total Cost [\$]
1 Drill & Blast	DMM2 Drill	100%	(\$ 406 + \$ 21)	*	0 = \$	-
32 Intentionally Left Blank	DMM2 Drill	100%	(\$ 406 + \$ 21)	*	0 = \$	0
Total Cost = \$						0

Equipment and Accessory Identification

- 1) Ingersoll-Rand DMM2 Crawler-type Drill

Data Sources:

- 2) PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2011 1st half edition. (see Table 12-B-23)
- 3) Labor Cost based on 2011 contract with ACME Inc. (see Table 12-B-24)
- 4) Total yardage drilled from 12-B-25 D&B

WORKSHEET NO. 14A
REVEGETATION COSTS

Name and Description of Areas to be Revegetated:

9 Revegetation

Description of Revegetation Activities

$$\text{Costs For Seeding} = \frac{242 \text{ ac}}{\text{Acreage to be reseeded}} * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$ 692,959$$

20% Contingency for vegetation failure:

$$\text{Costs For Reseeding} = \frac{48 \text{ ac}}{\text{Acreage to be reseeded}} * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$ 138,592$$

Other Revegetation Activity for this Area (e.g. Soil Sampling):
TOTAL REVEGETATION COST = \$ 831,551

Data Sources:

Navajo Mine records for contractor planting costs

Seedbed Preparation includes discing and ripping, drill seeding, topsoil and spoil sampling

Irrigation costs are included with seeding, fertilizing and mulching costs

WORKSHEET NO. 14B	
REVEGETATION COSTS	
Name and Description of Areas to be Revegetated:	
34 Revegetation Roads No Name Project	
Description of Revegetation Activities	
20% Contingency for vegetation failure:	
Costs For Seeding = $\frac{1 \text{ ac}}{\text{Acreage to be reseeded}} * \left(\frac{325.41 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$$	3,661
20% Contingency for vegetation failure:	
Costs For Reseeding = $\frac{0 \text{ ac}}{\text{Acreage to be reseeded}} * \left(\frac{325.41 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$$	732
Other Revegetation Activity for this Area (e.g. Soil Sampling):	
TOTAL REVEGETATION COST = \$ 4,394	

Data Sources:

Navajo Mine records for contractor planting costs

Seedbed Preparation includes discing and ripping, drill seeding, topsoil and spoil sampling

Irrigation costs are included with seeding, fertilizing and mulching costs

WORKSHEET NO. 14C**REVEGETATION COSTS**

Name and Description of Areas to be Revegetated:

32 Intentionally Left Blank

Description of Revegetation Activities

$$\begin{array}{rcll} \text{Costs For} & = & - & \text{ac} \\ \text{Seeding} & & \frac{\text{Acreage to be}}{\text{reseeded}} & * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$ - \end{array}$$

20% Contingency for vegetation failure:

$$\begin{array}{rcll} \text{Costs For} & = & 0 & \text{ac} \\ \text{Reseeding} & & \frac{\text{Acreage to be}}{\text{reseeded}} & * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$ - \end{array}$$

Other Revegetation Activity for this Area (e.g. Soil Sampling):**TOTAL REVEGETATION COST = \$ -**

Data Sources:

Navajo Mine records for contractor planting costs

Seedbed Preparation includes discing and ripping, drill seeding, topsoil and spoil sampling

Irrigation costs are included with seeding, fertilizing and mulching costs

WORKSHEET NO. 14D	
REVEGETATION COSTS	
Name and Description of Areas to be Revegetated:	
32 Intentionally Left Blank	
Description of Revegetation Activities	
20% Contingency for vegetation failure:	
Costs For Seeding = $\frac{- \text{ ac}}{\text{Acreage to be reseeded}} * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$$	-
Reseeding 20% of permanent program lands that were revegetated during or before 1999:	
Costs For Reseeding = $\frac{0 \text{ ac}}{\text{Acreage to be reseeded*}} * \left(\frac{325.4 \text{ \$/ac.}}{\text{cost for seedbed preparation}} + \frac{2536.5277 \text{ \$/ac.}}{\text{cost for seeding, fertilizing, mulching, and irrigation}} \right) = \$$	-
Other Revegetation Activity for this Area (e.g. Soil Sampling):	
TOTAL REVEGETATION COST = \$	
-	

Data Sources:

Navajo Mine records for contractor planting costs

Seedbed Preparation includes discing and ripping, drill seeding, topsoil and spoil sampling

Irrigation costs are included with seeding, fertilizing and mulching costs

WORKSHEET NO. 15A
PRODUCTIVITY AND HOURS FOR DRILL USE

Earthmoving Activity:

1 Drill & Blast

Characterization of Drill Used

Drill Model IR DMM2 Drill			
Drill Bit Diameter	10.63 [in]	Burden	26 [ft]
Drill Rod Length	35 [ft]	Bench Height	40 [ft]
Penetration Rate	228 [ft/hr]	Spacing	32 [ft]

1,233 Volume Shot per hole [bcy]

Description of Activity:

Drilling holes to provide space for explosives

Calculation:

$$\text{Cycles per Hour} = \frac{60 \text{ min}}{\text{time available}} / \left(\frac{10.5 \text{ min}}{\text{drill time}} + \frac{1.6 \text{ min}}{\text{rod feed time}} + \frac{0.4 \text{ min}}{\text{rod pull time}} + \frac{2.0 \text{ min}}{\text{misc.}} \right) = 4.1 \text{ cycles/hr}$$

$$\begin{aligned} \text{Operating Delays} &= \frac{30.0 \text{ min}}{\text{lunch}} + \frac{15.0 \text{ min}}{\text{shift change}} + \frac{10.0 \text{ min}}{\text{blasting}} + \frac{6.0 \text{ min}}{\text{service time}} + \frac{5.0 \text{ min}}{\text{moving}} + \frac{5 \text{ min}}{\text{misc.}} = 71 \text{ min} \\ &= 14.8\% \text{ of a shift} \\ &= 85.2\% \text{ operational utilization} \end{aligned}$$

$$\text{Effective Pit Utilization (EPU)} = \frac{85.2\%}{\text{operational utilization}} * \frac{90.0\%}{\text{availability}} = 76.7\%$$

$$\text{Maximum Penetration Rate} = \frac{40 \text{ ft}}{\text{bench height}} * \frac{4.1 \text{ cycles/hr}}{\text{cycles per hour}} * \frac{76.7\% \text{ EPU}}{\text{pit utilization}} = 126.5 \text{ ft/hr}$$

Maximum Production:

$$\text{per Scheduled Shift:} = \frac{26 \text{ ft}}{\text{burden}} * \frac{32 \text{ ft}}{\text{spacing}} * \frac{126.5 \text{ ft/hr}}{\text{max. penetration rate}} * \frac{8.0 \text{ hr/shift}}{\text{hours in a shift}} / \frac{27 \text{ ft}^3/\text{yd}^3}{\text{conversion factor}} = 31,184 \text{ bcy/shift}$$

$$\text{per Scheduled Hour} = \frac{31,184 \text{ bcy/shift}}{\text{max. production per sched. shift}} / \frac{8 \text{ hr/shift}}{\text{conversion factor}} = 3,898 \text{ bcy/hr}$$

$$\text{Drill Hours Required} = \frac{\text{ - bcy}}{\text{volume to be blasted}} / \frac{3,898 \text{ bcy/hr}}{\text{production rate}} = \text{ - hr}$$

WORKSHEET NO. 15B
PRODUCTIVITY AND HOURS FOR DRILL USE

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Drill Used

Drill Model IR DMM2 Drill			
Drill Bit Diameter	10.63 [in]	Burden	26 [ft]
Drill Rod Length	35 [ft]	Bench Height	40 [ft]
Penetration Rate	228 [ft/hr]	Spacing	32 [ft]

1,233 Volume Shot per hole [bcy]

Description of Activity:

Drilling holes to provide space for explosives

Calculation:

$$\text{Cycles per Hour} = \frac{60 \text{ min}}{\text{time available}} / \left(\frac{10.5 \text{ min}}{\text{drill time}} + \frac{1.6 \text{ min}}{\text{rod feed time}} + \frac{0.4 \text{ min}}{\text{rod pull time}} + \frac{2.0 \text{ min}}{\text{misc.}} \right) = 4.1 \text{ cycles/hr}$$

$$\begin{aligned} \text{Operating Delays} &= \frac{30.0 \text{ min}}{\text{lunch}} + \frac{15.0 \text{ min}}{\text{shift change}} + \frac{10.0 \text{ min}}{\text{blasting}} + \frac{6.0 \text{ min}}{\text{service time}} + \frac{5.0 \text{ min}}{\text{moving}} + \frac{5 \text{ min}}{\text{misc.}} = 71 \text{ min} \\ &= 14.8\% \text{ of a shift} \\ &= 85.2\% \text{ operational utilization} \end{aligned}$$

$$\text{Effective Pit Utilization (EPU)} = \frac{85.2\%}{\text{operational utilization}} * \frac{90.0\%}{\text{availability}} = 76.7\%$$

$$\text{Maximum Penetration Rate} = \frac{40 \text{ ft}}{\text{bench height}} * \frac{4.1 \text{ cycles/hr}}{\text{cycles per hour}} * \frac{76.7\% \text{ EPU}}{\text{pit utilization}} = 126.5 \text{ ft/hr}$$

Maximum Production:

$$\text{per Scheduled Shift:} = \frac{26 \text{ ft}}{\text{burden}} * \frac{32 \text{ ft}}{\text{spacing}} * \frac{126.5 \text{ ft/hr}}{\text{max. penetration rate}} * \frac{8.0 \text{ hr/shift}}{\text{conversion factor}} = 31,184 \text{ bcy/shift}$$

$$\text{per Scheduled Hour} = \frac{31,184 \text{ bcy/shift}}{\text{max. production per sched. shift}} / \frac{8 \text{ hr/shift}}{\text{conversion factor}} = 3,898 \text{ bcy/hr}$$

$$\text{Drill Hours Required} = \frac{0 \text{ bcy}}{\text{volume to be blasted}} / \frac{3,898 \text{ bcy/hr}}{\text{production rate}} = 0 \text{ hr}$$

WORKSHEET NO. 15C

PRODUCTIVITY AND COSTS FOR BLASTING ACTIVITIES

Earthmoving Activity:

1 Drill & Blast

Characterization of Blasting Parameters

Ingersoll Rand DMM2 Drill

Burden	26 [ft]	Powder Factor [lb/bcy]	0.9 [lb/bcy]
Bench Height	40 [ft]	Volume Shot per hole [bcy]	1,233 [bcy]
Spacing	32 [ft]		

Description of Activity:

ANFO used with boosters and primacord for explosive load

Calculation:

$$\text{Total ANFO Required} = \frac{- \text{bcy}}{\text{volume to be blasted}} * \frac{0.9 \text{ lb/bcy}}{\text{powder factor}} = - \text{lb}$$

$$\text{Miscellaneous Powder Supplies} = \frac{- \text{lb}}{\text{ANFO required}} * \frac{5\%}{\text{contingency factor}} = - \text{lb}$$

$$\text{Cord Cost per Hole} = \left(\frac{26 \text{ ft}}{\text{burden}} + \frac{32 \text{ ft}}{\text{spacing}} + \frac{40 \text{ ft}}{\text{bench height}} \right) * \frac{10\%}{\text{waste factor}} * \frac{0.26 \text{ \$/ft}}{\text{cord unit cost}} = 28 \text{ \$/hole}$$

$$\text{ANFO Cost per Hole} = \frac{1,233 \text{ bcy}}{\text{volume shot per hole}} * \frac{0.9 \text{ lb/bcy}}{\text{powder factor}} * \frac{0.26 \text{ \$/lb}}{\text{ANFO unit cost}} = 288 \text{ \$/hole}$$

$$\text{Primer Cost per Hole} = \frac{1}{\text{primers per hole}} * \frac{6.56 \text{ \$/ea}}{\text{primer unit cost}} = 6.56 \text{ \$/hole}$$

$$\text{Volumetric Blasting Cost} = \left(\frac{28 \text{ \$/hole}}{\text{cord cost per hole}} + \frac{288 \text{ \$/hole}}{\text{ANFO cost per hole}} + \frac{6.56 \text{ \$/hole}}{\text{primer cost per hole}} \right) / \frac{1,233 \text{ bcy}}{\text{volume shot per hole}} = 0.26 \text{ \$/bcy}$$

$$\text{Total Blasting Cost} = \frac{0.26 \text{ \$/bcy}}{\text{volumetric blasting cost}} * \frac{- \text{bcy}}{\text{volume to be blasted}} = \$ -$$

WORKSHEET NO. 15D

PRODUCTIVITY AND COSTS FOR BLASTING ACTIVITIES

Earthmoving Activity:

32 Intentionally Left Blank

Characterization of Blasting Parameters

Ingersoll Rand DMM2 Drill

26 Burden [ft]

0.9 Powder Factor [lb/bcy]

32 Spacing [ft]

1,233 Volume Shot per hole [bcy]

40 Bench Height [ft]

Description of Activity:

ANFO used with boosters and primacord for explosive load

Calculation:

$$\text{Total ANFO Required} = \frac{0 \text{ bcy}}{\text{volume to be blasted}} * \frac{0.9 \text{ lb/bcy}}{\text{powder factor}} = 0 \text{ lb}$$

$$\text{Miscellaneous Powder Supplies} = \frac{0 \text{ lb}}{\text{ANFO required}} * \frac{5\%}{\text{contingency factor}} = 0 \text{ lb}$$

$$\text{Cord Cost per Hole} = \left(\frac{26 \text{ ft}}{\text{burden}} + \frac{32 \text{ ft}}{\text{spacing}} + \frac{40 \text{ ft}}{\text{bench height}} \right) * \frac{10\%}{\text{waste factor}} * \frac{0.26 \text{ \$/ft}}{\text{cord unit cost}} = 28 \text{ \$/hole}$$

$$\text{ANFO Cost per Hole} = \frac{1,233 \text{ bcy}}{\text{volume shot per hole}} * \frac{0.9 \text{ lb/bcy}}{\text{powder factor}} * \frac{0.26 \text{ \$/lb}}{\text{ANFO unit cost}} = 288 \text{ \$/hole}$$

$$\text{Primer Cost per Hole} = \frac{1}{\text{primers per hole}} * \frac{6.56 \text{ \$/ea}}{\text{primer unit cost}} = 6.56 \text{ \$/hole}$$

$$\text{Volumetric Blasting Cost} = \left(\frac{28 \text{ \$/hole}}{\text{cord cost per hole}} + \frac{288 \text{ \$/hole}}{\text{ANFO cost per hole}} + \frac{6.56 \text{ \$/hole}}{\text{primer cost per hole}} \right) / \frac{1,233 \text{ bcy}}{\text{volume shot per hole}} = 0.26 \text{ \$/bcy}$$

$$\text{Total Blasting Cost} = \frac{0.26 \text{ \$/bcy}}{\text{volumetric blasting cost}} * \frac{0 \text{ bcy}}{\text{volume to be blasted}} = \$ 0$$

Project: No Name Permit

Date: Sep-2025

WORKSHEET NO. 15E

Other Reclamation Activity Costs

Earthmoving Activity:

Rip-Rap for Channels and Drop Structures

Calculation:

See detailed calculations in Appendix 12-C

Cost for No Name Project: \$ -

Total: \$ -

WORKSHEET NO. 16		
BOND 2025 to 2029 - NO NAME BOND SUMMARY SHEET		
	2024 Estimate	
1	Total Facility and Structure Removal Costs	\$ -
2	Total Earthmoving Costs	\$ 3,111,412
3	Total Revegetation Costs	\$ 835,944
4	Total Other Reclamation Activities Costs	\$ 0
5	Subtotal: Total Direct Costs	\$ 3,947,357
Indirects (Based on Line 5)		%
6	Mobilization and Demobilization	1.0% \$ 39,474
7	Contingencies	2.0% \$ 78,947
8	Engineering Redesign Fee	1.8% \$ 71,052
9	Contractor Profit and Overhead	15.0% \$ 592,104
10	Reclamation Management Fee	3.9% \$ 153,947
11	Subtotal 2024 Indirect Costs: ¹	\$ 935,524
Bond Release		
Subtotal Bond Release		\$0
Total No Name Bond Cost Estimate using 2024 cost		\$ 4,882,880
Bond Inflations		%
	2024 Inflation	6.66% \$ 5,208,080
	2025 Inflation	6.66% \$ 5,554,938
	2026 Inflation	TBD
	2027 Inflation	TBD
	2028 Inflation	TBD
	2029 Inflation	TBD

¹ Sum of items 5 through 10

Tables

2025 No Name Bond Tables

TABLE 50.A-1						
DEMOLITION UNIT COSTS						
Means Reference Number (1)			ID	Item	Unit	2024 Bare Costs
Building Demolition, Large Urban Projects (incl. 20 mile haul) No Foundation or Dump Fees, C.F. is vol. of building standing						
02 41	16.13	0020	1	Large urban buildings, steel	CF	\$0.43
02 41	16.13	5000	1a	Large urban buildings, steel, no interior walls reduce by 30%	CF	\$0.30
02 41	16.13	0050	2	Large urban buildings, concrete	CF	\$0.60
02 41	16.13	5000	2a	Large urban buildings, concrete, no interior walls reduce by 30%	CF	\$0.42
02 41	16.13	0080	3	Large Urban buildings, masonry	CF	\$0.46
02 41	16.13	5000	3a	Large Urban buildings, masonry, no interior walls reduce by 30%	CF	\$0.32
02 41	16.13	0100	4	Large urban buildings, mixture of types	CF	\$0.46
02 41	16.13	0500	5	Small urban buildings, steel	CF	\$0.42
02 41	16.13	5000	5a	Small urban buildings, steel, no interior walls reduce by 30%	CF	\$0.29
02 41	16.13	0600	6	Small urban buildings, concrete	CF	\$0.54
02 41	16.13	5000	6a	Small urban buildings, concrete, no interior walls reduce by 30%	CF	\$0.38
02 41	16.13	0650	7	Small Urban buildings, masonry	CF	\$0.42
02 41	16.13	5000	7a	Small Urban buildings, masonry, no interior walls reduce by 30%	CF	\$0.29
Building Demolition, Footings and Foundations, Floors, Concrete Slab on Grade						
02 41	16.17	0240	8	Floor, 4" concrete slab, plain	SF	\$0.84
02 41	16.17	0280	8a	Floor, 4" concrete slab, mesh reinforced	SF	\$1.05
02 41	16.17	0300	8b	Floor, 4" concrete slab, mesh reinforced, rods	SF	\$0.93
02 41	16.17	0400	9	Floor, 6" concrete slab, plain	SF	\$1.05
02 41	16.17	0420	9a	Floor, 6" concrete slab, mesh reinforced	SF	\$1.31
02 41	16.17	0440	9b	Floor, 6" concrete slab, mesh reinforced, rods	SF	\$1.16
02 41	16.17	0420	10	Floor, 8"concrete slab, mesh reinforced	SF	\$1.19
02 41	16.17	0440	10a	Floor, 8"concrete slab, mesh reinforced, rods	SF	\$1.55
1 41	16.16	0439	11	Floor, 12"concrete slab, mesh reinforces rods	SF	\$2.32
02 41	16.17	1000	12	Footings, concrete, 1' x 2'	LF	\$13.97
02 41	16.17	2600	12a	Footings, concrete, 1' x 2', average reinforcing + 10%	LF	\$15.37
02 41	16.17	1080	13	Footings, concrete, 1.5' x 2'	LF	\$16.76
02 41	16.17	2600	13a	Footings, concrete, 1.5' x 2', average reinforcing + 10%	LF	\$18.44
02 41	16.17	1120	14	Footings, concrete 1.5' x 3'	LF	\$20.92
02 41	16.17	2600	14a	Footings, concrete, 1.5' x 3', average reinforcing + 10%	LF	\$23.01
02 41	16.17	1140	15	Footings, concrete, 2' x 3'	LF	\$23.92
02 41	16.17	2600	15a	Footings, concrete, 2' x 3', average reinforcing + 10%	LF	\$26.31
02 41	16.17	1140	16	Footings, concrete, 2' x 6'	LF	\$47.84
02 41	16.17	2600	16a	Footings, concrete, 2' x 6', average reinforcing + 10%	LF	\$52.62
02 41	16.17	1140	51	Footings, concrete, 2' x16', average reinforcing + 10%	LF	\$140.33
02 41	16.17	2400	17	Walls, concrete, 3.5" thick	SF	\$0.41
02 41	16.17	2040	18	Walls, concrete, 6" thick	SF	\$0.70
02 41	16.17	2600	18a	Walls, concrete, 6" thick, Average reinforcing + 10%	SF	\$0.77
02 41	16.17	2420	19	Walls, concrete, 8" thick	SF	\$1.19

TABLE 50.A-1						
DEMOLITION UNIT COSTS						
Means Reference Number (1)			ID	Item	Unit	2024 Bare Costs
02 41	16.17	2600	19a	Walls, concrete, 8" thick, Average reinforcing + 10%	SF	\$1.31
02 41	16.17	2440	49	Walls, concrete, 10" thick	SF	\$1.39
02 41	16.17	2600	49a	Walls, concrete, 10" thick, Average reinforcing + 10%	SF	\$1.53
02 41	16.17	2500	50	Walls, concrete, 12" thick	SF	\$1.68
02 41	16.17	2600	50a	Walls, concrete, 12" thick, Average reinforcing + 10%	SF	\$1.85
02 41	16.17	2500	20	Walls, concrete, 18" thick, Average reinforcing + 10%	SF	\$2.95
02 41	16.17	2500	21	Walls, concrete, 2' thick, Average reinforcing + 10%	SF	\$3.93
02 41	16.17	4250	22	Disposal, Concrete/Masonry, Up to 5 mile haul	CY	\$22.12
02 41	13.60	1650	23	Fencing, 5-strand barbed wire	LF	\$2.77
02 41	13.60	1700	24	Fencing, chain link, posts and fabric, 8' to 10' high	LF	\$3.58
02 41	13.33	3500	25	Rail removal, ties and track	LF	\$15.22
02 41	13.33	3600	26	Remove Ballast	CY	\$5.54
02 41	13.30	4200	27	Sidewalk, concrete, mesh reinforced (converted to SF)	SF	\$1.18
02 41	13.17	5050	28	Pavement, bituminous, 4"- 6" (converted to SF)	SF	\$0.75
02 41	13.17	5200	29	Driveway, concrete, 6", mesh reinforced (converted to SF)	SF	\$1.23
02 41	13.17	5500	30	Concrete, 7" to 24" thick, reinforced (converted to CF)	CF	\$4.36
02 41	16.13	0500	31	Steel Tanks, Piping & Culvert (Use small building, steel)	CF	\$0.42
31 22	13.2	280	55	Rough Grading Sites 75,100 - 100,000 S.F.	EA	\$5,894.53
02 41	13.70	0600	40	Gabions, 18-36 inches deep	SY	\$167.93
02 41	13.43	0200	41	Box Culvert 8'x12'x8'	LF	\$27.92
02 41	13.86	0100	42	Road Rug (Geotextile Lining Material use Synthetic Grass Co)	SF	\$0.39
02 41	13.30	0800	43	Guard Rail, corrugated steel	LF	\$17.23
02 41	13.62	0400	44	Chain Link Gates, 20' Width	EA	\$158.76
02 41	19.19	3080		Machine Loading Rubbish Truck	CY	\$21.60
02 41	19.19	5100		Rubbish Haul 20 CY Truck	MI	\$0.98
Estimation (see 3 below)				Landfill Disposal Fee	CY	\$17.05
Calculated			45	Rubbish Disposal (Concrete and Asphalt, 40 MI Haul)	CY	\$40.61
Calculated			56	Rubbish Disposal (Building Debris, add. 40 MI and Disposal F	CY	\$19.01
Unit Costs from 2019 Inflated (see 2 below)			32	69 kV Power Lines	MI	\$11,085.58
			33	Conveyor	LF	\$35.93
			34	Water Wells	EA	\$2,895.23

x

TABLE 50.A-1 DEMOLITION UNIT COSTS				
Means Reference Number (1)	ID	Item	Unit	2024 Bare Costs
3rd Party Estimate (see 4 below)	35	Seedbed Prep per Acre	Acre	\$325.41
		16M Grader w/ ripper @1.1 acres/hour ⁷		\$215.41
		Chisel Plow ⁴		\$110.00
	36	Seeding, Mulching, Irrigation per Acre	Acre	\$2,536.53
		Scarify and Drill Seed ⁴		\$138.00
		Dribble Seed ⁴		\$32.00
		Mulch ⁴		\$203.00
		Crimp ⁴		\$127.00
		Seed Material ^{4a}		\$202.52
		Mulch Materials (2 ton per acre @ \$203 per ton) ⁴		\$406.00
Wage Rates from Table 50-B-24		First Year Irrigation ⁸		\$1,038.55
		Second Year Irrigation ⁸		\$389.46
	37	Drill Operator (Use Driller)	Labor Hour	\$21.00
	38	Blast Laborer (use regular Laborer)	Labor Hour	\$18.23
	39	Blast Foremen	Labor Hour	\$27.35
Estimation (see 5 below)	46	Primacord - aka detcord	LF	\$0.26
	47	ANFO	lb	\$0.26
	48	Primers - 3 lb type	EA	\$6.56
3rd Party estimate (see 6 below)		Rip-Rap	CY	\$157.77
1). R.S. Means Online, "Heavy Construction Cost Data," 2024 Unit Costs for Farmington NM 2). Escalation based on RSMeans Historical Cost Indices, see RSMeans Table 3). 3rd Party Estimate from Landfill near Mine Location 4). 3rd Party Estimate from Rocky Mountain Reclamation 4a). 3rd Party Estimate from Rocky Mountain Reclamation (2019) 5). Cost obtained from similar mining operation operating in the Western US (2019) 6). Cost obtained from Michele's Ready Mix, Rock, & Recycle, Inc. at a rate of \$87.65/ton delivered and a density of 1.8 tons per cubic yard 7). Production rate and hourly rate from Bond Estimate grading 8). Site specific estimate (2019)				

TABLE 12-A-2 CULVERT VOLUMES FOR DEMOLITION AND REMOVAL			
CULVERT ID	Diameter [in]	Length [ft]	Volume [ft ³]
0	0	0	-
Total			-

TABLE 12-A-3
BACKFILLING OF PONDS AND IMPOUNDMENTS

	Pond Volume		Dam ²					Dozer Push Distance [ft]	Backfill Volume ³ [bcy] ¹
Pond	[ac-ft]	[bcy] ¹	Bottom [ft]	Top [ft]	Height [ft]	Length [ft]	Volume [bcy] ¹		
Pond 501	7.0	2,082	-	-	-	-	Incised	200	2,082
Pond 502	10.0	5,250	-	-	-	-	Incised	200	5,250
Pond 503	21.0	3,930	-	-	-	-	Incised	200	3,930
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
		-	-	-	-	-	-	0	-
TOTAL		11,263	Weighted Average Push Distance [ft]					200.00	11,263

(1) BCY = Bank cubic yards

(2) Dam volume is the trapezoidal cross-sectional area times the length.

(3) Backfill volume is the smaller of the dam volume or pond volume.

This assumes that either the pond is filled or the dam is removed and pushed into the pond.

TABLE 12-A-4 ROAD RIPPING				
Description	Length [ft]	Width [ft]	Area [acres]	Equipment
No Name Project - West Haulroad Road	774	72	1.28	Cat 16G Motor Grader
			-	Cat 16G Motor Grader
			-	Cat 16G Motor Grader
			-	Cat 16G Motor Grader
			-	Cat 16G Motor Grader
Total			1.28	

26-Sep-25

Total yards go to Worksheet 3

TABLE 50-A-6
NO NAME BOND REGRADE EARTHMOVING
TRUCKS AND LOADER

26-Sep-25

Cut Block	Total Volume cu. yds.	Permanent Program %	Permanent Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
No Name										
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
0	0	100%	0			0			0	Adj. Dist. reflects haul route
Totals				Weighted Average						
No Name	0	100%	0			-			0.0	
GRAND TOTAL	0		0							

Total yards go to Worksheet 3

TABLE 50-A-7
NO NAME BOND REGRADE EARTHMOVING
SCRAPERS

26-Sep-25

Cut Block	Total Volume cu. yds.	Permanent Program %	Permanent Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
No Name Project										
RG 1 to RG 4	19,343	100%	19,343			1,433			-2%	Adj. Dist. reflects haul route
RG 1 to RG 5	112,889	100%	112,889			1,579			1%	Adj. Dist. reflects haul route
RG 2 to RG 5	22,771	100%	22,771			1,262			1%	Adj. Dist. reflects haul route
RG 3 to RG 6	5,854	100%	5,854			1,187			1%	Adj. Dist. reflects haul route
Totals				Weighted Average						
No Name Project	160,857	100%	160,857			1,502			0.0	
GRAND TOTAL	160,857		160,857							

Total yards go to Worksheet 3

TABLE 50-A-8
NO NAME BOND REGRADE TOPSOILING
SCRAPERS

26-Sep-25

Cut Block	Total Topsoil Volume cu. yds.	Area acres	Perm. Topsoil Volume cu. yds.	Root Zone Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
NO NAME Project					NO NAME Project						Adj. Dist. reflects haul route
TOTAL	-	-	-		Weighted Average:						

Total yards and acres go to Worksheet 3

Assumption:

0.48 feet topsoil replacement depth No Name
Used Marston's weighted average of 2970 feet haul for topsoil on No Name

TABLE 50-A-9
NO NAME BOND REGRADE TOPSOILING
TRUCKS AND LOADER

26-Sep-25

Cut Block	Total Volume cu. yds.	Area acres	Perm. Topsoil Volume cu. yds.	Root Zone Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
No Name Project	315,764	242.1	315,764		No Name Project		9,242			4.00%	Adj. Dist. reflects haul route
TOTAL	315,764	242.1	315,764		Weighted Average:		9,242			4.00%	

Total yards and acres go to Worksheet 3

Assumption:

0.81 feet topsoil replacement depth (537,739 in stockpile)

**TABLE 50-A-10
NO NAME BOND REGRADE MITIGATION
SCRAPERS**

26-Sep-25

Cut Block	Total Volume cu. yds.	Area acres	Topsoil Volume cu. yds.	Root Zone Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
No Name Project	0	0.0			No Name Project		0			0.00%	Adj. Dist. reflects haul route
TOTAL	-	-		-	Weighted Average		-			0.00%	

Total yards go to Worksheet 3

Assumptions:

10.8%	of all reclaim acres require mitigation
4.0	feet total of mitigation and topsoil

Assume that all mitigation suitable materials will be at the topsoil pile.

**TABLE 50-A-11
NO NAME BOND REGRADE MITIGATION
TRUCKS AND LOADER**

26-Sep-25

Cut Block	Total Volume cu. yds.	Area acres	Topsoil Volume cu. yds.	Perm. Root Zone Volume cu. yds.	Fill Block	Centroid Distance ft.	Planned Adj. Distance ft.	Cut Elev. ft	Fill Elev. ft	Grade %	Comments
No Name Project	148,715	242.1		148,715	No Name Project		9,242			4.00%	Adj. Dist. reflects haul route
TOTAL	148,715	242		148,715	Weighted Average		9,242			4.00%	

Total yards go to Worksheet 3

Assumptions:

10.8%	of all reclaim acres require mitigation
4	feet total of mitigation and topsoil
3.5	feet of mitigation "suitable" materials No Name
0.5	feet topsoil replacement depth No Name

TABLE 50-A-12

EQUIPMENT OWNERSHIP AND OPERATING COSTS

Equipment Model		Ownership Costs (\$/hr)			Overhaul Costs (\$/hr)				Field Repair and Fuel Costs (\$/hr)											2024 Total \$/hr	
		Depreciation	Depreciation Multiplier	Adjusted Depreciation	Labor	Labor Multiplier	Adjusted Labor	O/H Parts	Labor	Labor Multiplier	Adjusted Labor	Parts	Fuel	Fuel Multiplier	Adjusted Fuel	Lube	Tires	Tire Multiplier	Adjusted Tires		GEC (2)
D9R Dozer	Semi-U Blade	\$ 44.77	0.83	\$ 37.16	\$ 12.43	0.41	\$ 5.16	\$ 59.13	\$ 14.55	0.41	\$ 6.04	\$ 57.59	\$ 54.01	0.84	\$ 45.29	\$ 10.42	\$ -	1.00	\$ -	\$ 9.60	\$ 230.38
D10R Dozer	Semi-U Blade	\$ 57.98	0.83	\$ 48.12	\$ 12.43	0.41	\$ 5.16	\$ 75.59	\$ 14.55	0.41	\$ 6.04	\$ 73.62	\$ 74.32	0.84	\$ 62.32	\$ 13.85	\$ -	1.00	\$ -	\$ 12.27	\$ 296.97
D11R Dozer	U Blade	\$ 112.96	0.83	\$ 93.76	\$ 12.43	0.41	\$ 5.16	\$ 135.65	\$ 14.55	0.41	\$ 6.04	\$ 132.12	\$ 110.05	0.84	\$ 92.28	\$ 23.51	\$ -	1.00	\$ -	\$ 22.02	\$ 510.53
631E Scraper	Series II	\$ 109.22	0.83	\$ 90.65	\$ 6.87	0.41	\$ 2.85	\$ 114.31	\$ 10.04	0.41	\$ 4.16	\$ 113.39	\$ 70.90	0.84	\$ 59.45	\$ 12.74	\$ 8.48	1.00	\$ 8.48	\$ 4.83	\$ 410.87
992G Loader		\$ 89.64	0.83	\$ 74.40	\$ 7.58	0.41	\$ 3.14	\$ 49.94	\$ 9.25	0.41	\$ 3.84	\$ 55.09	\$ 79.79	0.84	\$ 66.91	\$ 19.19	\$ 68.46	1.00	\$ 68.46	\$ 7.50	\$ 348.47
777F Truck		\$ 64.05	0.83	\$ 53.16	\$ 19.25	0.41	\$ 7.99	\$ 45.63	\$ 11.82	0.41	\$ 4.90	\$ 28.16	\$ 57.80	0.84	\$ 48.47	\$ 19.93	\$ 35.36	1.00	\$ 35.36	\$ -	\$ 243.60
16M Grader		\$ 53.87	0.83	\$ 44.71	\$ 7.49	0.41	\$ 3.11	\$ 49.47	\$ 6.24	0.41	\$ 2.59	\$ 47.97	\$ 39.40	0.84	\$ 33.04	\$ 9.70	\$ 13.64	1.00	\$ 13.64	\$ 4.00	\$ 208.23
Water Truck	10,000 gal	\$ 37.31	0.83	\$ 30.97	\$ 17.73	0.41	\$ 7.35	\$ 19.98	\$ 10.05	0.41	\$ 4.17	\$ 38.57	\$ 63.62	0.84	\$ 53.35	\$ 10.38	\$ 10.47	1.00	\$ 10.47	\$ -	\$ 175.24
Small Backhoe	Cat 450E	\$ 23.06	0.83	\$ 19.14	\$ 9.32	0.41	\$ 3.87	\$ 19.45	\$ 12.30	0.41	\$ 5.10	\$ 17.20	\$ 20.00	0.84	\$ 16.77	\$ 3.50	\$ 2.01	1.00	\$ 2.01	\$ 2.44	\$ 89.48
Grader Ripper		\$ 3.18	0.83	\$ 2.64	\$ 0.05	0.41	\$ 0.02	\$ 1.05	\$ 1.04	0.41	\$ 0.43	\$ 1.55	\$ -	0.84	\$ -	\$ 0.20	\$ -	1.00	\$ -	\$ 1.29	\$ 7.18
16M Grader, ripping		\$ 57.05	0.83	\$ 47.35	\$ 7.54	0.41	\$ 3.13	\$ 50.52	\$ 7.28	0.41	\$ 3.02	\$ 49.52	\$ 39.40	0.84	\$ 33.04	\$ 9.90	\$ 13.64	1.00	\$ 13.64	\$ 5.29	\$ 215.41
Pickup Truck	1 ton 4x4	\$ 2.11	0.83	\$ 1.75	\$ 0.55	0.41	\$ 0.23	\$ 1.25	\$ 0.69	0.33	\$ 0.23	\$ 1.22	\$ 21.89	0.84	\$ 18.36	\$ 2.52	\$ 0.88	1.00	\$ 0.88	\$ -	\$ 26.44
Mechanic truck	1.75 ton 4x4	\$ 1.71	0.83	\$ 1.42	\$ 0.55	0.41	\$ 0.23	\$ 1.02	\$ 0.69	0.33	\$ 0.23	\$ 0.98	\$ 22.27	0.84	\$ 18.67	\$ 2.50	\$ 0.71	1.00	\$ 0.71	\$ -	\$ 25.76
DMM2 Drill		\$ 70.27	0.83	\$ 58.32	\$ 8.73	0.41	\$ 3.62	\$ 78.76	\$ 10.06	0.41	\$ 4.17	\$ 137.26	\$ 111.54	0.84	\$ 93.53	\$ 17.07	\$ -	1.00	\$ -	\$ 13.73	\$ 406.47

The Total \$/hr are used in Worksheet 13

- 1) CRG - PRIMEDIA Equipmentwatch, "Cost Reference Guide for Construction Equipment," 2024
- 2) GEC - Ground Engaging Components

Multipliers are calculated as follows:

Depreciation:	Assumes two shifts per day	Assumes	0.83000
Labor - Heavy Equipment Mechanic: Field Repair and Fuel Costs			
(((0.08)(CRG Wages) + Local Wages) / CRG Wages			
	CFG Wages	\$76.39 /hr	
	Local Wages	\$25.57 /hr*	*Davis Bacon Rate for Powered Equipment Mechanic per
		0.41	General Decision Number: NM20240035 03/01/2024 NM35
Labor - Light Vehicle Employee			
		\$76.39 /hr	
		\$25.57 /hr*	*Davis Bacon Rate for Powered Equipment Mechanic per
		0.33	General Decision Number: NM20240035 03/01/2024 NM35
Parts:	No adjustment	1.00	
Fuel (Diesel):			
	CFG Cost	\$4.15 /gal	
	Local Cost	\$3.48 /gal*	*3rd Party Estimate from Senergy Petroleum
	Fuel Multiplier	0.84	
Lube:	No adjustment	1	
Tires:	No adjustment	1	

TABLE 50-A-13 EQUIPMENT OPERATOR WAGE RATES	
Equipment Operator	Operator Rates [\$/hr] ¹
D9R Dozer	\$21.00
D10R Dozer	\$21.00
D11R Dozer	\$21.00
16M Grader	\$19.02
631E Scraper	\$18.30
992G Loader	\$18.30
777F Truck	\$15.53
Water Truck	\$15.53
Tractor	\$18.30
Track Hoe	\$25.04
Small Backhoe	\$25.04
Small Dumptruck	\$15.53
Drill Operator	\$21.00
Blast Laborer	\$18.23
Blast Foremen	\$27.35
Pickup Truck	\$18.23

1) Labor Rates including burden, excluding Profit&Overhead
from wdol.gov DBA

TABLE 12-A-14			
DRILL AND BLAST QUANTITIES			
Area	Volume [yd ³]	Equipment	Comments
No Name Project	0	Ingersoll-Rand DM23	Drilling and Blasting pit highwalls
Total	0		

TABLE 50-A-15 BOND EQUIPMENT AVAILABILITIES	
EQUIPMENT	AVERAGE AVAILABILITY
Front-End Loaders	90.0%
Haul Trucks	90.0%
Dozers	90.0%
Scrapers	90.0%
Drills	90.0%
Motor Graders	90.0%