

**Appendix F**  
**Earthworks Reclamation Cost Estimate**

# **Earthwork Reclamation Cost Estimate Process Summary Report**

## **Chino Mine Closure/Closeout Plan**

*Prepared for*  
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**October 2024**

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# Signature Page

## Earthwork Reclamation Cost Estimate Process Summary Report

### Chino Mine Closure/Closeout Plan

October 2024



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## 1.0 INTRODUCTION

The New Mexico Environment Department, Groundwater Bureau (NMED) and the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) regulations require facilities to provide financial assurance (FA) for reclamation at closure (New Mexico Administrative Code NMAC 20.6.7.29 and NMAC 19.10.12, respectively). Telesto Solutions Inc. (Telesto) presents this earthwork cost estimate process summary report (earthwork RCE report) for the Chino Mine as part of the 2024 Chino Mine Closure/Closeout Plan (CCP) Freeport-McMoRan Chino Mines Company (Chino). This earthwork RCE report details the scope of earthwork associated with closure/closeout activities. It includes attachments describing the base assumptions and approaches to determine the FA and the associated earthwork reclamation cost estimate (RCE) for the Chino Mine. The reclamation drawings supporting the cost estimate are in Appendix C of the CCP report. Agreements reached in 2019 between the Agencies and Chino (Chino, 2019; MMD and NMED, 2019) form the cost bases for the earthwork RCE.

### 1.1 Reclamation Overview

The earthwork RCE is based on the configuration of facilities as described in the end-of-year (EOY) 2030 mine plan (year 5 of mining). A recent evaluation of the five-year mining sequence, 2026 to 2030, determined that 2030 is the appropriate mine configuration for calculating reclamation designs and costs for financial assurance as it yields a higher cost than other years (CCP Report, AppendixA). The plan assumes that the design for reclamation will take place during the first closure year (2031), with reclamation starting the following year (2032). The O&M cost estimate assumes revegetation maintenance will continue for 12 years after reclamation is completed, while erosion control, road maintenance, and groundwater monitoring will continue for 100 years post-closure.

Locations of mine facilities are shown in Figures 3 and 4 (CCP update). Table 1 summarizes the mine facilities closed and associated reclamation activities performed at

each facility. Facility-by-facility reclamation activity comparisons are also made in Table 2 through Table 4 for the North Mine Area (NMA) stockpiles, other sites in the NMA, and South Mine Area (SMA) sites, respectively.

## 1.2 Report Organization

This earthwork reclamation cost estimate process summary report consists of the following sections:

- **Section 1.0** provides an introduction and overview of the RCE prepared for Chino
- **Section 2.0** presents the data and assumptions used for estimating earthwork, equipment, operation and maintenance (O&M) costs, quotes, and unit costs
- **Section 3.0** summarizes the information used to complete the earthwork RCE
- **Section 4.0** presents the results, including direct and indirect capital costs for each facility and site-wide direct and indirect O&M costs
- **Section 5.0** lists the references cited in this report

The following attachments provide supporting information and calculations:

- **Attachment 1** presents the engineering take-offs used in the calculations
- **Attachment 2** presents the key equations and documentation of the calculations used in the reclamation cost spreadsheet
- **Attachment 3** provides the letter and table documenting the FA Work Group agreement for indirect costs used in the RCE
- **Attachment 4** presents supporting data for the cost estimation, including labor rates, equipment data, direct quotes, and information on fuel costs
- **Attachment 5** presents the RCE spreadsheet

## 2.0 DATA AND ASSUMPTIONS

The reclamation design used as the basis for the earthwork RCE is presented in Appendix C of the CCP report. The reclamation cost estimate is included in a standalone calculation sheet in Attachment 5 of this earthwork RCE report.

Data and key assumptions used throughout the cost estimate calculations for earthwork processes and equipment, indirect and O&M costs, and direct quotes are listed in this section. Attachment 4 provides more detailed information. The sub-appendices in Attachment 4 are organized as follows:

- **Attachment 4.1** tabulates the 2024 labor rates from the New Mexico Department of Labor (NMDOL)
- **Attachment 4.2** contains copies of the EquipmentWatch (Penton Media, 2024) sheets from which equipment unit rates were obtained
- **Attachment 4.3** provides the curve fits used in the production sheets for dozers and haul trucks
- **Attachment 4.4** provides copies of the pertinent information from R.S. Means (Gordian, 2024) and pages from several editions of the Caterpillar Performance Handbook (CPH)
- **Attachment 4.5** provides direct quotes used in the cost estimates
- **Attachment 4.6** provides data and calculations used to prepare the fuel cost

### 2.1 Earthwork Processes and Equipment

Data and assumptions used in the RCE for earthwork processes and equipment include the following:

- **Dozer Push Distances:** Dozer push distances represent the distance from the cut block's centroid to the fill block's centroid
- **Cover Placement:** Trucks, loaders, shovels, and graders cover loading and distribution with optimal truck-to-equipment ratios for each haul route
- **Haul Distances:** Haul distances are calculated using a preferred route and up to three segments; they originate and terminate at the approximate source and reclamation area centroids
- **Borrow Areas:** In the NMA, the material in the Upper South Stockpile (USS) and the STS 2 Stockpile are the first cover sources utilized. Rubio Peak Stockpile provides the remaining cover required. Borrow areas F, E,



and H provide RCM in the SMA. The RCE includes hauling from the source centroid to the centroid of the individual reclamation area

- **Truck and Shovel Operations:** This RCE references the Komatsu 730 dump truck for operation calculations; no shovels are included
- **Scrappers:** Haul distances from centroid of cut to centroid of fill at final reclamation starting and ending elevations, respectively
- **Dust Suppression and Road Maintenance:** A water truck and motor grader are part of the fleet for reclamation (Table 5), with equal task time as a loader or hydraulic shovel
- **Labor Rates:** All labor rates are developed based on the NMDOL Type H (Heavy Engineering) rates. These rates include the base, fringe benefit, and apprenticeship contribution rates
- **Equipment Rates:** The equipment unit operating costs will be taken from the EquipmentWatch Custom Cost Evaluator
- **Hourly Adjustment:** The cost information provided in EquipmentWatch is based on 50 minutes of work per hour, as the RCE calculation is also based on this time frame; however, an hourly adjustment is made when applying this data to a 60-minute work hour
- **Revegetation and Scarification:** The revegetation unit cost is based on R.S. Means, EquipmentWatch, and direct quotes. Scarifying the final surface takes place at the same time as revegetation.
- **Equipment Production Factors:** Table 5 Summarizes equipment production factors from the Caterpillar Handbook (CPH) and EquipmentWatch. Productivity curves are also developed from the Caterpillar references and equipment-specific brochures.
- **Fuel Costs:** The fuel cost is based on discussions with the FA Work Group in the fall of 2018, as agreed in January 2019; historical local quotes are correlated with public data to estimate the fuel cost
- **Miscellaneous Unit Costs:** Other miscellaneous unit costs, shown in Table 6, were taken from several sources. Supporting documentation from direct quotes is included in Attachment 4.5.

## 2.2 Indirect and Operation and Maintenance Costs

The following sections describe how the RCE handles indirect and O&M costs.

### 2.2.1 Capital Indirect Costs and Operation Maintenance

Total indirect costs of 30% are applied to the capital direct costs, and 17.5% indirect costs to the O&M direct costs (Chino, 2019; MMD and NMED, 2019). Indirect costs include

but are not limited to mobilization and demobilization, contingencies, engineering redesign fees, contractor profit and overhead, project management fees, and state procurement costs.

## 2.2.2 Reclamation Timeframe

To update Chino Mine's total Net Present Value, the earthwork RCE assumes that work occurs relatively evenly at approximately 200 acres per year (see Table 16 in the main CCP). Revegetation monitoring is assumed to be completed at the end of 12 years in each area after the initial revegetation. Facility monitoring, and O&M start immediately after facility reclamation and complete at the end of 100 years (i.e., year 99 or 2130).

## 2.3 Direct Quotes

Direct quotes are used in the RCE as information to prepare unit costs, which will be presented in the RCE cost spreadsheet. Direct quotes include the following:

- **Articulated Concrete Blocks (ACBs):** ACB material and installation unit costs
- **Revegetation Materials:** Costs for seed and hay mulch used for reclamation
- **Well Abandonment:** The well abandonment unit costs are based on a quote from Layne, A Granite Company, obtained in July 2018 (Attachment 4.5).

## 3.0 CALCULATIONS

This section describes the elements included in estimating the earthwork reclamation costs for the Chino Mine, utilizing the data and assumptions discussed in Section 2.0. Attachment 2 presents key equations and calculations for the cost estimate, including sub-Attachment 2.2, which details determining the quantity take-offs used in the RCE spreadsheet based on the closure plans (Appendix C of the main CCP). Design parameters, assumptions, and other information are also provided within the spreadsheet to support the cost estimation. Cost calculations are presented in Attachment 5. The steps taken to complete the earthwork RCE include:

1. Project the effort required to perform each of the various reclamation activities (i.e., material quantities, distances, slopes, equipment choices, work type) (Table 2 through Table 4)
2. Based on construction industry information and labor and fuel costs, estimate the unit cost of each reclamation activity (Table 5 through Table 7)
3. Multiply the corresponding quantities by the unit costs to calculate the sub-total cost for each reclamation activity and sum for a total
4. Multiply the indirect percentage rate to the total to complete the cost estimate.

Overall, the cost-estimating process follows the typical, standard approach used in the engineering and construction industries. The earthwork cost estimate is an iterative process based on the required loading and hauling operations and haul distance. Telesto utilizes the unit costs associated with equipment in the fleet to calculate the total reclamation cost using the spreadsheets. Figure 1 summarizes the costing steps for one piece of equipment in developing the fleet.

This section discusses the main reclamation activities for the earthwork RCE, including stockpiles, open pits, and other miscellaneous costs. Table 1 Summarizes key reclamation activities for each facility.

### **3.1.1 Regrading and Grading**

Slopes are graded to an overall outslope gradient of 3.5:1 (horizontal: vertical) with inter-bench slope lengths of 200 ft and 3:1 interbench slopes, where possible. Grading is done in a manner to ensure positive drainage. Material placed on the west side of the West Stockpile is placed at a 2.7:1 overall slope (2.5:1 interbench slope) to keep the fill material out of Hanover Creek. The top surfaces of all tailing impoundments are graded to a minimum final grade of 0.5% toward water management structures. The top surfaces of all waste rock and leach stockpiles are graded to a minimum final grade of 1% toward water management structures.

### **3.1.2 Top Surface Channels and Channel Construction**

Because of the shallow reclamation grades on the tops of tailing waste rock stockpiles, top surface channels are unnecessary. Bench channels running nearly parallel to the out slopes are sized to carry the 100-yr, 24-hr storm with two feet of freeboard. Slopes range from 1% to 5%. Bench channels are grass lined unless velocities exceed five feet per second (fps). Channels with velocities exceeding five fps are rip rap lined.

### **3.1.3 Down Drain, Cover, Scraper Operations, Truck and Shovel**

To protect against erosion, down drains utilize ACBs and energy dissipators as necessary. The cost estimate covers the transportation and placement of 36 inches of fine-grained cover. Backfilling or repositioning operations are performed by trucks and loaders with dozer assistance. Trucks, loaders, or hydraulic shovels with dozer assistance are loading and distributing all covers. Each haul route will use the most cost-effective number of trucks per loader or hydraulic shovel.

### **3.1.4 Revegetation, Scarification, and Haul Road Reclamation**

The revegetation unit cost is based on R.S. Means, EquipmentWatch, and direct quotes. Scarifying of the final surface is performed simultaneously with the revegetation and is included in the revegetation cost. Haul road areas will be reclaimed through ripping and revegetation.

### **3.1.5 Berm Installation**

In the MMD permit GR009RE, the Santa Rita Pit was granted a conditional waiver from achieving a self-sustaining ecosystem. Reclamation of the open pit includes the construction of berms to minimize runoff into the open pit and discourage unsafe access.

## 3.2 Stockpiles

This earthwork RCE includes cost estimates for reclaiming the stockpiles at the Chino Mine. Stockpile surfaces targeted for reclamation include all surfaces outside the Santa Rita Open Pit OPSDA. However, although inside the OPSDA, the following stockpiles are also closed in this plan:

- Upper South Stockpile
- 3A Stockpile
- The entirety of the Main and North Lampbright Stockpiles

The primary stockpile closure activities include the following:

- Ripping top areas
- Regrading top surfaces and outslope benches where applicable
- Loading, hauling, and grading cover material
- Constructing bench channels
- Completing surface water channels to route stormwater
- Scarifying and revegetating covered areas
- Placing erosion protection (riprap in bench channels or ACBs in down drains)

Cost calculations are presented in the Attachment 5 spreadsheet file.

## 3.3 Tailing Ponds

This RCE estimates costs to reclaim the unreclaimed portions of the Tailing Ponds 6 and 7.

Tailing pond reclamation activities include the following:

- Regrading top surfaces and outslope benches
- Constructing benches and outslope channels
- Loading, hauling, and grading cover material
- Scarifying and revegetating covered areas
- Placing erosion protection (ACBs in down drains)

### 3.4 Reservoirs

If not covered by stockpile reclamation activities or used as part of the post-closure stormwater management and water treatment system, surface impoundments and reservoirs will be reclaimed. The main activities associated with this cost estimate include the following:

- Breaching dam where applicable
- Ripping liners and burying in place
- Regrading
- Loading, hauling, and grading cover material
- Scarifying and revegetating covered areas (including ripping)

### 3.5 Seepage Collection

There are several seepage collection systems located in the NMA. Seepage collection areas not designated for PMLU or used in water treatment will be reclaimed and buried as part of stockpile reclamation. Costs for ongoing seepage collection are addressed in the water treatment part of the RCE. Reclamation costs for the elimination of seepage collection systems include the following activities:

- Breaching dam where applicable
- Regrading
- Loading, hauling, and grading cover material
- Scarifying and revegetating covered areas

### 3.6 Roads

All haul roads, except those located within the OPSDA, designated for PMLU, or used during O&M, are included in the reclamation cost estimate. Activities associated with road closures include the following:

- Regrading and ripping where applicable
- Loading, hauling, and grading cover material
- Scarifying and revegetating covered areas

## 3.7 Other Reclamation Costs

Other reclamation activities covered in the earthwork RCE include building demolition, well abandonment, utility demolition, pipeline demolition, pipeline corridor closure, unplanned future disturbance area closures, and O&M. Closure activities associated with these other areas are discussed below.

### 3.7.1 Building Demolition

Several facilities are used for Industrial Post-Mining Land Use (PMLU). Those facilities not designated for Industrial PMLU will be demolished, removed, buried, or otherwise closed in accordance with an approved plan.

Attachment 2.3 provides the building information for the demolition cost estimate.

The main activities and assumptions for this reclamation cost estimate include:

- Regrading surfaces
- All equipment and above-grade structures are demolished and removed from the area or buried
- Debris is placed either into the stockpiles or other designated area
- Demolition debris is covered with 36-inches of cover material
- Demolition areas are covered with 36 inches of cover material, scarified and revegetated

### 3.7.2 Well Abandonment

The expenses related to abandoning monitoring wells follow the NMED's regulatory guidelines for well abandonment (i.e., cement grouting the well in place and removing surface casing). The well abandonment cost estimate includes the post-closure monitoring wells. It is estimated that seven monitoring wells will be utilized for post-closure monitoring and abandoned by the end of the reclamation year 99.

An estimated 1,700 feet of wells will be abandoned, plus an additional 10,000 feet of exploration well plugging under the earthwork RCE. The well abandonment unit costs are based on a quote from Layne, A Granite Company (formerly Layne Christensen Company) obtained in July 2018 (Table 7).

### **3.7.3 Utility Demolition**

Utility demolition activities include the removal of power poles, powerlines, telephone lines, and light poles. Powerlines to be demolished include existing powerlines that are not used post-closure during water treatment. Unit costs for powerlines and power poles are developed based on recent cost information (Gordian, 2024). The total footage of each is multiplied by the respective unit cost. Light poles and telephone wires/pole unit costs are assumed to be equivalent to unit costs to demolish powerlines and power poles.

### **3.7.4 Pipeline Demolition**

To estimate pipeline reclamation costs, unit costs are developed from cost data for sludge/water removal (Gordian, 2024). Table 7 is applied to a typical pipeline, assuming that sludge/water occupies one-third of the total volume of an 18-inch-diameter pipeline. Additionally, the reclaimed pipelines are covered and buried in place with a 36-inch-thick cover and 3H:1V side slopes. Reclamation is applied to 50% of the entire length of the pipeline on-site to exclude pipelines to be used during water treatment, pipelines within the pit area, pipelines under and adjacent to impoundments and stockpiles, and fresh water and sewer pipelines that will continue to be used under a PMLU.

### **3.7.5 Pipeline Corridor Reclamation**

Pipeline corridor closure activities include the costs of revegetating pipeline adjacent areas that are not needed for post-closure O&M.



### 3.7.6 Unplanned Future Disturbance Area Closures

Additional reclamation costs are included to account for the dynamic nature of mining. This approach is intended to allow greater flexibility in meeting the mine planning schedule and reduce the number of FA amendments. Unplanned future disturbance areas, estimated to total 200 acres in the NMA and SMA, each, and may include small staging areas, utility corridors, haul roads, pull-offs, stockpile expansions, or other miscellaneous unforeseen changes in the mine plan.

### 3.7.7 Operations and Maintenance

O&M costs related to periodic erosion control, water quality monitoring, road maintenance, and vegetation maintenance are included in the spreadsheet calculations (Attachment 5). Operations and maintenance costs are assumed to diminish with time. O&M for this cost estimate consists of the following:

**Erosion Control and Monitoring:** Chino Mine's annual erosion control and monitoring cost estimates are based on an erosion control crew engaged for:

- Reclamation Years 0–12: 12 days/year
- Reclamation Years 13–39: 4 days/year
- Reclamation Years 40–99: 1 day/year

**Water Quality Monitoring and Reporting:** Monitoring of site groundwater quality will be accomplished through sampling and analysis of potentially impacted water at specific site locations:

- Reclamation Years 0–19: 4 days/year
- Reclamation Years 20–39: 2 days/year
- Reclamation Years 40–99: 1 day/year

**Road Maintenance:** Road maintenance will be monthly during monsoon season (4 months/yr) and is assumed to consist of a motor grader engaged for 24 hours a month:

- Reclamation Years 0–19: 4 months/year at 24 hours/month
- Reclamation Years 20–39: 2 months/year at 24 hours/month
- Reclamation Years 40–99: 1 month/year at 24 hours/month

**Vegetation Maintenance:** Vegetation maintenance of reclaimed areas assumes a 2% failure every year for 12 years per facility, starting when reclamation is completed.

## 4.0 RESULTS

The total current dollar cost for earthwork reclamation is estimated to be \$xxx,xxx,xxx plus \$xx,xxx,xxx O&M for a total of \$xxx,xxx,xxx. A summary of the cost estimate is provided in Table 8. The costs presented in this RCE are current (2024) dollar costs.

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**TABLES**

**Table 1 Facility Overview**

Site	Status EOY 2030	Reclamation Overview
<b>Stockpiles</b>		
3A Stockpile	waste rock stockpile, within the AOPHC and OPSDA	grade, cover, vegetate
South Stockpile	leach stockpile entirely in the AOPHC and partially in the OPSDA, angle of repose slopes	grade top and western out slopes cover, vegetate
STS2 Stockpile	RCM stockpile used as a cover source for facilities in the western NMA, bottom elevation estimated at 1952 topography (~6,450 to 6,930 feet)	rip top surface, grade remnant out slopes and top to drain, vegetate
West Stockpile	leach and waste rock stockpile, angle of repose slopes, partially in the AOPHC and OPSDA	pull back west slope, grade, cover and vegetate
Lampbright Stockpile	leach stockpile, angle of repose slopes, partially in the AOPHC and OPSDA –	grade, cover, and vegetate
North Lampbright Stockpile	leach stockpile, angle of repose slopes, partially in the AOPHC and OPSDA –	grade, cover, and vegetate
Southwest Lampbright Stockpile	waste rock stockpile, angle of repose slopes, partially in the AOPHC	rip top surfaces, grade top
Kessel Stockpile	waste rock stockpile, overall reclamation slopes, interbench slopes at angle of repose–	rip top surface, grade inter-bench out slopes to 3:1, cover and vegetate
Northeast Stockpile	waste rock stockpile, angle of repose slopes, most material was removed in 2014, entirely in the OPSDA	Rip top surface, grade, cover and vegetate top only
Upper South Stockpile	RCM stockpile, used as a cover source for various areas around the mine and Continental Mine, bottom elevation estimated at 1952 topography (~6,525 to 6,700 feet)	rip top surface, grade remnant out slopes and top to drain, vegetate
<b>Tailing Ponds</b>		
Tailing Pond 1	reclaimed	continue O&M
2	reclaimed	continue O&M
B	reclaimed	continue O&M
C	reclaimed	continue O&M
4	reclaimed	continue O&M
6E	partially reclaimed	continue O&M on reclaimed portion, rip, grade top, grade out slopes and vegetate
6W	partially reclaimed	continue O&M on reclaimed portion, rip, grade top, grade out slopes and vegetate
7	Generally, 4H:1V out slopes, saturated tailing in depositional area	drain down, install discharge channel, rip top, grade, cover and vegetate
Axiflo	3H:1V out slopes, unlined pond bottom	drain, grade embankments, install outlet channel, cover and vegetate
<b>Impoundments, Reservoirs, Dams</b>		
Dam 15	stormwater containment	demo concrete, cover and vegetate
Dam 16	stormwater containment	demo concrete, cover and vegetate
Dam 20	stormwater containment	bury as part of West Stockpile reclamation
Elmo's Pond	stormwater runoff pond	rip liner, cover and vegetate
Lower Lined Pond	HDPE Lined Stormwater runoff pond	rip liner, cover and vegetate
Kessel Pond	Future Stormwater management pond, single-lined	rip liner, cover, vegetate, establish post-reclamation drainage
Kessel Dam 1	Future Stormwater runoff collection, single-lined	demo concrete, rip liner, cover and vegetate
Kessel Dam 2	Future Stormwater runoff collection, single-lined	demo concrete, rip liner, cover and vegetate
Upper Lined Pond	HDPE Lined Stormwater runoff pond	rip liner, cover and vegetate
Fleming Pond	Lined process water pond	rip liner, cover and vegetate
PLS Pond & Launder	Lined process water pond	rip liner, cover and vegetate

**Table 1 Facility Overview, Con'd.**

Site	Status EOY 2030 and Reclamation Description	Reclamation Overview
<b>Pit and Mill Area Water Management Facilities</b>		
5900 PLS Sump	Lined process sump	retain for water management PMLU
6300 PLS Booster Station	Lined process booster station–reclaim	retain for water management PMLU
Raffinate Pond	Lined process water pond–reclaim	rip liner, cover and vegetate
Reservoir 17	Lined process water pond–reclaim	retain for water management PMLU
Reservoir 2	Stormwater management pond, unlined–reclaim	retain for water management PMLU
Reservoir 6	Stormwater management pond, unlined–reclaim	retain for water management PMLU
Reservoir 7	Process water pond, unlined–reclaim	rip liner, cover and vegetate
Reservoir 9	Process water pond	cover and vegetate
Tailing Thickeners	Process water tanks	retain for water management PMLU
Lee Hill #2 Booster	Lined process water pond–reclaim	retain for water management PMLU
<b>Miscellaneous Areas</b>		
Disturbed Area Around Reservoir 5	Land surrounding Reservoir 5	rip, cover and vegetate
200-Acre Unplanned Disturbance NMA	Unplanned disturbed area	rip and vegetate
Chino Portion Cobre Haul Road	Removed for cover	rip and vegetate
Northwest Haul Road	Part outside Open Pit Surface Drainage Area (OPSDA)	rip, cover and vegetate
East Pit Access Disturbed Area	Outside OPSDA	rip, cover and vegetate
Highway to Heaven Haul Road	Active access road	rip, cover and vegetate
Slag Pile	Approximately 90% of area is reclaimed	rip, cover and vegetate
200-Acre Unplanned Disturbance - SMA	Unplanned disturbed area Reclaim	rip and vegetate

**Table 2 NMA Stockpiles - Cost Estimating Reclamation Activities**

	Rip top surface	Rough Grading Dozers	Dozer Assist Loaders\Scrapers	Load & Haul Stockpile Material	Load, Haul, Place, Grade Cover	Rip Cover Stockpiles	Excavate, Grade Benches	Install bench channels	Install downdrains, dissipators	Scarify & Seed / Revegetate	O&M
<b>Stockpiles</b>											
3A Stockpile	X	X	-	-	X	-	X	X	-	X	X
South Stockpile	-	X	X	X	X	-	X	X	X	X	X
West Stockpile	X	X	X	X	X	-	X	X	X	X	X
Lampbright Stockpile	X	X	X	X	X	-	X	X	X	X	X
North Lampbright Stockpile	-	X	-	-	X	-	X	X	-	X	X
Southwest Lampbright Stockpile	X	X	-	-	X	-	X	X	-	X	X
Kessel Stockpile	X	X	-	-	X	-	X	X	X	X	X
Northeast Stockpile	X	X	-	-	X	-	-	-	-	X	X
STS2 Stockpile	-	X	-	-	-	X	-	-	-	X	X
Upper South Stockpile	-	X	-	-	-	X	-	-	-	X	X
Rubio Peak Stockpile	-	X	-	-	-	X	-	-	-	X	X



**Table 3 NMA Other Facilities – Cost Estimating Reclamation Activities**

	Breach Dam	Puncture Liner	Rough Grading	Dozer Assist Loading	Load Cover	Haul Cover	Rip Area	Place & Grade Cover	Scarify & Seed / Revegetate	O&M
<b>North Mine Area</b>										
<b>Roads</b>										
Chino part of Cobre Haul Road	-	-	-	-	-	-	-	-	X	X
<b>Reservoirs/Impoundments</b>										
Fleming Pond	-	X	-	X	X	X	-	X	X	X
PLS Pond & Launder	-	X	-	X	X	X	-	X	X	X
Raffinate Pond	-	-	-	X	X	X	-	X	X	X
Disturbed Area Around Res. 5	-	-	-	X	X	X	-	X	X	X
Reservoir 6	X	-	-	X	X	X	X	X	X	X
Reservoir 7	X	-	-	X	X	X	X	X	X	X
Elmo's Pond	-	X	-	X	X	X	-	X	X	X
Lower Lined Pond	-	X	-	X	X	X	-	X	X	X
Upper Lined Pond	-	X	-	X	X	X	-	X	X	X
<b>Seep Collection</b>										
Dam 15	X	-	X	X	X	X	X	X	X	X
Dam 16	X	-	X	X	X	X	X	X	X	X
<b>Misc. Areas</b>										
200-Acre Unplanned Future Disturbance	-	-	-	X	X	X	X	X	X	X
150-Acres Misc Areas (e.g., roads, pads, pull offs)	-	-	-	X	X	X	X	X	X	X



**Table 5 Earthwork Equipment Production Factors**

Parameter	Value	Comment/Reference
Swell Factor Stockpiles and Tailings <sup>(1)</sup>	0% for native rock	Virgin materials are being excavated to generate cover. A swell factor is applied to the excavated native volume.
	8% for cover load & haul sites	Cover material volumes are calculated based on the reclaimed area and the cover depth. A swell factor is included in the cost estimate while calculating the bank cover volume.
<b>Coarse Regrading Tops and Outslopes (D11T CD)</b>		
Operator Factor <sup>(1)</sup>	1.0	Due to large job size assume operator with excellent skills (CPH 48: 19-55, excellent)
Material Factor	1.2 1.0	(CPH 48: 19-55) 1.2 for fine grading cover, other surfaces, and channel, 1.0 for coarse regrading stockpiles and tailing
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Grade Factor – Tops	1.0	(CPH 48: 19-55) 1 to 5% Slope
Grade Factor - Outslopes <sup>(1)</sup>	1.6	(CPH 48: 19-55) 3H:1V Slopes
Material Weight (lb/cy)	3,300 2,900	Stockpiles Tailing, cover materials
Production Method/Blade Factor	1.2	(CPH 48: 19-55) Slot dozing
Visibility Factor	1.0	(CPH 48: 19-55) Clear, dust controlled by water trucks
Elevation Factor	1.0	(CPH 48: 30-7) Horsepower reduction table
Direct Drive Transmission	1.0	-
<b>Fine Grading Cover, Other Surfaces, and Channels (D11T CD, D9T, D6T, 16M, 14M)</b>		
Material Factor	1.2	(CPH 48: 19-55) fine grading cover
Grade Factor – Tops	1.0	(CPH 48: 19-55) 1-5% slopes
Grade Factor – Outslopes <sup>(1)</sup>	1.6	(CPH 48: 19-55) 3H:1V Slopes
Material Weight (lb/cy)	2,900	Fine grading cover material and tailing
Production Method/Blade	1.2 1.0	(CPH 48: 19-55, slot dozing) No correction applied channels, downdrains, and benches
Effective Blade Width (feet [ft])	22.0 ft D11T CD Universal Blade	(CPH 48: 19-17, 19-49)
	14.08 ft D9T Semi Universal Blade	(CPH 48: 19-47)
	16 ft 16M, 14 ft 14M	(CPH 48: 11-17)
	10.67' D6T SU	(CPH 48: 19-10, 19-43)
Speed (miles/hr)	2.5 mph D11T CD, 16M, and 14M 1.0 mph D9T and D6T	(CPH 48: 11-19, 19-24, 19-25) maximum equipment speeds based on information provided in the Cat Handbook and Safe mining practices
Operator Factor <sup>(1)</sup>	0.75	(CPH 48: 19-55) Average operator skill
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Visibility Factor	1.0	(CPH 48: 19-55) Clear, dust controlled by

Parameter	Value	Comment/Reference
		water trucks
Elevation	1.0	(CPH 48: 30-7)
Direct Drive Transmission	1.0	-
<b>Ripper (D11T CD Multi-shank [w/MSR-359H])</b>		
Ripping Length (ft)	1,000 large surface areas 100 liners	-
Penetration (in)	18	Scope of Work (Telesto Solutions, Inc., 2017)
Pocket Spacing (in)	59	(CPH 48: 19-72)
Number of Pockets	3	(CPH 48: 19-72)
Turn Time (min/pass)	0.25	(CPH 48: 19-72 to 19-75)
Speed (mph)	1	(CPH 48: 19-72 to 19-75)
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Distance between passes (in)	59	Maintain pocket spacing value between passes (Scope of Work (Telesto Solutions, Inc., 2017))
<b>Loader (Cat 990K)</b>		
Struck Capacity (cy)	10.5	(CPH 49: 23-222)
Loader Cycle Time (load, dump, and maneuver; min)	0.575	(CPH 49: 23-287)
Bucket Fill Factor	0.875	(CPH 49: 23-287) $\geq$ 1" Loose Material
Speed (mph)	8.3 14.2	(CPH 49: 23-17) 8.3 mph loaded, forward 2 <sup>nd</sup> gear; 14.2 mph empty, forward 3 <sup>rd</sup> gear
Work Hour (min/hr)	50	(CPH 48: 19-55)
<b>Loader (Cat 986K)</b>		
Struck Capacity (cy)	6.7	(CPH 49: 23-216)
Loader Cycle Time (load, dump, and maneuver; min)	0.575	(CPH 49: 23-287)
Bucket Fill Factor	0.875	(CPH 49: 23-287) $\geq$ 1" Loose Material
Speed (mph)	8 14	(CPH 49: 23-17) 8 mph loaded, forward 2 <sup>nd</sup> gear; 14 mph empty, forward 3 <sup>rd</sup> gear
Work Hour (min/hr)	50	(CPH 48: 19-55)
<b>Loader (Hyundai HL 780XTD-9)</b>		
Struck Capacity (cy)	6	(Hyundai brochure pg. 9-11)
Loader Cycle Time (load, dump, and maneuver; min)	0.525	(Hyundai brochure pg. 9-11)
Bucket Fill Factor	0.875	(CPH 49: 23-287) $\geq$ 1" Loose Material
Speed (mph)	7.1 11.2	(Hyundai brochure pg. 9-11) 7.1 mph loaded, forward 2 <sup>nd</sup> gear, 11.2 mph empty, forward 3 <sup>rd</sup> gear
Work Hour (min/hr)	50	(CPH 48: 19-55)
<b>Trucks (Komatsu 730E) <sup>(3)</sup></b>		
Struck Capacity (cy)	101	EquipmentWatch Spec for Komatsu 730E
Heaped Capacity (cy)	145	(Komatsu Brochure pg. 5)
Rolling Resistance	2.5%	(CPH 48: 30-2) Radial tires, dirt road maintained fairly regularly, watered, flexing slightly
Truck Exchange Time (min)	0.7	(CPH 49: 10-20) Avg. 0.6-0.8

Parameter	Value	Comment/Reference
Dump/Maneuver Time (min)	1.1	(CPH 48: 10-20) Avg. 1.0-1.2
Speed (mph)	34.6	EquipmentWatch Spec for Komatsu 730E top speed (loaded)
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
<b>Trucks (CAT 770G)</b>		
Struck Capacity (cy)	22.52	(CPH 49: 10-4)
Heaped Capacity (cy)	32.8	(CPH 49: 10-4)
Rolling Resistance	2.5%	(CPH 48: 30-2) Radial tires, dirt road maintained fairly regularly, watered, flexing slightly
Truck Exchange Time (min)	0.7	(CPH 49: 10-20) Avg. 0.6-0.8
Dump/Maneuver Time (min)	1.1	(CPH 49: 10-20) Avg. 1.0-1.2
Speed (mph)	45.7	(CPH 49: 10-4) top speed (loaded)
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
<b>Trucks (CAT 730)</b>		
Struck Capacity (cy)	17.7	(CPH 49 pg. 1-2)
Heaped Capacity (cy)	22.1	(CPH 49 pg. 1-2)
Rolling Resistance	2.5%	(CPH 48: 30-2) Radial tires, dirt road maintained fairly regularly, watered, flexing slightly
Truck Exchange Time (min)	0.7	(CPH 49: 10-20) Avg. 0.6-0.8
Dump/Maneuver Time (min)	1.1	(CPH 49: 10-20) Avg. 1.0-1.2
Speed (mph)	34	(CPH 49: 1-2) top speed (loaded)
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
<b>Scraper (657G) Push-Pull</b>		
Heaped Capacity (cy)	44	(CPH 49: 24-4)
Struck Capacity (cy)	32	(CPH 49: 24-4)
Rated Load (lb)	104,000	(CPH 49: 24-4)
Rolling Resistance	2.5%	(CPH 48: 30-2) Radial tires, dirt road maintained fairly regularly, watered, flexing slightly
Load Time (min)	0.85	(CPH 49: 24-17) 0.6 to 1.1
Maneuver & Spread Time (min)	0.6	(CPH 49: 24-17)
Push Cycle Time (min)	0.10 Boost Time 1.19 return time (140% of scraper load time) 0.15 maneuver time	(CPH 49: 28-10)
Speed (mph)	33	(CPH 48: 24-4)
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
<b>Excavator (319D L)</b>		
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Heaped Capacity (cy)	1	(CPH 49: 7-25)
Sheepsfoot Roller Length	2	(CPH 49: 7-221)

Parameter	Value	Comment/Reference
(ft)		
Maximum Reach at Ground Level (in)	361	(CPH 49: 7-104)
Swing Time (Loaded) (min)	0.06	(CPH 49: 7-247)
Swing Time (Empty) (min)	0.05	(CPH 49: 7-247)
<b>Deere 7330 (and Finn B260 Mulcher, MSR-189H Ripper)</b>		
Operating Width (ft)	12	Assigned based on typical width of revegetation equipment/implements
Speed (mph)	3	Assigned as average speed of tractor pulling revegetation equipment/implements
Work Hour (min/hr)	50	Assigned for consistency with other earthwork operations

CPH = Caterpillar Performance Handbook Editions 48 and 49 (Caterpillar, Inc., 2018; Caterpillar, Inc., 2019)

<sup>(1)</sup> The swell and operator factors used are consistent with factors presented to MMD and NMED in meetings with Tyrone on June 11, 2012, November 2, 2012, and a letter to MMD and NMED from Tyrone dated September 5, 2012 (Freeport-McMoRan Copper & Gold, 2012)

**Table 6 Labor and Equipment Unit Costs**

<b>Equipment Description</b>	<b>Fuel Cost (\$/hr)</b>	<b>Total Rental Cost (w/o fuel) (\$/hr)</b>	<b>NMDOL Operator Group</b>	<b>NMDOL Labor Rates</b>	<b>Total Cost (Equipment, Fuel, Labor) (\$/hr)</b>
Cat D11T, U Blade	\$81.21	\$308.54	Equipment Operator IV	\$32.88	\$422.63
Cat D11T CD	\$81.21	\$277.90	Equipment Operator IV	\$32.88	\$391.99
Cat D9T, SU Blade	\$39.87	\$216.73	Equipment Operator IV	\$32.88	\$289.48
Cat D6, SU Blade	\$21.18	\$87.35	Equipment Operator IV	\$32.88	\$141.41
Cat D6 XL, SU Blade	\$24.72	\$91.96	Equipment Operator VI	\$32.88	\$149.56
Cat 320 GC	\$7.04	\$50.71	Equipment Operator VI	\$33.23	\$90.98
Cat 990K	\$52.05	\$266.76	Equipment Operator VI	\$33.23	\$352.04
Cat 986K	\$22.22	\$97.63	Equipment Operator VI	\$33.23	\$153.08
Hyundai HL780XTD-9	\$17.87	\$81.70	Equipment Operator VI	\$33.23	\$132.80
Cat 16M3	\$34.09	\$113.70	Equipment Operator IV	\$32.88	\$180.67
Cat 14M3	\$23.32	\$75.75	Equipment Operator IV	\$32.88	\$131.95
Finn B260	\$12.64	\$17.91	Truck Driver III	\$29.50	\$60.05
Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	Equipment Operator IV	\$32.88	\$391.99
MSR-189H	\$-	\$6.88	--	-	\$6.88
Cat 657G	\$147.95	\$211.61	Equipment Operator IV	\$32.88	\$392.44
Hitachi EX3600-5	\$253.12	\$526.28	Equipment Operator VI	\$33.23	\$812.63
Deere 7330	\$16.52	\$32.72	Truck Driver III	\$29.50	\$78.74
Cat 770G	\$20.90	\$55.72	Truck Driver III	\$29.50	\$106.12
Cat 730	\$21.63	\$87.09	Truck Driver III	\$29.50	\$138.22
Komatsu 730E	\$87.52	\$216.39	Truck Driver III	\$29.50	\$333.41
Off-Hwy Water Tanker Truck, 6,000-gal.	\$34.43	\$75.98	Truck Driver III	\$29.50	\$139.91
1 Deck Screening Plant (5X16, 48X60)	\$14.84	\$71.09	Laborer I	\$26.79	\$112.72
3 Deck Screening Plant (5X16, 42X60)	\$14.84	\$106.57	Laborer I	\$26.79	\$148.20

**Table 7 Miscellaneous Unit Costs**

Activity	Base Per Unit Cost	Fuel Per Unit Cost	Units	Source	Reference
Fuel	\$3.06	-	gal	-	Diesel fuel cost is estimated based on a predictive equation developed by correlating U.S. No. 2 diesel retail prices (U.S. Energy Information Administration) and FMI local fuel quotes, as agreed upon in November 2018 discussions with the agencies. The correlation is based on a dataset for the period from 1995-2018. Fuel cost includes direct and indirect costs at \$3.06/gal.
Revegetation	\$996.74	\$4.54	ac	Revegetation Unit Cost Sheet	See unit rates calculations - Cost is based on a calculated unit rate that includes tractor rental and maintenance, fuel, scarifying, discing, drill seeding, mulching, crimping, seed, and mulch.
Revegetation - Seed Only	\$258.09	-	ac	Quote	Rocky Mountain Reclamation, April 2018; Escalated 22.9% (2019 - 2024)
Revegetation - Mulch Only	\$602.21	-	ac	Quote	Rocky Mountain Reclamation, April 2018: \$245 per ton applied at 2 tons per acre; Escalated 22.9% (2019 - 2024)
Bench Grading Stockpile	\$1.58	\$0.41	ft	Bench Grading Unit Cost Sheet	See unit rates calculations
Bench Grading Tailings Pond	\$1.58	\$0.41	ft	Bench Grading Unit Cost Sheet	See unit rates calculations
Downdrain Construction	\$374.45	-	ft	Downdrain Unit Cost Sheet	See unit rates calculations
Downdrain Dissipater	\$15,601.58	-	ea	Downdrain Unit Cost Sheet	See unit rates calculations
Bench Channel Construction	\$4.80	\$1.01	ft	Bench Channel Unit Cost Sheet	See unit rates calculations
Top Channel Construction	\$2.20	\$0.51	ft	Top Channel Unit Cost Sheet	See unit rates calculations
Erosion Control	\$2,924.42	\$264.38	day	"Modified Crew B-13A/ Full Site O&M Sheet"	Erosion control for O&M - includes 1 foreman, 2 laborers, 1 equipment operator, 2 truck drivers, 1 loader (4 cy), 2 dump trucks (8 cy)
Structure Demolition	\$0.38	-	cf		Building demolition, large urban projects, mixture of types, excludes foundation demolition, dump fees
Concrete Slab Demolition	\$0.82	-	sf	Means Line Item 024116.13 0100	Building footings and foundations demolition, floors, concrete slab on grade, plain concrete, 6" thick, excludes disposal costs and dump fees
Storage Tank Demolition	\$1,934.69	-	ea	Means Line Item 024116.17 0400	Selective Demolition - Storage Tanks, steel tank, single wall, above ground, not including foundations, pumps or piping, 5,000 thru 10,000 gallon
Power Line Demolition	\$0.64	-	ft	Means Line Item 130505.75 0530	Electrical Demolition - Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead powerlines.
Power Pole Demolition	\$252.03	-	ea	Means Line Item 260505.10 0370	Selective Demolition - wood utility poles 35-45 ft high
Sludge/Water Removal from Pipelines	\$354.11	-	ft	Means Line Item 024113.80 0200	Removal of underground storage tanks, petroleum storage tanks, non-leaking, remove sludge, water and remaining product from tank bottom of tank with vacuum truck, 9,000 - 12,000 gallon tank
Well Plug & Abandon	\$18.17	-	ft	Means Line Item 026510.30 0320	"Unit cost of \$18.17/ft is based on a direct quote from Layne, A Granite Company
Well Replacement	\$81.64	-	ft	Quote	(formerly Layne Christensen Company) for a total of 172,631 ft of well and exploration
Reinforced Concrete Wall Demolition	\$230.01	-	hr	Quote	borehole abandonment over 300 days (575 ft/day); the unit cost includes 1 mobilization
Cover Haul Road Construction	\$31.88	\$8.33	ft	Means Crew B-12C	(\$15,000) and 1 demobilization (\$15,000) spread over 300 days at 575 ft/day"
Disc Harrow Attachment, for Tractor	\$3,051.61	-	month	Haul Road Unit Cost Sheet	Wilcox Professional Services, 8/2011, est. cost for 5 ½ in bore, \$173,500 for 3000 ft total (\$57.83/ft). Escalated 2% 2011-2018= \$66.43/ft; Escalated 22.9% (2019-2024)
Cast-in-Place Concrete	\$329.62	-	cy	Means Line Item 015433.20 1500	Standard Union Crew: 1 equipment operator (crane), 1 laborer, 1 hydraulic excavator, 2 cy, approximately 40 hrs to demo 200 ft reinforced concrete dam.
Cleanup & Disposal of Wastes Requiring Special Handling	\$392.50	-	ton	Means Line Item 033053.40 6200	Assume dozer construction, 1:1 original slope, 120 ft wide
Transport of Wastes Requiring Special Handling	\$5.60	-	mile	Means Line Item 028120.10 1120/1130	Equipment rental costs
Road Maintenance	\$5,138.67	\$1,497.12	month	Means Line Item 028120.10 1260/1270	Structural concrete, in place, gravity retaining wall (3000 psi), includes forms and reinforcement
Groundwater Monitoring	\$2,336.62	-	day	Full Site O&M Sheet	Solid pickup; average of minimum and maximum

Means data are obtained from RS Means online (2024) for Las Cruces.



**Table 8 Earthwork Cost Estimate Summary**

Facility	Direct Cost	Indirect Cost (30% of Direct)	Total Estimated Cost
3A Stockpile			
Kessel Stockpile			
South Stockpile			
Stockpile 2			
West Stockpile			
Lampbright Stockpile			
Northeast Stockpile			
Upper South			
<b>Stockpile Subtotal</b>			
Axiflo			
Tailings Pond 6			
Tailings Pond 7			
<b>Tailings Subtotal</b>			
Unplanned Disturbed Area			
Dams and Reservoirs			
Miscellaneous NMA			
Miscellaneous SMA			
<b>Miscellaneous and Dams Subtotal</b>			
Impacted Soil at TP7			
<b>Impacted Soil Subtotal</b>			
<b>Earthwork Subtotal</b>			
Demo			
<b>Closure Costs Total</b>			
<b>O&amp;M</b>		<b>17.5% of Direct</b>	
<b>Full Site O&amp;M Costs Total</b>			
<b>Total Cost (Closure + O&amp;M)</b>			

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**FIGURES**

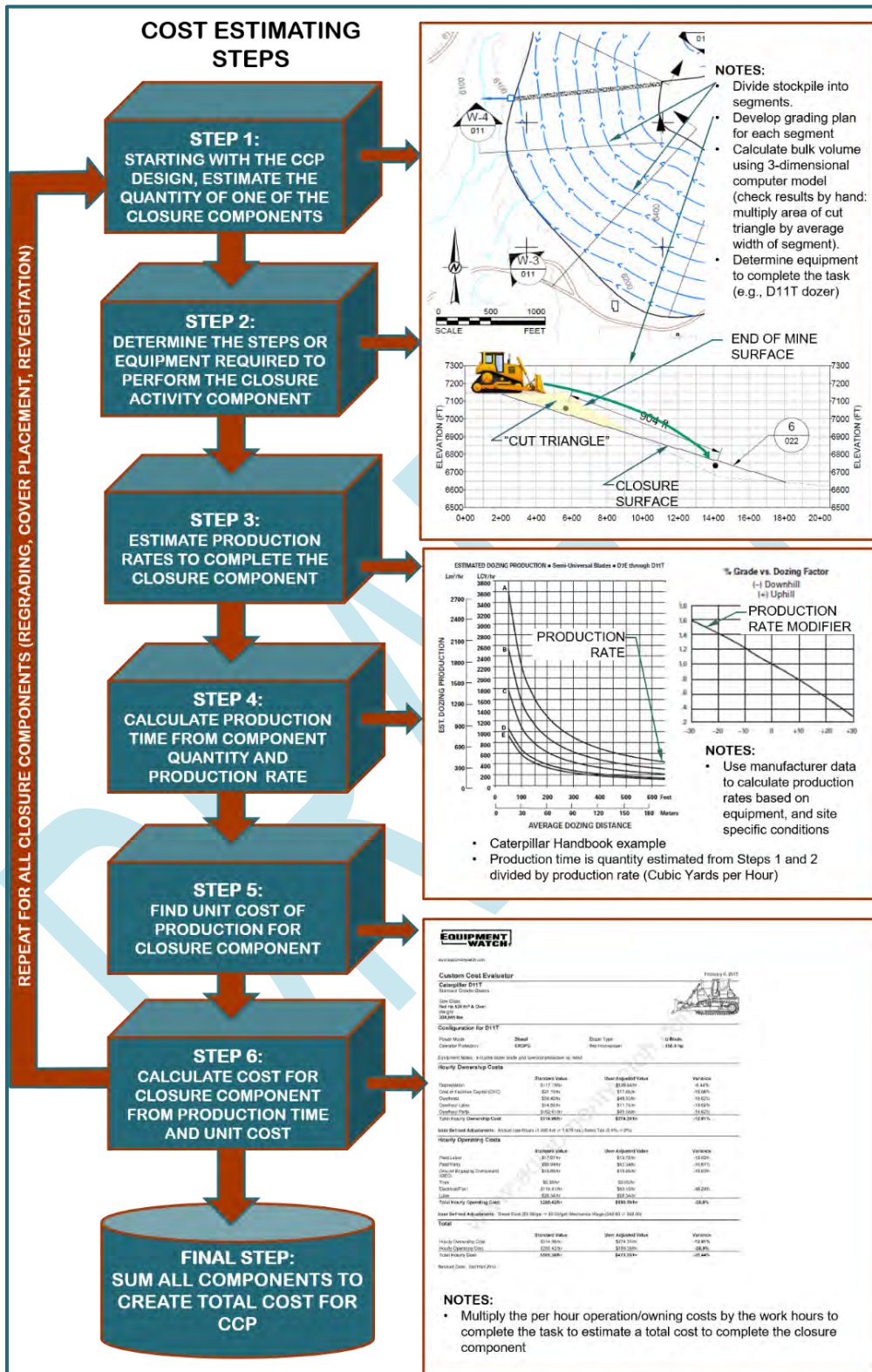


Figure 1 Earthwork Cost Estimating Process

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**ATTACHMENTS**

**Attachment 1**  
**Engineering Take-Offs and Quantities**

1 Item	2 Facility	3 Sub Area or Destination for Cover	4 Description	Segment 1		Segment 2		Segment 3	
				15 Distance (ft)	16 Average Grade (%)	17 Distance (ft)	18 Average Grade (%)	19 Distance (ft)	20 Average Grade (%)
9000	STS2	1100	3A-0	1,390	7.2%	3,428	0.0%	0	
9001	STS2	1300	S-0	1,390	7.2%	2,349	-13.4%	2,936	6.9%
9002	STS2	1400	ST-0	1,390	7.2%	2,349	-13.4%	2,936	6.9%
9003	Rubio Peak	1200	K	3,298	-2.5%	10,725	-3.7%	3,165	-2.4%
9004	Rubio Peak	1600	L-0	3,298	-2.5%	10,725	-3.7%	8,456	-1.1%
9005	Rubio Peak	1700	NE-0	3,298	-2.5%	10,725	-3.7%	9,886	-1.9%
9006	Upper South	1500	W-0	1,618	2.0%	11,251	6.0%	4,684	0.4%
9007	Upper South	1800	US-0						
9008	Upper South	1900	9 WRS-0	2,712	0.8%	2,420	8.5%	0	0.0%
9009	Upper South	2100	DR-0						
9010	Upper South	2200	Misc NMA-0 200-Acre Unplanned Future						
9011	Upper South Borrow Area F & North of	2300	Disturbance						
9012	Borrow Area F	3100	A-0	2,279	0.6%	1,390	-0.1%	1,459	-3.1%
9013	Borrow Area F	3200	TP6-0	5,336	1.0%	3,742	-0.6%	1,222	-1.6%
9014	Borrow Area F Borrow Area F, Borrow Area E, Borrow Area H, & West of	3300	TP7-0	3157	-0.59%	741	2.29%	4,902	-0.25%
9015	Borrow E&H	3400	Misc SMA-0	3,157	-0.6%	741	2.3%	4,902	-0.3%

1 Item	2 Facility	3 Sub Area or Destination for Cover Material	4 Description	5 Area (sf)	6.00 Volume (cy)
1100	3A Stockpile	3A-0	3A Stockpile	1,486,054	
1101	3A Stockpile	3A-1	Outslope		112,681.09
1102	3A Stockpile	3A-2	Outslope		131,498.24
1200	Kessel Stockpile	K	Kessel Stockpile	12,188,002	
1201	Kessel	K-1	Outslope		661,674.98
1202	Kessel	K-2	Outslope		1,904,218.02
1203	Kessel	K-3	Outslope		1,559,360.98
1300	South Stockpile	S-0	South Stockpile	22,123,711	
1301	South Stockpile	S-1	Outslope		691,899.97
1302	South Stockpile	S-2	Outslope		1,458,555.15
1303	South Stockpile	S-3	Outslope		6,323,471.28
1304	South Stockpile	S-4	Outslope		5,921,616.07
1305	South Stockpile	S-5	Outslope		6,181,884.67
1306	South Stockpile	S-6	Outslope		1,664,044.95
1307	South Stockpile	S-7	Outslope		3,309,770.13
1308	South Stockpile	S-8	Outslope		224,351.23
1309	South Stockpile	S-9	Outslope		1,205,963.30
1310	South Stockpile	S-10	Outslope		704,511.20
1311	South Stockpile	S-11	Outslope		212,139.48
1312	South Stockpile	S-12	Outslope		104,971.06
1313	South Stockpile	S-13	Outslope		208,213.69
1400	Stockpile 2	ST-0	Stockpile 2	3,310,560	
1401	Stockpile 2	ST-1	Top		
1402	Stockpile 2	ST-2	move from 2 to 1		1,701,942.10
1500	West Stockpile	W-0	West Stockpile	24,067,821	
1501	West Stockpile	W-1:5	Southeast outslope		5,107,208.75
1502	West Stockpile	W-6:9	South outslope		11,032,628.69
1503	West Stockpile	W-10:12	West outslope		7,499,642.95
1504	West Stockpile	W-13:14	North outslope		679,498.88
1600	Lampbright Stockpile	L-0	Lampbright Stockpile	40,763,354	
1601	Lampbright Stockpile	L-1	Outslope		8,702,794.38
1602	Lampbright Stockpile	L-2	Outslope		6,873,127.73
1603	Lampbright Stockpile	L-3	Outslope		5,078,468.85
1604	Lampbright Stockpile	L-4	Outslope		1,819,955.04
1605	Lampbright Stockpile	L-5	Outslope		1,408,766.34
1606	Lampbright Stockpile	L-6	Outslope		1,482,000.88
1607	Lampbright Stockpile	L-7	Outslope		2,088,110.82
1608	Lampbright Stockpile	L-8	Outslope		3,291,599.06
1609	Lampbright Stockpile	L-9	Outslope		2,567,330.18
1610	Lampbright Stockpile	L-10	Outslope		3,363,183.66
1611	Lampbright Stockpile	L-11	Outslope		6,656,808.91
1612	North Lampbright	NL-1:2	North East Outslope		1,133,426.54
1613	North Lampbright	NL-3:6	North West Outslope		1,813,267.35
1614	Southwest Lampbright	SW-1:2	South outslope		870,117.40
1615	Southwest Lampbright	SW-2:3	South outslope		365,529.89
1700	Northeast Stockpile	NE-0	Northeast Stockpile	511,263	
1701	Northeast Stockpile	NE-1 and NE-2	Top		4,013.60
1800	Upper South	US-0	Upper South Stockpile	6,214,266	
1801	Upper South	US-1	Outslope		1,657,691.84
1802	Upper South	US-2	Top		
2100	Dams and Reservoirs	DR-0	All	1,040,683	
2101	Dams and Reservoirs	Dam 15	Dam 15	4,356	484.00
2102	Dams and Reservoirs	Dam 16	Dam 16	4,356	484.00
2103	Dams and Reservoirs	Dam 20	Dam 20	13,939	1,548.80
2104	Dams and Reservoirs	Reservoir 17	Reservoir 18	146,362	16,262.40
2105	Dams and Reservoirs	Fleming Pond	Fleming Pond	33,977	3,775.20

2106	Dams and Reservoirs	Tailing Thickener 1	Tailing Thickener 2	113,256	12,584.00
2107	Dams and Reservoirs	PLS Pond & Launder	PLS Pond & Launder	11,326	1,258.40
2108	Dams and Reservoirs	Raffinate Pond	Raffinate Pond	4,792	532.40
2109	Dams and Reservoirs	Reservoir 2	Reservoir 2	9,583	1,064.80
2110	Dams and Reservoirs	Reservoir 6	Reservoir 6	65,340	55,660.00
2111	Dams and Reservoirs	Reservoir 7	Reservoir 7	104,980	35,864.40
2112	Dams and Reservoirs	Elmo's Pond	Elmo's Pond	54,014	6,001.60
2113	Dams and Reservoirs	Lower Lined Pond	Lower Lined Pond	97,139	10,793.20
2114	Dams and Reservoirs	Upper Lined Pond	Upper Lined Pond	17,860	1,984.40
2115	Dams and Reservoirs	5900 PLS Sump	5901 PLS Sump	24,829	2,758.80
2116	Dams and Reservoirs	6300 PLS Booster Station	6301 PLS Booster Station	1,307	145.20
2117	Dams and Reservoirs	Lee Hill #2 Booster	Lee Hill #2 Booster	6,098	677.60
2118	Dams and Reservoirs	KSW1	Kessel Stormwater 1	185,435	
2119	Dams and Reservoirs	KSW2	Kessel Stormwater 2	127,587	
2120	Dams and Reservoirs	KSW3	Kessel Stormwater 3	14,148	
2121	Dams and Reservoirs	Reservoir 9	Reservoir 9	2,043,388	
2200	Miscellaneous NMA	Misc NMA-0	Miscellaneous NMA	3,338,140	
2201	Miscellaneous NMA	Northwest Haul Road	Northwest Haul Road	210,395	23,383.00
2202	Miscellaneous NMA	East Pit Access Disturbed	East Pit Access Disturbed	159,865	17,775.00
2203	Miscellaneous NMA	Chino part of Cobre Haul	Chino part of Cobre Haul	139,828	15,533.00
2204	Miscellaneous NMA	Highway to Heaven Haul	Highway to Heaven Haul	1,413,139	
2205	Miscellaneous NMA	Disturbed Area Around R	Disturbed Area Around	1,414,913	
2206	Miscellaneous NMA	P&A Wells	P&A Wells	8,000	
2207	Miscellaneous NMA	Groundhog Mine	Previously Reclaimed	932,184	
2208	Miscellaneous NMA	NMA	Abandon wells		
2300	Unplanned Disturbed Area	200-Acre Unplanned Future	200-Acre Unplanned Future	8,712,000	
3100	Axiflo	A-0	Entire Impoundment	3,954,785	
3101	Axiflo	A-1	Sideslope		189.28
3102	Axiflo	A-2	Sideslope		2,357.74
3103	Axiflo	A-3	Sideslope		894.10
3104	Axiflo	A-4	Sideslope		1,943.93
3105	Axiflo	A-5	Sideslope		10,607.08
3106	Axiflo	A-6	Sideslope		2,943.68
3107	Axiflo	A-7	Sideslope		133.20
3108	Axiflo	A-8	Bottom		-
3200	Tailings Pond 6	TP6-0	Entire Impoundment	11,397,823	
3201	Tailings Pond 6	TP-6W	Outslope	1,447,374	114,239.75
3202	Tailings Pond 6	TP-6W	Top	4,148,184	
3203	Tailings Pond 6	TP-6E(1)	Outslope	123,343	5,552.96
3204	Tailings Pond 6	TP-6E(2)	Top	4,405,555	217,032.59
3205	Tailings Pond 6	TP-6E(3)	Outslope	1,273,367	57,327.52
3206	Tailings Pond 6	TP-6E and TP-6W	Previously Reclaimed	26,092,440	
3300	Tailings Pond 7	TP7-0	Entire Impoundment	73,545,567	
3301	Tailings Pond 7	TP7-2	Top		134,873.21
3302	Tailings Pond 7	TP7-3	Top		163,210.31
3302	Tailings Pond 7	TP7-4	Top		1,013,880.47
3304	Tailings Pond 7	TP7-5	Outslope		-
3400	Miscellaneous SMA	Misc SMA-0	Miscellaneous SMA	2,625,133	
3401	Miscellaneous SMA	Slag Pile Outslopes W side	Slag Pile Outslopes W side	357,192	
3402	Miscellaneous SMA	Tailings Pond 1	Previously Reclaimed	136	
3403	Miscellaneous SMA	Tailings Pond 2	Previously Reclaimed	162	
3404	Miscellaneous SMA	Tailings Pond B	Previously Reclaimed	200	
3405	Miscellaneous SMA	Tailings Pond C	Previously Reclaimed	187	
3406	Miscellaneous SMA	Tailings Pond 4	Previously Reclaimed	393	
3407	Miscellaneous NMA	Filter Plant	Filter Plant	742,262	
3408	Miscellaneous SMA	35 Acre Misc. Area	36 Acre Misc. Area	1,524,600	
3500	Impacted Soil at TP7		Impacted Soil at TP7	24,619,241	
3501	Tailing Affected Soil	TP 7 Affected Soil	soil affected by windblow	15,875,006	293,981.60
3502	Operational Deposition	TP 7 Operational deposit	TP 7 deposition	8,744,234	161,930.27



**Attachment 2**  
**Key Equations and Calculations**

# **Earthwork RCE Calculation Summary**



Job No: 200450-003-01 Client: Freeport NM Operations Page 1 of 21  
Task: Earthwork RCE Computed By: Dena Mawlawi Date: 8/6/2024  
Checked By: Walt Niccoli Date: 8/6/2024

## Calculation Documentation

### **Problem Statement:**

Freeport-McMoRan (FMI) uses a spreadsheet developed by the New Mexico Mining and Minerals Division (MMD) to estimate the closure costs for the Chino Closure/Closeout Plan (CCP). The spreadsheet calculations are intricate and complex, requiring careful study to understand their structure. Each worksheet groups similar activities, and each line on every worksheet documents one construction step needed to complete reclamation. The total of all the lines equals the entire earthwork for the CCP. The substantial amount of information in the spreadsheet makes reviewing the cost estimate challenging for a complex site.

### **Objective:**

1. Provide a guide to the earthwork spreadsheets.
2. This calculation set outlines the approach, data, assumptions, calculations, and results for developing the unit cost. It is meant to serve as a guide/example, even if the actual quantities and/or cost data used in these calculations change due to updates or applications to a different Freeport NM Operations mine. Screenshots of the example are from the Tyrone Mine CCP.

### **Approach:**

1. Identify the worksheets in the spreadsheet.
2. Provide a general equation or explain the calculation for each worksheet.
3. Use a graphic of each worksheet to illustrate the equations and enhance the explanations about the specific worksheet.



**Results:**

The following worksheets are included in the earthwork RCE spreadsheet and are covered in this calculation documentation:

Databases:

1. Quantities
2. Activity-Material Codes
3. Unit Rates
4. Equipment

Earthwork Calculations:

- |   |                              |
|---|------------------------------|
| 1. General                              | 13. M'grader                 |
| 2. Demo                                 | 14. Earth Sum                |
| 3. Material                             | 15. Revegetation             |
| 4. Earthwork                            | 16. Other                    |
| 5. Dozer                                | 17. Sum                      |
| 6. Water Truck (included in Road Maint) | 18. Facility Characteristics |
| 7. Road Maint                           |                              |
| 8. Ripper                               |                              |
| 9. Excavator                            |                              |
| 10. Trucks                              |                              |
| 11. Loader Shovel                       |                              |
| 12. Scrapers                            |                              |

The following worksheets are included in the earthwork RCE spreadsheet and are covered in separate calculation documentation:

Equipment Optimization:

19. Truck Optimization
20. Scraper Optimization

Unit Costs:

1. Bench Grading
2. Channel
3. Downdrain
4. Revegetation

O&M:

1. Full Site Vegetation Maint
2. Full Site O&M
3. Full Site O&M Sum



**Results Cont'd**

The first four sheets of this RCE workbook are general reference sheets. These sheets list all location sub-areas, activities, materials, and equipment needed for the RCE. Their primary purpose is to assign reference codes to each while creating a singular space for maintaining the raw data used throughout the workbook.

Quantities: To more accurately estimate the cost of reclaiming the Chino mine, the entire site has been subdivided into smaller areas, and data has been collected on those areas, including distance, material type, volume, grade, and elevation. To simplify later calculations, all this raw data is maintained in the Quantities sheet of the RCE. Within this sheet, each sub-area is assigned an item number linked to the raw data for that area and can easily be referenced in later calculations.

Item	Facility	Sub Area or Destination for Cover Material	Description	Area (sf)	Volume (cy)	Push Distance (ft) Berm Length (ft) or Fence Length(ft)	Coarse Regrading and Fine Grading (%)
1000	1A and 1B Leach	1A1B-0	Entire Stockpile	11,891,880	1,548,670	-	-
1001	1A and 1B Leach	1A1B-1	Top	740,520	79,000	430	1.0%
1002	1A and 1B Leach	1A1B-2	Outslopes - Regrade benches from pullback	-	1,329,670	90	-29.0%
1003	1A and 1B Leach	1A1B-3	Outslopes - Area outside of pullback	11,151,360	140,000	250	-29.0%
1100	1C	1C-0	Top (Haul Road)	740,700	-	-	-
1200	2A Leach and 2B Waste	2A2B-0	Entire Stockpile	21,213,358	8,203,000	-	-
1201	2A Leach and 2B Waste	2A2B-1	Top	1,568,160	143,000	370	1.0%
1202	2A Leach and 2B Waste	2A2B-2	Outslopes	19,645,198	8,060,000	470	-29.0%
1300	3A / 3B	3A3B-0	Entire Stockpile	19,819,800	5,289,064	-	-
1301	3A / 3B	3A3B-1	Top	1,437,480	199,000	560	1.0%
1302	3A / 3B	3A3B-2	Outslopes Pullback	-	17,500,000	-	-29.0%
1303	3A / 3B	3A3B-3	Outslopes - Regrade benches from pullback	-	1,590,064	90	-29.0%
1304	3A / 3B	3A3B-4	Outslopes (total area, volume outside of pullback)	18,382,320	3,500,000	560	-29.0%

Activity-Material Codes: All activities and materials were listed when considering the steps needed for a reclamation project. This sheet assigns a letter to each activity and material required for this process, and like the Quantities sheet, these activity/material letters are then referenced throughout later calculations

Item	Activity	Description
-	-	Place holder for item
A	Grade	Rough grading original material or fine grading cover material
B	Dozer Assist	Dozer is used to assist loader or shovel at cover stockpile or assist scrapers during rough grading
C	Load	Cover material is loaded at borrow areas onto haul trucks

Item	Material	Description
-	-	Placeholder
a	Existing Ground	Existing ground before rough grading
b	Cover	Cover material from cover stockpiles, before being placed at destination location
c	Rough Graded Material	Existing ground after rough grading



**Results Cont'd**

Unit Rates: Knowing the unit cost of the various activities needed to complete a reclamation project is essential. This sheet uses the RSMMeans online database, local quotes, and EquipmentWatch data to list the unit cost for each activity. Then, it assigns a code to that activity and cost so that the unit rates can be referenced and used in calculations throughout the cost estimate.

When applicable, the unit costs are broken down into the base per-unit cost (column C) and the fuel per-unit cost (column D). If a unit cost is obtained from RSMMeans, the cost for the Las Cruces, New Mexico area is used.

A	B	C	D	E	F	G
Code	Activity	Base Per Unit Cost	Fuel Per Unit Cost	Units	Source	Reference
U1	Fuel	\$ 2.34	\$ -	gal	-	Diesel fuel cost is estimated by correlating historical local quotes with public data, as agreed upon in November 2018 discussions with the agencies. Fuel cost
U2	Revegetation	\$ 820.12	\$ 3.85	ac	Revegetation Unit Cost Sheet	See unit rates calculations - Cost is based on a calculated unit rate that includes tractor rental and maintenance, fuel, scarifying, discing, drill seeding, mulching.
U3	Bench Grading Stockpile	\$ 1.35	\$ 0.33	ft	Bench Grading Unit Cost Sheet	See unit rates calculations
U4	Bench Grading Tailings Pond	\$ 1.35	\$ 0.33	ft	Bench Grading Unit Cost Sheet	See unit rates calculations
U5	Downdrain Construction	\$ 374.38	\$ -	ft	Downdrain Unit Cost Sheet	See unit rates calculations
U6	Downdrain Dissipater	\$ 14,556.48	\$ -	ea	Downdrain Unit Cost Sheet	See unit rates calculations
U7a	Bench Channel Construction w/	\$ 6.50	\$ 1.39	ft	N/A	See unit rates calculations
U7b	Bench Channel Construction w/o	\$ 0.41	\$ 0.10	ft	N/A	See unit rates calculations
U8	Erosion Control	\$ 2,923.36	\$ 382.26	day	Modified Crew B-13A	Erosion control for D&M - includes 1 foreman, 2 laborers, 1 equipment operator, 2 truck drivers, 1 loader (4 cu), 2 dump trucks (8 cu)
U9	Structure Demolition	\$ 0.25	\$ -	cf	Means Line Item 024116.13 0100	Building demolition, large urban projects, mixture of types, excludes foundation demolition, dump fees
U10	Concrete Slab Demolition	\$ 0.62	\$ -	sf	Means Line Item 024116.17 0400	Building footings and foundations demolition, floors, concrete slab on grade, plain concrete, 6" thick, excludes disposal costs and dump fees

Equipment: This sheet lists the necessary equipment for the reclamation process. It utilizes EquipmentWatch data, Caterpillar Performance Handbook (CPH) specifications, specific equipment brochure specifications, and New Mexico Department of Labor wages to calculate operating costs for each piece of equipment. Lastly, it assigns an equipment code to each piece to reference its price and specifications in subsequent sheets.

Equipment Code

Rental & Operating Equipment Costs

A	B	C	D	E	F	G	H	I	J	K	L	M	
Code	Equipment Description	Equipment Type	Fuel Consumption (gal/hr)	Fuel Cost (\$/hr)	Lube Cost (\$/hr)	Field Parts (\$/hr)	Tire Cost (\$/hr)	Ground Engaging Component Cost (\$/hr)	Monthly Rental Rate (\$/month)	Field Labor Time Cost (\$/hr)	Rental Cost (w/o fuel, lube, tires, or field parts) (\$/hr)	Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$/hr)	
1	EARTHWORK AND O&M EQUIPMENT												
2	1	2	3	4	5	6	7	8	9	10	11	12	13
5	Comb1	Cat 14M Off-Hwy Water Tanker Truck 6,000-gal	Combo 1	19.54	\$ 45.72	\$ 12.72	\$ 3.75	\$ 13.46	\$ 1.16	\$ 20,078.37	\$ 9.23	\$ 114.08	\$ 154.40
7	Dz1	Cat D11T U Blade	Dozer	29.75	\$ 69.52	\$ 28.23	\$ 13.89	\$ -	\$ 12.22	\$ 34,408.41	\$ 6.80	\$ 195.50	\$ 254.44
8	Dz2	Cat D11T OD U Blade	Dozer	29.75	\$ 69.52	\$ 28.23	\$ 13.89	\$ -	\$ 12.22	\$ 34,408.41	\$ 6.80	\$ 195.50	\$ 254.44
9	Dz3	Cat D9T SU Blade	Dozer	14.35	\$ 33.58	\$ 11.22	\$ 5.49	\$ -	\$ 3.99	\$ 30,109.48	\$ 6.80	\$ 171.08	\$ 189.37
10	Dz4	Cat D6T SU Blade	Dozer	7.22	\$ 16.89	\$ 4.83	\$ 2.10	\$ -	\$ 2.10	\$ 8,939.42	\$ 3.83	\$ 50.79	\$ 63.65
11	Dz5	Cat D6T XL SU Blade	Dozer	7.80	\$ 18.25	\$ 5.28	\$ 2.32	\$ -	\$ 2.36	\$ 9,104.55	\$ 3.83	\$ 51.73	\$ 65.52
12	Ex1	Cat 319D L	Excavator	5.25	\$ 12.29	\$ 3.47	\$ 1.19	\$ -	\$ 0.84	\$ 7,450.15	\$ 4.55	\$ 42.33	\$ 52.38
13	Ld1	Cat 992K	Loader	25.63	\$ 59.97	\$ 22.35	\$ 4.43	\$ 35.39	\$ 4.99	\$ 25,527.98	\$ 4.02	\$ 145.05	\$ 216.23
14	Ld2	Cat 988H	Loader	15.20	\$ 35.57	\$ 11.40	\$ 2.11	\$ 16.85	\$ 1.93	\$ 16,272.05	\$ 4.02	\$ 92.45	\$ 128.76
15	Ld3	Cat 980H	Loader	10.80	\$ 25.27	\$ 6.70	\$ 1.13	\$ 7.69	\$ 1.03	\$ 10,030.76	\$ 4.02	\$ 56.99	\$ 77.56
16	Ld4	Cat 956H	Loader	9.89	\$ 22.61	\$ 6.23	\$ 0.94	\$ 6.71	\$ 0.76	\$ 6,937.50	\$ 4.02	\$ 58.46	\$ 72.14

For example use only. Values may not match the current spreadsheet.



**Results Cont'd**

Equipment continued: The equipment sheet also contains the production equation coefficients for dozing (columns N-O) and scraper haul travel time coefficients (columns P-AI).

See the Dozer sheet (Sheet 5) for the development of the Productivity Equation

$Productivity_{normal} = C * (Distance_{push}^b)$   
 C = Multiplier Constant and b = Exponent Constant

EARTHWORK AND O&M EQUIPMENT			N	O	P	Q
Code	Equipment Description	Equipment Type	C	b	A	B
Comb1	Cat 14M Off-Hwy Water Tanker Truck 6,000-gal.	Combo 1	-	-	-	-
Dz2	Cat D11T CD	Dozer	162,758.78	-0.866631	-	-
Dz3	Cat D9T SU Blade	Dozer	52,161.03	-0.845532	-	-
Dz4	Cat D6T SU Blade	Dozer	13,582.45	-0.74851	-	-
Dz5	Cat D6T XL SU Blade	Dozer	13,582.45	-0.74851	-	-
Ex1	Cat 319DL	Excavator	-	-	-	-
Ld1	Cat 992K	Loader	-	-	-	-

See Trucks sheet (Sheet 9) for the development of the Haul Travel Time Equation

$Haul\ Travel\ Time\ (min/m) = A(Eff.\ Grade\ \%)^4 + B(Eff.\ Grade\ \%)^3 + C(Eff.\ Grade\ \%)^2 + D(Eff.\ Grade\ \%) + E$   
 where effective grade is the sum of the measured grade and rolling resistance

EARTHWORK AND O&M EQUIPMENT			P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
Code	Equipment Description	Equipment Type	Haul Travel Time (min/m) = A(Eff. Grade %) <sup>4</sup> + B(Eff. Grade %) <sup>3</sup> + C(Eff. Grade %) <sup>2</sup> + D(Eff. Grade %) + E																			
			Loaded Uphill					Empty Uphill					Loaded Downhill					Empty Downhill				
			A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Sp1	Cat D11T CD Multi-shank (w/MSK-359H)	Dozer w/ Ripper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sp2	MSR-189H	Ripper Attachment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sc2	Cat 857G	Scraper	1.0919	-0.8886	0.2817	-0.0068	0.0013	-0.4807	0.2559	-0.0001	-0.001	0.0022	0.495	-0.6003	0.2107	-0.0132	0.0016	0.0183	0.0547	-0.0151	0.0008	0.002
Sh1	Hitachi EX3600-5	Shovel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tc1	Deere 7330	Tractor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tc2	Cat 770G	Truck	10.305	-5.1409	0.9137	-0.0195	0.0011	0	-0.054	0.0426	-0.0027	0.0008	2.3323	-2.0131	0.5041	-0.0193	0.0009	-1.6373	0.9637	-0.1566	0.0074	0.0019
Tc3	Cat 730	Truck	3.7946	-2.6469	0.5996	-0.0124	0.0012	0.3211	-0.3433	0.1453	-0.0109	0.0023	7.1591	-5.0256	1.1209	-0.0562	0.0013	-1.426	0.8493	-0.1254	0.0053	0.002
Tc4	Komatsu 730E	Truck	8.0228	-3.9296	0.7273	-0.0083	0.0009	-23.611	6.4767	-0.4149	0.007	0.0013	4.5292	-2.0479	0.3875	-0.0108	0.0009	2.4535	-0.5561	0.0383	-0.0008	0.0013
Wt1	Off-Hwy Water Tanker Truck 6,000-gal.	Water Truck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Other equipment specifications in the equipment sheet can also be found in the RCE report. It is important to note that each piece of equipment is assigned an operator group, and labor rates are assigned according to the most up-to-date labor rates from NMDOL.

EARTHWORK AND O&M LABOR		
Rate		
50	NMDOL Type A	
52	Operator Group	
53	Equipment Operator IV	\$ 27.41
54	Equipment Operator V	\$ 27.52
55	Equipment Operator VI	\$ 27.70
56	Laborer I	\$ 23.09
57	Laborer II	\$ 23.84
58	Truck Driver III	\$ 24.27

For example use only. Values may not match the current spreadsheet.



Job No: 200450-003-01 Client: Freeport NM Page 6 of 21  
 Operations  
 Task: Earthwork RCE Computed By: Dena Mawlawi Date: 8/6/2024  
 Checked By: Walt Niccoli Date: 8/6/2024

**Results Cont'd**

**1 General:** This sheet includes a summary of the overall costs (before escalation and adjustment for the time value of money) and the applicant's information.

A	B	C
1		Tyrone Mine
2		Stockpile Spreadsheet Worksheet #1
3	<b>General Information</b>	4/29/2019
4		
5	Applicant	Tyrone Mine Company
6		Tyrone, New Mexico 88065
7		
8		
9		
10		
11	Disturbed Surface Area (acres)	3,031
12	<small>(does not include previously reclaimed areas)</small>	
13		
14	Type of Operation	Existing/Surface/Copper
15		
16		
17		
18	Current value of earthwork and IO&M before escalation and discounting	\$101,470,627
19		
20		
21		
22		
23		
24		
25		
26		

Stockpiles, Tailing, Reservoirs, Haul Roads and Disturbed Areas

**2 Demo:** This sheet estimates the total cost of demolishing pipelines, power poles, power lines, concrete containers, and buildings. To find this total cost, the sheet uses the RSMeans 2024 online database, on-site experience, and bids to list the unit cost for each item. Then, it simply multiplies the total quantity by the unit cost and adds those totals together.

Example calculation: (10,300 feet of powerline) x (\$0.63 per linear foot) = \$6,489

Item	Activity	Quantity	Unit	Unit Cost (\$/Unit)	Direct Item Cost (\$)	Reference	Means Line Item	Description
11	Power line Demolition (3 PLS to 1st Pond installed 2012)	10,300	ft	\$0.63	\$6,489	Means	Means Line Item 260905.10.0370	Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead power lines.
12	Power pole Demolition (3 PLS to 1st Pond installed 2012)	36	ea	\$216.24	\$7,785	Means	Means Line Item 024113.30.0200	wood utility poles 35-45 feet high
13	Power line Demolition (San Salvador Pit)	5,222	ft	\$0.63	\$3,290	Means	Means Line Item 260905.10.0370	Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead power lines.
14	Power pole Demolition (San Salvador Pit)	17	ea	\$216.24	\$3,676	Means	Means Line Item 024113.30.0200	wood utility poles 35-45 feet high
15	Power lines to substations or spurs for buildings to be demolished	66,200	ft	\$0.63	\$41,706	Means	Means Line Item 260905.10.0370	Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead power lines.
16	Power Poles to substations or spurs for buildings to be demolished	135	ea	\$216.24	\$29,192	Means	Means Line Item 024113.30.0200	wood utility poles 35-45 feet high
17	Telephone Lines around buildings to be demolished	1,400	ft	\$0.63	\$882	Means	Means Line Item 260905.10.0370	Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead power lines.
18	Light Poles around to be demolished buildings	13	ea	\$216.24	\$2,811	Means	Means Line Item 024113.30.0200	wood utility poles 35-45 feet high
19	Fire Hydrants Mainly by S/EV	14	ea	\$396.73	\$5,554	Means	Means Line Item 024113.33.0900	Minor Site Demolition; remove fire hydrants
20	Little Rock Dewatering Pipeline Alignment #1 and #2 (Year 34 of Closure)	4,940	ft	\$1.89	\$9,266	-	-	See Pipeline UC
21	Water Treatment Pipelines (Year 39 of Closure)	74,500	ft	\$4.57	\$340,232	-	-	See Pipeline UC
22	Sewer Pipelines (Year 6 of Closure)	1,414	ft	\$4.57	\$6,459	-	-	See Pipeline UC
23	PLS Pipelines (Year 6 of Closure)	18,893	ft	\$4.57	\$86,235	-	-	See Pipeline UC
24	2A East PLS Tank and 2A West PLS Tank (Year 6 of Closure)	2	ea	\$3,934.80	\$7,870	Means	Scaled Means Items	Storage Tanks, steel tank, single wall, above ground, not incl fdn, pumps or piping, 15,000 thru 30,000 gal; soaled for a 45,500 gal tank - assuming 22 ft diameter and 16 ft high
25	1A and 1B PLS Tanks (Year 39 of Closure)	2	ea	\$3,934.80	\$7,870	Means	Scaled Means Items	Storage Tanks, steel tank, single wall, above ground, not incl fdn, pumps or piping, 15,000 thru 30,000 gal; soaled for a 45,500 gal tank - assuming 22 ft diameter and 16 ft high
26	Culverts at Tailing Launder Line	22	ea	\$12.69	\$279	Means	Means Line Item 024113.40.0190	Selective demolition, metal drainage piping, CMP steel, 48"-60" diameter, excludes
27	Steel Trestle at Tailing Launder Line	1	ea	\$30,689.10	\$30,689	-	-	Bridge demolition, pedestrian, steel, 50' to 160' long, 8' to 10' wide
28	Substation Removal at Mangus Pumphouse	1	ea	\$12,470.55	\$12,470.55	-	-	See Substation Demo UC
29	Buildings and Associated Facilities	See Demo Sheets	-	-	\$4,493,228	-	-	-
<b>Total Direct Cost:</b>					<b>\$5,089,622</b>			

**For example use only. Values may not match the current spreadsheet.**





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**Results cont'd:**

**3 Material:** This sheet connects the first four reference sheets by matching each subarea from the quantities sheet with an activity, material, and piece of equipment. It generates an ID referenced throughout the remaining sheets in the RCE workbook (columns A-E).

All activities for the Chino RCE are listed on this sheet and carried through to the succeeding worksheets of the RCE. The description (column F) contains information about the activity, top or outslope (if applicable), and the material. The source location (column G) indicates the name of the stockpile or subarea where the activity is taking place. If borrow material is involved, it is moved from a borrow stockpile to a destination stockpile (column H). The push or haul distance (column I) and the haul grade or facility slope (column J) are used to calculate equipment production on later sheets. The equipment (column K) lists the name of the equipment referenced in the ID. Blank cells indicate that the column is not relevant to a particular activity.

Example ID 1300-D-b-Tk4: This indicates that a Komatsu 730E truck (Tk4) will be used to haul (D) cover material (b) from the Gila Borrow Area to the 3A/3B (1300). The total haul distance from STS2 to the Raffinate Pond is 11,221 feet, with an average haul grade of 1.3%.

2300-Facility and 23-Sub-area

D-Activity and b-Material

Tk4-Equipment to be used

Item	Activity	Material	Eq	ID	Description	Source Location 1	Destination Location 2	Total Haul/Push Distance (ft) <sup>1</sup>	Grade (%) <sup>2,3</sup>	Equipment	
123	1300	D	b	Tk4	1300-D-b-Tk4	Haul-Cover	Gila Borrow Area	3A/3B	11,221	1.3%	Komatsu 730E
124	1500	D	b	Tk4	1500-D-b-Tk4	Haul-Cover	Gila Borrow Area	5A Overburden	4,750	1.3%	Komatsu 730E
125	2200	D	b	Tk4	2200-D-b-Tk4	Haul-Cover	Leach Stockpile	San Salvador Pit	12,570	1.8%	Komatsu 730E
126	2300	D	b	Tk4	2300-D-b-Tk4	Haul-Cover	Gila Borrow Area	Savanna In-Pit Leach Stockpile	5,730	1.6%	Komatsu 730E
127	1400	D	b	Tk4	1400-D-b-Tk4	Haul-Cover	Gila Borrow Area	4C Leach	17,830	5.0%	Komatsu 730E
128	1800	D	b	Tk4	1800-D-b-Tk4	Haul-Cover	Gila Borrow Area	2C, 4A, 4B, 7B Leach	13,390	3.3%	Komatsu 730E
129	1900	D	b	Tk4	1900-D-b-Tk4	Haul-Cover	Gila Borrow Area	8C	5,730	1.6%	Komatsu 730E
130	1600	D	b	Tk4	1600-D-b-Tk4	Haul-Cover	Gila Borrow Area	6B	10,050	2.0%	Komatsu 730E
131	1700	D	b	Tk4	1700-D-b-Tk4	Haul-Cover	Gila Borrow Area	6C	11,833	2.5%	Komatsu 730E
132	2701	D	b	Tk4	2701-D-b-Tk4	Haul-Cover	Gila Borrow Area	Cntmnt-1	10,811	2.9%	Komatsu 730E
133	3300	D	b	Tk4	3300-D-b-Tk4	Haul-Cover	Gila Borrow Area	Unplanned Disturbance Area	10,811	2.9%	Komatsu 730E
134	2100	D	b	Tk4	2100-D-b-Tk4	Haul-Cover	9AX Stockpile Toe	9AX	6,343	7.7%	Komatsu 730E
135	2600	D	b	Tk2	2600-D-b-Tk2	Haul-Cover	9AX Stockpile	Tailing Launder Line	17,721	-1.8%	Cat 789D
136	2900	D	b	Tk2	2900-D-b-Tk2	Haul-Cover	Tailing Launder Line	Mangus Pumpouse	14,100	-1.8%	Cat 789D

For example use only. Values may not match the current spreadsheet.



**Results cont'd:**

**4 Earthwork:** When soil is disturbed, it naturally swells in volume. This sheet is designed to calculate and consider material swelling during transit, as it affects the production rate.

First, the relevant ID codes reference data from the Materials sheet. Then, the **area (ac)** is multiplied by the **cover depth (in)** to determine the **volume of the bank/stockpile**. Finally, the equation  $Volume_{loose} = \frac{Volume_{bank}}{(1+F_{swell})}$  is used to determine the volume of the soil that will be moved.

ID	Description	Source Location 1	Destination Location 2	Area (ac)	Cover Depth (in)	Bank/Stockpile Volume (bcy) <sup>1,4</sup>	Swell Factor (%) <sup>3</sup>	Loose/Stockpile Volume (lcy) <sup>2</sup>
1300-D-b-Tk4	Haul-Cover	Gila Borrow Area	3A / 3B	455.0	36	2,039,074	8%	2,202,200

$$Volume_{bank} = area * depth_{cover}$$

$$1325 * J325 / 12 * 43560 / 27$$

$$Volume_{loose} = \frac{Volume_{bank}}{(1 + F_{swell})}$$

$$M325 / (1 + L325)$$

**5 Dozer:** Dozers are used for rough grading facilities, assisting loaders or shovels at borrow stockpiles, or pushing scrapers for grading facilities.

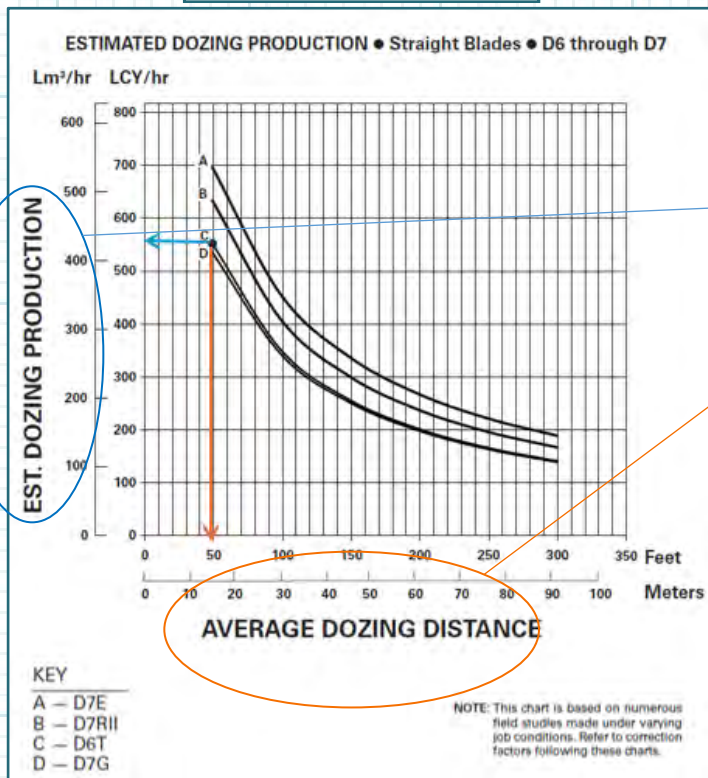
The purpose of this sheet is to estimate the amount of time it will take to use a dozer for each of its intended subareas and activities. To achieve this, relevant ID codes are referenced from the Material sheet to import the necessary data. This sheet then utilizes the CPH equation:

$Productivity = production_{normal} \times production_{factors}$  to determine the productivity and total task time for each material ID.

**Results cont'd:**

Dozer continued: We used input values from the Estimated Dozing Production graphs in the 2022 CPH to calculate normal productivity for a specific model dozer. Microsoft Excel was then used to plot these inputs and find a curve-fitting equation to represent the data.

**Caterpillar Performance Handbook 50, pg 16-12**

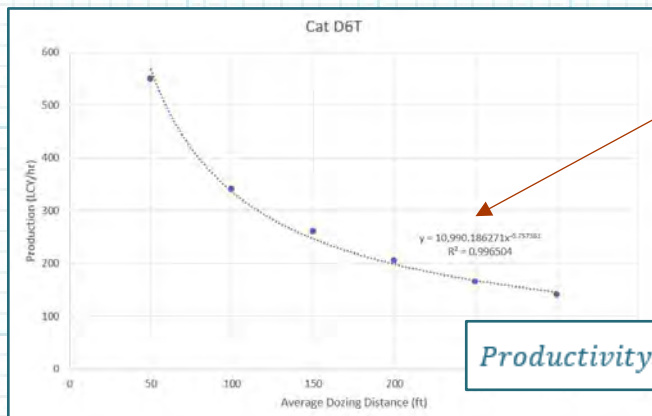


**D6T** Semi-Universal Blade

Push Distance (ft)	Production (cy/hr)
50	550
100	340
150	260
200	205
250	165
300	140

Caterpillar Performance Handbook Edition 50 pg. 16-12

**Graph these two columns and find the best-fit equation**



$Productivity_{normal} = 10990.186271 * Distance_{Push}^{-0.757381}$

**For example use only. Values may not match the current spreadsheet.**



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**Results cont'd:**

Dozer continued: This normal production curve, however, assumes work is being done on a level surface with a compacted material density of 2,300 lb/cy. Therefore, the Dozer sheet adjusts for slope, operator skill, equipment characteristics, and other site-specific production factors.

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Type of Equipment to Assist (ID)	Type of Equipment to Assist (Name)	Number of Dozers per Assist	Loose /Stockpile Volume (cy)	Area (ac)	Productivity (cy/hr)	Productivity (ac/hr)
1502-A-a-Dz2	Grade-Outslopes-Existing Ground	5A Overburden	-	Cat D11T CD	--	--	--	6,300,000	308	768	-

$Production_{normal} = C * Distance_{push}^b$

Scrapper Pusher Cycle Time (min)	Cycles per Scrapper per Hr	Loader/ Shovel/ Excavator Cycle Time	Total Task Time (hrs)	Material Factor	Grade Factor	Material Weight (lb/cy)	Production Method/ Blade	Centroid to Centroid Push Distance (ft)	Normal Production (cy/hr)	Effective Blade Width (ft)	Speed (mph)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans.	Cut to Fill Haul Grade (%)
-	-	-	8,204.8	1.0	1.6	3,300	1.2	540	697	22	3	1.00	50	1.0	1.0	1.0	-29%

$$Productivity \left( \frac{cy}{hr} \right) = F_{mat'l} * F_{grade} * F_{prod-method} * F_{operator} * F_{visibility} * F_{elev} * F_{drive} * \frac{WorkHour}{60min/hr} * \frac{2,300 lb/cy}{Mat'l Weight} * Production_{normal}$$

$$= U39 * V39 * X39 * AC39 * AE39 * AF39 * AG39 * (AD39/60) * (2300/W39) * Z39$$

**6 Water Truck/7 Road Maint:** Essential road maintenance is recommended to enhance productivity on a reclamation job site. This sheet calculates the time needed for a water truck and motor grader to suppress dust and maintain the site during earthwork reclamation. The Operational Maintenance Time (Column J) is assumed to equal the loader/shovel task time. The use of water trucks is included in road maintenance, and therefore, the Water Truck sheet does not include impactful data.

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Operational Maintenance Time
1000-P-b-Comb1	Road Maintenance	Gila Borrow Area	1A and 1B Leach	Cat 14M, Off-Hwy Water Tanker Truck, 6,000-gal.	423

Equals loading time on Loader/Shovel sheet  
 For example use only. Values may not match the current spreadsheet.



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**Results cont'd:**

**8 Ripper:** Rippers are used after rough grading and before placing cover at all facilities or before revegetation at borrow stockpiles to promote revegetation. Rippers are also used to loosen the existing ground before rough grading with scrapers.

In this sheet, columns A through J use the ID codes to reference subarea, material, and equipment-specific performance factors. Columns K and L represent the results of the dozer ripper productivity calculations, and the remaining columns provide the inputs necessary for calculating bulldozer ripper productivity in acres per hour based on ripper performance factors.

Task Description	Source Location 1	Destination Location 2	Equipment	Area (ac)	Productivity (ac/hr)	Task Time (hrs)	Ripping Length (ft)	Ripper Penetration (in)	Pocket Spacing (in)	Distance b/n Passes	Number of Shank Pockets	Turn Time (min/pass)	Work Hour (min/hr)	Speed (mph)	1000 Ft or 100 Ft Passes/Acre	Ripped Width Plus Distance b/n Passes (ft)
64 Rip-Top-Rough Graded Material	1A and 1B Leach	-	Cat D11T CD Multi-shank (w/MSR-353HL)	11	2.9	5.8	1000	18	53	59	3	0.25	50	1.0	15	30

$=S64/((M64/(5280*T64/60)+R64)*U64)$

$=J64/K64$

$=43560/(M64*V64)$

$=Q64*(P64+O64)/12$

Unit conversion factors

**9 Excavator:** An excavator with a sheepsfoot attachment is used to perforate liners before reclaiming lined impoundments.

This sheet uses ID codes to reference activities, locations, equipment, and areas from the Material sheet (columns A-I). The time required to excavate relevant subareas (column Q) is then calculated using inputs referenced from the Equipment sheet (columns J-P).

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Area (ac) or Volume (cy)	Unit (ac or cy)	Sheepsfoot Roller Width (ft) or Bucket Capacity (cy)	Unit (ft or cy)	Maximum Reach at Ground Level (ft)	Cycle Time (min)	Work Hour (min/hr)	Task Time (hr)
78	2701-K-a-Ex1 Perforate Liner-Surface Impoundments	Surface Impoundments closed at year 93, some closed year 6	-	Cat 319DL	212	ac	3.0	ft	31.7	0.16	50.00	31.15

$=O78*(J78*43560)/(L78*N78)/P78$

**For example use only. Values may not match the current spreadsheet.**



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**Results cont'd**

10 Trucks: Trucks transport cover material from borrow stockpiles to destination facilities. This sheet uses the ID codes to reference data from the Material, Truck Optimization, and Shovel sheets and the CPH and Komatsu 730E brochure. Using all relevant data, it then calculates how long it will take for a truck or loader to complete each needed haul.

Columns A through I repeat the ID reference process, and column J pulls the relevant stockpile volumes from the Earthwork sheet. Column K sums the truck cycle, which includes haul, load, return, empty, exchange, and dump/maneuver time. Column L reports the optimum number of trucks as limited by the number and size of loaders (calculated on the Truck Optimization sheet, as shown in the Equipment Optimization calculation summary). Columns M and O reference the Shovel sheet to list the loader or shovel net bucket capacity and loader/shovel task time. Columns N and P calculate the productivity and time required for the load-haul-dump operations, including possible idle times.

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Loose/Stockpile Volume (cy)	Truck Cycle Time (min)	Optimum Number of Trucks	Loader/Shovel Net Bucket Capacity (cy)	Productivity (cy/hr)	Loader/Shovel Task Time (hrs)	Truck Task Time (hrs)
1000.D-1-Trk	Haul-Cover	Upper South	All in rol flat areas	Komatsu 730E	381.671	7.0	3	27.4	2,924.4	129.8	134.0

=AQ123\*T123\*N123\*M123/L123

=IF(OR(K123=0,O123=0),0,IF(K123/O123<P123,P123,K123/O123))

Columns Q and R represent equipment specifications from the CPH. Column S calculates the loader/shovel cycles per truck based on the loader/shovel bucket capacity and truck capacity. The total haul distance (Column T) can be divided into three segments (Columns U-W) if the route varies greatly in slope. The average grade for each segment is calculated and entered in Columns X-Z. Columns T through Z are obtained from the Quantities sheet. Column AA represents the rolling resistance for the assumed underfoot and tires per the CPH. Columns AB-AD convert segment distances from feet to meters to apply the performance equations from the CPH.

Truck Task Time (hrs)	Struck Capacity (cy)	Heaped Capacity (cy)	Loader/Shovel Cycles per Tru	Total Haul Distance (ft)	Haul Distance Segment 1 (ft)	Haul Distance Segment 2 (ft)	Haul Distance Segment 3 (ft)	Haul Grade Segment 1 (%)	Haul Grade Segment 2 (%)	Haul Grade Segment 3 (%)	Rolling Resistance (%)	Haul Distance Segment 1 (mete)	Haul Distance Segment 2 (mete)	Haul Distance Segment 3 (mete)
0.2	101.0	145.0	5.0	22,486	22,486	-	-	1.0%	-	-	2.5%	6,854	-	-

**For example use only. Values may not match the current spreadsheet.**



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**Results cont'd**

Trucks continued: Columns AE through AJ calculate the effective grade of the segment (physical grade plus the rolling resistance). Haul time (column AK) and return time (column AL) are calculated by multiplying travel times (per distance) by haul/return distance. Loading time (column AM) is based on loader/shovel productivity (shovel sheet). Times in columns AN, AO, and AP are referenced from the Equipment sheet.

$=AR123*AC123+AS123*AD123+AE123*AT123$

AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP
Effective Haul Grade Segment 1 (%)	Effective Haul Grade Segment 2 (%)	Effective Haul Grade Segment 3 (%)	Effective Return Grade Segment 1 (%)	Effective Return Grade Segment 2 (%)	Effective Return Grade Segment 3 (%)	Haul Time (min)	Return Time (min)	Loading Time (min)	Truck Exchange Time (min)	Dump/Maneuver Time (min)	Work Hour (min/hr)
3.5%	2.5%	2.5%	1.5%	2.5%	2.5%	9.1	7.4	2.25	0.6	0.6	50

$=IF(Y123>=\$AB123, Y123+\$AB123, ABS(Y123+\$AB123))$

$=IF(-Y123>=\$AB123, -Y123+\$AB123, ABS(-Y123+\$AB123))$

$=AU123*AC123+AV123*AD123+AE123*AW123$

Columns AQ through AV calculate the travel time (per distance) to form a curve fit based on CPH production factors, as explained on the following page. Travel time depends on effective grades. If the haul grade is positive (uphill), the loaded or empty uphill travel time is calculated within the truck's maximum speed. If the grade is negative (downhill), the loaded or empty downhill travel time is calculated within the truck's maximum speed.

AQ	AR	AS	AT	AU	AV
Travel Time Loaded Segment 1 (min/m)	Travel Time Loaded Segment 2 (min/m)	Travel Time Loaded Segment 3 (min/m)	Travel Time Empty Segment 1 (min/m)	Travel Time Empty Segment 2 (min/m)	Travel Time Empty Segment 3 (min/m)
0.00133	-	-	0.00108	-	-

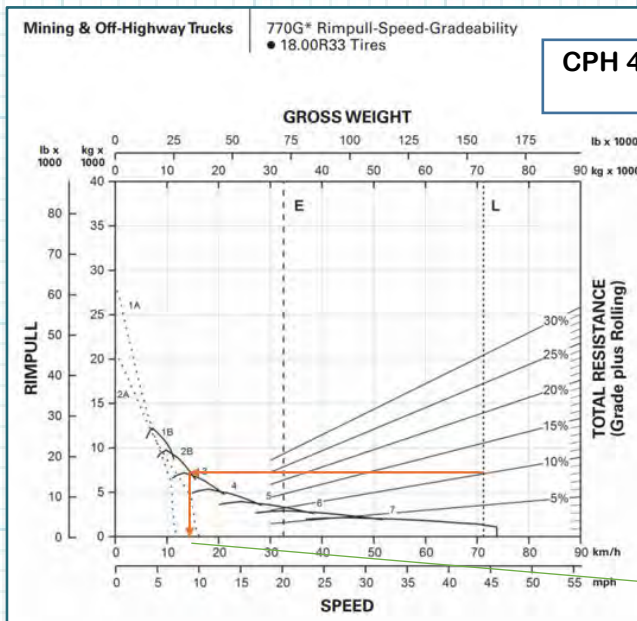
**For example use only. Values may not match the current spreadsheet.**



**Results cont'd**

Trucks continued: To calculate haul times, data was taken from the rimpull-speed grade ability curves and retarding curves to create a relationship for travel time vs. effective resistance for travel uphill and downhill, respectively. Microsoft Excel was then used to graph the relationships and find a best-fit equation to represent those relationships. The coefficients for these best-fit equations were listed for each type of truck in the equipment sheet.

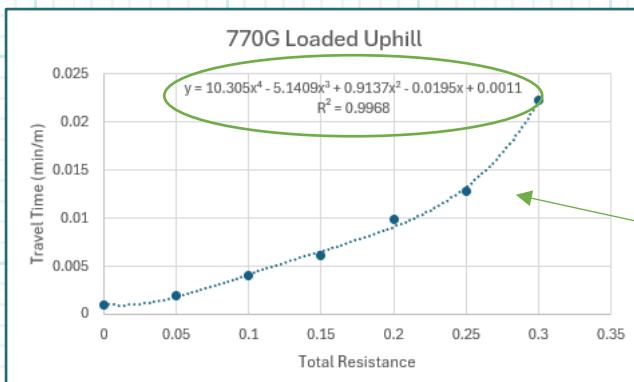
An example shown below is the Caterpillar 770G. Assuming a loaded truck travels uphill at a 10% grade, it travels at 14.8 km/h. Using the Caterpillar conversion chart, we find that 14.8 km/h equals 246.66 meters/min. This data is input into a Microsoft Excel spreadsheet, converted to min/meters, and plotted on a graph. Excel is then used to find the best-fit equation to represent the data, and the coefficients for that equation are used in the Equipment sheet of the RCE and later referenced in the Truck sheet to help estimate the hours required for truck use.



SPEED CONVERSION					
km/h Equivalents in m/min			MPH Equivalents in FPM		
km/h	m/min	km/h	m/min	mph	fpm
1	16.7	21	350.0	1	88
2	33.3	22	366.7	2	176
3	50.0	23	383.3	3	264
4	66.7	24	400.0	4	352
5	83.3	25	416.7	5	440
6	100.0	26	433.3	6	528
7	116.7	27	450.0	7	616
8	133.3	28	466.7	8	704
9	150.0	29	483.3	9	792
10	166.7	30	500.0	10	880
11	183.3	31	516.7	11	968
12	200.0	32	533.3	12	1056
13	216.7	33	550.0	13	1144
14	233.3	34	566.7	14	1232
15	250.0	35	583.3	15	1320
16	266.7	36	600.0	16	1408
17	283.3	37	616.7	17	1496
18	300.0	38	633.3	18	1584
19	316.7	39	650.0	19	1672
20	333.3	40	666.7	20	1760

NOTE: Since 1 km/h equals 16.7 m/min (1000 ÷ 60), to interpolate, add 1.67 m/min for each 0.1 km/h.  
 NOTE: Since 1 mph equals 88 fpm (5280 ÷ 60), to interpolate, add 8.8 fpm for every 0.1 mph.  
 1 mph = 26.8 m/min.

770 G Loaded Uphill			
Total Resistance	Speed (m/min)	Travel Time (min/m)	
30%	44.99	0.02223	
25%	78.39	0.01276	
20%	101.67	0.00984	
15%	163.36	0.00612	
10%	246.66	0.00405	
5%	500	0.00200	
0%	1000	0.00100	



Graph these two columns and find best-fit equation

For example use only. Values may not match the current spreadsheet.





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**Results cont'd**

**11 Shovel:** Loaders or shovels load cover material onto haul trucks at the borrow stockpiles. This sheet uses the ID codes to reference data from the material and equipment sheets to calculate the time it will take to load material in all relevant areas.

Columns L, P, and Q are from the Equipment sheet, while columns M and N are calculated directly on this sheet (see below). As with the truck task time calculation, column O uses the maximum loader/shovel or truck task time.

Productivity and Hours Required for Front End Loader Use or Hydraulic Shovel Use													PERFORMANCE FACTORS			
ID	Task Description	Source Location 1	Destination Location 2	Equipment	Hauling Equipment ID	Loose/Stockpile Volume (cy)	Loader/ Shovel Cycle Time (min)	Per Loader/Shovel Productivity (cy/hr)	Loader/ Shovel Task Time (hrs)	Max of Loader/Shovel or Truck Task Time (hrs)	Net Bucket Capacity (cy)	Work Hour (min/hr)				
1000-C-b-Sh1	Load-Cover	Gila Borrow Area	1A and 1B Leach	Hitachi EX3600-5	Tk4	1,321.320	0.45	3,120.6	423.4	423.4	28.1	50				

$=P99/L99*Q99$   
 $=K99/M98$

**12 Scrapers:** Scrapers level surfaces by moving the earth at various distances. They can help reduce the cost of only using dozers to move earth, especially when moving long distances. While the Tyrone RCE did not use scrapers, this RCE does. The Scrapper sheet works in a way similar to the other equipment sheets; it utilizes ID codes to reference specific subareas and equipment specifications and calculate the time required to level the Chino site.

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Loose/Stockpile Volume (cy)	Total Haul Distance One Way (feet)	Haul & Scrape Grade (%)	Rolling Resistance (%)	Effective Grade Uphill (%)	Effective Grade Downhill (%)
1402-A-f-Sc1	Grade-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	Cat 657G	302,842	1,413.6	-13.00%	2.5%	0.0%	0.0%
1501-A-f-Sc1	Grade-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	1,448,283	1,665.4	-9.00%	2.5%	0.0%	0.0%

Load Time (min)	Maneuver & Spread Time (min)	Full Scraper Haul Speed (mph)	Empty Scraper Return Speed (mph)	Scraper R/T Cycle Task Time	Pusher Cycle Time (min/cycle)	Rated Load (lb)	Soil Weight (lbs/cy)	Heaped Capacity (cy)	Work Hour (min/hr)	Cycles per Scraper per H	Productivity per Heaped Scraper (cy/hr)	Total Task Time (hrs)	Number of Scrapers	Task Time w All Scrapers (hrs)
0.9	0.6	28.7	15.5	3.04	1.44	104,000	2,900	44	50	16	574	528	1.0	528
0.9	0.6	28.7	15.5	3.33	1.44	104,000	3,300	44	50	15	473	3,064	1.0	3,064

**For example use only. Values may not match the current spreadsheet.**



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 Operations  
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**Results cont'd**

**13 M'grader:** Motor graders are used for rough grading the tops of stockpiles or fine grading cover material. This sheet uses the ID codes to reference the Material and Earthwork sheet data to calculate the time needed to complete the grading at the Chino site.

Column K, shaping productivity, is calculated from the speed and effective blade width. Column L is calculated directly. The grade factor (Column M) is calculated based on the percent grade. Column N is an assumed material handling factor, and Column U is a factor based on operator experience. Columns O-T are based on material properties and equipment information.

ID	Task Description	Source Location 1	Destination Location 2	Grading Equipment	Area (ac)	Grading Shaping Productivity (ac/hr)	Task Time (hrs)	Grade Factor	Material Factor	Material Weight (lb/cy)	Production Method/Blade	Effective Blade Width (ft)	Pass Overlap (ft)	Speed (mph)	Work Hour (min/hr)	Operator Factor
1001-A-a-Mg1	Grade-Top-Existing Ground	1A and 1B Leach	-	Cat 16M	17	3	5.9	1.0	1.0	3,300	1.20	16.00	2.00	2.50	50	1.00

$$=(T46/60)*N46*(2300/O46)*P46*U46*M46*S46*(Q46-R46)*5280/43560$$

$$=IF(K115>0,J115/K115,0)$$

Unit conversion factors

Soil weight (lb/cy) assumed in CPH

**14 EarthSum:** This sheet summarizes the cost of reclaiming each subarea. It first lists each ID code from the Material sheet and then references the quantities calculated for each ID in sheets 5, and 7 through 12. Finally, it applies the costs from EquipmentWatch, the New Mexico labor rates table, and fuel quotes to find the individual price for each subarea.

The number of equipment units is assumed to be one, except for trucks and scrapers, which use an optimum number of units calculated on the truck and scraper optimization sheets. The time required is taken from each equipment sheet (sheets 5-12). The fuel, rental, maintenance, and labor costs are calculated by multiplying the unit costs by the time required for each task. The total equipment cost (column R) is the sum of the fuel, rental, maintenance, and labor costs.

ID	Description	Source Location 1	Destination Location 2	Equipment	Fuel Cost (\$/hr)	Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$/hr)	Labor Cost (\$/hr)
1202-A-a-Dz2	Grade-Outslopes-Existing Ground	2A Leach and 2B Waste	-	Cat D11T CD	\$63.82	\$254.44	\$27.41

**For example use only. Values may not match the current spreadsheet.**



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**Results cont'd**  
 EarthSum cont'd:

	M	N	O	P	Q	R	S	T	
1								Tyrone Mine	
2								Stockpile Spreadsheet Worksheet #13	
3								04/29/19	
4									
5								ency (Cat. Handbook Edition 47 pg 11-27)	
6								3%, therefore use of graders an option. (Cat. Handbook Edition 46 pg 11-30)	
7									
8									
9									
10									
11									
12									
13									
		<b>Number of Units (Equipment)</b>	<b>Time Req'd (hrs)</b>	<b>Direct Fuel Cost (\$)</b>	<b>Direct Lube, Tires, GEC, &amp; Field Parts Adjusted Rental Cost (w/o fuel) (\$)</b>	<b>Direct Labor Cost (\$)</b>	<b>Total Equipment Cost (\$)</b>	<b>Total Production Volume (CY)</b>	<b>Total Production Area (AC)</b>
14									
15									
16									
36			3,306.9	\$647,837	\$2,368,057	\$255,101	\$3,271,055	8,060,000	-

=SUM(O15:Q15)

=J15\*N15\*M15

**15 Revegetation:** This sheet calculates the cost of revegetation for each area that will be revegetated. Columns A through I repeat the ID, activity title, locations, and areas from the Material and Earthwork sheets. The unit rates for revegetation (revegetation fuel cost and revegetation cost without fuel) are multiplied by the corresponding areas to calculate each location's associated direct revegetation costs. The total revegetation direct cost is the sum of all direct costs related to each location.

	E	F	G	H	I	J	K	L	M	
1									Tyrone Mine	
2									Stockpile Spreadsheet Worksheet #14	
3									04/29/19	
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
		<b>ID</b>	<b>Description</b>	<b>Source Location 1</b>	<b>Destination Location 2</b>	<b>Area (ac)</b>	<b>Fuel Unit Cost (\$/ac)</b>	<b>Reveg w/o Fuel Unit Cost (\$/ac)</b>	<b>Fuel Direct Cost (\$)</b>	<b>Reveg w/o Fuel Direct Cost (\$)</b>
14										
154		1000-J-e-U2	Revegetate-Entire Stockpile-Final Grade	1A and 1B Leach	-	273.0	\$ 3.85	\$ 820.12	\$ 1,051	\$ 223,893
155		1100-J-e-U2	Revegetate-Top (Haul Road)-Final Grade	9C	-	17.0	\$ 3.85	\$ 820.12	\$ 65	\$ 13,945
156		1200-J-e-U2	Revegetate-Entire Stockpile-Final Grade	2A Leach and 2B Waste	-	487.0	\$ 3.85	\$ 820.12	\$ 1,874	\$ 399,392
157		1300-J-e-U2	Revegetate-Entire Stockpile-Final Grade	3A / 3E	-	455.0	\$ 3.85	\$ 820.12	\$ 1,751	\$ 373,155
158		1500-J-e-U2	Revegetate-Entire Stockpile-Final Grade	5A Overburden	-	371.0	\$ 3.85	\$ 820.12	\$ 1,428	\$ 304,285
159		2200-J-e-U2	Revegetate-Entire Pit-Final Grade	San Salvador Pit	-	115.0	\$ 3.85	\$ 820.12	\$ 443	\$ 94,314
160		2300-J-e-U2	Revegetate-Entire Stockpile-Final Grade	Savanna In-Pit Leach Stockpile	-	65.0	\$ 3.85	\$ 820.12	\$ 250	\$ 53,308
161		1400-J-e-U2	Revegetate-Entire Stockpile-Final Grade	4C Leach	-	183.0	\$ 3.85	\$ 820.12	\$ 704	\$ 150,082
162		1800-J-e-U2	Revegetate-Entire Stockpile-Final Grade	2C, 4A, 4B, 7B Leach	-	375.0	\$ 3.85	\$ 820.12	\$ 1,443	\$ 307,545
163		1900-J-e-U2	Revegetate-Sludge Disposal Area-Final Grade	8C	-	47.4	\$ 3.85	\$ 820.12	\$ 182	\$ 38,841
164		1600-J-e-U2	Revegetate-Entire Stockpile-Final Grade	6B	-	54.0	\$ 3.85	\$ 820.12	\$ 208	\$ 44,286
165		1700-J-e-U2	Revegetate-Entire Stockpile-Final Grade	6C	-	66.0	\$ 3.85	\$ 820.12	\$ 254	\$ 54,128
166		2000-J-e-U2	Revegetate-Entire Stockpile-Final Grade	9A Overburden	-	129.0	\$ 3.85	\$ 820.12	\$ 496	\$ 105,796
167		2600-J-e-U2	Revegetate-Tailing Launder Line-Final Grade	Tailing Launder Line	-	7.4	\$ 3.85	\$ 820.12	\$ 28	\$ 6,072
168		2900-J-e-U2	Revegetate-Mangus Pumphouse-Final Grade	Mangus Pumphouse	-	7.0	\$ 3.85	\$ 820.12	\$ 27	\$ 5,741
169		2701-J-e-U2	Revegetate-Surface Impoundments closed at year 99; some closed year 6	Surface Impoundments closed at year 99; some closed year 6	-	21.2	\$ 3.85	\$ 820.12	\$ 82	\$ 17,411
170		2702-J-e-U2	Revegetate-Surface Impoundments graded over at closure-Final Grade	Surface Impoundments graded over at closure	-	0.5	\$ 3.85	\$ 820.12	\$ 2	\$ 394
171		3300-J-e-U2	Revegetate-Unplanned Disturbance Area-Final Grade	Unplanned Disturbance Area	-	125.0	\$ 3.85	\$ 820.12	\$ 481	\$ 102,515
172		2100-J-e-U2	Revegetate-Entire Stockpile-Final Grade	9AX	-	63.7	\$ 3.85	\$ 820.12	\$ 245	\$ 52,242
173		2803-J-e-U2	Revegetate-Revegetation Area-Final Grade	Tailing Repositories Borrow Areas	-	74.7	\$ 3.85	\$ 820.12	\$ 287	\$ 61,263
290										
291						TOTAL	###		\$ 11,301	\$ 2,408,586

=I173\*J173

=SUM(M15:M290)

**For example use only. Values may not match the current spreadsheet.**



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 Checked By: Walt Niccoli Date: 8/6/2024

**Results cont'd**

**16 Other:** This sheet contains the direct costs of miscellaneous earthwork tasks. These tasks include grading benches, constructing downdrains, constructing downdrain dissipators, constructing bench channels (including filter and riprap production and placement), replacing infrastructure, plugging and abandoning wells, replacing wells, constructing berms, fencing (including vehicle gates and signs), and building grade control walls.

Columns E through H repeat the ID, description, and locations from the Material sheet. Columns I and J document the quantity and unit associated with each quantity for each task (referenced from the Quantities sheet). The unit costs (columns K and L) are referenced from the Unit Rates sheet. The quantity multiplied by the unit costs gives the direct costs for each activity. The direct costs are totaled at the bottom of the sheet.

E	F	G	H	I	J	K	L	M	N
Other Reclamation Activity Costs									Tyrone Mine Stockpile Spreadsheet Worksheet #15 04/23/19
Assumptions:									
1 - Cost to construct drain or channel on re-graded stockpile									
2 - The downdrain, ACB, well plug & abandon, and well replacement costs include fuel									
May filter on equipment (D14) to show pertinent rows									
ID	Description	Source Location 1	Destination Location 2	Quantity	Unit	Fuel Unit Cost (\$/unit)	Unit Cost w/o Fuel (\$/unit)	Fuel Direct Cost (\$)	Direct w/o Fuel Cost (\$)
238	1700-G-e-U5 Construct Downdrains-Entire Stockpile-Final Grade	6C	-	550	ft	\$ -	\$ 374.38	\$ -	\$ 205,909
239	2000-G-e-U5 Construct Downdrains-Entire Stockpile-Final Grade	3A Overburden	-	2,500	ft	\$ -	\$ 374.38	\$ -	\$ 935,951
240	1000-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	1A and 1B Leach	-	4	ea	\$ -	\$ 14,556.48	\$ -	\$ 58,226
241	1200-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	2A Leach and 2B Waste	-	5	ea	\$ -	\$ 14,556.48	\$ -	\$ 72,782
242	1300-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	3A / 3B	-	4	ea	\$ -	\$ 14,556.48	\$ -	\$ 58,226
243	1500-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	5A Overburden	-	2	ea	\$ -	\$ 14,556.48	\$ -	\$ 29,113
244	2200-Gb-e-U6 Construct Downdrain Dissipators-Entire Pit-Final Grade	San Salvador Pit	-	1	ea	\$ -	\$ 14,556.48	\$ -	\$ 14,556
245	1400-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	4C Leach	-	3	ea	\$ -	\$ 14,556.48	\$ -	\$ 43,669
246	1800-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	2C, 4A, 4B, 7B Leach	-	3	ea	\$ -	\$ 14,556.48	\$ -	\$ 43,669
247	1600-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	6B	-	1	ea	\$ -	\$ 14,556.48	\$ -	\$ 14,556
248	1700-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	6C	-	1	ea	\$ -	\$ 14,556.48	\$ -	\$ 14,556
249	2000-Gb-e-U6 Construct Downdrain Dissipators-Entire Stockpile-Final Grade	3A Overburden	-	1	ea	\$ -	\$ 14,556.48	\$ -	\$ 14,556
250	1000-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	1A and 1B Leach	-	50,013	ft	\$ 1.39	\$ 6.60	\$ 69,277.99	\$ 330,188
251	1200-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	2A Leach and 2B Waste	-	88,062	ft	\$ 1.39	\$ 6.60	\$ 94,279.45	\$ 443,240
252	1300-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	3A / 3B	-	65,980	ft	\$ 1.39	\$ 6.60	\$ 91,395.47	\$ 435,497
253	1500-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	5A Overburden	-	50,330	ft	\$ 1.39	\$ 6.60	\$ 69,717.09	\$ 332,200
254	2200-H-e-U7a Construct Bench Channels w/ Riprap-Entire Pit-Final Grade	San Salvador Pit	-	3,940	ft	\$ 1.39	\$ 6.60	\$ 13,768.88	\$ 65,608
255	1400-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	4C Leach	-	23,501	ft	\$ 1.39	\$ 6.60	\$ 32,553.57	\$ 155,717
256	1800-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	2C, 4A, 4B, 7B Leach	-	26,700	ft	\$ 1.39	\$ 6.60	\$ 36,394.83	\$ 176,232
257	1700-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	6C	-	4,100	ft	\$ 1.39	\$ 6.60	\$ 5,673.32	\$ 27,082
258	2000-H-e-U7a Construct Bench Channels w/ Riprap-Entire Stockpile-Final Grade	3A Overburden	-	25,148	ft	\$ 1.39	\$ 6.60	\$ 34,835.00	\$ 165,988
259	2800-Hb-e-U7f Construct Bench Channels w/o Riprap-Borrow Areas-Final Grade	Tailing Repositories Borrow Areas	-	13,501	ft	\$ 0.10	\$ 0.41	\$ 1,381.33	\$ 5,593
260	2800-R-e-U28 Construct Berms-Borrow Areas-Final Grade	Tailing Repositories Borrow Areas	-	3,142	ft	\$ -	\$ 0.06	\$ -	\$ 195
261	2600-T-e-U35 Build Grade Control Walls-Tailing Launder Line-Final Grade	Tailing Launder Line	-	1,002	ft	\$ -	\$ 165.59	\$ -	\$ 165,992
<b>TOTAL</b>								\$ 547,362	\$ 19,973,626

=I259\*K259

=SUM(M15:M261)

For example use only. Values may not match the current spreadsheet.



**Results cont'd**

17 Sum: This sheet consolidates the direct costs from Demo, EarthSum, Revegetation, and Other, as well as the indirect costs added as a percentage of the direct costs.

	A	B	C	D	E
1					Tyrone Mine
2					Stockpile Spreadsheet Worksheet #16
3					4/29/2019
4					
5					<b>Tyrone Mine</b>
6					Reclamation Summary Stockpiles, Haul Roads, Reservoirs, and Disturbed Areas
7					
8					<b>Current Value</b>
9	<b>DIRECT COSTS</b>	Facility and Structure Removal		\$5,089,622	=2 Demo!F31
10		Earthmoving		\$43,140,197	=13 EarthSum!R295
11		Revegetation		\$2,419,888	=14 Revegetation!M291+14 Revegetation!L291
12		Other		\$20,527,008	=15 Other!N291+15 Other!M291
13		Subtotal, Direct Costs		\$71,176,714	=SUM(D9:D12)
14					
15	<b>INDIRECT COSTS</b>	Subtotal, Indirect Costs	30.0%	\$21,353,014	=C15*\$D\$13
16					
17					
18	<b>TOTAL COST</b>			\$92,529,729	=(D13+D15)
19		Twelve Year Annual Expenditure		\$7,710,811	=D18/12
20					
21					
22	Notes:				
23	Indirect costs are based on 2019 agreement between FMI and agencies				
24	Indirect costs include but are not limited to mobilization and demobilization, engineering redesign fee,				
25	contingencies, contractor profit and overhead, project management fee, and state procurement cost				

The total indirect costs of 30% are applied to the capital direct costs based on discussions involving the FA Work Group completed in December 2018 and as agreed upon in January 2019. The FA Work Group involved Freeport-McMoRan New Mexico Operations (FNMO), MMD, NMED, and Gila Resources Information Project (GRIP) representatives. Indirect costs include mobilization and demobilization, contingencies, engineering redesign fees, contractor profit and overhead, project management fees, and other administrative costs. The RCE report provides further information on the FA Work Group agreement.



**Results cont'd**

18a/b Facility Characteristics: Sheet A lists the reclamation costs for all facilities for reference on the next sheet.

Sheet B summarizes direct and indirect costs for each facility in a way that meets MMD reporting requirements.

	A	B	C	D	E	F
1						
2						
3	<b>Facility Characteristics</b>					
4	Facilities are categorized in this listing to meet the MMD reporting					
5	requirement					
6			1000	1100	1200	1300
7		<b>Facility</b>	<b>1A and 1B Leach</b>	<b>1C</b>	<b>2A Leach and 2B Waste</b>	<b>3A / 3B</b>
8						
9		<b>Reclaimed Acres<sup>1</sup></b>	273.00	17.00	486.99	455.00
10						
11		<b>Item</b>	<b>Capital Cost</b>	<b>Capital Cost</b>	<b>Capital Cost</b>	<b>Capital Cost</b>
12	Direct Costs	Cover Material Excav, Haul, Grade <sup>1</sup>	\$1,262,102	\$95,723	\$3,231,529	\$3,105,876
13		Pullback or Backfill	\$0	\$0	\$0	\$13,577,409
14		Top/Outslope Adjustment Grading <sup>2</sup>	\$164,600	\$0	\$3,277,233	\$1,659,024
15		Scarify, Seed & Mulch, Reveg <sup>3</sup>	\$224,943	\$14,011	\$401,266	\$374,906
16		Channels & Benches <sup>4</sup>	\$1,928,349	\$0	\$3,709,623	\$2,966,998
17		Demolition	\$0	\$0	\$0	\$0
18		Other <sup>5</sup>	\$0	\$0	\$0	\$0
19		<b>Capital Cost Totals</b>	<b>\$3,579,994</b>	<b>\$109,734</b>	<b>\$10,619,651</b>	<b>\$21,684,211</b>
20		<b>Capital Cost/Acre</b>	<b>\$13,114</b>	<b>\$6,453</b>	<b>\$21,807</b>	<b>\$47,658</b>
21						
22	Indirect Costs	Cover Material Excav, Haul, Grade <sup>1</sup>	\$378,631	\$28,717	\$969,459	\$931,763
23		Pullback or Backfill	\$0	\$0	\$0	\$4,073,223
24		Top/Outslope Adjustment Grading <sup>2</sup>	\$49,380	\$0	\$983,170	\$497,707
25		Scarify, Seed & Mulch, Reveg <sup>3</sup>	\$67,483	\$4,203	\$120,380	\$112,472
26		Channels & Benches <sup>4</sup>	\$578,505	\$0	\$1,112,887	\$890,099
27		Demolition	\$0	\$0	\$0	\$0
28		Other <sup>5</sup>	\$0	\$0	\$0	\$0
29		<b>Indirect Cost Totals</b>	<b>\$1,073,998</b>	<b>\$32,920</b>	<b>\$3,185,895</b>	<b>\$6,505,263</b>
30		<b>Indirect Cost/Acre</b>	<b>\$3,934</b>	<b>\$1,936</b>	<b>\$6,542</b>	<b>\$14,297</b>
31						
32						
33						
34		<b>Total Cost</b>	<b>\$4,653,992</b>	<b>\$142,654</b>	<b>\$13,805,546</b>	<b>\$28,189,475</b>
35		Total Cost Cover	\$1,640,733	\$124,440	\$4,200,988	\$4,037,638
36		Pullback or Backfill	\$0	\$0	\$0	\$17,650,631
37		Total Cost Top/Outslope Adjustment	\$213,980	\$0	\$4,260,403	\$2,156,731
38		Total Cost Earthwork	\$1,854,712	\$124,440	\$8,461,391	\$23,845,001
39		Capital Cost Re-Veg	\$292,426	\$18,214	\$521,645	\$487,377
40		Capital Cost Other <sup>5</sup>	\$0	\$0	\$0	\$0
41						
42		<b>Total Cost/Acre</b>	<b>\$17,048</b>	<b>\$8,389</b>	<b>\$28,349</b>	<b>\$61,955</b>
43		Total Cost/Acre Cover	<b>\$6,010</b>	<b>\$7,318</b>	<b>\$8,626</b>	<b>\$8,874</b>
44		Pullback or Backfill	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$38,793</b>
45		Total Cost/Acre Top/Outslope Adjustment	<b>\$784</b>	<b>\$0</b>	<b>\$8,748</b>	<b>\$4,740</b>
46		Total Cost/Acre Earthwork	<b>\$6,794</b>	<b>\$7,318</b>	<b>\$17,375</b>	<b>\$52,407</b>
47		Capital Cost/Acre Re-Veg	<b>\$1,071</b>	<b>\$1,071</b>	<b>\$1,071</b>	<b>\$1,071</b>
48		Capital Cost/Acre Other <sup>5</sup>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
49						

The direct and indirect costs are divided into the following sections: Cover Material, Pullback or Backfill, Top/Outslope Adjustment Grading, Revegetation, Channels & Benches, Demolition, and Other. Demolition is not divided by location but is given as a total.

**For example use only. Values may not match the current spreadsheet.**



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Checked By: Walt Niccoli Date: 8/6/2024

**Results cont'd**

Remaining Sheets: The remaining sheets and data supporting the earthwork calculations described in this calculation documentation are described in the following calculation summaries:

- Equipment Optimization
- O&M
- Bench Grading Unit Cost
- Channel Unit Cost
- Downdrain Unit Cost
- Revegetation Unit Cost
- Fuel Unit Cost

# **Truck and Scraper Optimization**





## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan's (FMI's) Chino Mines Company utilizes truck optimization and scraper optimization information to develop the most efficient proportions of equipment as part of earthwork closure cost estimation associated with the Chino Mine Closure/Closeout Plan (CCP). Optimization must account for the time required and associated costs for truck loading and hauling operations for cover material and scraper/dozer productivity for rough grading.

### **Objectives:**

1. Develop optimization calculations to determine the most efficient number of trucks (2 to 9 and a calculated maximum) per loader or shovel for loading cover material at borrow stockpiles and the most efficient number of scrapers (2 to 9 and a calculated maximum) per dozer (the dozer assists scrapers for rough grading at waste rock stockpiles).
2. Note that this calculation set presents the approach, calculations, and results for optimizing equipment for earthwork. It is intended to serve as a guide/example even if the actual quantities and/or cost data used in these calculations change due to updates or application to a different Freeport NM Operations mine.

### **Approach:**

1. The data, calculations, and results for the optimization calculations are presented within the earthwork RCE spreadsheet in two sheets (tabs) named "18 Truck Optimization" and "19 Scraper Optimization".
2. Truck optimization is calculated for each cover material source and destination based on
  - The truck cycle time for 1 roundtrip between a cover material source and destination and the maximum number of trucks per loader/shovel.
  - For X number of trucks (2 to 9 and a calculated maximum), the productivity, task time, cost of using X trucks per loader, the optimum number of trucks per loader/shovel, and the maximum number of trucks per loader/shovel.
3. Scraper optimization is calculated for each area requiring rough grading based on
  - The time required for 1 scraper to rough grade.
  - For X number of scrapers per dozer (2 to 9 and a calculated maximum), the task time, cost of using X scrapers per dozer, the optimum number of scrapers per dozer, and the maximum number of scrapers per dozer.



**Calculations and Results:**

- The truck optimization calculations are set up as shown in Table 1, which is a snapshot of a row of data/calculations in the "18 Truck Optimization" sheet. Table 1 is shown in 6 parts due to the many columns in the spreadsheet. Key calculation steps are listed after Table 1, with referencing to the Column identifier in Table 1 (and the spreadsheet).

Table 1

	E	F	G	H	I	J	K	L
13								
14	ID	Task Description	Source Location 1	Destination Location 2	Equipment	Work Hour (min/hr)	Loader/Shovel Cycles per Truck	Loader/Shovel Cycle Time (min)
299	1200-D-b-Tk4	Haul-Cover	Upper South	West Stockpile	Komatsu 730E	50	5	0.45

	M	N	O	P	Q	R	S	T	U
13									
14	Loader/Shovel Time Per Truck (min)	Truck Cycle Time Per Truck (min)	Trucks Per Loader/Shovel	Loader/Shovel Type	Loader/Shovel Cost (\$/hr)	Loader Net Bucket Capacity (cy)	Haul Volume (cy)	Max Trucks Round Up	Max Trucks Round Down
299	2.25	22.7	10.1	Sh1	\$ 535.68	27.4	3,031,924	3,317	3,016

	V	W	X	Y	Z	AA	AB	AC
13	Productivity for X Trucks (cy/hr)							
14	9	8	7	6	5	4	3	2
299	2,714	2,412	2,111	1,809	1,508	1,206	905	603

	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
13	Task Time for X Trucks (hr)									
14	Max Trucks Round Up	Max Trucks Round Down	9	8	7	6	5	4	3	2
299	914.0	1,005.4	1,117.2	1,256.8	1,436.4	1,675.7	2,010.9	2,513.6	3,351.5	5,027.2

	AN	AO	AP	AQ	AR	AS	AT	AU
13	Cost of Using X Trucks per Loader (\$)							
14	Loader/Shovel Task Time (hr)	Truck Cost (\$/hr)	Max Trucks Round Up	Max Trucks Round Down	9	8	7	6
299	995.9	\$ 246.06	\$ 3,229,021	\$ 3,012,613	\$ 3,072,458	\$ 3,147,264	\$ 3,243,442	\$ 3,371,681

	AV	AW	AX	AY	AZ	BA	BB
13	)						
14	5	4	3	2	Lowest Cost (\$)	Optimum Number of Trucks Per Loader/Shovel	Optimum Number of Trucks Per Loader/Shovel Within Max
299	\$ 3,551,215	\$ 3,820,515	\$ 4,269,350	\$ 5,167,019	\$ 3,012,613	10	10

For example use only. Values may not match the current spreadsheet.



**Calculations and Results:**

1. Truck optimization (continued)

- Calculate the number of loader/shovel (or referred to as loader) cycles to load a truck and the loading time required per truck (Columns K, L, and M) – this calculation uses data from the “9 Trucks” and “10 Shovel” sheets.

$$\begin{aligned} \text{Loader Time Per Truck (Col. M)} &= \\ &[\text{Loader Cycles per Truck (Col. K)}] \times [\text{Loader Cycle Time, min (Col. L)}] \\ &= (5 \text{ cycles/truck}) \times (0.45 \text{ min/cycle}) = 2.25 \text{ min/truck} \end{aligned}$$

- Using the truck cycle time for 1 roundtrip between a cover material source and destination (data from the “9 Trucks” sheet), calculate the maximum number of trucks per loader/shovel.

$$\begin{aligned} \text{Max Number Trucks Per Loader (Col. O)} &= [\text{Truck Cycle Time, min (Col. N)}] / [\text{Loader Time, min/truck (Col. M)}] \\ &= (22.7 \text{ min}) / (2.25 \text{ loader min/truck}) = 10.1 \text{ trucks/loader} \end{aligned}$$

- Calculate the productivity (cy/hr) for X number of trucks (2 to 9 and a calculated maximum).

$$\begin{aligned} \text{For X=6 trucks, Productivity, cy/hr (Col. Y)} &= \\ &(X) \times \text{Work Hour, min/hr (Col. J)} \times \text{Loader Cycles/Truck (Col. K)} \times [\text{Loader Net Bucket Capacity, cy (Col. R)}] / [\text{Truck Cycle Time Per Truck, min (Col. N)}] \\ &= [6 \times (50 \text{ min/hr}) \times (5 \text{ loader cycles/truck}) \times (27.4 \text{ cy/loader cycle})] / (22.7 \text{ min/truck cycle}) = 1,809 \text{ cy/hr} \end{aligned}$$

- Using the productivity and total volume of cover material to be hauled, calculate the task time for X trucks (2 to 9).

$$\begin{aligned} \text{For X=6 trucks, Task Time, hr (Col. AI)} &= \\ &[\text{Haul Volume, cy (Col. S)}] / [\text{Productivity, cy/hr (Col. Y)}] \\ &= (3,031,924 \text{ cy}) / (1,809 \text{ cy/hr}) = 1,676 \text{ hr} \end{aligned}$$



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Task: Truck and Scraper  
Optimization

Computed By: Fred Charles Date: 2/28/2019

Checked By: Taryn Tigges Date: 3/14/2019

### Calculations and Results (continued):

#### 1. Truck optimization (continued):

- Calculate the cost of using X trucks per loader (2 to 9 and a calculated maximum) using data for loader/shovel task time in "9 Trucks" (for each cover material source and destination), loader/shovel cost (\$/hr), truck cost (\$/hr), and task time for the number of trucks.

For X=6 trucks, Cost of Using X Trucks per Loader, \$ (Col. AU) =  
[Max of Task Time for Trucks (Col AI) or Loader/Shovel Task Time (Col. AN)] x  
{(Loader Cost, \$/hr (Col. Q) + [(X) x (Truck Cost, \$/hr (Col. AO))]}  
= (1,675.7 hr) x {(\$535.68/hr + [6 x \$246.06/hr]} = \$3,371,681

- The optimum number of trucks per loader is the lowest cost number of trucks per loader/shovel. This optimum number is compared with the maximum number of trucks per loader/shovel, to ensure the optimum number is within the maximum.

For this row of data, the optimum number of trucks per loader = 10, which is the same within the max.



**Calculations and Results (continued):**

- The scraper optimization calculations are set up as shown in Table 2, which is a snapshot of a row of data/calculations in the "19 Scraper Optimization" sheet. Table 2 is shown in 5 parts due to the many columns in the spreadsheet. Key calculation steps are listed after Table 2, with referencing to the Column identifier in Table 2 (and the spreadsheet).

Table 2

	E	F	G	H	I	J
13						
14	ID	Task Description	Source Location 1	Destination Location 2	Equipment	Scraper R/T Task Time (min)
84	1101-A-a-Sc2	Grade-Outslope-Existing Ground	South Stockpile S-1	-	Cat 657G	6.1

	K	L	M	N	O
13					
14	Pusher Cycle Time (min/cycle)	Max Number of Scrapers per Dozer	Dozer Type	Dozer Cost (\$/hr)	Task Time for one Scraper (hr)

	P	Q	R	S	T	U	V	W	X	Y	Z
13	Task Time for X Scrapers (hr)										
14	Max Scrapers Round Up	Max Scrapers Round Down	9	8	7	6	5	4	3	2	Scrapers Cost (\$/hr)
84	276	345	153	173	197	230	276	345	460	690	222.44

	AA	AB	AC	AD	AE	AF	AG	AH
13	Cost of Using X Scrapers per Dozer (\$)							
14	Max Scrapers Round Up	Max Scrapers Round Down	9	8	7	6	5	4
84	\$ 369,418	\$ 385,002	\$ 341,712	\$ 346,041	\$ 351,607	\$ 359,028	\$ 369,418	\$ 385,002

	AI	AJ	AK	AL	AM	AN
13						
14	3	2	1	Lowest Cost (\$)	Optimum Number of Scrapers Per Dozer	Optimum Number of Scrapers Per Dozer Within Max
84	\$ 410,975	\$ 462,922	\$ 618,764	\$ 341,712	9	5



**Calculations and Results (continued):**

2. Scraper optimization (continued)

- Calculate the maximum number of scrapers per dozer based on scraper roundtrip time and pusher cycle time.

$$\begin{aligned} \text{Max Number of Scrapers per Dozer (Col. L)} &= [\text{Scraper Roundtrip Task Time, min (Col. J)}] / [\text{Pusher Cycle Time, min/cycle (Col. K)}] \\ &= (6.1 \text{ min scraper/cycle}) / (1.44 \text{ min pusher/cycle}) = 4.2 \text{ scrapers/dozer (max)} \end{aligned}$$

- Using the task time required for 1 scraper (at a given rough grading area), calculate the task time for X number of scrapers (2 to 9 and a calculated maximum).

$$\begin{aligned} \text{For } X=6 \text{ scrapers, the Task Time for X Scrapers (Col. U)} &= \\ &= [\text{Task Time for one Scraper, hr (Col. O)}] / (X) \\ &= (1,380 \text{ hr/scraper}) / (6 \text{ scrapers}) = 230 \text{ hr} \end{aligned}$$

- Calculate the cost of using X scrapers per dozer (2 to 9 and a calculated maximum) using task time for X scrapers, number of scrapers per dozer, scraper cost (\$/hr), and dozer cost (\$/hr).

$$\begin{aligned} \text{For } X=6 \text{ scrapers, the Cost of Using X Scrapers per Dozer (Col. AF)} &= \\ &= \{[\text{Task Time for X Scrapers, hr (Col. U)}] \times [X] \times [\text{Scraper Cost, } \$/\text{hr (Col. Z)}]\} + \\ &= \{[\text{Task Time for X Scrapers, hr (Col. U)}] \times [\text{Dozer Cost, } \$/\text{hr (Col. N)}]\} \\ &= [(230 \text{ hr}) \times (6 \text{ scrapers/dozer}) \times (\$222.44/\text{hr/scraper})] + [(230 \text{ hr}) \times \\ &= (\$225.78/\text{hr/dozer})] = \$359,028 \end{aligned}$$

- The optimum number of scrapers per dozer is the lowest cost number of scrapers per dozer. This optimum number is compared with the maximum number of scrapers per dozer, to ensure the optimum number is within the maximum.

For this row of data, the optimum number of scrapers per dozer = 9. However, the number of scrapers per dozer within the maximum = 5 (rounded up from the calculation for Max Number of Scrapers per Dozer [Col. L], see above).

# O&M Costs



## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan (FMI) utilizes cost information for operations and maintenance (O&M) as part of earthwork closure cost estimation associated with the Little Rock Mine Closure/Closeout Plan (CCP). The O&M costs need to account for vegetation maintenance costs for a 12-year period after completion of initial revegetation activities in each area, along with ongoing erosion control, road maintenance, and groundwater monitoring for a 100-year period. Tailing cover maintenance for areas reclaimed in the past will take place for the first 7 years of closure reclamation.

This calculation set summarizes the approach and results for estimating O&M costs. The earthwork reclamation cost estimate (RCE) spreadsheet file provides detailed information.

This calculation set is intended to serve as a guide/example even if the actual cost data used in these calculations change due to updates or applications to a different Freeport NM Operations mine.

### **Objective:**

1. Develop the estimated O&M costs for vegetation maintenance for a 12-year period after completion of initial revegetation activities in each area, along with ongoing erosion control, road maintenance, and groundwater monitoring activities for a 100-year period. Also, develop tailing cover maintenance costs for previously reclaimed areas for the first 7 years of closure reclamation. The O&M costs are part of the earthwork RCE for FMI's mining operations in Grant County, NM.

### **Approach:**

1. The data, assumptions, calculations, and results for the O&M cost estimate are presented within the earthwork RCE spreadsheet file. Also, a summary of the results is presented in the spreadsheet file.
2. The approach for estimating vegetation maintenance O&M costs is as follows:
  - For each facility (stockpile, tailing pond, reservoirs, etc.), the total area is listed, along with the approximate year of reclamation start, vegetation maintenance start, and vegetation maintenance complete. A 2% loss per year (i.e., 2% of vegetation fails each year) for 12 years is assumed to estimate the acreage requiring vegetation maintenance for each year.
  - Revegetation unit costs (equipment and fuel) are applied to the annual acreage loss to calculate each facility's vegetation maintenance cost.





**Approach (continued):**

3. The approach for estimating erosion control, road maintenance, tailings cover maintenance, and groundwater monitoring (“Other”) O&M costs is as follows:
  - For erosion control and road maintenance
    - Determine base costs (\$/day) for equipment and fuel base. Also, estimate the number of days/yr for erosion control and road maintenance for Years 0-19, 20-39, and 40-99.
    - Calculate the annual equipment and fuel costs, based on days/yr, for the same three periods.
  - For tailing cover maintenance
    - Use erosion control equipment with reduced truck requirement, reducing base cost. Assume 10 days/yr for Years 0-6, after which tailing cover maintenance is not required.
  - For groundwater monitoring
    - Determine base costs (\$/day) for equipment and aqueous chemistry (lab analytical), and days/yr for groundwater monitoring for three periods: Years 0-19, 20-39, and 40-99.
    - Calculate the annual equipment and annual aqueous chemistry costs for the same three periods based on days/yr.
  - For these “Other” O&M activities
    - While reclamation is ongoing, adjust the O&M costs accordingly based on the proportion of reclamation completed as of each year. The full annual cost applies when reclamation is complete.
    - For years after reclamation is complete, assign the O&M costs for each year based on the annual costs calculated for Years 0-19, 20-39, and 40-99.

**Results:**

1. The vegetation maintenance and “Other” O&M costs are summed for all years, as shown in the summary table below (some of the final results may vary from what is shown). These results are used in the overall earthwork RCE.
2. The indirect costs are 17.5% of direct costs, based on an agreement between FMI and the agencies in January 2019. Indirect costs include but are not limited to mobilization and demobilization, contingencies, engineering redesign fees, contractor profit and overhead, project management, administrative expenses, etc.

<b>Continental Mine</b>			
Operations and Maintenance Summary			
			Current Value
DIRECT COSTS	Facility and Structure Removal		\$0
	Earthmoving		\$0
	Vegetation		\$2,093,587
	Other		\$3,132,839
	<b>Subtotal, Direct Costs</b>		<b>\$5,226,425</b>
INDIRECT COSTS	<b>Subtotal, Indirect Costs</b>	<b>17.5%</b>	<b>\$914,624</b>
<b>TOTAL COST</b>			<b>\$6,141,050</b>

# **Bench Grading Unit Cost**



## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan (FMI) utilizes unit cost information for bench grading on side slopes of stockpiles and tailing ponds as part of earthwork closure cost estimation associated with the Little Rock Mine Closure/Closeout Plan (CCP). The unit costs must account for the earthwork process and site-specific conditions, equipment productivity, equipment rental rates, and associated equipment maintenance, fuel, and labor rates.

This calculation set summarizes the approach and results for estimating the unit cost of bench grading. The earthwork reclamation cost estimate (RCE) spreadsheet file provides detailed information.

This calculation set is intended to serve as a guide/example even if the actual quantities and/or cost data used in these calculations change due to updates or application to a different Freeport NM Operations mine.

### **Objective:**

1. Develop a bench grading unit cost (\$/ft) for stockpile side slopes and tailing pond side slopes to estimate earthwork closure costs at FMI's mining operations in Grant County, NM. Account for equipment and fuel costs in the estimate.

### **Approach:**

1. The data, assumptions, calculations, and results for the bench grading unit cost estimate are presented within the Chino earthwork RCE spreadsheet file in a sheet (tab) named "Bench Grading\_UC".
2. The approach for estimating bench grading unit costs is as follows:
  - Compile data and assumptions used in the calculations. Data obtained from the CCP or Scope of Work include:
    - Material factors
    - Grade factors
    - Soil weight
    - Production method/blade factors
    - Centroid to centroid push distance
    - Operator factor
    - Work hour
    - Visibility factor
    - Elevation factor
    - Transmission factor
    - Number of passes to finish grade
    - Speed
    - Volume

**For example use only. Values may not match the current spreadsheet.**



**Approach:**

- Equipment costs are referenced from the Equipment Sheet
- Estimate the unit cost for bench grading on the sides slopes of the stockpiles and tailing ponds. The unit cost for bench grading operations is calculated based on two construction steps: excavate and final grade.

- Productivity in cy/hr is calculated for excavation using the following equation:

$$\begin{aligned}
 & \text{Productivity (cy/hr)} = \text{Normal Production (cy/hr)} * \text{Operator} * \\
 & \text{Material} * \frac{\text{Work Hour (min/hr)}}{60 \text{ (min/hr)}} * \text{Grade Factor} * \frac{2300 \text{ (lbs/cy)}}{\text{Material Weight (lbs/cy)}} * \\
 & \text{Prod. Method} * \text{Visibility} * \text{Elev.} * \text{Drive Trans.}
 \end{aligned}$$

- Productivity in hrs/ft is calculated for finish grade by using the following equation:

$$\begin{aligned}
 & \text{Productivity (hrs/ft)} \\
 & = \left( \text{Operator} * \text{Material} * \text{Grade Factor} * \frac{\text{Work Hour (min/hr)}}{60 \text{ (min/hr)}} \right. \\
 & * \frac{2300 \left( \frac{\text{lbs}}{\text{cy}} \right)}{\text{Material Weight} \left( \frac{\text{lbs}}{\text{cy}} \right)} * \text{Prod. Method} * \text{Visibility} * \text{Elev.} \\
 & \left. * \text{Drive Trans.} * \text{Speed (mi/hr)} * 5280 \text{ (ft/mi)} * \frac{1}{\# \text{ Passes}} \right)^{-1}
 \end{aligned}$$



**Results:**

- The results of the bench grading unit cost calculations are shown below (some of the final results may vary from what is shown). These results are used in the overall earthwork RCE.

<b>Bench Grading Unit Cost</b>					
<b>Bench Grading - 3:1 Stockpiles</b>					
Task Description	Equipment	Bench Equipment Cost (\$/ft)	Bench Fuel Cost (\$/ft)		
Excavate	Cat D11T CD	\$1.68	\$0.44		
Finish Grade	Cat D6, SU Blade	\$0.06	\$0.01		
		<b>\$1.74</b>	<b>\$0.45</b>	<b>\$2.19</b>	<b>Total</b>
<b>Bench Grading -Tailings</b>					
Task Description	Equipment	Bench Equipment Cost (\$/ft)	Bench Fuel Cost (\$/ft)		
Excavate	Cat D11T CD	\$1.68	\$0.44		
Finish Grade	Cat D6, SU Blade	\$0.06	\$0.01		
		<b>\$1.74</b>	<b>\$0.45</b>	<b>\$2.19</b>	<b>Total</b>

# **Bench Channel Unit Cost**



## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan (FMI) utilizes bench channel unit cost information to estimate earthwork closure costs associated with the Little Rock Mine Closure/Closeout Plan (CCP). The unit cost for bench channel construction (including production and placement of riprap and filter material) must account for the earthwork process and site-specific conditions, equipment productivity, equipment rental rates, and associated equipment maintenance, fuel costs, and labor rates.

### **Objectives:**

1. Develop a bench channel unit cost (\$/ft) for estimating earthwork closure costs at FMI's mining operations in Grant County, NM.
2. Note that this calculation set presents the approach, data and assumptions, and calculations and results for developing the unit cost. It is intended to serve as a guide/example even if the actual quantities and cost data used in these calculations change due to updates or applications to a different Freeport NM Operations mine.

### **Approach:**

1. The data, assumptions, calculations, and results for the bench channel unit cost estimate are presented within the earthwork RCE spreadsheet file in sheets (tabs) named "Channel\_UC" and "Riprap\_Gravel\_UC".
2. The approach for the calculations is as follows:
  - Estimate the unit cost for each of the five following bench channel construction steps:
    - Earthwork excavate and waste
    - Load and transfer riprap and filter
    - Haul riprap and filter
    - Place riprap and filter
    - Finish grade channel and riprap
  - Estimate the cost of producing riprap and filter where these materials are obtained.
  - Combine equipment and fuel costs for the bench channel operations and riprap and filter production for a total bench channel unit cost.



**Data and Assumptions:**

1. Bench channel cross-section data and earthwork quantities are defined in the reclamation design, with additional calculations presented below in Calculations and Results. Basic channel dimensions are shown in Table 1.

Table 1

BENCH CHANNELS		
Dimensions:		
Left Side Slope:	3.00	H:1V
Left Side Slope:	2.50	H:1V
Depth:	2.00	ft
Left Side Slope Length:	3.61	
Right Side Slope Length:	3.20	
Bottom Width:	5.00	ft
Left Anchor	0.00	ft
Right Anchor	0.00	ft
Perimeter:	11.81	ft
Excavation Area:	21.00	sf
Filter Area <sup>1</sup> (cross-sectional)	5.90	sf or c/ft <sup>2</sup>
Riprap Area (cross-sectional)	11.81	sf or c/ft
1. Bench cross width* 6" filter thickness		
2. Volume (cy) =Area(sf)*Length(ft)/27		

2. Equipment and fuel cost information used for bench channel unit cost calculations is developed in the Equipment sheet of the separate Earthwork RCE spreadsheet (summary) calculation set.
3. Equipment rates from Equipment Watch include overhaul labor, parts, and time and are corrected for a 50-minute work hour.
4. Other equipment parameters used in the calculations are assigned based on previous use at other FMI New Mexico operations.
5. The work day is 8 hours/day, 50 minutes/hour.
6. The following assumptions/data inputs apply to riprap and filter production:
  - For riprap and filter production, the primary plant is fed directly by two Komatsu 730E haul trucks, 300 to 400 yd haul.
  - 400 tons input/hr (per Rusty McCauley, equipment peak production is 900 tons/hr).
  - 30% - 60% waste, depending on smallest rip rap size used. (per Rusty McCauley, consistent w/ McCain Springs waste rate of 43% - 1" minus).
  - 3650 lb/cy (Caterpillar Performance Handbook p. 27-4, consistent with 1.8 tons/cy riprap unit weight).





Job No: 200450-003-01 Client: Freeport NM Operations Page 3 of 14  
 Task: Channel Unit Cost (including riprap/filter material) Computed By: Fred Charles Date: 4/29/2019  
 Checked By: Taryn Tigges Date: 4/30/2019

**Data and Assumptions (continued):**

- 7. Key assumptions/data inputs for riprap and filter production equipment and labor are shown in Table 2.

Table 2

Equipment & Labor	Rate (\$/hr)	Comment
One Cat 986K Loader with Operator (bucket = 8 cy)	\$ 130.86	Used to load stockpiled material to two Komatsu 730E haul trucks
Three Komatsu 730E haul trucks with drivers (22 cy, 36 ton payload each)	\$ 729.54	Option: Two used to directly feed primary screening plant, one used to move material from end of conveyor
One 1 Deck Portable Screening Plant w/ 5x16 screen & 48"x60" conveyor + 1 Operator	\$ 104.34	Primary screening plant, grizzly used to split oversized, 6" - 12" and 6" minus (2 conveyers) One operator required in tower to run screening plant
One 3 Deck Portable Screening Plant w/ 5x16 screen & 42"x60" conveyor + 1 Operator	\$ 139.82	One operator required in tower to run screening plant Fed with 6" minus, Produce 6" - 6", 1.5" - 3", 3/8" - 1.5", 3/8 minus One operator required in tower to run screening plant
Two Hyundai HL780XTD-9 Loaders with Operator (bucket = 7.1 cy)	\$ 229.86	Used move material to conveyors or load trucks
Zero Cat 990K Loaders with Operator (bucket = 13 cy)	\$ -	Unused loader option
One Hyundai HL780XTD-9 Loader with Operator (bucket = 7.1 cy)	\$ 114.93	Used to move material from end of conveyors & load trucks
One Water Truck with Driver (10,000 gal)	\$ 102.77	Dust suppression
One Foreman	\$ 35.95	



**Calculations and Results:**

The unit costs for each of the five following bench channel construction steps are developed:

- Earthwork excavate and waste
- Load and transfer riprap and filter
- Haul riprap and filter
- Place riprap and filter
- Finish grade channel and riprap

1. Excavate and waste (earthwork) operations comprise the first construction step (shown in "Channel\_UC" sheet). The unit cost is calculated based on both operations using a Cat D11T CD, U Blade dozer. Table 3 (split into 3 segments due to many columns) shows the progression of the calculations to estimate the cost for these operations. This table is followed by the calculations (or assigned parameters) for the "Excavate" row.

Table 3

	B	C	D	E	F	G	H	I	J
5		Task Description	Equipment	Volume (cy/ft)	Productivity (cy/hr)	Material Factor <sup>2</sup>	Grade Factor <sup>2</sup>	Material Weight <sup>2</sup> (lb/cy)	Production Method/ Blade Factor <sup>2</sup>
6	Bench Channels	Excavate	Cat D11T CD, U Blade	0.78	1123	1.20	1.0	2900	1.00
7	Bench Channels	Waste	Cat D11T CD, U Blade	0.78	1001	1.20	1.0	2900	1.00

	B	C	K	L	M	N	O	P	Q
5		Task Description	Centroid to Centroid Push Distance <sup>2</sup> (feet)	Normal Production (cy/hr)	Operator Factor <sup>2</sup>	Work Hour <sup>2</sup> (min/hr)	Visibility Factor <sup>2</sup>	Elevation Factor <sup>2</sup>	Transmission Factor <sup>2</sup>
6	Bench Channels	Excavate	175	1851	0.75	50	1.00	1.00	1.00
7	Bench Channels	Waste	200	1649	0.75	50	1.00	1.00	1.00

	B	C	R	S	T	U	V	W	X	Y
5		Task Description	Productivity (hrs/ft)	Fuel Cost (\$/hr)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	Bench Equipment Cost (\$/ft)	Bench Fuel Cost (\$/ft)	Total \$/ft
6	Bench Channels	Excavate	0.0007	69.62	254.44	27.41	281.85	0.20	0.05	
7	Bench Channels	Waste	0.0008	69.62	254.44	27.41	281.85	0.22	0.05	
8								0.41	0.10	\$ 0.52

The following parameters used in the calculations are based on previous use at other FMI New Mexico operations – also see Equipment sheet in the separate Earthwork RCE (summary) spreadsheet calculation set: Material Factor (Col. G), Grade Factor (Col. H), Material Weight (Col. I), Production Method/Blade Factor (Col. J), Centroid to Centroid Push Distance (Col. K), Operator Factor (Col. M), Work Hour (Col. N), Visibility Factor (Col. O), Elevation Factor (Col. P), and Transmission Factor (Col. Q).



**Calculations and Results (continued):**

1. Excavate and waste (earthwork) calculations (continued)

$$Volume(Col. E) = \frac{(Excav Area, sf [Bench channel, Table 1])}{(27 cf/cy)} = \frac{21.00 sf}{27 cf/cy} = 0.78 cy/ft$$

$$Productivity(Col. F) = Col. L \times M \times G \times \left(\frac{N}{60}\right) \times H \times \left(\frac{2300}{I}\right) \times J \times O \times P \times Q =$$

$$1851 \frac{cy}{hr} \times 0.75 \times 1.20 \times \left(\frac{50 min/hr}{60 min}\right) \times 1.0 \times \frac{2300 lb/cy}{2900 lb/cy} \times 1.00 \times 1.00 \times 1.00 \times 1.00 =$$

$$1123 cy/hr$$

Normal Production (Col. L): If Centroid to Centroid Push Distance is not 0, then, for the equipment used, look up the production curve fit parameters C and b for equation:  $C \times (Average\ dozing\ distance\ [ft])^b = 162,758.76 \times (175 ft)^{-0.86691} = 1851 cy/hr$

$$Productivity(Col. R) = \frac{(Volume, \frac{cy}{ft} [Col. E])}{(Productivity, \frac{cy}{hr} [Col. F])} = \frac{(0.78 cy/ft)}{(1123 cy/hr)} =$$

$$0.00069 hr/ft (or 0.0007 hr/ft)$$

Fuel Cost (Col. S), Equipment Cost (Col. T), and Operator (IV) Cost (Col. U) are from Equipment cost calcs (presented in the Earthwork RCE spreadsheet calculation set).

$$Dozer Cost (Col. V) = \frac{\$254.44}{hr} (equipment) + \frac{\$27.41}{hr} (operator) = \frac{\$281.85}{hr}$$

$$Bench equipment cost (Col. W) =$$

$$\left(Dozer\ cost, \frac{\$}{hr} [Col. V]\right) \times \left(Productivity, \frac{hr}{ft} [Col. R]\right) = (\$281.85/hr) \times (0.00069 hr/ft) =$$

$$\$0.20/ft$$

$$Bench Fuel Cost (Col. X) =$$

$$\left(Fuel\ cost, \frac{\$}{hr} [Col. S]\right) \times \left(Productivity, \frac{hr}{ft} [Col. R]\right) = (\$69.62/hr) \times (0.00069 hr/ft) =$$

$$\$0.05/ft$$

The total unit cost for the earthwork (excavate and waste) = \$0.52/ft



**Calculations and Results (continued):**

2. Load riprap and filter, and transfer for placing, unit cost is calculated based on the following separate operations (see "Riprap\_Gravel\_UC" sheet): load riprap, load filter, transfer riprap for placing, and transfer filter for placing. A Cat 990K is used for these operations. Table 4 (split into 2 segments due to many columns) shows the progression of the calculations to estimate the cost for these operations. This table is followed by the calculations (or assigned parameters) for the "Load Riprap" row.

Table 4

	B	C	D	E	F	G	H	I	J
4	Earthwork								
5	Loading per cy								
6	Task Description	Equipment		Load, Dump, Maneuver Time (min)	Work Time (min)	Loads/ hr	Net Bucket (cy/load)	Production Rate (cy/hr)	Fuel Use Gal per Hour
7	Load riprap	Cat 992K		0.65	50	76.92	14.00	1076.92	25.63
8	Load filter	Cat 992K		0.65	50	76.92	14.00	1076.92	25.63
9	Transfer riprap for placing	Cat 992K		0.65	50	76.92	14.00	1076.92	25.63
10	Transfer filter for placing	Cat 992K		0.65	50	76.92	14.00	1076.92	25.63

	B	K	L	M	N	O	P	Q
4	Earthwork							
5	Loading per cy							
6	Task Description	Fuel Cost (\$/hr)	Equipment Cost (\$/hr)	Operator Cost (\$/hr)	Loader+Oper Cost (\$/hr)	Load+Op Cost (\$/cy)	Fuel Cost (\$/cy)	Total Cost (\$/cy)
7	Load riprap	59.97	216.23	27.70	243.93	0.23	0.06	0.28
8	Load filter	59.97	216.23	27.70	243.93	0.23	0.06	0.28
9	Transfer riprap for placing	59.97	216.23	27.70	243.93	0.23	0.06	0.28
10	Transfer filter for placing	59.97	216.23	27.70	243.93	0.23	0.06	0.28

The following parameters used in the calculations are developed in the Equipment sheet as described for the separate Earthwork RCE (summary) spreadsheet calculation set: Load, Dump, Maneuver Time (min) (Col. E); Net Bucket (cy/load) (Col. H); Fuel Use Gal per Hour (Col. J); Fuel Cost (\$/hr) (Col. K); Equipment Cost (\$/hr) (Col. L); and Operator Cost (\$/hr) (Col. M).



Job No: 200450-003-01 Client: Freeport NM Operations Page 7 of 14  
Task: Channel Unit Cost (including riprap/filter material) Computed By: Fred Charles Date: 4/29/2019  
Checked By: Taryn Tigges Date: 4/30/2019

**Calculations and Results (continued):**

2. Load/transfer riprap and filter (continued)

Work Time (Col. F) = 50 min per hour

Loads/hr (Col. G) = (Col. F)/(Col. E) = 50/0.65 = 76.92 loads/hr

Production Rate (cy/hr) (Col. I) = (Col. H) x (Col. G) = 14.00 x 76.92 = 1076.92 cy/hr

Loader + Operator Cost/hr (Col. N) = Equipment Cost (Col. L) + Operator Cost (Col. M)  
= \$216.23/hr + \$27.70/hr = \$243.93/hr

Loader + Operator Cost/cy (Col. O) = [Loader Cost, \$/hr (Col. N)]/[Production Rate, cy/hr (Col. I)]  
= (\$243.93/hr)/(1076.92 cy/hr) = \$0.23/cy

Fuel Cost/cy (Col. P) = [Fuel Cost/hr (Col. K)]/[Production Rate, cy/hr (Col. I)]  
= (\$59.97/hr)/(1076.92 cy/hr) = \$0.06/cy

The total unit cost for the loading and transferring (for placing) riprap and filter = total for equipment + total for fuel = \$0.23/ft + \$0.06/ft = \$0.28/ft (difference due to rounding)



**Calculations and Results (continued):**

- Haul riprap and filter unit cost is calculated based on the following separate operations (see "Riprap\_Gravel\_UC" sheet): haul riprap and haul filter. A Komatsu 730E is used for these operations. Table 5 (split into 3 segments due to many columns) shows the progression of the calculations to estimate the cost for these operations. This table is followed by the calculations (or assigned parameters) for the "Haul Riprap" row.

Table 5

	B	C	D	E	F	G	H	I	J
12									
13	Hauling								
14	Task Description	Equipment		Exchange Time (min)	Delivery Travel Time <sup>1</sup> (min)	Unload and Maneuver Time (min)	Return Travel Time <sup>1</sup> (min)	Load Time (min)	Total Time (min)
15	Haul riprap from source to site	Komatsu 730E		0.70	8.62	1.10	3.47	6.73	20.62
16	Haul filter from source to site	Komatsu 730E		0.70	8.62	1.10	3.47	6.73	20.62
17									

	B	K	L	M	N	O	P
12							
13	Hauling						
14	Task Description	Work Time (min)	Loads/hr	Heaped Capacity (cy/load)	Production Rate (cy/hr)	Fuel Use Gal per Hour	Fuel Cost (\$/hr)
15	Haul riprap from source to site	50	2.42	145	352	33.48	78.34
16	Haul filter from source to site	50	2.42	145	352	33.48	78.34
17							

	B	Q	R	S	T	U	V
12							
13	Hauling						
14	Task Description	Equipment Cost (\$/hr)	Operator Cost (\$/hr)	Truck+Op Cost (\$/hr)	Truck + Op Cost (\$/cy)	Fuel Cost (\$/cy)	Total Cost (\$/cy)
15	Haul riprap from source to site	221.79	24.27	246.06	0.70	0.22	0.92
16	Haul filter from source to site	221.79	24.27	246.06	0.70	0.22	0.92
17							

The following parameters used in the calculations are developed in the Equipment sheet as described for the separate Earthwork RCE (summary) spreadsheet calculation set: Exchange Time (min) (Col. E); Unload and Maneuver Time (min) (Col. G); Heaped Capacity (cy/load) (Col. M); Fuel Use Gal per Hour (Col. O); Fuel Cost (\$/hr) (Col. P); Equipment Cost (\$/hr) (Col. Q); and Operator Cost (\$/hr) (Col. R).

Delivery Travel Time (Col. F) and Return Travel Time (Col. H) are based on site-wide average borrow haul time.



**Calculations and Results (continued):**

3. Haul riprap and filter (continued)

Load Time (Col. I)

$$\begin{aligned} &= \text{Dump, Maneuver Time (Col. E in load/transfer riprap)} \\ &\times [\text{Heaped Capacity, cy/load (Col. M)}] / [\text{Net Bucket, cy/load (Col. H in load/transfer riprap)}] \\ &= 0.65 \text{ min} \times (145 \text{ cy/load}) / (14.00 \text{ cy/load}) = 6.73 \text{ min} \end{aligned}$$

$$\begin{aligned} \text{Total Time (Col. J)} &= \text{Exchange Time (Col. E)} + \text{Delivery Travel Time (Col. F)} + \text{Unload and} \\ &\text{Maneuver Time (Col. G)} + \text{Return Travel Time (Col. H)} + \text{Load Time (Col. I)} \\ &= 0.70 + 8.62 + 1.10 + 3.47 + 6.73 = 20.62 \text{ min} \end{aligned}$$

Work Time (Col. K) = 50 min per hour

$$\text{Loads/hr (Col. L)} = [\text{Work Time (Col. K)}] / [\text{Total Time (Col. J)}] = 50 / 20.62 = 2.42 \text{ loads/hr}$$

$$\begin{aligned} \text{Production Rate, cy/hr (Col. N)} &= [\text{Heaped Capacity, cy/load (Col. M)}] \times [\text{Loads/hr (Col. L)}] \\ &= (145 \text{ cy/load}) \times (2.42 \text{ loads/hr}) = 352 \text{ cy/hr} \end{aligned}$$

$$\begin{aligned} \text{Truck + Operator Cost/hr (Col. S)} &= \text{Equipment Cost (Col. Q)} + \text{Operator Cost (Col. R)} \\ &= \$221.79/\text{hr} + \$24.27/\text{hr} = \$246.06/\text{hr} \end{aligned}$$

$$\text{Truck + Operator Cost/cy (Col. T)} = [\text{Truck + Operator Cost, \$/hr (Col. S)}] / [\text{Production Rate, cy/hr (Col. N)}] = (\$246.06/\text{hr}) / (352 \text{ cy/hr}) = \$0.70/\text{cy}$$

$$\begin{aligned} \text{Fuel Cost/cy (Col. U)} &= [\text{Fuel Cost/hr (Col. P)}] / [\text{Production Rate, cy/hr (Col. N)}] \\ &= (\$78.34/\text{hr}) / (352 \text{ cy/hr}) = \$0.22/\text{cy} \end{aligned}$$

$$\begin{aligned} \text{The total unit cost for the hauling riprap and filter} &= \text{total for equipment} + \text{total for fuel} = \\ &= \$0.70/\text{ft} + \$0.22/\text{ft} = \$0.92/\text{ft} \end{aligned}$$



**Calculations and Results (continued):**

- Place riprap and filter unit cost is calculated based on the following separate operations (see "Riprap\_Gravel\_UC" sheet): place riprap and place filter. A Komatsu 730 is used for these operations. The sequence of calculations for the place riprap and filter unit cost is the same as for haul riprap and filter (from source to site) calculations above. Delivery and return travel times are calculated based on the haul distance and the Haul Travel Time polynomial equation (see Equipment sheet), which calculates minutes/meter based on effective grade.

Table 6 (split into three segments due to many columns) shows the progression of the calculations to estimate the cost for these operations.

Table 6

	B	C	D	E	F	G	H	I
19	Placing							
20	Task Description	Equipment	Distance	Grade	Exchange Time (min)	Delivery Travel Time (min)	Unload and Maneuver Time (min)	Return Travel Time (min)
21	Place riprap	Cat 725	400.00	-30%	0.70	3.25	1.10	0.74
22	Place filter	Cat 725	400.00	-30%	0.70	3.25	1.10	0.74

	B	J	K	L	M	N	O	P
19	Placing							
20	Task Description	Load Time (min)	Total Time (min)	Work Time (min)	Loads/hr	Heaped Capacity (cy/load)	Production Rate (cy/hr)	Fuel Use Gal per Hour
21	Place riprap	0.87	6.67	50	7.50	19	141.01	6.02
22	Place filter	0.87	6.67	50	7.50	19	141.01	6.02

	B	Q	R	S	T	U	V	W
19	Placing							
20	Task Description	Fuel Cost (\$/hr)	Equipment Cost (\$/hr)	Operator Cost (\$/hr)	Truck + Op Cost (\$/hr)	Truck+Op Cost (\$/cy)	Fuel Cost (\$/cy)	Total Cost (\$/cy)
21	Place riprap	14.09	73.11	24.27	97.38	0.69	0.10	0.79
22	Place filter	14.09	73.11	24.27	97.38	0.69	0.10	0.79





**Calculations and Results (continued):**

5. Finish grade unit cost is calculated based on the following separate operations (see “Riprap\_Gravel\_UC” sheet): finish grade channel and finish grade riprap. A Cat D6T, SU Blade is used for these operations. The sequence of calculations for the finish grade unit cost is the same as for the first operation for bench channel construction – earthwork (excavate and waste) (see those calculations above for details). Inputs to the finish grade channel and finish grade riprap calculations are generally the same with the following exceptions:

- Cat D6T, SU Blade operating parameters and costs are used.
- Material Factor (Col. E) and Material Weight (Col. G) for riprap are used, which are different than for the excavate and waste, and channel grading, materials.

Table 7 (split into 3 segments due to many columns) shows the progression of the calculations to estimate the cost for these operations.

Table 7

	B	C	D	E	F	G	H	I
24								
25	Grading							
26	Task Description	Equipment	Productivity (cy/hr)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/Blade Factor	Centroid to Centroid Push Distance (ft)
27	Finish grade -filter	Cat D6T, SU Blade	304.38	1.0	1.02	3500	1.0	50
28	Finish grade - Riprap	Cat D6T, SU Blade	230.34	0.8	1.02	3700	1.0	50

	B	J	K	L	M	N	O
24							
25	Grading						
26	Task Description	Normal Production (cy/hr)	Operator Factor	Work Time (min)	Visibility Factor <sup>2</sup>	Elevation Factor	Transmission Factor
27	Finish grade -filter	727	1	50	1	1.00	1.00
28	Finish grade - Riprap	727	1	50	1	1.00	1.00

	B	P	Q	R	S	T	U	V
24								
25	Grading							
26	Task Description	Fuel Cost (\$/hr)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer +Op Cost (\$/hr)	Dozer + Op Cost (\$/cy)	Fuel Cost (\$/cy)	Total Cost (\$/cy)
27	Finish grade -filter	16.8948	63.65	27.41	91.06	0.30	0.06	0.35
28	Finish grade - Riprap	16.8948	63.65	27.41	91.06	0.40	0.07	0.47



**Calculations and Results (continued):**

6. Riprap and filter production costs (where the material source is located) are estimated according to Table 8, with a summary of the calculations provided after Table 8.

Table 8

	B	C	D	E	F	G	H	I
36	Equipment	Equipment Cost	Fuel Cost	# Equipment	Operator	# Operator	Total Equipment Cost	Total Fuel Cost
37		(\$/hr)	(\$/hr)		(\$/hr)		(\$/hr)	(\$/hr)
38	Cat 988H	\$ 128.76	\$ 35.57	1	\$ 27.70	1	\$ 156.46	\$ 35.57
39	Cat 769D	\$ 108.01	\$ 22.79	3	\$ 24.27	3	\$ 396.83	\$ 68.37
40	1 Deck Screening Plant (5X16, 48X60)	\$ 40.59	\$ 11.35	1	\$ 23.09	1	\$ 63.68	\$ 11.35
41	3 Deck Screening Plant (5X16, 42X60)	\$ 41.16	\$ 11.35	1	\$ 23.09	1	\$ 64.25	\$ 11.35
42	Cat 980H	\$ 77.56	\$ 25.27	2	\$ 27.70	2	\$ 210.53	\$ 50.54
43	Cat 992K	\$ 216.23	\$ 59.97	0	\$ 27.70	0	\$ -	\$ -
44	Cat 966H	\$ 73.11	\$ 19.61	1	\$ 27.70	1	\$ 100.81	\$ 19.61
45	Off-Hwy Water Tanker Truck,6,000-gal.	\$ 67.69	\$ 26.33	1	\$ 24.27	1	\$ 91.96	\$ 26.33
46	Supervisor	\$ -	-	0	\$ 23.84	1	\$ 23.84	\$ -
47								
48					Direct Cost	Equipment Fuel		
49						\$ 1,108	\$ 223	\$/hr
50						8	8	hr/work day
51						\$ 8,867	\$ 1,785	\$/day
52								
53					Production			
54						400	tons input/hr (total)	
55						0.30	% waste	
56						0.70	% rip rap and gravel/filter	
57						280	tons produced/hr (net)	
58						560,000	lb/hr	
59						3,650	lb/cy	
60						153	cy/hr	
61						8	hr/day (net (60 min/hr))	
62						1,227	cy/day net production	
63								
64					Production	\$ 7.22	\$ 1.45	\$/cy
65					Filter Delivery and placement	\$ 2.14	\$ 0.49	\$/cy
66					Rip Rap Delivery and placement	\$ 2.24	\$ 0.51	\$/cy
67								



**Calculations and Results (continued):**

6. Riprap and filter production calculations (continued):

For each type of equipment used, the costs calculated (see Earthwork RCE spreadsheet calculation set) are tabulated in Table 8, including Equipment Cost (Col. C), Fuel Cost (Col. D), and Operator Cost (Col. F).

The number of pieces of equipment (Col. E) and number of operators (Col. G) are assigned based on the logistical requirements for production. Pieces of equipment match the number of operators, except for addition of a Supervisor.

Total equipment cost (Col. H) is calculated as follows, with an example calculation shown for the Cat 988H:

$$\begin{aligned} \text{Total Equipment Cost, } \$/\text{hr} &= \\ & \{(\text{Equip Cost [Col. C]}) \times (\# \text{ Equipment [Col. E]})\} + \\ & \{(\text{Operator Cost [Col. F]}) \times (\# \text{ Operator [Col. G]})\} = \\ & \{(\$128.76) \times (1)\} + \{(\$27.70) \times (1)\} = \$156.46/\text{hr} \end{aligned}$$

Total fuel cost (Col. I) is calculated as follows, with an example calculation shown for the Cat 988H:

$$\begin{aligned} \text{Total Fuel Cost, } \$/\text{hr} &= \{(\text{Fuel Cost [Col. D]}) \times (\# \text{ Equipment [Col. E]})\} = \\ & \{(\$35.57) \times (1)\} = \$35.57/\text{hr} \end{aligned}$$

The daily cost is calculated for all equipment by summing the total equipment cost (Cell G56) and total fuel cost (Cell H56), as follows:

$$\begin{aligned} \text{Daily Total Equipment Cost, } \frac{\$}{\text{day}} &= \left( \text{Sum for all equipment, } \frac{\$}{\text{hr}} \right) \times \left( 8 \frac{\text{hr}}{\text{day}} \right) = \\ & \left( \frac{\$1,108}{\text{hr}} \right) \times \left( 8 \frac{\text{hr}}{\text{day}} \right) = \frac{\$8,867}{\text{day}} \end{aligned}$$

$$\begin{aligned} \text{Daily Total Fuel Cost, } \frac{\$}{\text{day}} &= \left( \text{Sum for all fuel, } \frac{\$}{\text{hr}} \right) \times \left( 8 \frac{\text{hr}}{\text{day}} \right) = \\ & \left( \frac{\$223}{\text{hr}} \right) \times \left( 8 \frac{\text{hr}}{\text{day}} \right) = \frac{\$1,785}{\text{day}} \end{aligned}$$



**Calculations and Results (continued):**

6. Riprap and filter production calculations (continued):

Next, the production calculations are summarized (see Rows 54-62 in Table 8). Daily net production is calculated via the following sequence:

- 400 tons input/hr (total) – see production assumptions
- 30% waste – see production assumptions
- 70 % riprap and gravel/filter = 100 minus % waste
- 280 tons produced/hr (net) = (400 tons input/hr) x (70%)
- 560,000 lb/hr = (280 tons) x (2,000 lb/ton)
- 3,650 lb/cy – see production assumptions
- 153 cy/hr = (560,000 lb/hr)/(3,650 lb/cy)
- 8 hr/day (net [60 min/hr]) – see production assumptions
- 1,227 cy/day net production = (153 cy/hr) x (8 hr/day)

The total cost for production (see Row 64 in Table 8) is calculated separately for equipment and fuel as follows:

- Equipment portion of the cost = (\$8,867/day)/(1,227 cy/day) = \$7.22/cy
- Fuel portion of the cost = (\$1,785/day)/(1,227 cy/day) = \$1.45/cy
- This yields a total cost of \$8.67/cy

**Summary and Conclusions:**

These calculations achieve the objective to develop an estimated bench channel unit cost for the earthwork RCE, as summarized below for production of filter and riprap, and delivery and placement of filter and riprap.

The cost for production of filter and riprap \$7.22/cy (equipment + operator) + \$1.45/cy (fuel) = \$8.68/cy (difference due to rounding).

The cost for filter delivery and placement is the sum of the calculations presented above, for loading, hauling, placing, and final grading, for a total of \$2.14/cy (equipment + operator) + \$0.49/cy (fuel) = \$2.63/cy

Similarly, the cost for riprap delivery and placement is the sum of the calculations above, for a total of \$2.24/cy (equipment + operator) + \$0.51/cy (fuel) = \$2.75/cy

The total cost (\$/ft) for bench channel construction, including the initial earthwork (excavate and waste) along with riprap placed at 0.44 cy/ft and filter placed at 0.22 cy/ft, for combined equipment/operator and fuel costs, is:

$$\$0.52/\text{ft (excavate and waste)} + \$2.47/\text{ft (filter)} + \$5.00/\text{ft (riprap)} = \$7.99/\text{ft}$$

# **Downdrain/ Dissipater Unit Cost**



## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan's (FMI's) Chino Mines Company utilizes downdrain/dissipater unit cost information for earthwork closure cost estimation associated with the Chino Mine Closure/Closeout Plan (CCP). Downdrains are constructed on regraded side slopes of rock or tailing piles to convey runoff. Dissipaters are constructed as needed at the bottom end (downslope) of specific downdrains to dissipate the energy of the downdrain runoff flow. The unit cost must account for excavation/preparation of the subgrade, material, and placement costs to install articulated concrete blocks (ACBs) in the downdrains and dissipaters and install a concrete cutoff wall at the downslope end of each dissipater.

### **Objective:**

1. Develop unit costs for downdrains (\$/ft) and dissipaters (\$/each) for estimating earthwork closure costs at FMI's mining operations in Grant County, NM.
2. Note that this calculation set presents the approach, data and assumptions, and calculations and results for developing the unit cost. It is intended to serve as a guide/example even if the actual quantities and cost data used in these calculations change due to updates or applications to a different Freeport NM Operations mine.

### **Approach:**

1. The data, assumptions, calculations, and results for the downdrain/dissipater unit cost estimate are presented within the earthwork RCE spreadsheet in the sheet (tab) named "Downdrain\_UC."
2. The approach for the calculations is as follows:
  - Identify locations and lengths required for downdrains. Use reclamation design drawings and quantities.
  - Identify excavation equipment and estimate cost to complete the rough grade where the downdrains and dissipaters will be constructed. Use equipment cost information and calculations developed for other earthwork operations to calculate the earthwork.
  - Estimate cost to finish grade and place ACBs in downdrains and dissipaters. Use available unit costs from Contech Engineered Solutions (Contech ES), the manufacturer and installer of ACBs in the area.
  - Estimate the cost of installing a cast-in-place concrete cutoff wall at the downslope end of dissipaters. Use online RS Means data.



### Data and Assumptions:

1. Location and dimensions of downdrains and dissipaters are shown in Attachment A, as well as the following key quantity data used to develop unit costs (note that Attachment A also includes the calculations and results presented in this calculation set):
  - Downdrain base excavation area = 52 square feet/foot of length (sf/ft)
  - Downdrain ACB area coverage = 31 sf/ft
  - Dissipater area (middle [Area 2]) = 320 sf
  - Dissipater area (each side [Area 1 = Area 3]) = 253 sf
  - Cutoff wall concrete volume (each dissipater) = 14 cubic yards
2. Unit cost data from Contech ES (see Attachment A) include the following:
  - Material costs for ACBs (includes non-woven geotextile and microgrid/geogrid) are as follows:
    - \$9.42/sf (Block Class 40T, for the channel of each downdrain and both side areas of each dissipater)
    - \$13.53/sf (Block Class 70T, for the center area of each dissipater)
  - Installation cost is \$4.63/sf, which covers the following installation process for both sizes of ACBs: off-load the truck and place delivered ACBs in temporary storage area, fine grade base/subgrade soils, compact soils to 90% Standard Proctor (D698), place and secure filter fabric (non-woven geotextile), place 4- to 6-inch drainage layer overlaid by geogrid, place ACBs in final configuration, grout seams, and backfill ACBs with crushed stone. The installation cost includes crushed stone.
3. Cost data from RS Means for installation of a concrete cutoff wall at the downslope end of each dissipater are presented in Appendix A. The online RS Means cost is \$329.62/cubic yard.

### Calculations and Results:

1. The estimated cost to excavate the rough grade (where the downdrains will be constructed) is developed similarly to excavation costs prepared for bench channel unit costs. Therefore, see the bench channel unit cost calculation set for details. The downdrain rough grade cost = \$0.90/ft.
2. The estimated cost to install ACBs in downdrains includes the finish grade and subsequent placement of ACBs. This estimated cost is developed from the Contech ES quotes (as listed above in Data and Assumptions), as follows:
  - Downdrain material cost for 40T ACBs is \$9.42/sf
  - Downdrain installation cost for 40T ACBs is \$5.88/sf
  - The cost per ft of downdrain (\$/ft) = (\$9.42/sf x 31 sf/ft) + (\$5.88/sf x 31 sf/ft) = \$292.02/sf + \$182.28/ft = \$474.30/ft

**Total downdrain installation cost (after rough grading) = \$475.20/ft**

**For example use only. Values may not match the current spreadsheet.**



### Calculations and Results (continued):

3. Similarly, the estimated cost to install ACBs in dissipaters includes the finish grade and subsequent placement of ACBs. This estimated cost is developed from the Contech ES quotes (as listed above in Data and Assumptions), as follows:

- Dissipater material cost for 40T ACBs is \$9.42/sf
- Dissipater material cost for 70T ACBs is \$13.53/sf
- Dissipater installation cost for 40T and 70T ACBs is \$5.88/sf
- For each dissipater, 40T ACBs cover 506 sf and 70T ACBs cover 320 sf
- The cost for the 40T part of each downdrain (\$/each) =  
 $(\$9.42/\text{sf} + \$5.88/\text{sf}) \times (506 \text{ sf}) = \$15.30/\text{sf} \times 506 \text{ sf} = \$7,741.80/\text{each}$
- The cost for the 70T part of each downdrain (\$/each) =  
 $(\$13.53/\text{sf} + \$5.88/\text{sf}) \times (320 \text{ sf}) = \$19.41/\text{sf} \times 320 \text{ sf} = \$6,211.20/\text{each}$
- The total cost for ACBs in each dissipater =  $\$7,741.80 + \$6,211.20 = \$13,953.00$

4. The estimated cost for installing a cast-in-place concrete cutoff wall at the downslope end of each dissipater is based on on-line cost data from RS Means and the required concrete volume:

- Cast-in-place concrete cutoff wall (RS Means) cost = \$329.62/cubic yard
- Each dissipater requires cutoff wall concrete volume of 14 cubic yard
- The total cost for cutoff wall installation at each dissipater =  
 $(\$329.62/\text{cubic yard}) \times (14 \text{ cubic yard}) = \$4,614.68$

***Total dissipater installation cost (after rough grading) =  
\$13,953.00 + \$4,614.68 = \$18,567.68***

### Summary and Conclusions:

1. Unit costs for installing downdrains (\$/ft) and dissipaters (\$/each) were developed to estimate earthwork closure costs at FMI's mining operations in Grant County, NM. Note that the estimated unit cost developed in this analysis applies only to FMI operations in the Silver City (Grant County), NM area.
2. Downdrain cost = \$0.90/ft (rough grading) + \$474.30/ft (after rough grading) = **\$475.20/ft**
3. Dissipater cost = \$13,953/each (rough grading is included in downdrain cost) + \$4,614.68/each (cutoff wall) = **\$18,567.68/each**



**Downdrain Unit Cost**

Rough Grade

Task Description	Equipment	Productivity (cy/hr)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/Blade Factor	Centroid to Centroid Push Distance (ft)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Transmission Factor	Volume (cy/ft)	Productivity (hrs/ft)	Fuel Cost (\$/hr)	Equipment Cost (\$/hr)	Operator Cost (\$/hr)	Dozer Cost (\$/hr)	Equipment w/o Fuel Cost (\$/ft)	Fuel Cost (\$/ft)	Total Excavation Cost (\$/ft)
Excavate	Cat D11T CD	1440	1.2	1.6	3600	1.0	175	1912	0.75	50	1.0	1.0	1.0	1.9	0.0013	\$81.21	\$277.90	\$32.88	\$310.78	\$0.42	\$0.11	\$0.52
Waste	Cat D11T CD	1282	1.2	1.6	3600	1.0	200	1703	0.75	50	1.0	1.0	1.0	1.9	0.0015	\$81.21	\$277.90	\$32.88	\$310.78	\$0.47	\$0.12	\$0.59
																				\$0.88	\$0.23	\$1.11

Finish Grade & Place ACB

	Area (sf/ft)	Unit Cost (\$/sf)	\$/ft
Downdrain ACBs			
40T <sup>1</sup>	31	\$7.72	\$239.31
Installation <sup>1</sup>	31	\$4.82	\$149.33
		<b>ACB Cost/ft</b>	<b>\$388.64</b>

<b>Total Downdrain Cost (\$/ft)</b>	<b>\$389.75</b>
-------------------------------------	-----------------

Place ACB

	Area (sf)	Unit Cost (\$/sf)	\$/sf
Dissipater ACBs			
70T <sup>1</sup>	320	\$11.08	\$3,545.68
Installation <sup>1</sup>	320	\$4.82	\$1,541.46
40T <sup>1</sup>	506	\$7.72	\$3,906.20
Installation <sup>1</sup>	506	\$4.82	\$2,437.43
		<b>ACB Cost per Dissipater</b>	<b>\$11,430.77</b>

Install Cutoff Wall

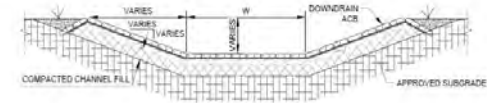
Cutoff Wall (cast in place concrete)	cubic yard	\$/cubic yard	\$/dissipater <sup>1</sup>
RSMeans (2020)	14	\$	329.62
			<b>\$4,614.68</b>

<b>Total Dissipater Cost (\$/each)</b>	<b>\$16,045.45</b>
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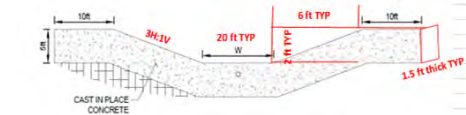
DOWNDRAIN			
Dimensions:			
Left Side Slope: <sup>2</sup>	3	H:1V	
Right Side Slope: <sup>2</sup>	3	H:1V	
Depth: <sup>2</sup>	2	ft	
Perimeter: <sup>2</sup>	31	ft	
Excavation Area <sup>2</sup>	52	sf	
ACB Area <sup>2</sup>	31	sf	

DISSIPATERS	ACB <sup>2</sup>			Total	Cutoff Wall <sup>2,4</sup> Cross-Sectional Area	Thickness	Volume
	Surface Area 1 (sf)	Surface Area 2 (sf)	Surface Area 3 (sf)				
	253	320	253	825	260	1.5	14

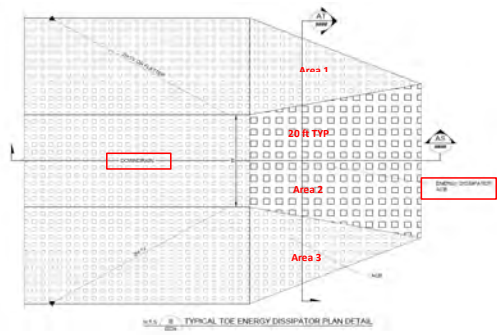
- Quote from Contech ES 2019, adjusted for inflation; Downdrain ACB installation includes fine grade base/subgrade soils (assuming subgrade at + 0.5 ft); equipment is D6 LGP dozer with Power Angle Tilt Blade (PAT) and GPS Blade Control
- Assigned based on previous use at other FMI New Mexico operations
- One cutoff wall per dissipater
- Typical flow depth is 2'; concrete depth is 5' (diagram is not drawn to scale); concrete thickness is 1.5'



NTS AU 0234 TYPICAL DOWNDRAIN SECTION



NTS AX 0235 TYPICAL CUTOFF WALL SECTION



NTS AX 0236 TYPICAL TDE ENERGY DISSIPATOR PLAN DETAIL

# **Revegetation Unit Cost**



## Calculation Documentation

While originally completed for the Little Rock Mine CCP in 2019, these calculation documents still apply to the Chino Mine CCP for 2024, as the same calculations were used in compiling the RCE for Chino CCP 2024.

### **Problem Statement:**

Freeport-McMoRan's (FMI's) Chino Mines Company utilizes revegetation unit cost information as part of earthwork closure cost estimation associated with the Chino Mine Closure/Closeout Plan (CCP). The unit revegetation cost must account for equipment rental rates and associated maintenance, fuel, and labor costs.

### **Objectives:**

1. Develop a revegetation unit cost (\$/acre) for estimating earthwork closure costs at FMI's mining operations in Grant County, NM.
2. Note that this calculation set presents the approach, data and assumptions, and calculations and results for developing the unit cost. It is intended to serve as a guide/example even if the actual quantities and/or cost data used in these calculations change due to updates or applications to a different Freeport NM Operations mine.

### **Approach:**

1. The data, assumptions, calculations, and results for the revegetation unit cost estimate are presented within the earthwork RCE spreadsheet in sheet (tab) "Revegetation\_UC."
2. The approach for the calculations is as follows:
  - Identify equipment types for scarifying, discing, drill seeding, mulching, and crimping.
  - Obtain equipment information from EquipmentWatch (EQW) and RS Means, labor rates from NMDOL, revegetation material costs (seed, mulch) from FMI and/or their supplier, and the current fuel price from fuel cost calculations.
  - Determine the equipment traveling distance and time to cover 1 acre.
  - For each key operation, estimate the operating cost (\$/hour).
  - Combine all operations and material costs and calculate the total unit cost.

### **Data and Assumptions:**

1. Access rental and operating cost information online from EQW for tractor (Deere 7330), ripper, and mulcher, and RS Means for disc harrow (see Attachment A). Monthly rental rates are converted to hourly, assuming 176 hours/month.
2. Equipment information is unavailable in EQW or RS Means for drill seeding and crimping. Therefore, the drill seeder cost is assumed to be an average of the mulcher and disc (the two are similar in complexity, so an average is assumed), and the crimper rental cost is assumed to be equal to the disc harrow (a similar type of equipment).



**Data and Assumptions (continued):**

3. Costs are included in the ripper and disc harrow (and drill seeder and crimper) to account for these implements' ground engaging component (GEC). The GEC cost for the ripper is applied to each of these other implements.
4. The local fuel price is developed from fuel cost calculations also prepared for earthwork closure cost estimates—the estimated 2024 fuel price is \$3.06/gallon.
5. Revegetation material costs are from quotes by Rocky Mountain Reclamation, based on typical sources for seed and mulch (see Attachment A). The cost for seed is \$258/acre, and for mulch, it is \$301/ton, which, at 2 tons/acre, is \$602/acre.
6. Labor rates are from NMDOL (see Attachment A).
7. Equipment typical net coverage (width) is set at 12 feet, and equipment travel speed is set at 3 miles/hour (mph) for a 60-minute hour.

**Calculations and Results:**

1. The Deere 7330 tractor data, along with labor and fuel costs, are tabulated in the following table:

	B	C	D	E
5	Tractor used for each operation is Deere 7330	Cost	Unit	Information or Calculation
6	EQW base rate for tractor rental	\$ 4,058.42	\$ per month	EQW for Deere 7330
7	EQW base rate for tractor rental	\$ 23.06	\$ per hour	=( \$/month)/176
8	EQW field labor rate per hour of operation	\$ 4.93	\$ per hour	EQW for Deere 7330, which includes mechanic's wage of \$23.09 (NMDOL, 2024)
9	EQW lube material cost	\$ 2.91	\$ per hour	EQW for Deere 7330
10	EQW field parts cost	\$ 0.90	\$ per hour	EQW for Deere 7330
11	EQW tire material cost	\$ 0.92	\$ per hour	EQW for Deere 7330
12	EQW fuel burn rate		5.4 gallons per hour	EQW for Deere 7330
13	Local fuel cost	\$ 3.06	\$ per gallon	Local quote
14	Fuel cost	\$ 16.52	\$ per hour	=(EQW fuel burn rate) x (local fuel cost)
15	NM Department of labor equipment operator rate	\$ 29.50	\$ per hour	NM Department of Labor (NMDOL)
16	Total tractor cost	\$ 78.74	\$ per hour	Sum of \$ per hour costs shown in boxes

Data in Rows 6 and 8-12 are from EQW, data in Row 8 also incorporates an NMDOL labor rate in the EQW cost, Row 13 is the estimated local fuel cost of \$3.06/gallon, and Row 15 shows an NMDOL labor rate. Costs in other rows (7, 14, and 16) are calculated as follows:

$$EQW \text{ base rate for tractor rental} = (\$4,058.42/\text{month}) / (176 \text{ hours/month}) = \$23.06/\text{hour}$$

$$Fuel \text{ cost} = (\text{EQW burn rate}) \times (\text{local fuel cost}) = (5.4 \text{ gallons/hour}) \times (\$3.06/\text{gallon}) = \$16.52/\text{hour}$$

$$Total \text{ tractor cost} = \text{sum of rows 7, 8, 9, 10, 11, 14, 15} = 23.06 + 4.93 + 2.91 + 0.90 + 0.92 + 16.52 + 29.50 = \$78.74/\text{hour}$$

2. Based on the equipment's typical net width of 12 feet and equipment net travel speed of 2.5 mph (3 mph x 50/60 to adjust for a 50-minute hour), each operation will travel a distance of 3,630 feet to cover 1 acre and will require 0.275 hours to travel this distance (see calc steps in the table below). The resulting fuel cost is \$4.54/acre.

	B	C	D	E
18	Tractor coverage/rate of operation, fuel cost per acre			
19	Tractor/equipment net width	12 feet		Assigned as a typical net width of coverage for each pass
20	Tractor/equipment travel speed	2.5 miles per hour		Assigned as approximate average speed of equipment (3 mph for 50 min/hr)
21	For 1 acre, total traveling distance	3630 feet per acre		=(43560 sf/ac)/(net width)
22	Time of travel over 1 acre	0.275 hour per acre		=[(traveling distance feet/acre)/(5280 ft/mile)]/(travel speed)
23	Fuel cost per acre	\$ 4.54	\$ per acre	Already included in total tractor cost... Fuel cost/acre = (fuel cost/hour) x (travel time hour/acre)

**For example use only. Values may not match the current spreadsheet.**



**Calculations and Results (continued):**

3. Operating costs for each of the 5 revegetation operations are calculated as shown in the following table. Calculation equations are also noted in the table. Note the total cost for each operation includes fuel.

	B	C	D	E
25	<b>Operation</b>			
26	<u>Scarifying</u>			
27	Base rate for ripper rental	\$ 898.90	per month	EQW Ripper, Miscellaneous MSR-189H, to 260 HP
28	Base rate for ripper rental	\$ 5.11	\$ per hour	=( $\$/\text{month}$ )/176
29	Field labor rate per hour of operation	\$ 0.69	\$ per hour	EQW for ripper, incl mechanic's wage \$23.09 (NMDOL, 2019)
30	Lube material cost	\$ 0.15	\$ per hour	EQW for ripper
31	Field parts cost	\$ 0.93	\$ per hour	EQW for ripper
32	Ground Engaging Component cost	\$ -	\$ per hour	EQW for ripper
33	<b>Total cost with tractor+operator included</b>	<b>\$ 85.62</b>	<b>per hour</b>	<b>= total tractor cost + (rake without tractor, with ratio)</b>
34				
35	<u>Discing</u>			
36	Disc harrow attachment, for tractor	\$ 3,051.61	per month	RS Means 01 54 33 20 1500
37	Disc harrow attachment, for tractor	\$ 17.34	per hour	=( $\$/\text{month}$ )/176
38	Ground Engaging Component (GEC) cost	\$ -	\$ per hour	Assume similar to GEC cost for ripper (EQW)
39	<b>Total cost with tractor included</b>	<b>\$ 96.08</b>	<b>per hour</b>	<b>= total tractor cost + (disc harrow, with ratio)</b>
40				
41	<u>Drill seeding (assume similar to discing)</u>			
42	Disc harrow attachment, for tractor	\$ 3,051.61	per month	RS Means 01 54 33 20 1500
43	Disc harrow attachment, for tractor	\$ 17.34	per hour	=( $\$/\text{month}$ )/176
44	Ground Engaging Component cost	\$ -	\$ per hour	Assume similar to GEC cost for ripper (EQW)
45	<b>Total cost with tractor+operator included</b>	<b>\$ 96.08</b>	<b>per hour</b>	
46				
47	<u>Mulching</u>			
48	Mulcher, diesel powered, trailer mounted	\$ 2,167.95	per month	EQW for trailer mounted mulcher (Finn B260)
49	Mulcher, diesel powered, trailer mounted	\$ 12.32	per hour	=( $\$/\text{month}$ )/176
50	Field labor rate per hour of operation	\$ 2.95	\$ per hour	EQW for trailer mounted mulcher (Finn B260), incl mechanic's wage \$23.09 (NMDOL, 2019)
51	Lube material cost	\$ 1.76	\$ per hour	EQW for trailer mounted mulcher (Finn B260)
52	Field parts cost	\$ 0.28	\$ per hour	EQW for trailer mounted mulcher (Finn B260)
53	Tire material cost	\$ 0.60	\$ per hour	EQW for trailer mounted mulcher (Finn B260)
54	Fuel burn rate	4.13	gallons per hour	EQW for trailer mounted mulcher (Finn B260)
55	Local fuel cost	\$ 3.06	\$ per gallon	Local quote
56	Fuel cost	\$ 12.64	\$ per hour	=(EQW fuel burn rate) x (local fuel cost)
57	NM Department of labor equipment operator rate	\$ 29.50	\$ per hour	NM Department of Labor (NMDOL)
58	<b>Total cost with tractor+operator included</b>	<b>\$ 138.79</b>	<b>per hour</b>	
59				
60	<u>Crimping (assume similar to discing)</u>			
61	Disc harrow attachment, for tractor	\$ 3,051.61	per month	RS Means 01 54 33 20 1500
62	Disc harrow attachment, for tractor	\$ 17.34	per hour	=( $\$/\text{month}$ )/176
63	Ground Engaging Component cost	\$ -	\$ per hour	Assume similar to GEC cost for ripper (EQW)
64	<b>Total cost with tractor+operator included</b>	<b>\$ 96.08</b>	<b>per hour</b>	



**Calculations and Results (continued):**

5. The hourly operating cost for each operation (including fuel) is summed for a total cost of \$512.66/hour. The cost for each operation is as follows:

- Scarifying = \$85.62/hour
- Discing = \$96.08/hour
- Drill seeding = \$96.08/hour
- Mulching = \$138.79/hour
- Crimping = \$96.08/hour

6. The total combined equipment operating cost with fuel (\$/acre) is then calculated based on the operating cost per hour and the time of travel over 1 acre, as follows:

$$\text{Total combined operating cost} = \left( \frac{\$512.66}{\text{hour}} \right) \times \left( 0.275 \frac{\text{hour}}{\text{acre}} \right) = \$140.98/\text{acre}$$

7. Seed and mulch costs are added to the total combined operating cost (\$/acre) to calculate the total revegetation unit cost as follows:

- Total combined operating cost = \$140.98/acre
- Seed = \$258.09/acre
- Mulch = \$602.21/acre

$$\text{Total revegetation unit cost} = \text{Total combined operating cost} + \text{Seed} + \text{Mulch} = \$140.98/\text{acre} + \$258.09/\text{acre} + \$602.21/\text{acre} = \$1,001.28/\text{acre}$$

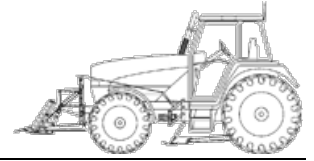
**Summary and Conclusions:**

1. A revegetation unit cost was developed to estimate earthwork closure costs at FMI's Grant County, NM mining operations. Note that the estimated unit cost developed in this analysis applies only to FMI operations in the Silver City (Grant County), NM area.
2. The total revegetation unit cost is \$1,001.28/acre.

**Custom Cost Evaluator**

July 22, 2024

**Deere 7330**  
 Wheel Tractors

 Size Class:  
**125 - 174 hp**  
 Weight:  
 N/A

**Configuration for 7330**

 Horsepower **150.0 hp** Power Mode **Diesel**
**Hourly Ownership Costs**

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$17.17/hr	USD \$16.10/hr	-6.2%
Cost of Facilities Capital (CFC)	USD \$8.91/hr	USD \$5.62/hr	-36.8%
Overhead	USD \$14.26/hr	USD \$8.72/hr	-38.9%
Overhaul Labor	USD \$9.62/hr	USD \$3.74/hr	-61.1%
Overhaul Parts	USD \$10.07/hr	USD \$6.15/hr	-38.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$60.03/hr</b>	<b>USD \$40.34/hr</b>	<b>-32.8%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (517hrs -> 846hrs)			

**Hourly Operating Costs**

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.69/hr	USD \$4.93/hr	-61.1%
Field Parts	USD \$8.83/hr	USD \$0.90/hr	-89.8%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.92/hr	-	-
Electrical/Fuel	USD \$19.75/hr	USD \$5.40/hr	-72.7%
Lube	USD \$2.91/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$45.11/hr</b>	<b>USD \$15.07/hr</b>	<b>-66.6%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$760.53 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$3,802.66 -> USD \$760.53)			

**Total**

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$60.03/hr	USD \$40.34/hr	-32.8%
Hourly Operating Costs	USD \$45.11/hr	USD \$15.07/hr	-66.6%
<b>Total Hourly Cost</b>	<b>USD \$105.13</b>	<b>USD \$55.41/hr</b>	<b>-47.3%</b>

**Non-active use rates**

	Standard Value	User Adjusted Value	Variance
Standby	USD \$40.34/hr	USD \$30.45/hr	-24.5%
Idle	USD \$79.78/hr	USD \$45.74/hr	-42.7%

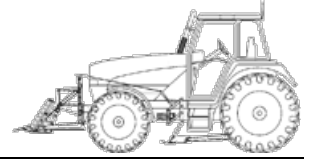
Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**

July 22, 2024

**Deere 7330**  
 Wheel Tractors

 Size Class:  
**125 - 174 hp**  
 Weight:  
 N/A

**Configuration for 7330**

Horsepower	<b>150.0 hp</b>	Power Mode	<b>Diesel</b>
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**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	Monthly	Weekly	Daily
Published Rates	USD \$3,891.00	USD \$1,303.00	USD \$463.00
<b>Adjustments</b>			
Region (New Mexico: 104.3%)	USD \$167.42	USD \$56.07	USD \$19.92
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$4,058.42</b>	<b>USD \$1,359.07</b>	<b>USD \$482.92</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com



## Custom Cost Evaluator

**Miscellaneous MSR-189H**  
Crawler Tractor Multi-Shank Rippers

Size Class:  
**To 260 hp**  
Weight:  
**3557 lbs**



### Configuration for MSR-189H

Horsepower Ripper Type	<b>130.0 hp</b> Parallelogram	Number Of Shanks Power Mode	<b>3.0</b> Hydraulic
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### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$2.64/hr	USD \$2.50/hr	-5.1%
Cost of Facilities Capital (CFC)	USD \$0.53/hr	USD \$0.43/hr	-18.5%
Overhead	USD \$0.66/hr	USD \$0.52/hr	-21.1%
Overhaul Labor	USD \$0.82/hr	USD \$0.41/hr	-49.8%
Overhaul Parts	USD \$0.95/hr	USD \$0.75/hr	-21.1%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$5.60/hr</b>	<b>USD \$4.62/hr</b>	<b>-17.5%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,285hrs -> 1,629hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$1.37/hr	USD \$0.69/hr	-49.8%
Field Parts	USD \$1.18/hr	USD \$0.93/hr	-21.1%
Ground Engaging Component (GEC)	USD \$0.99/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$0.00/hr	-	-
Lube	USD \$0.15/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$3.69/hr</b>	<b>USD \$1.77/hr</b>	<b>-52%</b>
<b>User Defined Adjustments:</b> Annual Ground Engaging Component (USD \$1,268.16 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$253.63 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$1,268.16 -> USD \$1,521.79)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$5.60/hr	USD \$4.62/hr	-17.5%
Hourly Operating Costs	USD \$3.69/hr	USD \$1.77/hr	-52%
<b>Total Hourly Cost</b>	<b>USD \$9.29</b>	<b>USD \$6.39/hr</b>	<b>-31.2%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$3.83/hr	USD \$3.46/hr	-9.7%
Idle	USD \$5.60/hr	USD \$4.62/hr	-17.5%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**Custom Cost Evaluator**
**Finn B260**

Trailer Mounted Mulchers

Size Class:

**51 hp & Over**

Weight:

**4880 lbs**

**Configuration for B260**

Horsepower

**115.0**

Power Mode

**Diesel**
**Hourly Ownership Costs**

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$5.80/hr	USD \$5.45/hr	-6.1%
Cost of Facilities Capital (CFC)	USD \$3.14/hr	USD \$1.73/hr	-45%
Overhead	USD \$3.33/hr	USD \$1.75/hr	-47.5%
Overhaul Labor	USD \$7.08/hr	USD \$2.36/hr	-66.6%
Overhaul Parts	USD \$7.16/hr	USD \$3.75/hr	-47.5%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$26.51/hr</b>	<b>USD \$15.04/hr</b>	<b>-43.3%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (373hrs -> 711hrs)			

**Hourly Operating Costs**

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$8.85/hr	USD \$2.95/hr	-66.6%
Field Parts	USD \$4.14/hr	USD \$0.28/hr	-93.2%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.60/hr	-	-
Electrical/Fuel	USD \$15.10/hr	USD \$4.13/hr	-72.7%
Lube	USD \$1.76/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$30.45/hr</b>	<b>USD \$9.73/hr</b>	<b>-68.1%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$201.40 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$1,342.66 -> USD \$201.40)			

**Total**

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$26.51/hr	USD \$15.04/hr	-43.3%
Hourly Operating Costs	USD \$30.45/hr	USD \$9.73/hr	-68.1%
<b>Total Hourly Cost</b>	<b>USD \$56.97</b>	<b>USD \$24.77/hr</b>	<b>-56.5%</b>

**Non-active use rates**

	Standard Value	User Adjusted Value	Variance
Standby	USD \$12.28/hr	USD \$8.92/hr	-27.3%
Idle	USD \$41.62/hr	USD \$19.17/hr	-53.9%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

RS Means Online Data

**Demolition/Remediation - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
024113400190	Selective demolition, metal drainage piping, CMP, steel, 48"-60", diameter, excludes excavation	L.F.	\$ -	\$ 11.45	\$ 9.86	\$ 21.31	Year 2024	NEW MEXICO / LAS CRUCES (880)
024116130100	Building demolition, large urban projects, mixture of types, excludes foundation demolition, dump fees	C.F.	\$ -	\$ 0.14	\$ 0.24	\$ 0.38	Year 2024	NEW MEXICO / LAS CRUCES (880)
024116170400	Building footings and foundations, floors, concrete slab on grade, plain concrete, 6" thick, excludes disposal costs and dump fees	S.F.	\$ -	\$ 0.21	\$ 0.61	\$ 0.82	Year 2024	NEW MEXICO / LAS CRUCES (880)
130505750530	Steel tank, single wall, above ground, 5,000 thru 10,000 gallon, selective demolition, excluding foundation, pumps or piping	Ea.	\$ -	\$ 670.19	\$ 1,264.50	\$ 1,934.69	Year 2024	NEW MEXICO / LAS CRUCES (880)
130505750540	Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping	Ea.	\$ -	\$ 927.30	\$ 2,107.50	\$ 3,034.80	Year 2024	NEW MEXICO / LAS CRUCES (880)
260505100390	Non metallic sheathed cable, (Romex), #10, 3 wire, electrical demolition, remove	L.F.	\$ -	\$ 0.94	\$ -	\$ 0.94	Year 2024	NEW MEXICO / LAS CRUCES (880)
024113800200	Selective demolition, utility poles & cross arms, utility poles, wood, 35'-45' high	Ea.	\$ -	\$ 218.31	\$ 33.72	\$ 252.03	Year 2024	NEW MEXICO / LAS CRUCES (880)
028120101120/1130	Hazardous waste cleanup/pickup/disposal, solid pickup, bulk material, minimum/maximum	Ton	\$ -	\$ -	\$ -	\$ 392.50	Year 2024	NEW MEXICO / LAS CRUCES (880)
028120101260/1270	Hazardous waste cleanup/pickup/disposal, transportation to disposal site, truckload = 80 drums or 25 C.Y. or 18 tons, minimum/maximum	Mile	\$ -	\$ -	\$ -	\$ 5.60	Year 2024	NEW MEXICO / LAS CRUCES (880)
024113230900	Utility removal, hydrants, fire, remove only, excludes hauling	Ea.	\$ -	\$ 371.51	\$ 112.12	\$ 483.63	Year 2024	NEW MEXICO / LAS CRUCES (880)
026510300320	Removal of underground storage tanks, petroleum storage tanks, non-leaking, remove sludge, water and remaining product from tank bottom of tank with vacuum truck, 9,000 - 12,000 gallon tank	Ea.	\$ -	\$ 113.85	\$ 240.26	\$ 354.11	Year 2024	NEW MEXICO / LAS CRUCES (880)
260505101570	Transformer, dry type, primary, 3 phase, to 600V, 750 kVA, electrical demolition, remove, including removal of supports, wire & conduit terminations	Ea.	\$ -	\$ 958.10	\$ 154.27	\$ 1,112.37	Year 2024	NEW MEXICO / LAS CRUCES (880)
015433406300	Rent steam cleaner 100 gph	Week	\$ -	\$ -	\$ -	\$ 240.55	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Revegetation - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
015433201500	Rent disc harrow attachment for tractor, Excl. Hourly Oper. Cost.	Month	\$ -	\$ -	\$ 3,051.61	\$ 3,051.61	Year 2024	NEW MEXICO / LAS CRUCES (880)
329343100560	Planting, trees, shrubs, and ground cover, medium soil, bare root seedlings, 3" to 5", includes planting only	Ea.	\$ -	\$ 0.45	\$ -	\$ 0.45	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Concrete cutoff wall (dissipater [dissipation basin]) & Grade Control Wall - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
033053406200	Structural concrete, in place, gravity retaining wall (3000 psi), 4' high, includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	C.Y.	\$ 206.49	\$ 111.75	\$ 11.38	\$ 329.62	Year 2024	NEW MEXICO / LAS CRUCES (880)
033053403945	Structural concrete, in place, continuous strip footing (3000 psi), 36" wide x 12" deep, unreinforced, includes forms(4 uses), concrete (Portland cement Type I), placing and finishing, excludes reinforcing	C.Y.	\$ 176.40	\$ 47.59	\$ 0.38	\$ 224.37	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Perimeter Items - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
323126200020	Wire fencing & gates, wire fencing general, barbed wire, galvanized, domestic steel, standard, 12-3/4 ga.	M.L.F.	\$ 184.99	\$ -	\$ -	\$ 184.99	Year 2024	NEW MEXICO / LAS CRUCES (880)
323113200800	Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC, 6' high, includes excavation, & concrete, excludes barbed wire	L.F.	\$ 25.14	\$ 3.15	\$ 1.60	\$ 29.89	Year 2024	NEW MEXICO / LAS CRUCES (880)
323113205070	Fence, chain link industrial, double swing gates, 6' high, 20' opening, includes excavation, posts & hardware in concrete	Opng.	\$ 965.35	\$ 302.21	\$ 154.27	\$ 1,421.83	Year 2024	NEW MEXICO / LAS CRUCES (880)
101453200600	Signs, guide and directional signs, reflectorized, 12" x 18", excludes posts	Ea.	\$ 39.50	\$ 21.08	\$ 8.22	\$ 68.80	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Excavation/Hauling - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
312316466010	Excavating, bulk, dozer, open site, bank measure, common earth, 700 HP dozer, 50' haul	B.C.Y.	\$ -	\$ 0.18	\$ 1.32	\$ 1.50	Year 2024	NEW MEXICO / LAS CRUCES (880)
312316466070	Excavating, bulk, dozer, open site, bank measure, common earth, 700 HP dozer, 300' haul	B.C.Y.	\$ -	\$ 0.61	\$ 4.43	\$ 5.04	Year 2024	NEW MEXICO / LAS CRUCES (880)
312323156075	Borrow clay, till, or blasted rock, 5 C.Y. bucket, loading and/or spreading, front end loader, track mounted	B.C.Y.	\$ 16.78	\$ 0.30	\$ 0.85	\$ 17.93	Year 2024	NEW MEXICO / LAS CRUCES (880)
312323205040	Cycle hauling (wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 22 C.Y. truck, cycle 1 mile, 5 MPH, excludes loading equipment	L.C.Y.	\$ -	\$ 0.93	\$ 3.55	\$ 4.48	Year 2024	NEW MEXICO / LAS CRUCES (880)

Labor Rates

NMDOL Type A Operator Group	Base rate	Fringe rate	Apprenticeship	Total 2024 Rate (\$/hr)
Equipment Operator IV	25.49	6.79	0.6	\$ 32.88
Equipment Operator V	25.6	6.79	0.6	\$ 32.99
Equipment Operator VI	25.84	6.79	0.6	\$ 33.23
Equipment Operator VII	25.86	6.79	0.6	\$ 33.25
Equipment Operator VIII	28.56	6.79	0.6	\$ 35.95
Laborer I	18.89	7.3	0.6	\$ 26.79
Laborer II	18.95	7.3	0.6	\$ 26.85
Truck Driver III	19.75	9.15	0.60	\$ 29.50
Truck Driver V	19.75	9.15	0.60	\$ 29.50
Truck Driver VIII	19.75	9.15	0.60	\$ 29.50

Labor rates based on NM Department of Labor Type H (Heavy Engineering) 2024 labor rates. Rates include [https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing\\_Wage\\_Poster\\_H\\_2024.pdf](https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2024.pdf)



Revegetation/Reclamation  
 Rangeland Rehabilitation  
 Landscaping / Fencing  
 Hydroseeding  
 Environmental Consulting

# ROCKY MOUNTAIN RECLAMATION

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## FREEPORT MCMORAN – NEW MEXICO MINING OPERATIONS

### PRICE ESTIMATES FOR REVEGETATION SERVICES FOR BUDGETING ESTIMATES

**Table 1 –Freeport McMoRan, New Mexico Mining Operations – Price Estimates for Revegetation Services for Budgeting Estimates, prepared April, 2018.**

REVEGETATION OPERATION	ESTIMATED QUANTITY	UNITS	COST/UNIT (\$)	TOTAL COST
<b>I. OPERATIONS:</b>				
1 SCARIFYING	500	Acres	\$30.00	\$15,000.00
2 DISCING	500	Acres	\$20.00	\$10,000.00
3 DRILL SEEDING (special Rangeland Drill)	500	Acres	\$80.00	\$40,000.00
4 MULCHING	500	Acres	\$148.00	\$74,000.00
5 CRIMPING	500	Acres	\$55.00	\$27,500.00
6 DAILY PER DIEM, ETC.	50	Days	\$385.00	\$19,250.00
7 MOBILIZATION	1	Each	\$13,500.00	\$13,500.00
	<b>Subtotal</b>			<b>\$199,250.00</b>
<b>II. MATERIALS:</b>				
1 SEED at 8.9 PLS/acre	500	Acres	\$210.00	\$105,000.00
2 HAY MULCH - nox. weed free, native	1000	Tons	\$245.00	\$245,000.00
	<b>Subtotal</b>			<b>\$350,000.00</b>
<b>TOTAL ESTIMATED REVEGETATION COST BEFORE TAX</b>				<b>\$549,250.00</b>
Add New Mexico Gross Receipts Tax	5.9375	%		\$32,611.72
<b>ESTIMATED REVEGETATION COST PER ACRE:</b>			<b>\$1,163.72</b>	
<b>TOTAL ESTIMATED REVEGETATION COST</b>				<b>\$581,861.72</b>

Estimate prepared by Ron Schreiber, Rocky Mountain Reclamation, for use for Budgeting Estimates.

# Fuel Cost



## Calculation Documentation

### Problem Statement:

Freeport-McMoRan (FMI) utilizes fuel price information as part of earthwork closure cost estimation associated with the Chino Closure/Closeout Plan (CCP). A reliable estimate of the local 2024 fuel price is needed, based on local and national data for past years.

### Objective:

1. Develop an equation to predict the current estimated local fuel price for estimating earthwork closure costs at FMI's mining operations in Grant County, NM.

### Approach:

1. Identify existing data used for the calculation.
2. Correlate local and national data for fuel price, paired by year.
3. Estimate current fuel price for use in the earthwork closure costs.

### Data and Assumptions:

1. Data used for the calculations are shown below (1995-2018 as an example) and include (a) U.S. No. 2 Diesel Retail Prices (annual national) and (b) FMI quotes (for specific dates within a year) for the local Silver City area. All prices are in \$/gallon.

Fuel Price Data		FMI Fuel Quotes <sup>2</sup>			
<b>Data 1: U.S. No 2 Diesel Retail Prices (Dollars per Gallon)</b>		<b>Site</b>	<b>Date</b>	<b>Dyed, low-sulfur diesel</b>	<b>Notes</b>
<b>Date</b>	<b>U.S. No 2 Diesel Retail Prices<sup>1</sup></b>	Continental	1/21/2005	\$1.40	Tom Shelley - quote from fuel broker
1995	1.109	Chino & Tyrone	5/9/2007	\$2.41	Porter Oil Quote (7500 gal capacity)
1996	1.235	Continental	1/23/2009	\$1.80	Porter Oil Quote (7500 gal capacity)
1997	1.198	Tyrone (Little Rock)	1/14/2010	\$2.49	Porter Oil Quote (7500 gal capacity)
1998	1.044	Tyrone	7/7/2012	\$3.13	Western Refining Oil
1999	1.121	Continental	6/18/2014	\$3.22	Western Refining Oil
2000	1.491	Chino (North Lampbright)	11/5/2015	\$1.74	Western Refining Oil
2001	1.401	Chino	5/20/2016	\$1.66	Western Refining Oil
2002	1.319	Tyrone (Little Rock)	4/24/2017	\$1.90	Western Refining Oil
2003	1.509	Continental	3/12/2018	\$2.75	Griffin Propane
2004	1.81	Chino	10/10/2018	\$2.75	Griffin Propane
2005	2.402				
2006	2.705				
2007	2.885				
2008	3.803				
2009	2.467				
2010	2.992				
2011	3.84				
2012	3.968				
2013	3.922				
2014	3.825				
2015	2.707				
2016	2.304				
2017	2.65				
2018	3.178				
2019	3.056				
2020	2.551				
2021	3.125				
<b>Date</b>	<b>U.S. No 2 Diesel Retail Prices<sup>1</sup></b>				
July 2024	3.722				

1. U.S. Energy Information Administration  
[https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD\\_EPD2D\\_PTE\\_NUS\\_DPG&f=M](https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2D_PTE_NUS_DPG&f=M)  
 2. Quotes obtained from Freeport-McMoRan (FMI)

**For example use only. Values may not match the current spreadsheet.**

**Data and Assumptions (continued):**

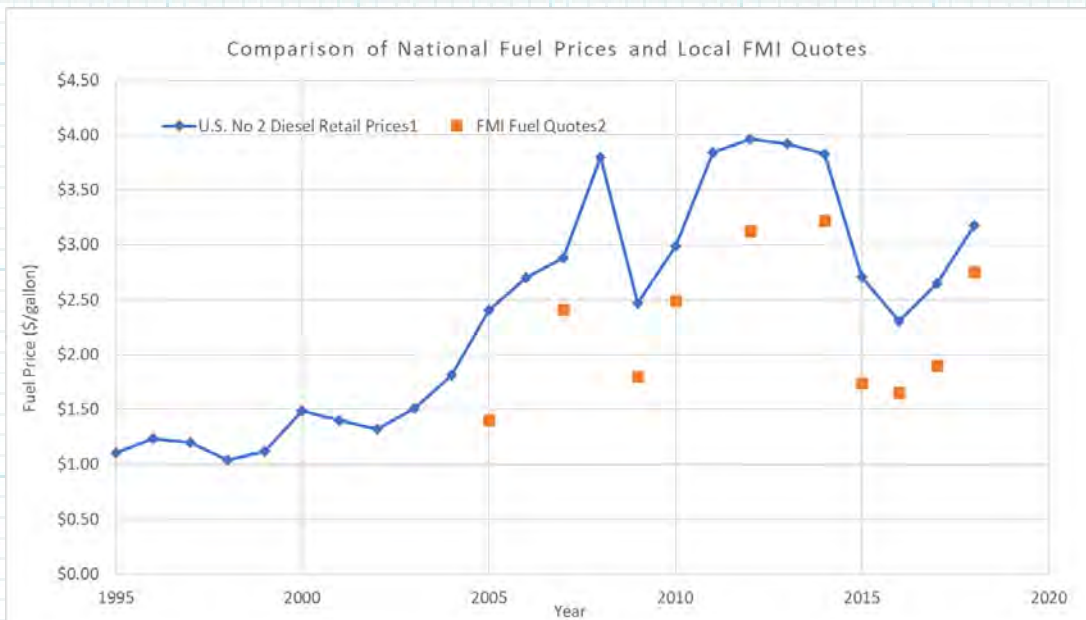
- The local FMI fuel quotes and annual national retail fuel (U.S. No. 2) prices are assumed to trend similarly – if the national prices increase, local prices also increase.
- A correlation between national and local fuel prices is assumed to reasonably predict local fuel prices for any period (e.g., annual, monthly, etc).

**Calculations and Results:**

- The annual national retail fuel prices (U.S. Energy Information Administration) dataset is tabulated and plotted for comparison with the available annual local FMI fuel quotes (note that quotes are not available for blank years).

Year	U.S. No 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>	Year	U.S. No 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>
1995	1.109		2007	2.885	\$2.41
1996	1.235		2008	3.803	
1997	1.198		2009	2.467	\$1.80
1998	1.044		2010	2.992	\$2.49
1999	1.121		2011	3.84	
2000	1.491		2012	3.968	\$3.13
2001	1.401		2013	3.922	
2002	1.319		2014	3.825	\$3.22
2003	1.509		2015	2.707	\$1.74
2004	1.81		2016	2.304	\$1.66
2005	2.402	\$1.40	2017	2.65	\$1.90
2006	2.705		2018	3.178	\$2.75

1. U.S. Energy Information Administration  
<http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD EPD2D PTE NUS DPG&f=M>  
 2. Quotes obtained from Freeport-McMoRan (FMI)



**For example use only. Values may not match the current spreadsheet.**





**Calculations and Results (continued):**

2. The annual national fuel retail prices are ranked from lowest to highest, corresponding to local FMI fuel quotes for matching years in which they are available. (see Col. A and B below)
3. The difference between the national fuel retail prices and FMI fuel quotes is calculated for each pairing. FMI fuel quotes are all lower than the corresponding national fuel retail prices. We average the differences for all pairs. (Col. C)
4. For each year without an FMI quote, the average difference of \$0.69 is subtracted from the national fuel retail prices. This results in a calculated FMI value for each unpaired data year. (Col. D)
5. We combine the available FMI fuel quotes and calculated FMI values into one column, providing a comprehensive listing of all calculated FMI values and FMI quotes. (Col. E)
6. We plot the annual national fuel retail prices (Col. A) against the FMI calculated values and quotes (Col. E) and develop a correlation. Here, national fuel prices serve as the independent variable, while FMI values and quotes act as the dependent (i.e., estimated) variable. (see Col. F and graph below)

A	B	C	D	E	F
U.S. No. 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>	Difference Between Retail Prices and FMI Quotes	Calculated FMI Values Based on Average Difference	Calculated FMI Values and Quotes	$y = -0.0617x^3 + 0.4659x^2 - 0.0611x + 0.0148$
\$0.00				\$0.00	\$0.01
\$1.11			\$0.42	\$0.42	\$0.44
\$1.24			\$0.55	\$0.55	\$0.53
\$1.20			\$0.51	\$0.51	\$0.50
\$1.04			\$0.36	\$0.36	\$0.39
\$1.12			\$0.43	\$0.43	\$0.44
\$1.49			\$0.80	\$0.80	\$0.75
\$1.40			\$0.71	\$0.71	\$0.67
\$1.32			\$0.63	\$0.63	\$0.60
\$1.51			\$0.82	\$0.82	\$0.77
\$1.81			\$1.12	\$1.12	\$1.06
\$2.40	\$1.40	\$1.00		\$1.40	\$1.70
\$2.71			\$2.02	\$2.02	\$2.04
\$2.89	\$2.41	\$0.47		\$2.41	\$2.23
\$3.80			\$3.11	\$3.11	\$3.13
\$2.47	\$1.80	\$0.67		\$1.80	\$1.77
\$2.99	\$2.49	\$0.50		\$2.49	\$2.35
\$3.84			\$3.15	\$3.15	\$3.16
\$3.97	\$3.13	\$0.84		\$3.13	\$3.25
\$3.92			\$3.23	\$3.23	\$3.22
\$3.83	\$3.22	\$0.61		\$3.22	\$3.14
\$2.71	\$1.74	\$0.97		\$1.74	\$2.04
\$2.30	\$1.66	\$0.65		\$1.66	\$1.59
\$2.65	\$1.90	\$0.75		\$1.90	\$1.98
\$3.18	\$2.75	\$0.43		\$2.75	\$2.89
	Average	\$0.69			

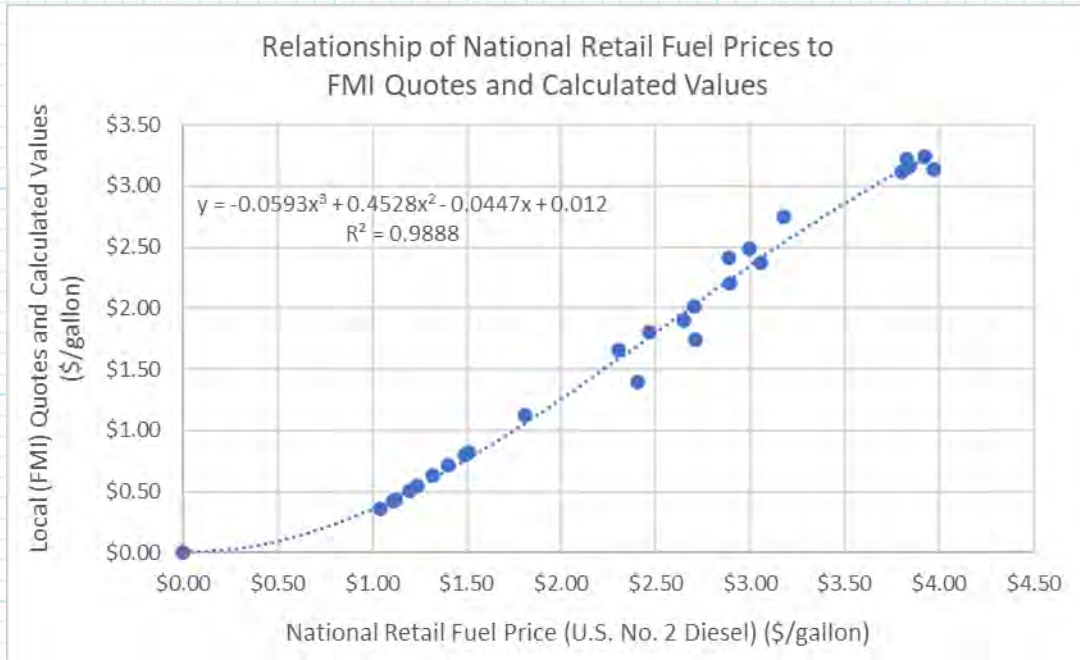
1. U.S. Energy Information Administration

<http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD EPD2D PTE NUS DPG&f=M>

2. Quotes obtained from Freeport-McMoRan (FMI)

**For example use only. Values may not match the current spreadsheet.**

**Calculations and Results (continued):**



7. The prediction equation (and coefficient of determination,  $R^2$ ) is shown in the above graph where  $x$  = national retail fuel price (\$/gallon) and  $y$  = predicted local fuel price (\$/gallon).
8. Based on this equation and the national retail fuel price in June 2024 of \$3.72, the predicted local FMI fuel price for U.S. No. 2 diesel (June) is

$$\text{Local fuel price} = (-0.0593)(3.72)^3 + (0.4528)(3.72)^2 - (0.0447)(3.72) + 0.012 = \$3.06/\text{gallon}$$

**Summary and Conclusions:**

1. We used National and local (FMI) fuel price data to develop a strongly correlated ( $R^2 = 0.9888$ ) prediction equation by which local FMI fuel prices can be predicted from national fuel price data. Note that the relationship developed in this analysis applies only to FMI operations in the Silver City (Grant County), NM area.
2. Telesto can use the following prediction equation developed in these calculations to predict the estimated December 2020 local fuel price for use in earthwork closure costs:

$$\text{Local fuel price} = -0.0593x^3 + 0.4528x^2 - 0.0447x + 0.012$$

where  $x$  = national retail fuel price (\$/gallon) and  $y$  = predicted local fuel price (\$/gallon)

# **Attachment 2.2**

## **Quantity Takeoff Calculations**



## Calculation Documentation

### **Problem Statement:**

Freeport-McMoRan's (FMI's) Chino Mines Company must complete a Reclamation Cost Estimate (RCE) as part of the Chino Mine Closure/Closeout Plan (CCP). The RCE is developed based on various data, including the volumes of earth moved, the distance moved, and the equipment that will move it throughout the reclamation process.

### **Objectives:**

Proportion out earthwork quantities by cross-sections to calculate the equipment and time requirements to complete earthwork portions of site closure as needed for the reclamation cost estimate, including:

- Material Volumes
- Push/Haul distances
- Push/Haul grades

### **Approach:**

1. Determine the earthwork methods required to achieve reclamation grades for the closure of each mining facility using the reclamation grading cross-section as developed under the closure grading plan. (CCP, Appendix C)
2. Calculate the proportion of earth volume to be moved in each cross section for each mining facility.
3. Find the centroids of the cut and fill regions to determine the push/haul distance.
4. Calculate appropriate percentage grades for equipment to increase the accuracy of the cost estimate.



**Data and Assumptions:**

1. Data on each stockpile derives from the earthwork closure plans in Appendix C of the CCP. This includes total volumes for each stockpile (as a whole).

<b>Stockpile</b>	<b>Area (sf)</b>	<b>Volume (cy)</b>
3A	1,486,054	244,179
Kessel	12,188,002	4,125,254
South	22,123,711	28,211,392
Stockpile 2	3,310,560	1,701,942
West	24,067,821	24,318,979
Lampbright	40,763,354	47,514,487
Northeast	511,263	4,014
Axiflo	3,954,785	19,069

**Calculations and Results:**

1. Earthwork methods

- a. Dozer Push

- For stockpiles with push distances of *less than* 500 ft and initial grade of over 10%
- Excess material pushed straight down the stockpile achieves reclamation slopes
- Push distance of each cross-section measures from the centroid of the top cut region to the centroid of the bottom fill region

- b. Truck Haul

- For stockpiles with haul distances *over* 500 ft and initial grade of over 10%
- Excess material is loaded into a truck using a loader and dozer assist and hauled from the top of the stockpile to the bottom of the stockpile to achieve reclamation slopes
- Haul distance measures from the centroid of the top cut region to the centroid of the bottom fill region

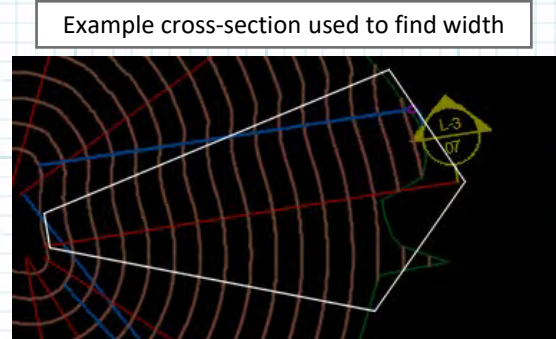
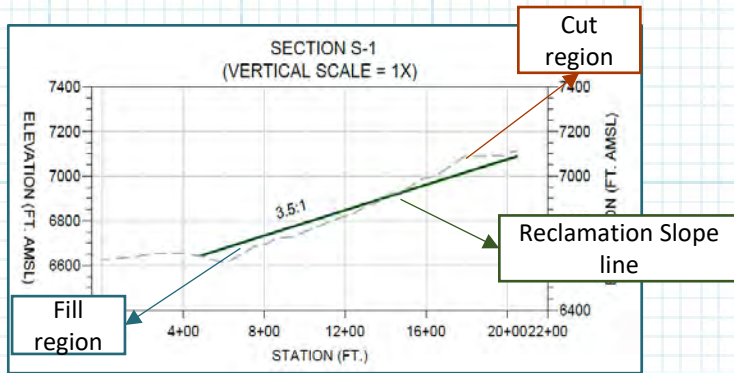
**Calculations and Results Con'd:**

1. Earthwork methods con'd

c. Scraper Haul

- For stockpiles with haul distances *over* 500 ft, initial grades of 10% or less, and entire cross-sections of cut or fill regions
- Excess material is hauled (scraped) from regions of cut to fill areas in elliptical-shaped routes
- Haul distance measures from the centroid of a cut region to the centroid of the nearest fill region in a slightly curved shape rather than a direct line

2. The portion of earth volume for a given cross-section is estimated by taking the area of earth moved in a cross-section and multiplying it by the width of the cross-section. AutoCAD calculates a cut section's area and a cross-section's width.



Item	Facility	Cross Section	Description	Area of earth outside final reclamation (sf)	Average (sf)	Width (f)	Volume(cy)
21	Lampbright Stockpile	L-1	Outslope	223,375.03	276,057.8289	354.46	3624128.075

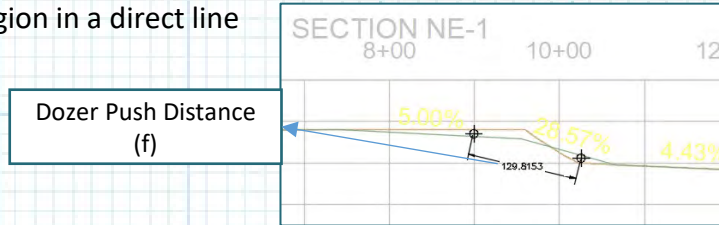
$$Average (sf) = \frac{(223,375.03 + 328,740.63)}{2} = 276,057.8289 sf$$

$$Volume (cy) = \frac{276,057.8289 (Average sf) \times 354.46 (cross - section width f)}{27 (convert cf to cy)} = 3,624,128.075$$

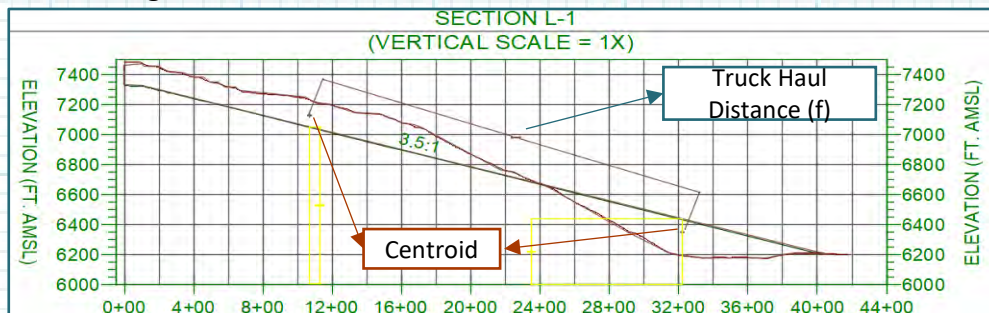
**Calculations and Results Con'd:**

3. The push/haul distance measurement depends on the earthwork method used for that cross-section/stockpile.

a. Dozer Push: The push distance measures from the centroid to the centroid of the cut-to-fill region in a direct line

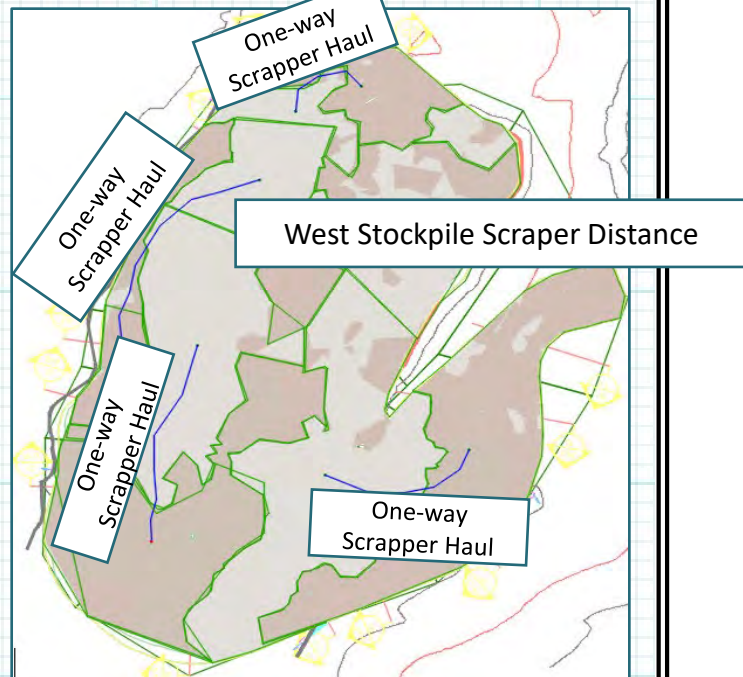


a. Truck Haul: The haul distance measures in a direct line from the centroid to the centroid of the cut/fill regions for each cross-section



b. Scraper One Way Haul: The haul distance measures from centroid to centroid of a cut region to the nearest fill region in a slightly curved shape to estimate the first half of the scraper's elliptical route

West Stockpile Cut and Fill Regions





**Calculations and Results Con'd:**

- The difference in the heights of the cut and fill centroids divided by the push/haul distance was calculated to determine the slope (% grade) for each section.

	A	B	C	D	I	J	K	L	M
8	WEST STOCKPILE								
	Item	Facility	X section	Description	One-Way Scrapper Distance (f)	Volume (cy)	Elevation 1	Elevation 2	Scrapper Grade %
9									
10	1501	West Stockpile	W-1	Outslope	1,665.37	1,448,282.55			9%
11		West Stockpile	W-2	Outslope				6,285.37	
12		West Stockpile	W-3	Outslope					
13		West Stockpile	W-4	Outslope			6,433.53		
14		West Stockpile	W-5	Outslope					

$$Slope (\% Grade) = \frac{(6,433.53 (elevation 1) - 6,285.37 (elevation 2))}{1,665.37 (Scrapper Haul Distance)} \times 100 = 9\%$$

- Finally, cut and fill volumes were reconciled with those developed in the closure plan to ensure the accuracy of the final volume data entered into the RCE spreadsheet.

**Summary and Conclusions:**

- AutoCAD assisted in providing data to calculate the earth volume portion in each stockpile cross-section.
- Push/Haul distances were measured, using AutoCAD, from the centroid of cut regions to the centroid of fill regions. For trucks and dozers, this was a direct route from top to bottom of a stockpile, while scrapers assume a more elliptical or curved route from cut to fill area.
- AutoCAD provided the elevation and distance data determining the % grade at which equipment would operate.
- The results of these calculations are included in the Chino Mines Earthwork Spreadsheet under the Quantities tab to provide an accurate reclamation cost estimate.



# **Attachment 2.3**

## **Building Demolition**

**Building Demolition**

			Building Demolition			
Chino Tag Number	General Name	Number	Demo	Unit	Unit	Item
			Quantity	Unit	Cost (\$/unit)	Cost (\$)
CP-6	Pump House	1	1761200	cf	\$0.38	\$669,256
CP-36	Sewer Plant	1	18640	cf	\$0.38	\$7,083
CP-37	Wash Rack and Pad	1	13920	cf	\$0.82	\$11,414
<b>Demolition Total Direct Cost</b>						<b>\$687,754</b>

ID	Unit Cost (\$/unit) <sup>1</sup>	Units	RS Means Line Item	Description
Structure Demolition	\$0.38	\$/cf	024116.13 0100	Building demolition, large urban projects, mixture of types, excludes foundation demolition, dump fees
Concrete Slab Demolition	\$0.82	\$/sf floor	024116.17-0400	Building footing and foundation demolition 6" thick plain concrete
Concrete Slab Demolition	\$5.74	\$/sf floor	-	Scaled RS Means Cost for 3.5' thick plain concrete
Storage Tank Demolition	\$1,934.69	\$/each	130505.75-0530	Selective Demolition - Storage Tanks, steel tank, single wall, above ground, not including foundations, pumps or piping, 5,000 thru 10,000 gallon
Storage Tank Demolition	\$3,034.80	\$/each	130505.75-0540	Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping

1. RS Means Online 2024; RS Means Location adjustment: New Mexico Las Cruces
2. 24' eave height assumed
3. Increased volume by 20% for large equipment

**Building Demolition - Cover**

Soil Cover Depth ft: 3

			Cover			
Chino Tag Number	Description	Number	Cover Quantity	Unit	Unit Cost (\$/unit)	Item Cost (\$)
CP-6	Pump House	1	195689	cy	\$0.57	\$111,504
CP-36	Sewer Plant	1	2071	cy	\$0.57	\$1,180
CP-37	Wash Rack and Pad	1	1547	cy	\$0.57	\$881

**Cover Total Direct Cost: \$113,566**

Item	Unit Cost \$/cy	Description
Load and Haul cover material	\$0.57	Site-Wide Weighted Average Unit Cover Material Excav, Haul, Grade Cost (\$/cy)

**Building Demolition - Vegetation**

			Vegetation			
					Unit Cost	Item Cost
Chino Tag Number	Description	Number	Area	Unit	(\$/unit)	(\$)
CP-6	Pump House	1	1.01	ac	\$1,599.79	\$1,616
CP-36	Sewer Plant	1	0.01	ac	\$1,599.79	\$16
CP-37	Wash Rack a	1	0.01	ac	\$1,599.79	\$16

Revegetation unit cost: \$ 1,599.79 \$/acre

Data Sources:

**Revegetation Total Direct Cost: \$ 1,648**

See "Revegetation\_UC"

Building Demolition - Waste Requiring Special Handling

				Wastes Requiring Special Handling								
				Cleanup & Disposal				Transportation				
Chino Tag Number	Description	Area (cf)		Quantity	Unit	Unit Cost (\$/unit)	Item Cost (\$)	Drums	Trips	Miles	Unit Cost (\$/unit)	Item Cost (\$)
CP-6	Pump House	1761200		282.7854	cy			905	11	337	\$5.60	\$21,347
CP-36	Sewer Plant	18640		2.9929	cy		\$392.50	10	0	337	\$5.60	\$226
CP-37	Wash Rack and Pad	13920		2.2351	cy		\$392.50	7	0	337	\$5.60	\$169
												\$21,742
							\$113,045					
											<b>Total Cost</b>	<b>\$134,787</b>

Item	Min. Base Cost	Max. Base Cost	Ave. Base Cost	Units	Means Line Item
	\$/unit	\$/unit	\$/unit		
Cleanup & Disposal of Wastes Requiring Special Handling	\$190.00	\$595.00	\$392.50	\$/ton	Means Line Item 028120.10 1120/1130
Transport of Wastes Requiring Special Handling (Truckload = 80 drums or 25 cy or 18 tons)	\$3.95	\$7.25	\$5.60	\$/mile	Means Line Item 028120.10 1260/1270

R.S. Means Online Heavy Construction Cost Data, 2021  
Volume of wastes requiring special handling is assumed to be in the same proportion to the structural material volume as for other FMI New Mexico operations  
Disposal Location: Veolia 5736 W Jefferson St, Phoenix, AZ 85043

0.0001606 cy/cf  
337 miles

**Continental Mine**  
Facility Demolition Summary

		<b>Current Value</b>
<b>DIRECT COSTS</b>	Facility and Structure Removal	\$687,754
	Cover	\$113,566
	Ripping & Revegetation	\$1,648
	Waste Requiring Special Handling	\$134,787
	<b>Subtotal, Direct Costs</b>	<b>\$937,754</b>
<b>INDIRECT COSTS</b>	<b>Subtotal, Indirect Costs 30.0%</b>	<b>\$281,326</b>
<b>TOTAL COST</b>		<b>\$1,219,080</b>

Notes:

Indirect costs are based on 2019 agreement between FMI and agencies

Indirect costs include but are not limited to mobilization and demobilization, engineering redesign fee, contingencies, contractor profit and overhead, project management fee, and state procurement cost

DRAFT

**Attachment 3**  
**Indirect Costs**

**Table 1 Summary of Cost Estimate Resolutions**

Issue Item	Resolution
<b>Equipment Unit Cost Source and Removal of Indirect Cost Items from EquipmentWatch Ownership Values</b>	Equipment costs determined in the following order sourced from EquipmentWatch: <ul style="list-style-type: none"> <li>• <b>Unmodified</b> EquipmentWatch Average Rental Rate for Southern New Mexico</li> <li>• <b>Unmodified</b> EquipmentWatch Average Rental Rate for New Mexico</li> <li>• <b>Unmodified</b> Blue Book Rental Rate</li> <li>• If equipment is not listed in EquipmentWatch, then another piece of equipment must be used</li> <li>• <b>Minimum listed rates will not be used</b></li> <li>• <b>EquipmentWatch Average Rental Rates will be used without adjustment for duplicative indirect cost components</b></li> </ul>
<b>Revegetation</b>	Revegetation steps costed in similar manner to other earthworks
<b>Demolition Costs</b>	Freeport will add 20% for buildings with large equipment (e.g., mills, SX, crusher)
<b>Direct "Commodity" Costs / Quotes</b>	It is fine to use quotes, but the quotes must be for the specifications and scope/scale of Freeport's default scenario (e.g., fuel to complete all Freeport New Mexico mine closures over a series of years). The following are specific examples discussed. <ul style="list-style-type: none"> <li>• <b>FNMO will compile a database of vendor quotes as they are developed for submittal to the agencies</b></li> <li>• <b>Quotes will be used directly with no consideration to vendor's profit/overhead or other indirect costing items</b></li> <li>• <b>Quotes will be used directly with no adjustment for duplicated indirect components</b></li> </ul>
Fuel	Use historical quotes and correlate to public data for future cost estimates
Seed	Freeport quotes, specs and scope
Lime	Freeport quotes, specs and scope
Mulch	Freeport quotes, specs and scope
Articulated Concrete Blocks	Freeport quotes, specs and scope
Well Plugging/replacement	Freeport quotes, specs and scope
Geomembranes (e.g., stormwater pond replacement)	Use RS Means published data
Power	Published rates for area, scope considered
<b>State Labor Rates</b>	Use prevailing wage as published by NMDOLA, which includes fringe benefits
<b>Indirect Rates</b>	Negotiated total values ( <b>includes: mobilization and demobilization, contingencies, engineering redesign fees, contractor profit and overhead, project management, administrative expenses, bonding, state procurement costs, construction management, insurance, QA/QC, etc.</b> )
All capital cost items	30%
All Operations and Maintenance cost items	17.5%

Items in black are reformatted from workgroup spreadsheet sent 11/19/2019 and subsequent negotiations

Items in red are from subsequent communications and added for clarity





State of New Mexico  
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT  
and the  
ENVIRONMENT DEPARTMENT

Michelle Lujan Grisham  
Governor

Howie Morales  
Lieutenant Governor

Sarah Cottrell Probst  
Cabinet Secretary Designate, EMNRD

James Kenney  
Cabinet Secretary Designate, NMED

7008 0500 0001 4875 1648

**Certified Mail**

January 16, 2019

Sherry Burt-Kested, Manager  
Environmental Services  
Freeport-McMoRan Chion Mines Company  
P.O. Box 10  
Bayard, NM 88023

**Re: Approval of Cost Estimate Resolutions (Agreement) and Request for Schedule**

Dear Ms. Burt-Kested,

The New Mexico Mining and Minerals Division of the Energy, Minerals and Natural Resources Department (MMD-EMNRD), and the Mining Environmental Compliance Section (MECS) of the New Mexico Environment Department (MECS-NMED) (collectively, the Agencies) received a letter with tabulated cost estimate resolutions (Agreement) dated January 11, 2019, from Freeport McMoRan New Mexico Operations (FMNO). As noted in your letter, the Financial Assurance (FA) work group included representatives of the Agencies, FMNO, and the Gila Resources Information Project (GRIP). Over the course of multiple meetings and teleconferences, the FA work group developed the Agreement in 2018. The Agencies hereby approve the Agreement for the formulation of cost estimates for closure/closeout plans at the Continental, Little Rock, Tyrone and Chino Mines.

Since the FA work group reached agreement, the Agencies concur this precludes the need for a third party review of cost estimates that had been conditionally required by condition 8.N.7 of MMD Permit No. GR002RE Revision 15-2, and C113.E of NMED Draft DP-1403. FMNO must submit an updated cost estimate by April 3, 2019, in order to fulfill Continental permit condition 8.N.6 of MMD Permit No. GR002RE Revision 15-2, which is similar to condition C113.D of NMED Draft DP-1403.

In your letter, FMNO proposed a timeline for the Continental, Chino, and Tyrone mines for the submittal of updated cost estimates. To ensure efficient use of limited resources, the Agencies request FMNO submit a more detailed schedule that provides greater specificity of when the cost estimates and any other major milestones will be completed. The schedule should provide

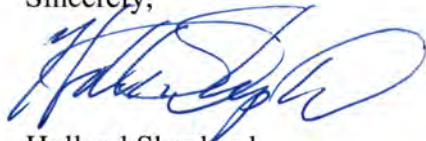
Ms. Burk-Kested, Manager  
January 16, 2019  
Page 2 of 2

managers and permit leads a best estimate of key FMNO submittals. With FMNO cooperation, the Agencies anticipate completion of reviews and approvals of cost estimates and associated changes to FA instruments before the end of 2019.

The Agencies acknowledge the successful resolution of multiple cost estimate issues. We appreciate that the FA work group reached agreement through extra effort by FMNO, GRIP, and the Agencies. This Agreement reduces much of the uncertainty associated with FMNO cost estimation and the Agencies' review process. Going forward, the Agencies believe the Agreement ensures timely updates of closure/closeout cost estimates that maintain adequate FA to the mutual benefit of all parties.

If you have any questions, please do not hesitate to contact us or the respective permit leads at MMD and NMED for Continental, Tyrone, Little Rock, and Chino Mines.

Sincerely,



Holland Shepherd  
Program Manager  
Mining Act Reclamation Program  
Mining and Minerals Division-EMNRD  
505-476-3437



Kurt Vollbrecht  
Program Manager  
Mining Environmental Compliance Section  
New Mexico Environment Department  
505-827-0195

cc: Allyson Siwik, Executive Director, GRIP  
MMD mine permit files GR002RE, GR007RE, GR009RE and GR010RE.  
NMED discharge permit files DP-1236, 1340, DP-1341 and DP-1403.

**Attachment 4**  
**Supporting Data for Cost Estimation**

# **Attachment 4.1**

## **New Mexico Labor Rates**

Labor Rates

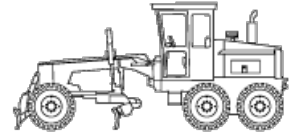
NMDOL Type A Operator Group	Base rate	Fringe rate	Apprenticeship	Total 2024 Rate (\$/hr)
Equipment Operator IV	25.49	6.79	0.6	\$ 32.88
Equipment Operator V	25.6	6.79	0.6	\$ 32.99
Equipment Operator VI	25.84	6.79	0.6	\$ 33.23
Equipment Operator VII	25.86	6.79	0.6	\$ 33.25
Equipment Operator VIII	28.56	6.79	0.6	\$ 35.95
Laborer I	18.89	7.3	0.6	\$ 26.79
Laborer II	18.95	7.3	0.6	\$ 26.85
Truck Driver III	19.75	9.15	0.60	\$ 29.50
Truck Driver V	19.75	9.15	0.60	\$ 29.50
Truck Driver VIII	19.75	9.15	0.60	\$ 29.50

Labor rates based on NM Department of Labor Type H (Heavy Engineering) 2024 labor rates. Rates include [https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing\\_Wage\\_Poster\\_H\\_2024.pdf](https://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Prevailing_Wage_Poster_H_2024.pdf)

# **Attachment 4.2**

## **EquipmentWatch**

## Custom Cost Evaluator

**Caterpillar 14M3 (disc. 2019)**  
 Articulated Frame Graders

 Size Class:  
**200 - 249 hp**  
 Weight:  
**N/A**

### Configuration for 14M3 (disc. 2019)

Moldboard Size	<b>14 ft</b>	Horsepower	<b>238.0 hp</b>
Operator Protection	<b>ROPS/FOPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$30.07/hr	USD \$28.07/hr	-6.6%
Cost of Facilities Capital (CFC)	USD \$14.34/hr	USD \$11.35/hr	-20.8%
Overhead	USD \$16.35/hr	USD \$12.75/hr	-22%
Overhaul Labor	USD \$1.83/hr	USD \$0.91/hr	-50.4%
Overhaul Parts	USD \$23.14/hr	USD \$18.05/hr	-22%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$85.73/hr</b>	<b>USD \$71.13/hr</b>	<b>-17%</b>

**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,539hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$1.10/hr	USD \$0.55/hr	-50.4%
Field Parts	USD \$22.44/hr	USD \$4.38/hr	-80.5%
Ground Engaging Component (GEC)	USD \$1.87/hr	USD \$0.00/hr	-100%
Tire	USD \$11.13/hr	-	-
Electrical/Fuel	USD \$27.86/hr	USD \$7.62/hr	-72.7%
Lube	USD \$6.23/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$70.63/hr</b>	<b>USD \$29.90/hr</b>	<b>-57.7%</b>

**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$2,244.44 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$4,488.89 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$22,444.44 -> USD \$6,733.33)

### Total

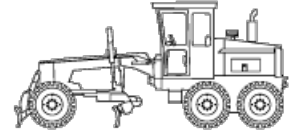
	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$85.73/hr	USD \$71.13/hr	-17%
Hourly Operating Costs	USD \$70.63/hr	USD \$29.90/hr	-57.7%
<b>Total Hourly Cost</b>	<b>USD \$156.36</b>	<b>USD \$101.02/hr</b>	<b>-35.4%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$60.75/hr	USD \$52.17/hr	-14.1%
Idle	USD \$113.59/hr	USD \$78.74/hr	-30.7%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Caterpillar 14M3 (disc. 2019)**  
 Articulated Frame Graders

 Size Class:  
**200 - 249 hp**  
 Weight:  
 N/A

**Configuration for 14M3 (disc. 2019)**

Moldboard Size	<b>14 ft</b>	Horsepower	<b>238.0 hp</b>
Operator Protection	<b>ROPS/FOPS</b>	Power Mode	<b>Diesel</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$10,911.00	USD \$4,284.00	USD \$1,448.00
<b>Adjustments</b>			
Region (New Mexico: 86.23%)	(USD \$1,502.03)	(USD \$589.74)	(USD \$199.33)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$9,408.97</b>	<b>USD \$3,694.26</b>	<b>USD \$1,248.67</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

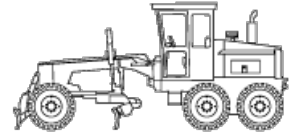


## Custom Cost Evaluator

July 22, 2024

### Caterpillar 16M3 (disc. 2019)

Articulated Frame Graders

 Size Class:  
**250 hp & Over**  
 Weight:  
 N/A


### Configuration for 16M3 (disc. 2019)

 Horsepower **348.0 hp**

#### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$66.13/hr	USD \$61.85/hr	-6.5%
Cost of Facilities Capital (CFC)	USD \$29.56/hr	USD \$23.41/hr	-20.8%
Overhead	USD \$20.75/hr	USD \$16.18/hr	-22%
Overhaul Labor	USD \$1.83/hr	USD \$0.91/hr	-50.4%
Overhaul Parts	USD \$47.66/hr	USD \$37.16/hr	-22%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$165.94/hr</b>	<b>USD \$139.52/hr</b>	<b>-15.9%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,539hrs)			

#### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$1.10/hr	USD \$0.55/hr	-50.4%
Field Parts	USD \$46.23/hr	USD \$9.01/hr	-80.5%
Ground Engaging Component (GEC)	USD \$3.85/hr	USD \$0.00/hr	-100%
Tire	USD \$18.04/hr	-	-
Electrical/Fuel	USD \$40.74/hr	USD \$11.14/hr	-72.7%
Lube	USD \$11.17/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$121.13/hr</b>	<b>USD \$49.91/hr</b>	<b>-58.8%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$4,622.56 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$9,245.11 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$46,225.57 -> USD \$13,867.67)			

#### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$165.94/hr	USD \$139.52/hr	-15.9%
Hourly Operating Costs	USD \$121.13/hr	USD \$49.91/hr	-58.8%
<b>Total Hourly Cost</b>	<b>USD \$287.06</b>	<b>USD \$189.42/hr</b>	<b>-34%</b>

#### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$116.44/hr	USD \$101.44/hr	-12.9%
Idle	USD \$206.67/hr	USD \$150.65/hr	-27.1%

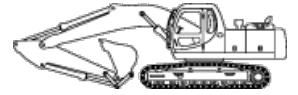
Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 320 GC

Crawler Mounted Hydraulic Excavators


 Size Class:  
**19.5 - 21.4 mt**  
 Weight:  
 N/A

### Configuration for 320 GC

Horsepower	<b>121.0 hp</b>	Operating Weight	<b>45400.0 lbs</b>
Power Mode	<b>Diesel</b>		

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$15.33/hr	USD \$14.35/hr	-6.4%
Cost of Facilities Capital (CFC)	USD \$9.28/hr	USD \$6.53/hr	-29.7%
Overhead	USD \$13.80/hr	USD \$9.51/hr	-31.1%
Overhaul Labor	USD \$4.38/hr	USD \$1.92/hr	-56.1%
Overhaul Parts	USD \$12.55/hr	USD \$8.65/hr	-31.1%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$55.35/hr</b>	<b>USD \$40.96/hr</b>	<b>-26%</b>

**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (743hrs -> 1,078hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$2.19/hr	USD \$0.96/hr	-56.1%
Field Parts	USD \$12.47/hr	USD \$3.09/hr	-75.2%
Ground Engaging Component (GEC)	USD \$1.99/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$8.41/hr	USD \$2.30/hr	-72.7%
Lube	USD \$2.58/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$27.65/hr</b>	<b>USD \$8.94/hr</b>	<b>-67.7%</b>

**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$1,481.90 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,852.38 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$7,409.52 -> USD \$3,334.28)

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$55.35/hr	USD \$40.96/hr	-26%
Hourly Operating Costs	USD \$27.65/hr	USD \$8.94/hr	-67.7%
<b>Total Hourly Cost</b>	<b>USD \$82.99</b>	<b>USD \$49.90/hr</b>	<b>-39.9%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$38.41/hr	USD \$30.38/hr	-20.9%
Idle	USD \$63.76/hr	USD \$43.26/hr	-32.2%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com

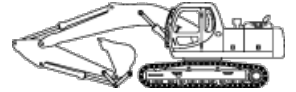
All prices shown in US dollars (\$)

## AED Green Book®

July 22, 2024

### Caterpillar 320 GC

Crawler Mounted Hydraulic Excavators



Size Class:  
**19.5 - 21.4 mt**  
 Weight:  
 N/A

### Configuration for 320 GC

Horsepower	<b>121.0 hp</b>	Operating Weight	<b>45400.0 lbs</b>
Power Mode	<b>Diesel</b>		

### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$7,671.00	USD \$2,954.00	USD \$1,101.00
<b>Adjustments</b>			
Region (New Mexico: 101.13%)	USD \$86.75	USD \$33.40	USD \$12.45
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$7,757.75</b>	<b>USD \$2,987.40</b>	<b>USD \$1,113.45</b>

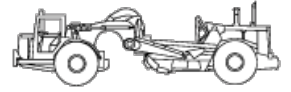
Date Last Updated: Jun 01, 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 657G

Dual Engine Conventional Scrapers

 Size Class:  
**18 cu yd & Over**  
 Weight:  
**149417 lbs**


### Configuration for 657G

Horsepower	<b>564.0 hp</b>	Operator Protection	<b>EROPS</b>
Power Mode	<b>Diesel</b>	Scraper Capacity	<b>32.0 - 44.0 cu yd</b>
Scraper Horsepower	<b>410.0</b>		

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$125.42/hr	USD \$118.11/hr	-5.8%
Cost of Facilities Capital (CFC)	USD \$89.63/hr	USD \$66.41/hr	-25.9%
Overhead	USD \$159.34/hr	USD \$116.47/hr	-26.9%
Overhaul Labor	USD \$17.97/hr	USD \$8.36/hr	-53.5%
Overhaul Parts	USD \$154.96/hr	USD \$113.27/hr	-26.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$547.33/hr</b>	<b>USD \$422.62/hr</b>	<b>-22.8%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (796hrs -> 1,089hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.17/hr	USD \$5.66/hr	-53.5%
Field Parts	USD \$156.17/hr	USD \$21.86/hr	-86%
Ground Engaging Component (GEC)	USD \$6.65/hr	USD \$0.00/hr	-100%
Tire	USD \$13.78/hr	-	-
Electrical/Fuel	USD \$176.88/hr	USD \$48.35/hr	-72.7%
Lube	USD \$37.46/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$403.11/hr</b>	<b>USD \$127.12/hr</b>	<b>-68.5%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$5,289.96 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$18,514.88 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$105,799.29 -> USD \$23,804.86)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$547.33/hr	USD \$422.62/hr	-22.8%
Hourly Operating Costs	USD \$403.11/hr	USD \$127.12/hr	-68.5%
<b>Total Hourly Cost</b>	<b>USD \$950.44</b>	<b>USD \$549.74/hr</b>	<b>-42.2%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$374.40/hr	USD \$301.00/hr	-19.6%
Idle	USD \$724.21/hr	USD \$470.98/hr	-35%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com

All prices shown in US dollars (\$)

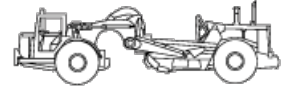
## AED Green Book®

July 22, 2024

### Caterpillar 657G

Dual Engine Conventional Scrapers

Size Class:  
**18 cu yd & Over**  
 Weight:  
**149417 lbs**



### Configuration for 657G

Horsepower	<b>564.0 hp</b>	Operator Protection	<b>EROPS</b>
Power Mode	<b>Diesel</b>	Scraper Capacity	<b>32.0 - 44.0 cu yd</b>
Scraper Horsepower	<b>410.0</b>		

### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$23,658.00	USD \$7,283.00	USD \$2,825.00
<b>Adjustments</b>			
Region (New Mexico: 98.83%)	(USD \$276.21)	(USD \$85.03)	(USD \$32.98)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$23,381.79</b>	<b>USD \$7,197.97</b>	<b>USD \$2,792.02</b>

Date Last Updated: Jun 01, 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 730

Articulated Rear Dumps


 Size Class:  
**25.5 - 29.4 mt**  
 Weight:  
 N/A

### Configuration for 730

Axle Configuration	<b>6 x 6</b>	Body Capacity	<b>23 cu yd</b>
Horsepower	<b>370 hp</b>	Power Mode	<b>Diesel</b>
Rated Payload	<b>28.1 mt</b>		

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$33.06/hr	USD \$31.11/hr	-5.9%
Cost of Facilities Capital (CFC)	USD \$15.69/hr	USD \$12.45/hr	-20.7%
Overhead	USD \$25.79/hr	USD \$20.12/hr	-22%
Overhaul Labor	USD \$23.51/hr	USD \$11.67/hr	-50.4%
Overhaul Parts	USD \$16.92/hr	USD \$13.20/hr	-22%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$114.97/hr</b>	<b>USD \$88.54/hr</b>	<b>-23%</b>

**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (936hrs -> 1,200hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.18/hr	USD \$6.05/hr	-50.4%
Field Parts	USD \$10.44/hr	USD \$1.36/hr	-87%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$8.04/hr	-	-
Electrical/Fuel	USD \$25.86/hr	USD \$7.07/hr	-72.7%
Lube	USD \$6.61/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$63.13/hr</b>	<b>USD \$29.12/hr</b>	<b>-53.9%</b>

**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,628.79 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$8,143.95 -> USD \$1,628.79)

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$114.97/hr	USD \$88.54/hr	-23%
Hourly Operating Costs	USD \$63.13/hr	USD \$29.12/hr	-53.9%
<b>Total Hourly Cost</b>	<b>USD \$178.10</b>	<b>USD \$117.66/hr</b>	<b>-33.9%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$74.53/hr	USD \$63.67/hr	-14.6%
Idle	USD \$140.82/hr	USD \$95.61/hr	-32.1%

Revised Date: 3rd quarter 2024

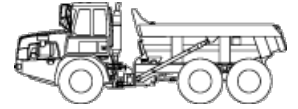
The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**

July 22, 2024

**Caterpillar 730**

Articulated Rear Dumps


 Size Class:  
**25.5 - 29.4 mt**  
 Weight:  
 N/A

**Configuration for 730**

Axle Configuration	<b>6 x 6</b>	Body Capacity	<b>23 cu yd</b>
Horsepower	<b>370 hp</b>	Power Mode	<b>Diesel</b>
Rated Payload	<b>28.1 mt</b>		

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

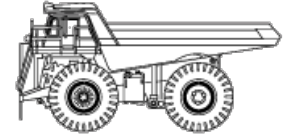
	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$11,577.00	USD \$3,996.00	USD \$1,367.00
<b>Adjustments</b>			
Region (New Mexico: 98.86%)	(USD \$132.03)	(USD \$45.57)	(USD \$15.59)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$11,444.97</b>	<b>USD \$3,950.43</b>	<b>USD \$1,351.41</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 770G

Mechanical Drive Rear Dumps

 Size Class:  
**39.5 - 54.4 mt**  
 Weight:  
 N/A


### Configuration for 770G

 Horsepower **477.0 hp**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$25.19/hr	USD \$23.72/hr	-5.8%
Cost of Facilities Capital (CFC)	USD \$10.00/hr	USD \$8.33/hr	-16.7%
Overhead	USD \$16.25/hr	USD \$13.32/hr	-18%
Overhaul Labor	USD \$1.87/hr	USD \$0.97/hr	-47.8%
Overhaul Parts	USD \$10.66/hr	USD \$8.74/hr	-18%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$63.97/hr</b>	<b>USD \$55.09/hr</b>	<b>-13.9%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,534hrs -> 1,871hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$2.30/hr	USD \$1.20/hr	-47.8%
Field Parts	USD \$6.58/hr	USD \$0.90/hr	-86.3%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$7.29/hr	-	-
Electrical/Fuel	USD \$24.99/hr	USD \$6.83/hr	-72.7%
Lube	USD \$6.65/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$47.80/hr</b>	<b>USD \$22.87/hr</b>	<b>-52.2%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,682.03 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$8,410.13 -> USD \$1,682.03)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$63.97/hr	USD \$55.09/hr	-13.9%
Hourly Operating Costs	USD \$47.80/hr	USD \$22.87/hr	-52.2%
<b>Total Hourly Cost</b>	<b>USD \$111.77</b>	<b>USD \$77.96/hr</b>	<b>-30.3%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$51.44/hr	USD \$45.38/hr	-11.8%
Idle	USD \$88.96/hr	USD \$61.92/hr	-30.4%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

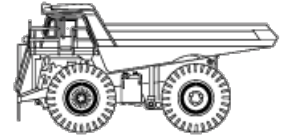


**AED Green Book®**

July 22, 2024

**Caterpillar 770G**

Mechanical Drive Rear Dumps

 Size Class:  
**39.5 - 54.4 mt**  
 Weight:  
 N/A

**Configuration for 770G**

 Horsepower **477.0 hp**
**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	Monthly	Weekly	Daily
Published Rates	USD \$6,400.00	USD \$2,516.00	USD \$878.00
<b>Adjustments</b>			
Region (New Mexico: 109.11%)	USD \$583.04	USD \$229.21	USD \$79.99
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$6,983.04</b>	<b>USD \$2,745.21</b>	<b>USD \$957.99</b>
Date Last Updated: Sep 01, 2023			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 966 GC

4-Wd Articulated Wheel Loaders

 Size Class:  
**275 - 349 hp**  
 Weight:  
 N/A


### Configuration for 966 GC

Bucket Capacity	<b>4.3 cu yd</b>	Horsepower	<b>321 hp</b>
Operator Protection	<b>ROPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$25.44/hr	USD \$23.68/hr	-6.9%
Cost of Facilities Capital (CFC)	USD \$13.21/hr	USD \$10.73/hr	-18.8%
Overhead	USD \$19.71/hr	USD \$15.78/hr	-19.9%
Overhaul Labor	USD \$8.95/hr	USD \$4.56/hr	-49.1%
Overhaul Parts	USD \$8.77/hr	USD \$7.02/hr	-19.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$76.09/hr</b>	<b>USD \$61.77/hr</b>	<b>-18.8%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,229hrs -> 1,535hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$10.92/hr	USD \$5.57/hr	-49.1%
Field Parts	USD \$9.68/hr	USD \$2.21/hr	-77.2%
Ground Engaging Component (GEC)	USD \$1.32/hr	USD \$0.00/hr	-100%
Tire	USD \$9.11/hr	-	-
Electrical/Fuel	USD \$19.94/hr	USD \$5.45/hr	-72.7%
Lube	USD \$5.18/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$56.15/hr</b>	<b>USD \$27.52/hr</b>	<b>-51%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$1,619.37 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,771.19 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$10,121.06 -> USD \$3,390.56)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$76.09/hr	USD \$61.77/hr	-18.8%
Hourly Operating Costs	USD \$56.15/hr	USD \$27.52/hr	-51%
<b>Total Hourly Cost</b>	<b>USD \$132.24</b>	<b>USD \$89.29/hr</b>	<b>-32.5%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$58.36/hr	USD \$50.19/hr	-14%
Idle	USD \$96.03/hr	USD \$67.22/hr	-30%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com

All prices shown in US dollars (\$)

## AED Green Book®

July 22, 2024

### Caterpillar 966 GC

4-Wd Articulated Wheel Loaders

Size Class:  
**275 - 349 hp**  
 Weight:  
**N/A**



### Configuration for 966 GC

Bucket Capacity	<b>4.3 cu yd</b>	Horsepower	<b>321 hp</b>
Operator Protection	<b>ROPS</b>	Power Mode	<b>Diesel</b>

### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$10,859.00	USD \$3,639.00	USD \$1,149.00
<b>Adjustments</b>			
Region (New Mexico: 99.21%)	(USD \$86.09)	(USD \$28.85)	(USD \$9.11)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$10,772.91</b>	<b>USD \$3,610.15</b>	<b>USD \$1,139.89</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 986K

4-Wd Articulated Wheel Loaders

 Size Class:  
**350 - 499 hp**  
 Weight:  
 N/A


### Configuration for 986K

 Horsepower **378.0 hp**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$28.87/hr	USD \$26.92/hr	-6.7%
Cost of Facilities Capital (CFC)	USD \$14.59/hr	USD \$11.82/hr	-19%
Overhead	USD \$24.06/hr	USD \$19.22/hr	-20.1%
Overhaul Labor	USD \$9.06/hr	USD \$4.60/hr	-49.2%
Overhaul Parts	USD \$9.69/hr	USD \$7.74/hr	-20.1%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$86.26/hr</b>	<b>USD \$70.30/hr</b>	<b>-18.5%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,215hrs -> 1,521hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$11.05/hr	USD \$5.62/hr	-49.2%
Field Parts	USD \$10.69/hr	USD \$2.43/hr	-77.2%
Ground Engaging Component (GEC)	USD \$1.46/hr	USD \$0.00/hr	-100%
Tire	USD \$7.92/hr	-	-
Electrical/Fuel	USD \$26.56/hr	USD \$7.26/hr	-72.7%
Lube	USD \$6.14/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$63.81/hr</b>	<b>USD \$29.37/hr</b>	<b>-54%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$1,767.88 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,933.62 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$11,049.24 -> USD \$3,701.50)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$86.26/hr	USD \$70.30/hr	-18.5%
Hourly Operating Costs	USD \$63.81/hr	USD \$29.37/hr	-54%
<b>Total Hourly Cost</b>	<b>USD \$150.07</b>	<b>USD \$99.67/hr</b>	<b>-33.6%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$67.51/hr	USD \$57.96/hr	-14.2%
Idle	USD \$112.82/hr	USD \$77.56/hr	-31.3%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com

All prices shown in US dollars (\$)

## AED Green Book®

July 22, 2024

### Caterpillar 986K

4-Wd Articulated Wheel Loaders

Size Class:  
**350 - 499 hp**  
 Weight:  
 N/A



### Configuration for 986K

Horsepower **378.0 hp**

### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	Monthly	Weekly	Daily
Published Rates	USD \$13,397.00	USD \$4,534.00	USD \$1,380.00
<b>Adjustments</b>			
Region (New Mexico: 99.21%)	(USD \$106.21)	(USD \$35.95)	(USD \$10.94)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$13,290.79</b>	<b>USD \$4,498.05</b>	<b>USD \$1,369.06</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Caterpillar 990K

4-Wd Articulated Wheel Loaders

 Size Class:  
**500 - 999 hp**  
 Weight:  
 N/A


### Configuration for 990K

 Horsepower **699.0 hp**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$88.55/hr	USD \$82.41/hr	-6.9%
Cost of Facilities Capital (CFC)	USD \$43.91/hr	USD \$35.50/hr	-19.1%
Overhead	USD \$56.87/hr	USD \$45.32/hr	-20.3%
Overhaul Labor	USD \$9.17/hr	USD \$4.65/hr	-49.3%
Overhaul Parts	USD \$29.16/hr	USD \$23.23/hr	-20.3%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$227.66/hr</b>	<b>USD \$191.11/hr</b>	<b>-16.1%</b>

**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,506hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$11.19/hr	USD \$5.67/hr	-49.3%
Field Parts	USD \$32.17/hr	USD \$7.31/hr	-77.3%
Ground Engaging Component (GEC)	USD \$4.38/hr	USD \$0.00/hr	-100%
Tire	USD \$39.97/hr	-	-
Electrical/Fuel	USD \$62.21/hr	USD \$17.01/hr	-72.7%
Lube	USD \$16.57/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$166.49/hr</b>	<b>USD \$86.53/hr</b>	<b>-48%</b>

**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$5,256.49 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$5,749.29 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$32,853.08 -> USD \$11,005.73)

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$227.66/hr	USD \$191.11/hr	-16.1%
Hourly Operating Costs	USD \$166.49/hr	USD \$86.53/hr	-48%
<b>Total Hourly Cost</b>	<b>USD \$394.15</b>	<b>USD \$277.64/hr</b>	<b>-29.6%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$189.33/hr	USD \$163.23/hr	-13.8%
Idle	USD \$289.87/hr	USD \$208.12/hr	-28.2%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Caterpillar 990K**

4-Wd Articulated Wheel Loaders

 Size Class:  
**500 - 999 hp**  
 Weight:  
 N/A

**Configuration for 990K**

 Horsepower **699.0 hp**
**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

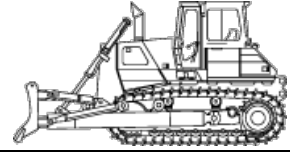
	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$34,992.00	USD \$12,700.00	USD \$4,623.00
<b>Adjustments</b>			
Region (New Mexico: 99.21%)	(USD \$277.42)	(USD \$100.69)	(USD \$36.65)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$34,714.58</b>	<b>USD \$12,599.31</b>	<b>USD \$4,586.35</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

July 22, 2024

**Caterpillar D6**  
 Standard Crawler Dozers

 Size Class:  
**190 - 259 hp**  
 Weight:  
 N/A


### Configuration for D6

 Horsepower **215.0 hp**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$26.76/hr	USD \$25.04/hr	-6.4%
Cost of Facilities Capital (CFC)	USD \$11.84/hr	USD \$9.54/hr	-19.5%
Overhead	USD \$19.04/hr	USD \$15.11/hr	-20.6%
Overhaul Labor	USD \$7.89/hr	USD \$3.98/hr	-49.5%
Overhaul Parts	USD \$19.43/hr	USD \$15.42/hr	-20.6%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$84.97/hr</b>	<b>USD \$69.10/hr</b>	<b>-18.7%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,512hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$9.72/hr	USD \$4.91/hr	-49.5%
Field Parts	USD \$18.83/hr	USD \$4.98/hr	-73.5%
Ground Engaging Component (GEC)	USD \$3.14/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$25.32/hr	USD \$6.92/hr	-72.7%
Lube	USD \$5.30/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$62.32/hr</b>	<b>USD \$22.12/hr</b>	<b>-64.5%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$3,766.41 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$3,766.41 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$18,832.04 -> USD \$7,532.82)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$84.97/hr	USD \$69.10/hr	-18.7%
Hourly Operating Costs	USD \$62.32/hr	USD \$22.12/hr	-64.5%
<b>Total Hourly Cost</b>	<b>USD \$147.29</b>	<b>USD \$91.22/hr</b>	<b>-38.1%</b>

### Non-active use rates

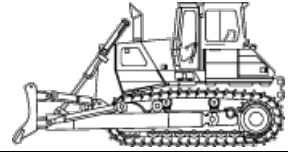
	Standard Value	User Adjusted Value	Variance
Standby	USD \$57.65/hr	USD \$49.70/hr	-13.8%
Idle	USD \$110.30/hr	USD \$76.02/hr	-31.1%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)



**AED Green Book®**
**Caterpillar D6**  
 Standard Crawler Dozers

 Size Class:  
**190 - 259 hp**  
 Weight:  
 N/A

**Configuration for D6**

 Horsepower **215.0 hp**
**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

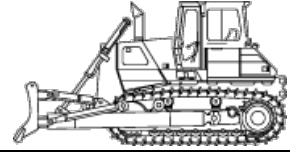
	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
<b>Published Rates</b>	USD \$11,675.00	USD \$3,949.00	USD \$1,244.00
<b>Adjustments</b>			
Region (New Mexico: 108.79%)	USD \$1,025.84	USD \$346.98	USD \$109.31
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$12,700.83</b>	<b>USD \$4,295.98</b>	<b>USD \$1,353.31</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Caterpillar D6XL**  
Standard Crawler Dozers

Size Class:  
**190 - 259 hp**  
Weight:  
**N/A**



### Configuration for D6XL

Dozer Type	<b>SU</b>	Horsepower	<b>250.8 hp</b>
Operator Protection	<b>ROPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$41.22/hr	USD \$38.57/hr	-6.4%
Cost of Facilities Capital (CFC)	USD \$18.24/hr	USD \$14.69/hr	-19.5%
Overhead	USD \$24.51/hr	USD \$19.45/hr	-20.6%
Overhaul Labor	USD \$7.89/hr	USD \$3.98/hr	-49.5%
Overhaul Parts	USD \$29.93/hr	USD \$23.75/hr	-20.6%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$121.78/hr</b>	<b>USD \$100.44/hr</b>	<b>-17.5%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,512hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$9.72/hr	USD \$4.91/hr	-49.5%
Field Parts	USD \$29.00/hr	USD \$7.67/hr	-73.5%
Ground Engaging Component (GEC)	USD \$4.83/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$29.54/hr	USD \$8.08/hr	-72.7%
Lube	USD \$7.22/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$80.32/hr</b>	<b>USD \$27.88/hr</b>	<b>-65.3%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$5,800.19 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$5,800.19 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$29,000.94 -> USD \$11,600.38)			

### Total

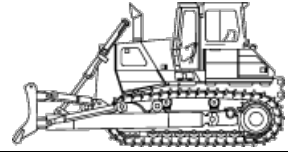
	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$121.78/hr	USD \$100.44/hr	-17.5%
Hourly Operating Costs	USD \$80.32/hr	USD \$27.88/hr	-65.3%
<b>Total Hourly Cost</b>	<b>USD \$202.10</b>	<b>USD \$128.32/hr</b>	<b>-36.5%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$83.96/hr	USD \$72.71/hr	-13.4%
Idle	USD \$151.32/hr	USD \$108.52/hr	-28.3%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Caterpillar D6XL**  
 Standard Crawler Dozers

 Size Class:  
**190 - 259 hp**  
 Weight:  
 N/A

**Configuration for D6XL**

Dozer Type	<b>SU</b>	Horsepower	<b>250.8 hp</b>
Operator Protection	<b>ROPS</b>	Power Mode	<b>Diesel</b>

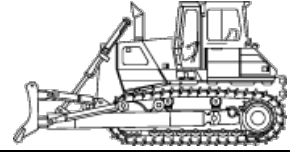
**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$11,675.00	USD \$3,949.00	USD \$1,244.00
<b>Adjustments</b>			
Region (New Mexico: 108.79%)	USD \$1,025.84	USD \$346.98	USD \$109.31
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$12,700.83</b>	<b>USD \$4,295.98</b>	<b>USD \$1,353.31</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Caterpillar D9T (disc. 2023)**  
 Standard Crawler Dozers

 Size Class:  
**360 - 519 hp**  
 Weight:  
**105600 lbs**

### Configuration for D9T (disc. 2023)

Dozer Type	<b>Semi-U</b>	Horsepower	<b>410.0 hp</b>
Operator Protection	<b>ROPS/FOPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$81.91/hr	USD \$77.07/hr	-5.9%
Cost of Facilities Capital (CFC)	USD \$31.74/hr	USD \$26.13/hr	-17.7%
Overhead	USD \$47.17/hr	USD \$38.27/hr	-18.9%
Overhaul Labor	USD \$15.04/hr	USD \$7.76/hr	-48.4%
Overhaul Parts	USD \$73.04/hr	USD \$59.26/hr	-18.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$248.90/hr</b>	<b>USD \$208.50/hr</b>	<b>-16.2%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,479hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$17.61/hr	USD \$9.09/hr	-48.4%
Field Parts	USD \$71.14/hr	USD \$19.24/hr	-73%
Ground Engaging Component (GEC)	USD \$11.86/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$47.65/hr	USD \$13.03/hr	-72.7%
Lube	USD \$13.95/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$162.21/hr</b>	<b>USD \$55.31/hr</b>	<b>-65.9%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$14,228.05 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$14,228.05 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$71,140.27 -> USD \$28,456.10)			

### Total

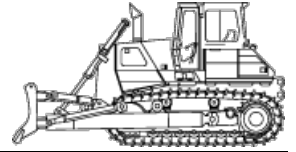
	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$248.90/hr	USD \$208.50/hr	-16.2%
Hourly Operating Costs	USD \$162.21/hr	USD \$55.31/hr	-65.9%
<b>Total Hourly Cost</b>	<b>USD \$411.11</b>	<b>USD \$263.81/hr</b>	<b>-35.8%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$160.82/hr	USD \$141.47/hr	-12%
Idle	USD \$296.55/hr	USD \$221.52/hr	-25.3%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Caterpillar D9T (disc. 2023)**  
 Standard Crawler Dozers

 Size Class:  
**360 - 519 hp**  
 Weight:  
**105600 lbs**
**Configuration for D9T (disc. 2023)**

Dozer Type	<b>Semi-U</b>	Horsepower	<b>410.0 hp</b>
Operator Protection	<b>ROPS/FOPS</b>	Power Mode	<b>Diesel</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$28,223.00	USD \$10,126.00	USD \$3,698.00
<b>Adjustments</b>			
Region (New Mexico: 108.79%)	USD \$2,479.84	USD \$889.73	USD \$324.93
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$30,702.84</b>	<b>USD \$11,015.73</b>	<b>USD \$4,022.93</b>
Date Last Updated: Jun 01, 2024			

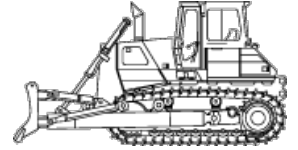
The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

July 22, 2024

### Caterpillar D11T CD (disc. 2018)

Standard Crawler Dozers



Size Class:  
**520 hp & Over**  
 Weight:  
 N/A

### Configuration for D11T CD (disc. 2018)

Dozer Type	<b>U Blade</b>	Horsepower	<b>850.0 hp</b>
Operator Protection	<b>EROPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$83.80/hr	USD \$78.85/hr	-5.9%
Cost of Facilities Capital (CFC)	USD \$32.05/hr	USD \$26.38/hr	-17.7%
Overhead	USD \$43.91/hr	USD \$35.63/hr	-18.9%
Overhaul Labor	USD \$15.04/hr	USD \$7.76/hr	-48.4%
Overhaul Parts	USD \$87.93/hr	USD \$71.34/hr	-18.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$262.72/hr</b>	<b>USD \$219.97/hr</b>	<b>-16.3%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,479hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$17.61/hr	USD \$9.09/hr	-48.4%
Field Parts	USD \$85.64/hr	USD \$23.16/hr	-73%
Ground Engaging Component (GEC)	USD \$14.27/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$97.10/hr	USD \$26.54/hr	-72.7%
Lube	USD \$18.99/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$233.61/hr</b>	<b>USD \$77.78/hr</b>	<b>-66.7%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$17,127.44 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$17,127.44 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$85,637.19 -> USD \$34,254.88)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$262.72/hr	USD \$219.97/hr	-16.3%
Hourly Operating Costs	USD \$233.61/hr	USD \$77.78/hr	-66.7%
<b>Total Hourly Cost</b>	<b>USD \$496.33</b>	<b>USD \$297.75/hr</b>	<b>-40%</b>

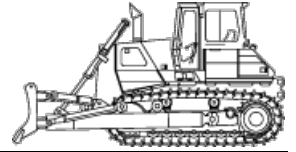
### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$159.75/hr	USD \$140.87/hr	-11.8%
Idle	USD \$359.82/hr	USD \$246.52/hr	-31.5%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Caterpillar D11T CD (disc. 2018)**  
 Standard Crawler Dozers

 Size Class:  
**520 hp & Over**  
 Weight:  
 N/A

**Configuration for D11T CD (disc. 2018)**

Dozer Type	<b>U Blade</b>	Horsepower	<b>850.0 hp</b>
Operator Protection	<b>EROPS</b>	Power Mode	<b>Diesel</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$36,670.00	USD \$13,570.00	USD \$4,999.00
<b>Adjustments</b>			
Region (New Mexico: 108.79%)	USD \$3,222.04	USD \$1,192.34	USD \$439.24
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$39,892.04</b>	<b>USD \$14,762.34</b>	<b>USD \$5,438.24</b>
Date Last Updated: Jun 01, 2024			

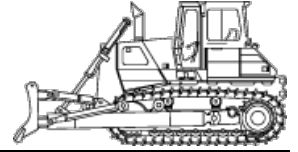
The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Adjustments for WalterNiccoli58 in All Saved Models

July 22, 2024

### Caterpillar D11T (disc. 2018)

Standard Crawler Dozers



Size Class:  
**520 hp & Over**  
 Weight:  
**208885 lbs**

### Configuration for D11T (disc. 2018)

Dozer Type	<b>U Blade</b>	Horsepower	<b>850.0 hp</b>
Operator Protection	<b>EROPS</b>	Power Mode	<b>Diesel</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$162.97/hr	USD \$153.36/hr	-5.9%
Cost of Facilities Capital (CFC)	USD \$62.33/hr	USD \$51.31/hr	-17.7%
Overhead	USD \$69.53/hr	USD \$56.41/hr	-18.9%
Overhaul Labor	USD \$15.04/hr	USD \$7.76/hr	-48.4%
Overhaul Parts	USD \$171.00/hr	USD \$138.74/hr	-18.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$480.86/hr</b>	<b>USD \$407.58/hr</b>	<b>-15.2%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,200hrs -> 1,479hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$17.61/hr	USD \$9.09/hr	-48.4%
Field Parts	USD \$166.55/hr	USD \$45.04/hr	-73%
Ground Engaging Component (GEC)	USD \$27.76/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$97.10/hr	USD \$26.54/hr	-72.7%
Lube	USD \$27.75/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$336.76/hr</b>	<b>USD \$108.43/hr</b>	<b>-67.8%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$33,309.26 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$33,309.26 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$166,546.28 -> USD \$66,618.52)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$480.86/hr	USD \$407.58/hr	-15.2%
Hourly Operating Costs	USD \$336.76/hr	USD \$108.43/hr	-67.8%
<b>Total Hourly Cost</b>	<b>USD \$817.62</b>	<b>USD \$516.01/hr</b>	<b>-36.9%</b>

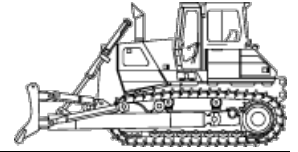
### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$294.82/hr	USD \$261.08/hr	-11.4%
Idle	USD \$577.96/hr	USD \$434.13/hr	-24.9%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)



**Adjustments for WalterNiccoli58 in All Saved Models**
**Caterpillar D11T (disc. 2018)**  
 Standard Crawler Dozers

 Size Class:  
**520 hp & Over**  
 Weight:  
**208885 lbs**
**Configuration for D11T (disc. 2018)**

Dozer Type	<b>U Blade</b>	Horsepower	<b>850.0 hp</b>
Operator Protection	<b>EROPS</b>	Power Mode	<b>Diesel</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

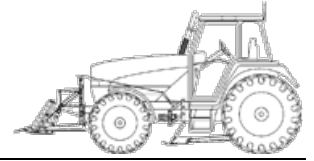
	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$36,670.00	USD \$13,570.00	USD \$4,999.00
<b>Adjustments</b>			
Region (New Mexico: 108.79%)	USD \$3,222.04	USD \$1,192.34	USD \$439.24
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$39,892.04</b>	<b>USD \$14,762.34</b>	<b>USD \$5,438.24</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**Custom Cost Evaluator**

July 22, 2024

**Deere 7330**  
 Wheel Tractors

 Size Class:  
**125 - 174 hp**  
 Weight:  
 N/A

**Configuration for 7330**

 Horsepower **150.0 hp** Power Mode **Diesel**
**Hourly Ownership Costs**

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$17.17/hr	USD \$16.10/hr	-6.2%
Cost of Facilities Capital (CFC)	USD \$8.91/hr	USD \$5.62/hr	-36.8%
Overhead	USD \$14.26/hr	USD \$8.72/hr	-38.9%
Overhaul Labor	USD \$9.62/hr	USD \$3.74/hr	-61.1%
Overhaul Parts	USD \$10.07/hr	USD \$6.15/hr	-38.9%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$60.03/hr</b>	<b>USD \$40.34/hr</b>	<b>-32.8%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (517hrs -> 846hrs)			

**Hourly Operating Costs**

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.69/hr	USD \$4.93/hr	-61.1%
Field Parts	USD \$8.83/hr	USD \$0.90/hr	-89.8%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.92/hr	-	-
Electrical/Fuel	USD \$19.75/hr	USD \$5.40/hr	-72.7%
Lube	USD \$2.91/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$45.11/hr</b>	<b>USD \$15.07/hr</b>	<b>-66.6%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$760.53 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$3,802.66 -> USD \$760.53)			

**Total**

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$60.03/hr	USD \$40.34/hr	-32.8%
Hourly Operating Costs	USD \$45.11/hr	USD \$15.07/hr	-66.6%
<b>Total Hourly Cost</b>	<b>USD \$105.13</b>	<b>USD \$55.41/hr</b>	<b>-47.3%</b>

**Non-active use rates**

	Standard Value	User Adjusted Value	Variance
Standby	USD \$40.34/hr	USD \$30.45/hr	-24.5%
Idle	USD \$79.78/hr	USD \$45.74/hr	-42.7%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

www.equipmentwatch.com

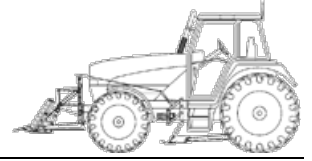
All prices shown in US dollars (\$)

## AED Green Book®

July 22, 2024

**Deere 7330**  
Wheel Tractors

Size Class:  
**125 - 174 hp**  
Weight:  
N/A



### Configuration for 7330

Horsepower	<b>150.0 hp</b>	Power Mode	<b>Diesel</b>
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### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$3,891.00	USD \$1,303.00	USD \$463.00
<b>Adjustments</b>			
Region (New Mexico: 104.3%)	USD \$167.42	USD \$56.07	USD \$19.92
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$4,058.42</b>	<b>USD \$1,359.07</b>	<b>USD \$482.92</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

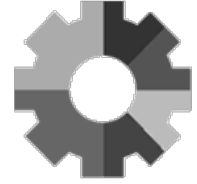
### Finn B260

Trailer Mounted Mulchers

Size Class:

**51 hp & Over**

Weight:

**4880 lbs**


### Configuration for B260

Horsepower

**115.0**

Power Mode

**Diesel**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$5.80/hr	USD \$5.45/hr	-6.1%
Cost of Facilities Capital (CFC)	USD \$3.14/hr	USD \$1.73/hr	-45%
Overhead	USD \$3.33/hr	USD \$1.75/hr	-47.5%
Overhaul Labor	USD \$7.08/hr	USD \$2.36/hr	-66.6%
Overhaul Parts	USD \$7.16/hr	USD \$3.75/hr	-47.5%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$26.51/hr</b>	<b>USD \$15.04/hr</b>	<b>-43.3%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (373hrs -> 711hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$8.85/hr	USD \$2.95/hr	-66.6%
Field Parts	USD \$4.14/hr	USD \$0.28/hr	-93.2%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.60/hr	-	-
Electrical/Fuel	USD \$15.10/hr	USD \$4.13/hr	-72.7%
Lube	USD \$1.76/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$30.45/hr</b>	<b>USD \$9.73/hr</b>	<b>-68.1%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$201.40 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$1,342.66 -> USD \$201.40)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$26.51/hr	USD \$15.04/hr	-43.3%
Hourly Operating Costs	USD \$30.45/hr	USD \$9.73/hr	-68.1%
<b>Total Hourly Cost</b>	<b>USD \$56.97</b>	<b>USD \$24.77/hr</b>	<b>-56.5%</b>

### Non-active use rates

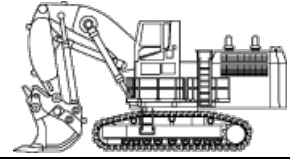
	Standard Value	User Adjusted Value	Variance
Standby	USD \$12.28/hr	USD \$8.92/hr	-27.3%
Idle	USD \$41.62/hr	USD \$19.17/hr	-53.9%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Hitachi EX3600-5 (disc. 2009)**  
Hydraulic Shovels



Size Class:  
**150.5 mt & Over**  
Weight:  
**772000 lbs**

### Configuration for EX3600-5 (disc. 2009)

Horsepower **1880.0 hp** Operating Weight **350.0 mt**  
Power Mode **Diesel**

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$157.54/hr	USD \$148.69/hr	-5.6%
Cost of Facilities Capital (CFC)	USD \$64.97/hr	USD \$59.36/hr	-8.6%
Overhead	USD \$72.89/hr	USD \$66.17/hr	-9.2%
Overhaul Labor	USD \$22.84/hr	USD \$13.19/hr	-42.2%
Overhaul Parts	USD \$176.95/hr	USD \$160.62/hr	-9.2%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$495.19/hr</b>	<b>USD \$448.03/hr</b>	<b>-9.5%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,850hrs -> 2,038hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.18/hr	USD \$7.04/hr	-42.2%
Field Parts	USD \$193.75/hr	USD \$63.31/hr	-67.3%
Ground Engaging Component (GEC)	USD \$31.00/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$302.59/hr	USD \$82.72/hr	-72.7%
Lube	USD \$62.36/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$601.88/hr</b>	<b>USD \$215.44/hr</b>	<b>-64.2%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$57,348.98 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$71,686.22 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$286,744.88 -> USD \$129,035.20)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$495.19/hr	USD \$448.03/hr	-9.5%
Hourly Operating Costs	USD \$601.88/hr	USD \$215.44/hr	-64.2%
<b>Total Hourly Cost</b>	<b>USD \$1,097.07</b>	<b>USD \$663.47/hr</b>	<b>-39.5%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$295.40/hr	USD \$274.21/hr	-7.2%
Idle	USD \$797.78/hr	USD \$530.75/hr	-33.5%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Hyundai HL780XTD-9

4-Wd Articulated Wheel Loaders

 Size Class:  
**275 - 349 hp**  
 Weight:  
**67900 lbs**


### Configuration for HL780XTD-9

Horsepower	<b>344.0 hp</b>	Operator Protection	<b>EROPS</b>
Power Mode	<b>Diesel</b>		

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$22.41/hr	USD \$20.86/hr	-6.9%
Cost of Facilities Capital (CFC)	USD \$11.63/hr	USD \$9.45/hr	-18.8%
Overhead	USD \$13.71/hr	USD \$10.98/hr	-19.9%
Overhaul Labor	USD \$8.95/hr	USD \$4.56/hr	-49.1%
Overhaul Parts	USD \$7.73/hr	USD \$6.19/hr	-19.9%

<b>Total Hourly Ownership Cost:</b>	<b>USD \$64.43/hr</b>	<b>USD \$52.03/hr</b>	<b>-19.3%</b>
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**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (1,229hrs -> 1,535hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$10.92/hr	USD \$5.57/hr	-49.1%
Field Parts	USD \$8.52/hr	USD \$1.95/hr	-77.2%
Ground Engaging Component (GEC)	USD \$1.16/hr	USD \$0.00/hr	-100%
Tire	USD \$8.02/hr	-	-
Electrical/Fuel	USD \$21.37/hr	USD \$5.84/hr	-72.7%
Lube	USD \$4.95/hr	-	-

<b>Total Operating Ownership Cost:</b>	<b>USD \$54.95/hr</b>	<b>USD \$26.32/hr</b>	<b>-52.1%</b>
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**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Annual Ground Engaging Component (USD \$1,426.46 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,560.19 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$8,915.36 -> USD \$2,986.65)

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$64.43/hr	USD \$52.03/hr	-19.3%
Hourly Operating Costs	USD \$54.95/hr	USD \$26.32/hr	-52.1%
<b>Total Hourly Cost</b>	<b>USD \$119.39</b>	<b>USD \$78.35/hr</b>	<b>-34.4%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$47.75/hr	USD \$41.28/hr	-13.6%
Idle	USD \$85.81/hr	USD \$57.87/hr	-32.6%

Revised Date: 3rd quarter 2024

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www.equipmentwatch.com

All prices shown in US dollars (\$)

## AED Green Book®

July 22, 2024

### Hyundai HL780XTD-9

4-Wd Articulated Wheel Loaders

Size Class:  
**275 - 349 hp**  
 Weight:  
**67900 lbs**



### Configuration for HL780XTD-9

Horsepower	<b>344.0 hp</b>	Operator Protection	<b>EROPS</b>
Power Mode	<b>Diesel</b>		

### AED Rental Rates

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

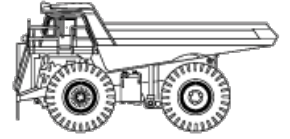
	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$10,859.00	USD \$3,639.00	USD \$1,149.00
<b>Adjustments</b>			
Region (New Mexico: 99.21%)	(USD \$86.09)	(USD \$28.85)	(USD \$9.11)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$10,772.91</b>	<b>USD \$3,610.15</b>	<b>USD \$1,139.89</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

### Komatsu 730E

Electric Drive Rear Dumps

 Size Class:  
**169.5 - 199.4 mt**  
 Weight:  
**309950 lbs**


### Configuration for 730E

Horsepower	<b>1860.0 hp</b>	Power Mode	<b>Diesel</b>
Rated Payload	<b>183.7 mt</b>	Wheel Motor Model	<b>GE788</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$57.76/hr	USD \$54.40/hr	-5.8%
Cost of Facilities Capital (CFC)	USD \$25.23/hr	USD \$22.17/hr	-12.1%
Overhead	USD \$29.49/hr	USD \$25.66/hr	-13%
Overhaul Labor	USD \$10.21/hr	USD \$5.65/hr	-44.6%
Overhaul Parts	USD \$23.65/hr	USD \$20.58/hr	-13%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$146.34/hr</b>	<b>USD \$128.46/hr</b>	<b>-12.2%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,850hrs -> 2,126hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$12.18/hr	USD \$6.75/hr	-44.6%
Field Parts	USD \$11.14/hr	USD \$1.62/hr	-85.5%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$21.21/hr	-	-
Electrical/Fuel	USD \$104.62/hr	USD \$28.60/hr	-72.7%
Lube	USD \$20.01/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$169.16/hr</b>	<b>USD \$78.18/hr</b>	<b>-53.8%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$3,436.08 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$17,180.42 -> USD \$3,436.08)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$146.34/hr	USD \$128.46/hr	-12.2%
Hourly Operating Costs	USD \$169.16/hr	USD \$78.18/hr	-53.8%
<b>Total Hourly Cost</b>	<b>USD \$315.51</b>	<b>USD \$206.64/hr</b>	<b>-34.5%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$112.49/hr	USD \$102.24/hr	-9.1%
Idle	USD \$250.96/hr	USD \$157.06/hr	-37.4%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)



## Custom Cost Evaluator

**Miscellaneous 6000 330**  
Off-Highway Water Tanker Trucks

Size Class:  
**300 - 399 hp**  
Weight:  
**54400 lbs**



### Configuration for 6000 330

Horsepower	<b>330.0</b>	Power Mode	<b>Diesel</b>
Tank Capacity	<b>6000.0 gal</b>		

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$22.90/hr	USD \$21.43/hr	-6.4%
Cost of Facilities Capital (CFC)	USD \$16.53/hr	USD \$11.41/hr	-31%
Overhead	USD \$15.43/hr	USD \$10.45/hr	-32.3%
Overhaul Labor	USD \$3.10/hr	USD \$1.33/hr	-56.9%
Overhaul Parts	USD \$11.96/hr	USD \$8.10/hr	-32.3%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$69.91/hr</b>	<b>USD \$52.72/hr</b>	<b>-24.6%</b>

**User Defined Adjustments:** Sales Tax (5.1% -> 0%) Annual Use Hours (711hrs -> 1,050hrs)

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$1.55/hr	USD \$0.67/hr	-56.9%
Field Parts	USD \$22.55/hr	USD \$2.54/hr	-88.7%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$6.42/hr	-	-
Electrical/Fuel	USD \$41.16/hr	USD \$11.25/hr	-72.7%
Lube	USD \$6.58/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$78.27/hr</b>	<b>USD \$27.47/hr</b>	<b>-64.9%</b>

**User Defined Adjustments:** Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$2,671.74 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$13,358.67 -> USD \$2,671.74)

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$69.91/hr	USD \$52.72/hr	-24.6%
Hourly Operating Costs	USD \$78.27/hr	USD \$27.47/hr	-64.9%
<b>Total Hourly Cost</b>	<b>USD \$148.18</b>	<b>USD \$80.19/hr</b>	<b>-45.9%</b>

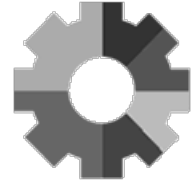
### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$54.86/hr	USD \$43.29/hr	-21.1%
Idle	USD \$111.08/hr	USD \$63.97/hr	-42.4%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Miscellaneous 6000 330**  
 Off-Highway Water Tanker Trucks

 Size Class:  
**300 - 399 hp**  
 Weight:  
**54400 lbs**

**Configuration for 6000 330**

Horsepower	<b>330.0</b>	Power Mode	<b>Diesel</b>
Tank Capacity	<b>6000.0 gal</b>		

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$10,644.00	USD \$3,853.00	USD \$1,435.00
<b>Adjustments</b>			
Region (New Mexico: 98.83%)	(USD \$124.27)	(USD \$44.98)	(USD \$16.75)
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$10,519.73</b>	<b>USD \$3,808.02</b>	<b>USD \$1,418.25</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Miscellaneous MSR-189H**  
Crawler Tractor Multi-Shank Rippers

Size Class:  
**To 260 hp**  
Weight:  
**3557 lbs**



### Configuration for MSR-189H

Horsepower Ripper Type	<b>130.0 hp</b> Parallelogram	Number Of Shanks Power Mode	<b>3.0</b> Hydraulic
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### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$2.64/hr	USD \$2.50/hr	-5.1%
Cost of Facilities Capital (CFC)	USD \$0.53/hr	USD \$0.43/hr	-18.5%
Overhead	USD \$0.66/hr	USD \$0.52/hr	-21.1%
Overhaul Labor	USD \$0.82/hr	USD \$0.41/hr	-49.8%
Overhaul Parts	USD \$0.95/hr	USD \$0.75/hr	-21.1%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$5.60/hr</b>	<b>USD \$4.62/hr</b>	<b>-17.5%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,285hrs -> 1,629hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$1.37/hr	USD \$0.69/hr	-49.8%
Field Parts	USD \$1.18/hr	USD \$0.93/hr	-21.1%
Ground Engaging Component (GEC)	USD \$0.99/hr	USD \$0.00/hr	-100%
Tire	USD \$0.00/hr	-	-
Electrical/Fuel	USD \$0.00/hr	-	-
Lube	USD \$0.15/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$3.69/hr</b>	<b>USD \$1.77/hr</b>	<b>-52%</b>
<b>User Defined Adjustments:</b> Annual Ground Engaging Component (USD \$1,268.16 -> USD \$0.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$253.63 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$1,268.16 -> USD \$1,521.79)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$5.60/hr	USD \$4.62/hr	-17.5%
Hourly Operating Costs	USD \$3.69/hr	USD \$1.77/hr	-52%
<b>Total Hourly Cost</b>	<b>USD \$9.29</b>	<b>USD \$6.39/hr</b>	<b>-31.2%</b>

### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$3.83/hr	USD \$3.46/hr	-9.7%
Idle	USD \$5.60/hr	USD \$4.62/hr	-17.5%

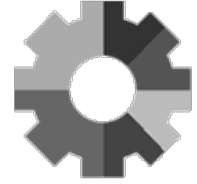
Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Miscellaneous 48 X 60' - 516**  
Single Deck Portable Screening Plants

Size Class:  
**37 in & Over**  
Weight:  
**24900 lbs**



### Configuration for 48 X 60' - 516

Conveyor Size	<b>48' X 60'</b>	Horsepower	<b>110.0</b>
Power Mode	<b>Diesel</b>	Screen Size	<b>5' X 16'</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$10.30/hr	USD \$9.74/hr	-5.5%
Cost of Facilities Capital (CFC)	USD \$3.50/hr	USD \$2.72/hr	-22.3%
Overhead	USD \$4.22/hr	USD \$3.19/hr	-24.2%
Overhaul Labor	USD \$4.39/hr	USD \$2.12/hr	-51.8%
Overhaul Parts	USD \$9.19/hr	USD \$6.96/hr	-24.2%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$31.60/hr</b>	<b>USD \$24.73/hr</b>	<b>-21.7%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,033hrs -> 1,363hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$2.17/hr	USD \$1.05/hr	-51.8%
Field Parts	USD \$8.54/hr	USD \$1.29/hr	-84.8%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.39/hr	-	-
Electrical/Fuel	USD \$17.74/hr	USD \$4.85/hr	-72.7%
Lube	USD \$2.56/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$31.40/hr</b>	<b>USD \$10.14/hr</b>	<b>-67.7%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,763.65 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$7,054.61 -> USD \$1,763.65)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$31.60/hr	USD \$24.73/hr	-21.7%
Hourly Operating Costs	USD \$31.40/hr	USD \$10.14/hr	-67.7%
<b>Total Hourly Cost</b>	<b>USD \$63.00</b>	<b>USD \$34.87/hr</b>	<b>-44.6%</b>

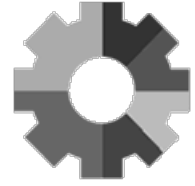
### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$18.02/hr	USD \$15.65/hr	-13.1%
Idle	USD \$49.34/hr	USD \$29.58/hr	-40%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Miscellaneous 48 X 60' - 516**  
 Single Deck Portable Screening Plants

 Size Class:  
**37 in & Over**  
 Weight:  
**24900 lbs**

**Configuration for 48 X 60' - 516**

Conveyor Size	<b>48' X 60'</b>	Horsepower	<b>110.0</b>
Power Mode	<b>Diesel</b>	Screen Size	<b>5' X 16'</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$11,357.00	USD \$3,786.00	USD \$1,196.00
<b>Adjustments</b>			
Region (New Mexico: 101.97%)	USD \$224.15	USD \$74.72	USD \$23.61
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$11,581.15</b>	<b>USD \$3,860.72</b>	<b>USD \$1,219.61</b>
Date Last Updated: Jun 01, 2024			

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

## Custom Cost Evaluator

**Miscellaneous 42 X 60' - 516**  
Triple Deck Portable Screening Plants

Size Class:  
**37 in & Over**  
Weight:  
**27900 lbs**



### Configuration for 42 X 60' - 516

Conveyor Size	<b>42' X 60'</b>	Horsepower	<b>110.0</b>
Power Mode	<b>Diesel</b>	Screen Size	<b>5' X 16'</b>

### Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	USD \$10.18/hr	USD \$9.62/hr	-5.5%
Cost of Facilities Capital (CFC)	USD \$2.96/hr	USD \$2.74/hr	-7.5%
Overhead	USD \$3.52/hr	USD \$3.23/hr	-8.3%
Overhaul Labor	USD \$4.40/hr	USD \$2.57/hr	-41.6%
Overhaul Parts	USD \$7.56/hr	USD \$6.93/hr	-8.3%
<b>Total Hourly Ownership Cost:</b>	<b>USD \$28.62/hr</b>	<b>USD \$25.09/hr</b>	<b>-12.3%</b>
<b>User Defined Adjustments:</b> Sales Tax (5.1% -> 0%) Annual Use Hours (1,250hrs -> 1,363hrs)			

### Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	USD \$2.22/hr	USD \$1.29/hr	-41.6%
Field Parts	USD \$7.23/hr	USD \$1.29/hr	-82.1%
Ground Engaging Component (GEC)	USD \$0.00/hr	-	-
Tire	USD \$0.37/hr	-	-
Electrical/Fuel	USD \$17.74/hr	USD \$4.85/hr	-72.7%
Lube	USD \$2.57/hr	-	-
<b>Total Operating Ownership Cost:</b>	<b>USD \$30.12/hr</b>	<b>USD \$10.37/hr</b>	<b>-65.6%</b>
<b>User Defined Adjustments:</b> Fuel (USD \$3.66 -> USD \$1.00) Mechanics Wage (USD \$44.02 -> USD \$28.01) Annual Misc Supply Parts (USD \$1,806.29 -> USD \$0.00) Annual Field Repair Parts Cost (USD \$7,225.16 -> USD \$1,763.65)			

### Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Costs	USD \$28.62/hr	USD \$25.09/hr	-12.3%
Hourly Operating Costs	USD \$30.12/hr	USD \$10.37/hr	-65.6%
<b>Total Hourly Cost</b>	<b>USD \$58.75</b>	<b>USD \$35.46/hr</b>	<b>-39.6%</b>

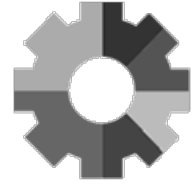
### Non-active use rates

	Standard Value	User Adjusted Value	Variance
Standby	USD \$16.66/hr	USD \$15.59/hr	-6.4%
Idle	USD \$46.37/hr	USD \$29.94/hr	-35.4%

Revised Date: 3rd quarter 2024

The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

**AED Green Book®**
**Miscellaneous 42 X 60' - 516**  
 Triple Deck Portable Screening Plants

 Size Class:  
**37 in & Over**  
 Weight:  
**27900 lbs**

**Configuration for 42 X 60' - 516**

Conveyor Size	<b>42' X 60'</b>	Horsepower	<b>110.0</b>
Power Mode	<b>Diesel</b>	Screen Size	<b>5' X 16'</b>

**AED Rental Rates**

These rental rates reflect an average for equipment of this type and size. Rates shown for specific brands or models are provided for convenience only. Rates charged by rental companies for specific brands or models will vary depending on many factors

	<b>Monthly</b>	<b>Weekly</b>	<b>Daily</b>
Published Rates	USD \$16,452.00	USD \$5,485.00	USD \$1,801.00
<b>Adjustments</b>			
Region (New Mexico: 108.11%)	USD \$1,333.56	USD \$444.60	USD \$145.98
<b>User Defined</b>			
Rental Rates (100%)	-	-	-
<b>Total:</b>	<b>USD \$17,785.56</b>	<b>USD \$5,929.60</b>	<b>USD \$1,946.98</b>
Date Last Updated: Jun 01, 2024			

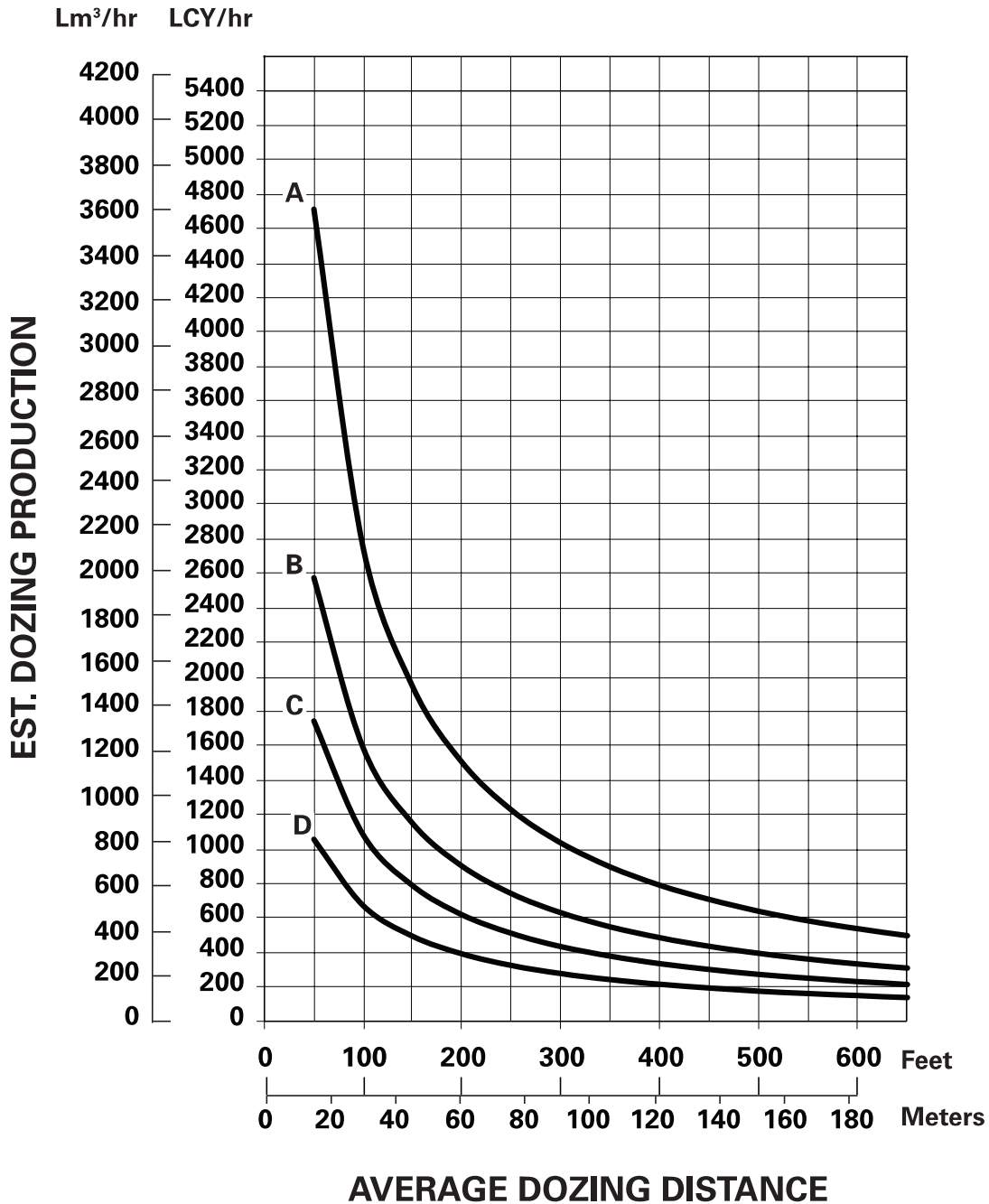
The equipment represented in this report has been exclusively prepared for Walter Niccoli (wniccoli@telesto-inc.com)

# **Attachment 4.3**

## **Curve Fits**



**ESTIMATED DOZING PRODUCTION ● Semi-Universal Blades ● D8 through D11**

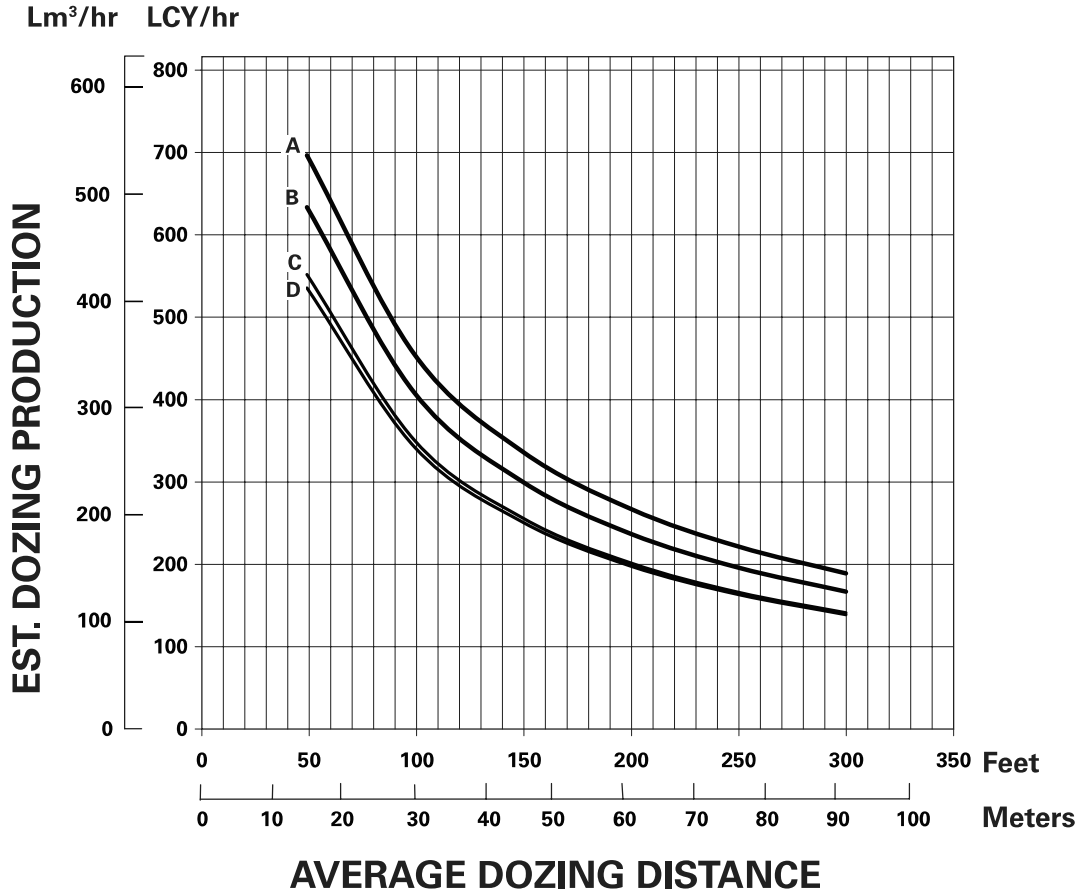


**KEY**

- A — D11 SU
- B — D10 SU
- C — D9 SU
- D — D8 SU

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

**ESTIMATED DOZING PRODUCTION ● Straight Blades ● D6 through D7**

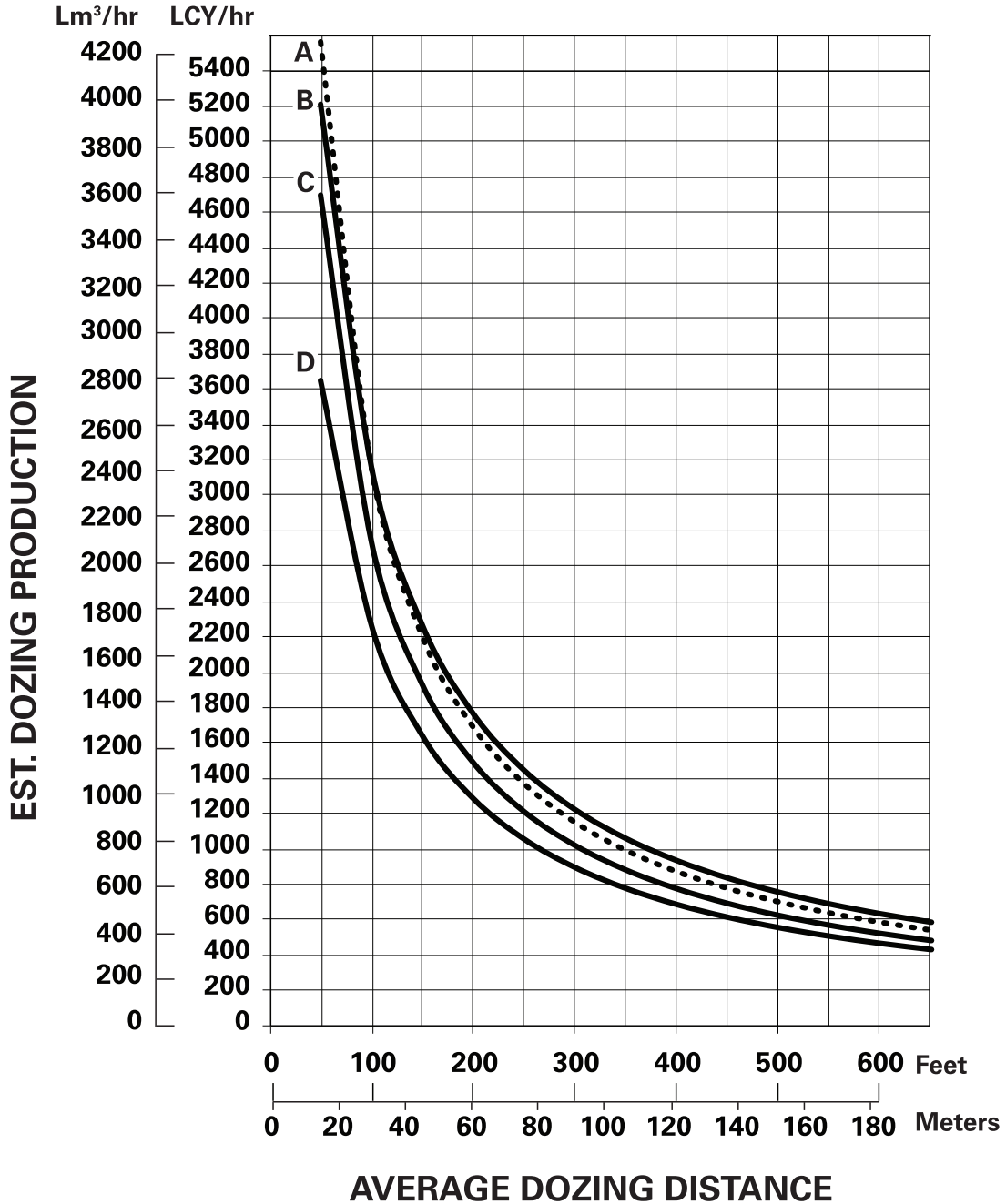


**KEY**

- A — D7E
- B — D7R11
- C — D6T
- D — D7G

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

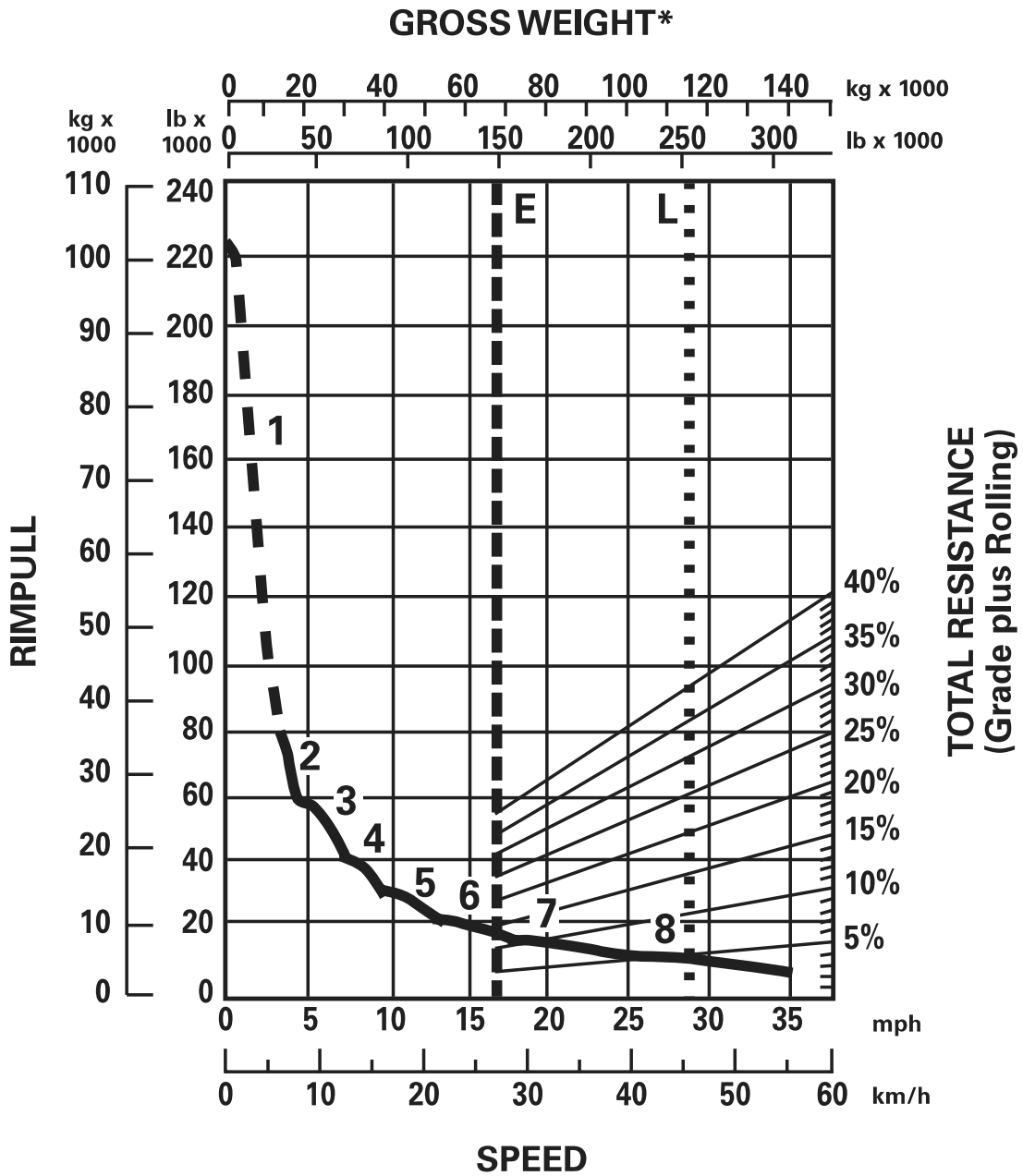
**ESTIMATED DOZING PRODUCTION ● D11**



**KEY**

- A — D11 XU
- B — D11 CD
- C — D11 U
- D — D11 SU

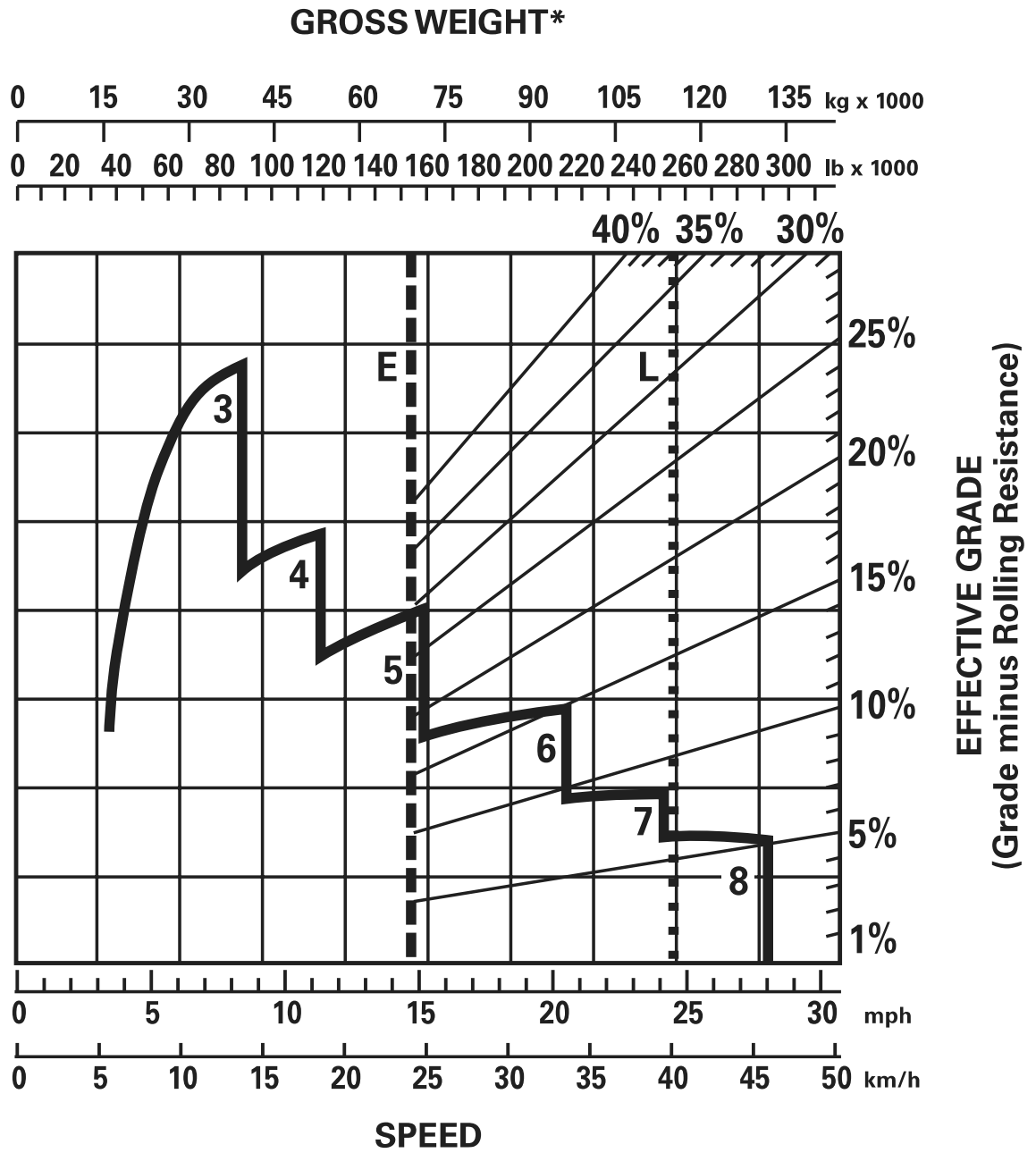
**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.



\*at sea level

# Wheel Tractor-Scrapers

657G Retarding  
 ● 37.25/R35 Tires



\*at sea level

**KEY**

- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

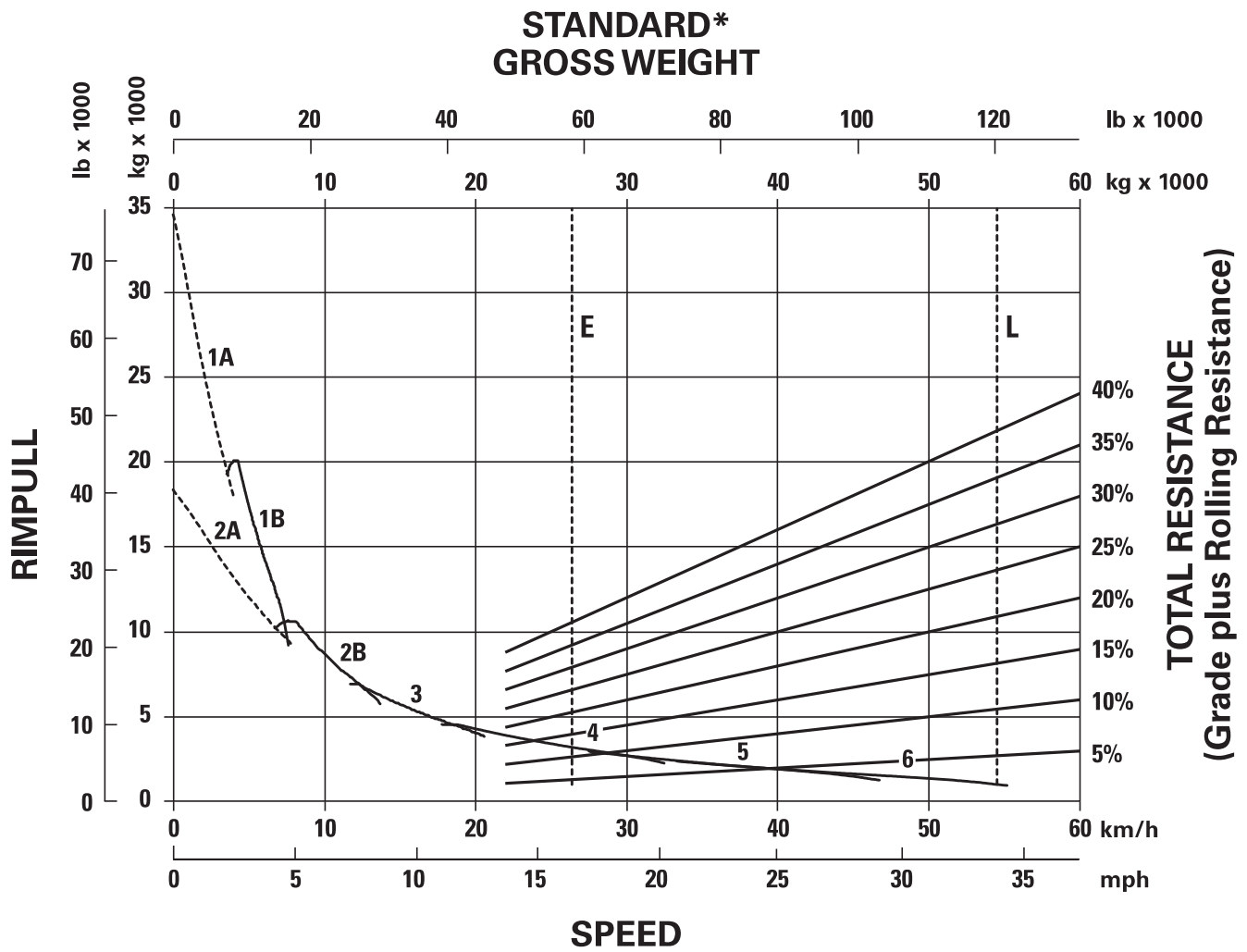
**KEY**

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)

# 730C2 EJ Rimpull-Speed-Gradeability

# Articulated Trucks

- 750/65/R26 Tires
- Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final)



**KEY**

- 1A — 1st Gear (Converter Drive)
- 1B — 1st Gear (Direct Drive)
- 2A — 2nd Gear (Converter Drive)
- 2B — 2nd Gear (Direct Drive)
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear

**KEY**

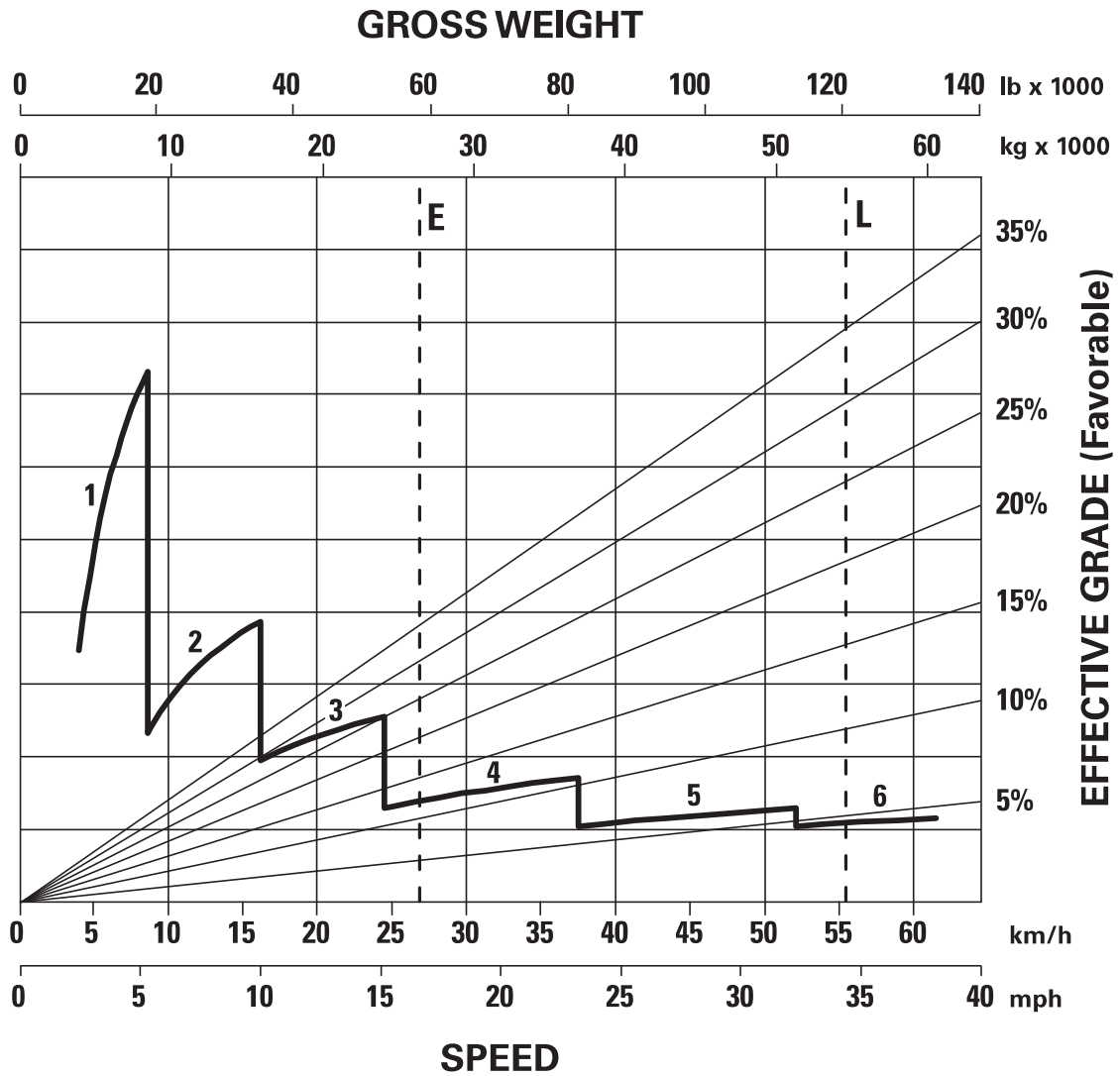
- E — Empty 26 395 kg (58,190 lb)
- L — Loaded 54 515 kg (120,186 lb)

\*At sea level.

# Articulated Trucks

## 730C2 EJ Brake/Retarder Performance Curve

- 750/65/R26 Tires
- Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final)

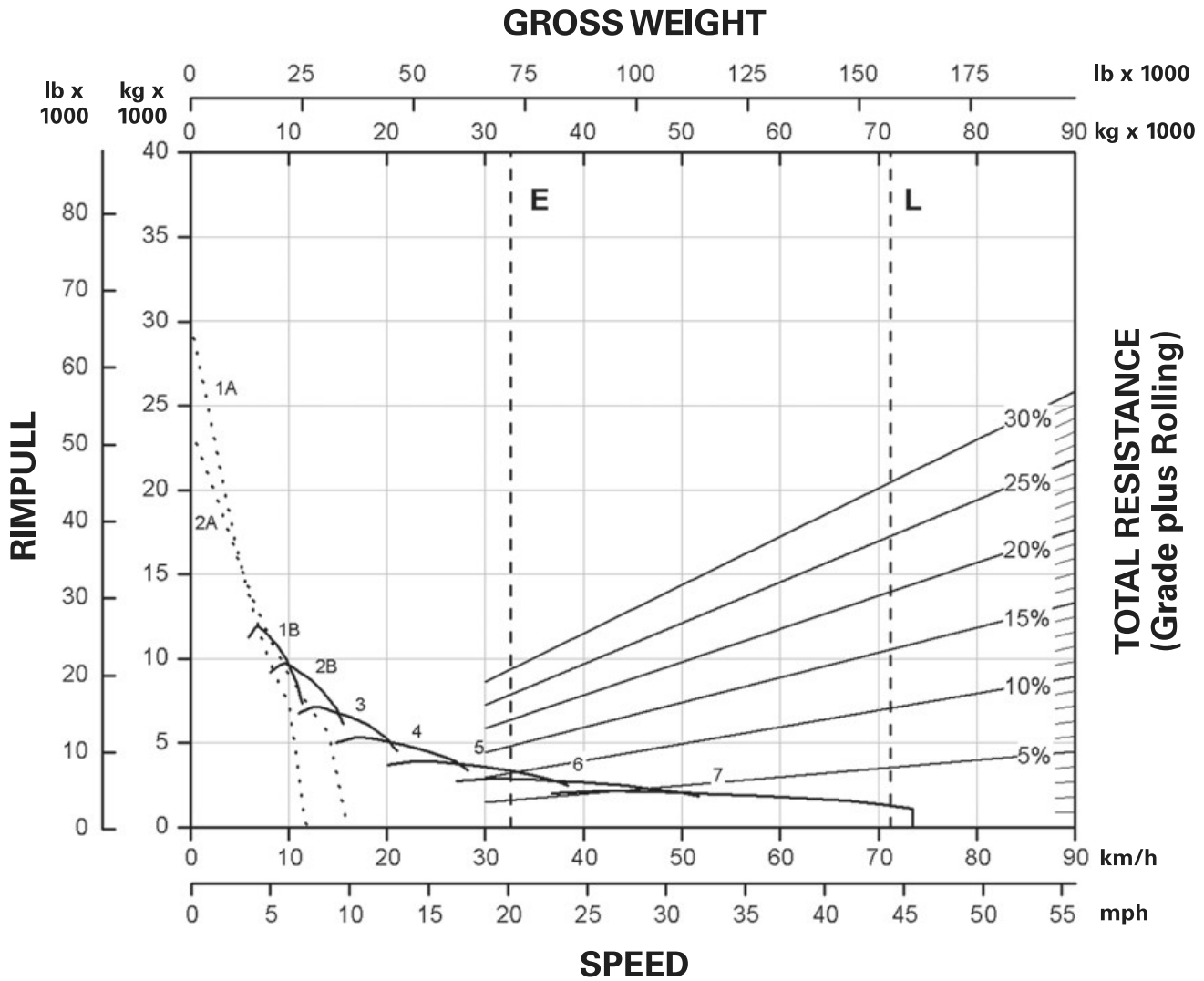


**KEY**

- 1 — 1st Gear
- 2 — 2nd Gear
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear

**KEY**

- E — Empty 26 395 kg (58,190 lb)
- L — Loaded 54 515 kg (120,186 lb)



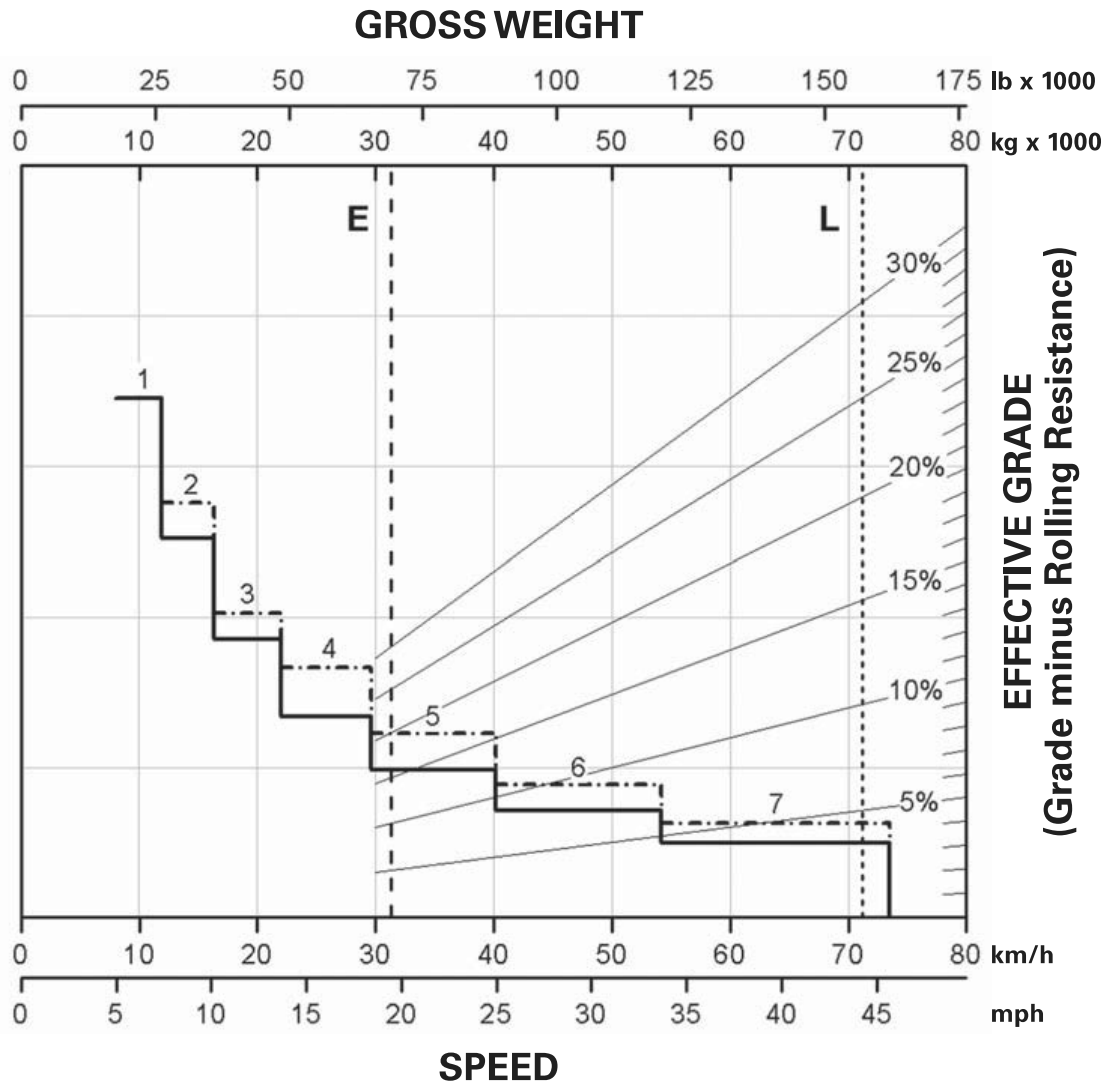
**KEY**

- 1A – 1st Gear (Torque Converter)
- 1B – 1st gear
- 2A – 2nd Gear (Torque Converter)
- 2B – 2nd Gear
- 3 – 3rd Gear
- 4 – 4th Gear
- 5 – 5th Gear
- 6 – 6th Gear
- 7 – 7th Gear

**KEY**

- E – Empty Weight 32 565 kg (71,793 lb)
- L – Target GMW 71 214 kg (157,000 lb)





**CONTINUOUS GRADE LENGTH**

**KEY**

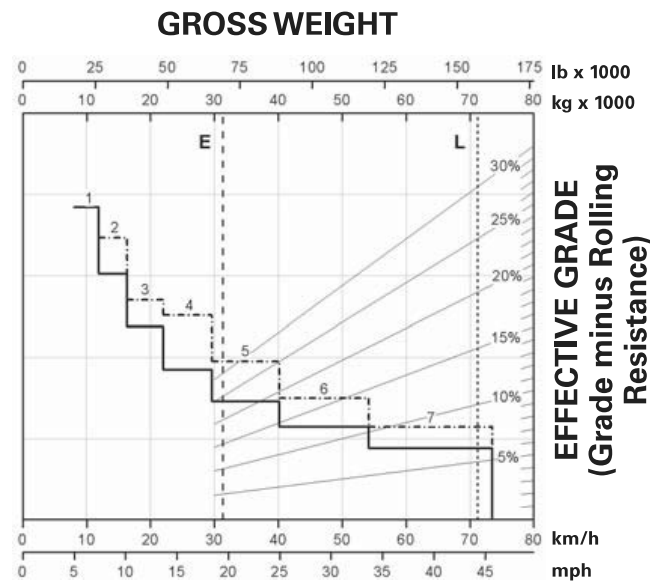
- 1 — 1st Gear
- 2 — 2nd Gear
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear
- 7 — 7th Gear

**KEY**

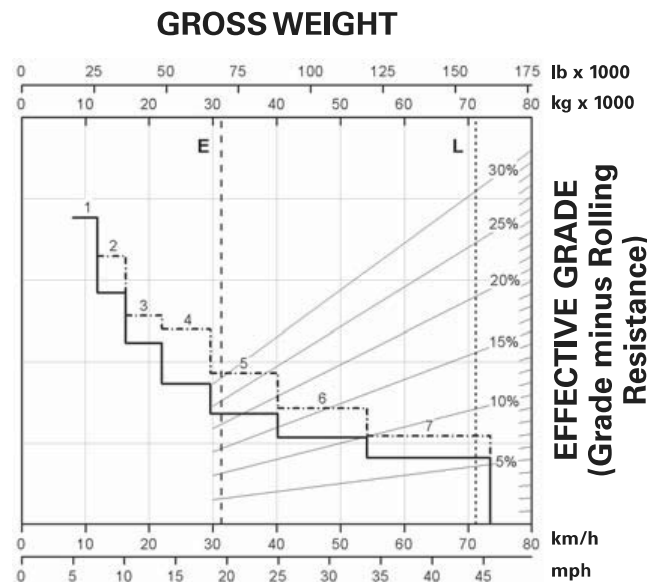
- E — Empty Weight 32 565 kg (71,793 lb)
- L — Target GMW 71 214 kg (157,000 lb)
- With ARC Only
- ARC and Engine Brake

770G Brake Performance

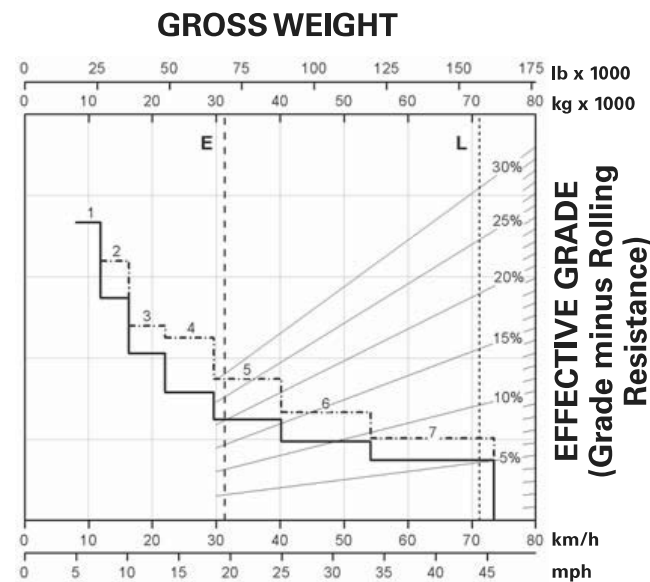
- 450 m (1500 ft)
- 600 m (2000 ft)
- 900 m (3000 ft)
- 1500 m (5000 ft)



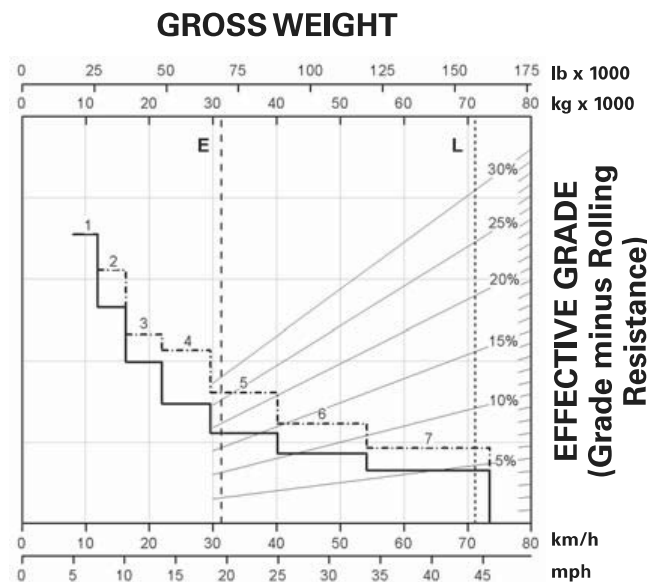
**GROSS WEIGHT**  
**SPEED**  
 GRADE DISTANCE — 450 m (1500 ft)



**GROSS WEIGHT**  
**SPEED**  
 GRADE DISTANCE — 600 m (2000 ft)



**GROSS WEIGHT**  
**SPEED**  
 GRADE DISTANCE — 900 m (3000 ft)



**GROSS WEIGHT**  
**SPEED**  
 GRADE DISTANCE — 1500 m (5000 ft)

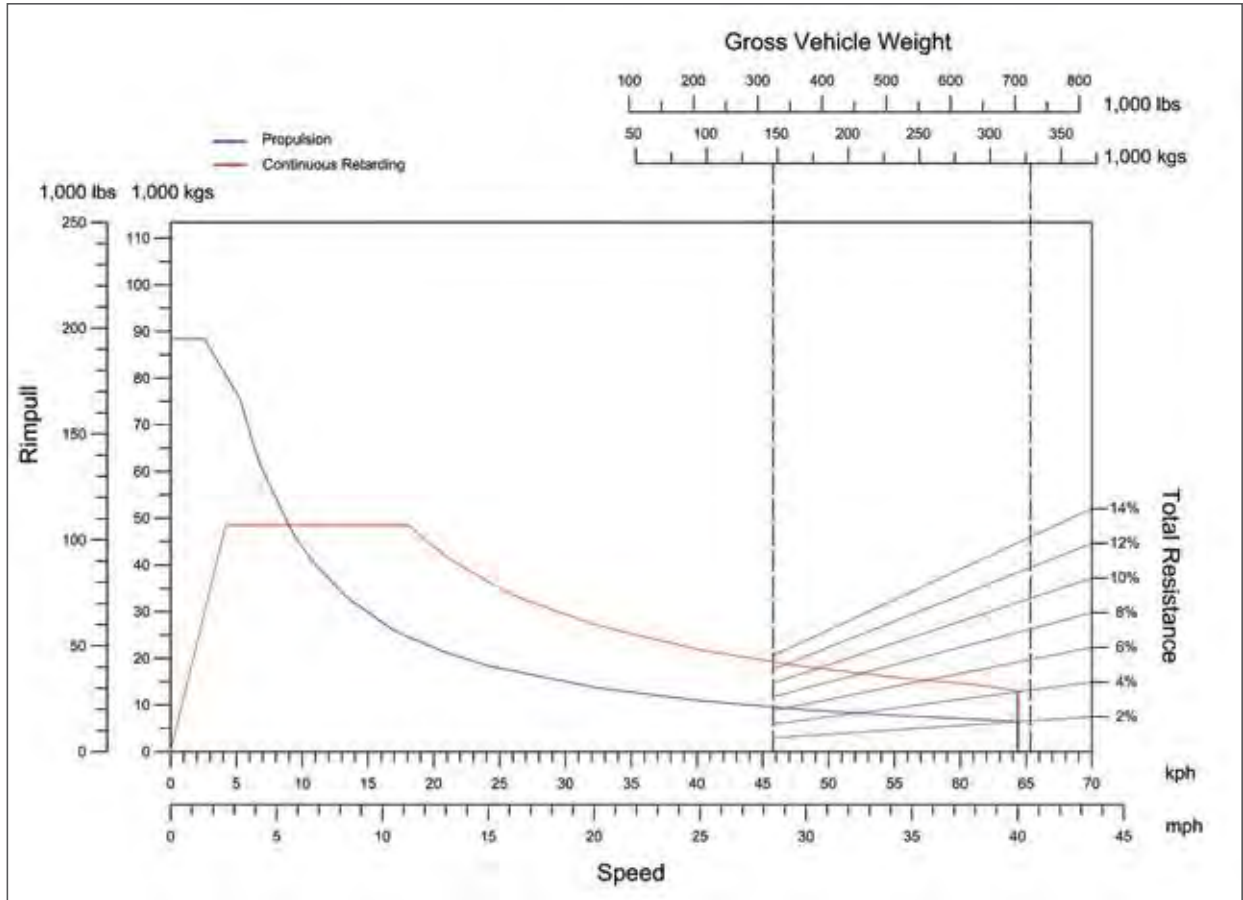
KEY

- 1 — 1st Gear
- 2 — 2nd Gear
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear
- 7 — 7th Gear

KEY

- E — Empty Weight 32 565 kg (71,793 lb)
- L — Target GMW 71 214 kg (157,000 lb)
- With ARC Only
- ARC and Engine Brake

## Performance Chart



730E-8

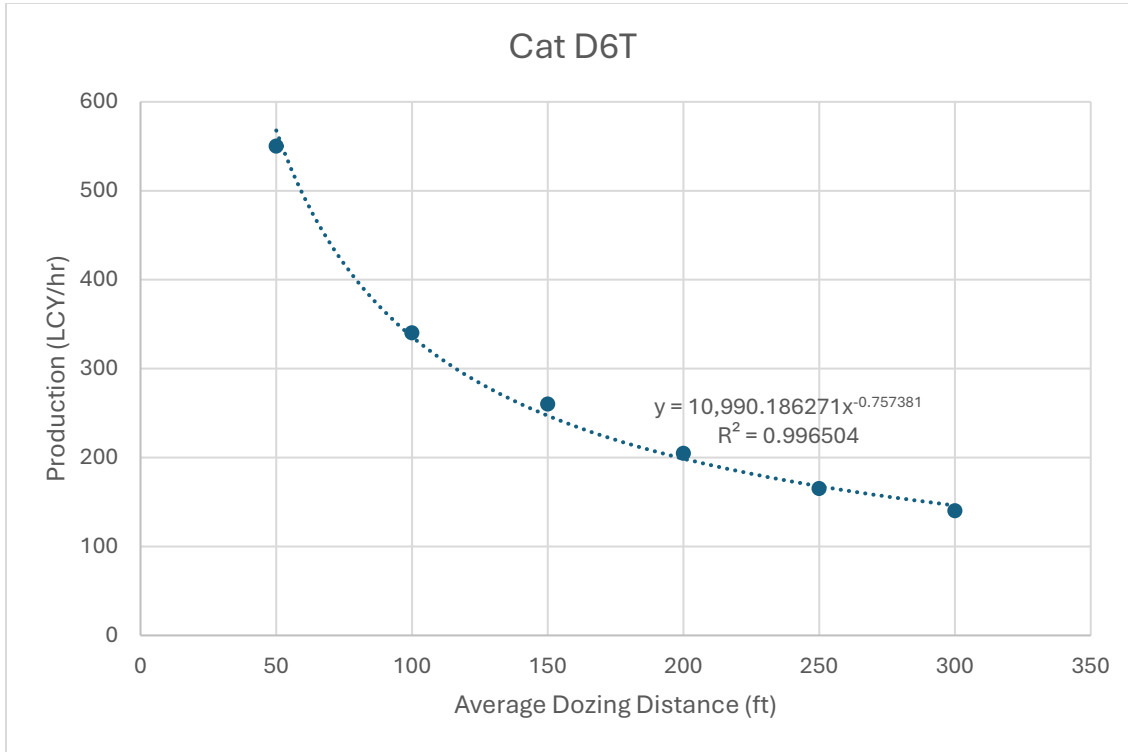
## Komatsu Product Line Loader/Truck Matching

Typical Number of Passes to Load

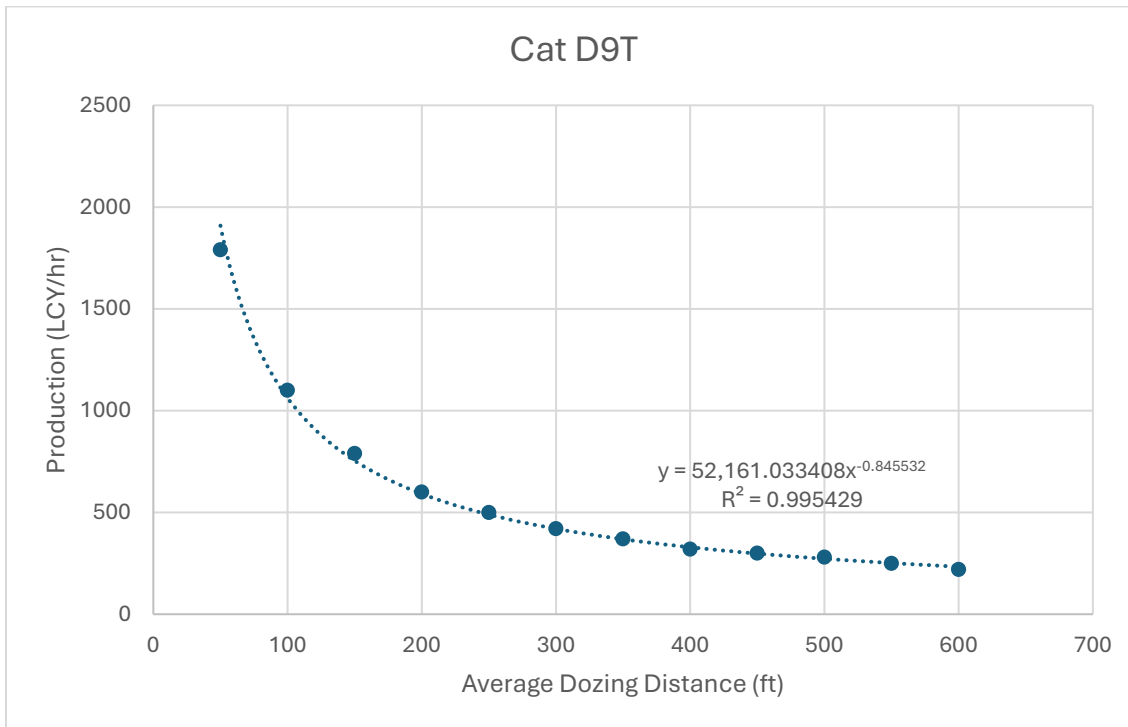
		Komatsu Trucks							
		HD785 100 ton	HD1500 159 ton	730E 200 ton	830E-AC 244 ton	860E-1K 280 ton	930E-4 320 ton	930E-4SE 320 ton	960E 360 ton
KOMATSU EXCAVATORS	PC2000 15.7 yd <sup>3</sup>	4	7						
	PC3000 19.5 yd <sup>3</sup>	4	6	7					
	PC4000 29 yd <sup>3</sup>	3	4	5	6	6			
	PC5500 37 yd <sup>3</sup>		3	4	5	5	6	6	7
	PC8000 55 yd <sup>3</sup>				3	3	4	4	5

Nominal truck payload rating (short tons)  
 Bucket ratings are based on 1780 kg/lcm **3,000 lbs/lcy** material density.

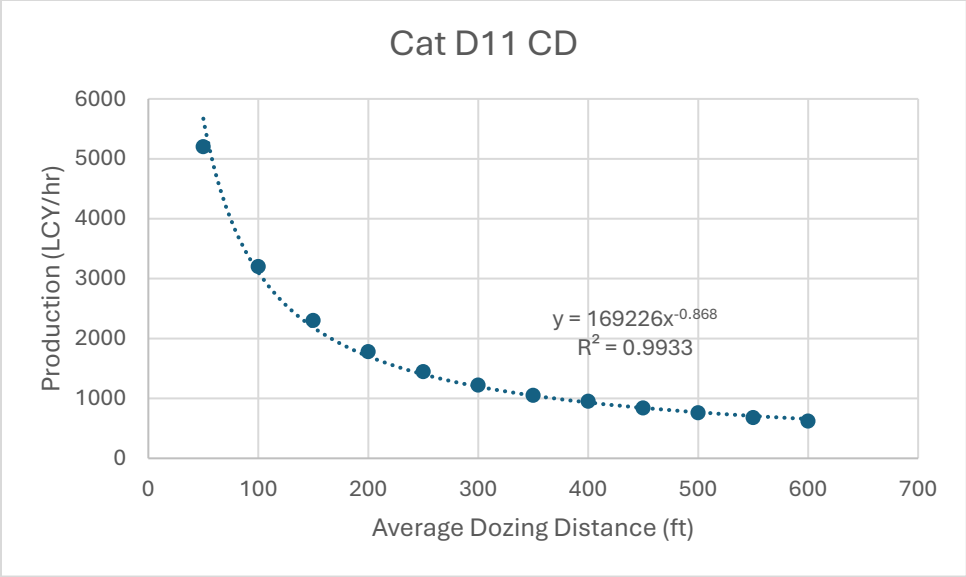
## Dozing Production



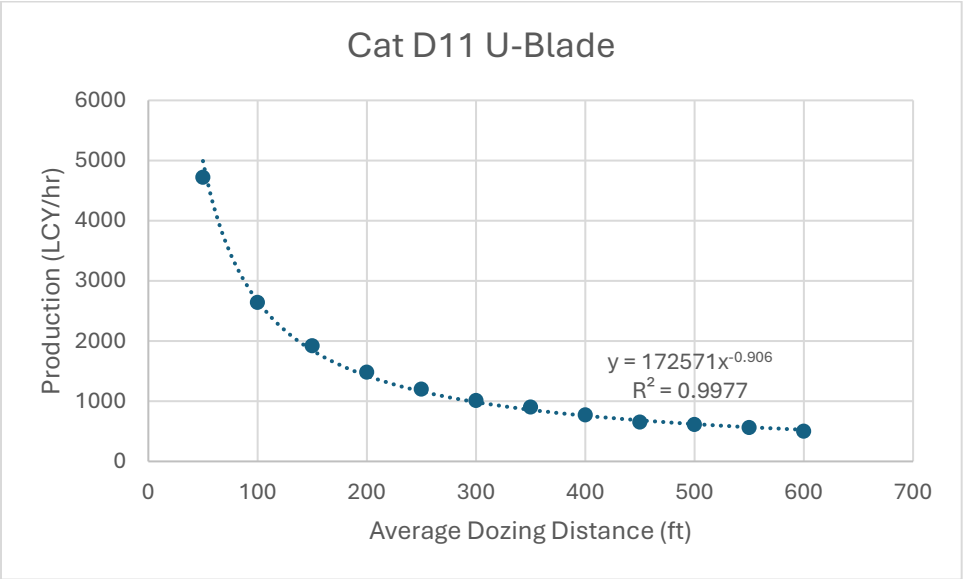
Caterpillar Performance Handbook Edition 50, 16-12



Caterpillar Performance Handbook Edition 50, 16-11

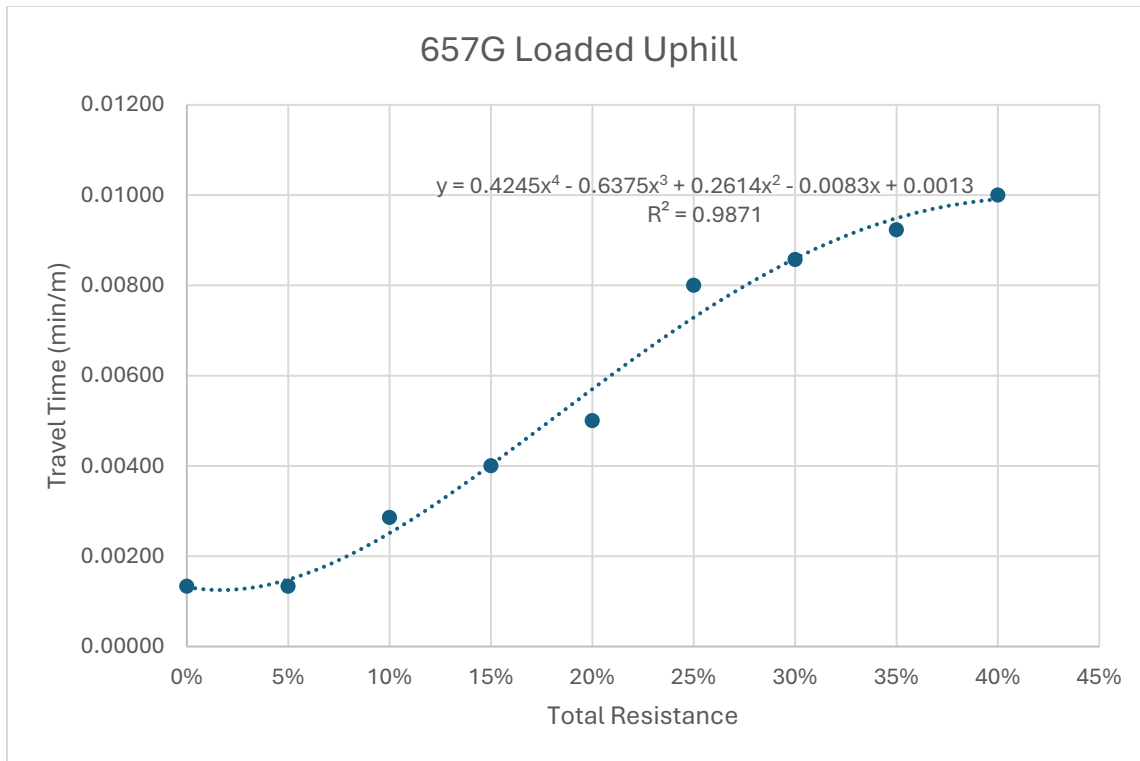


Caterpillar Performance Handbook Edition 50, 16-16

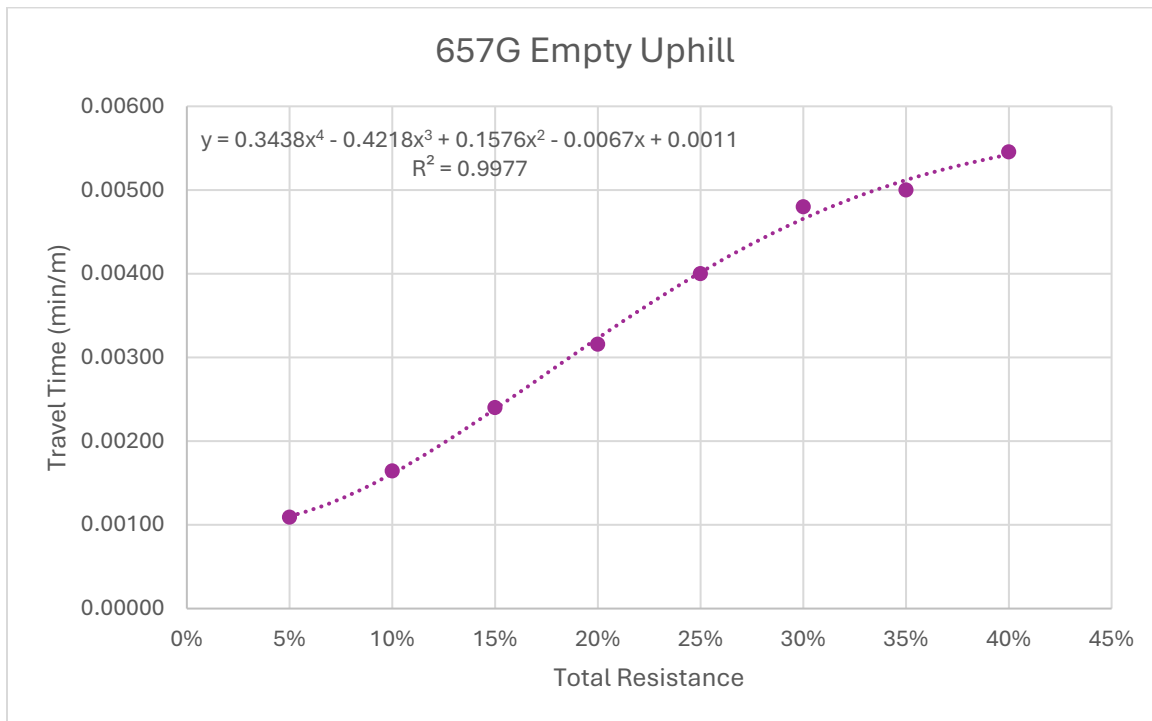


Caterpillar Performance Handbook Edition 50, 16-16

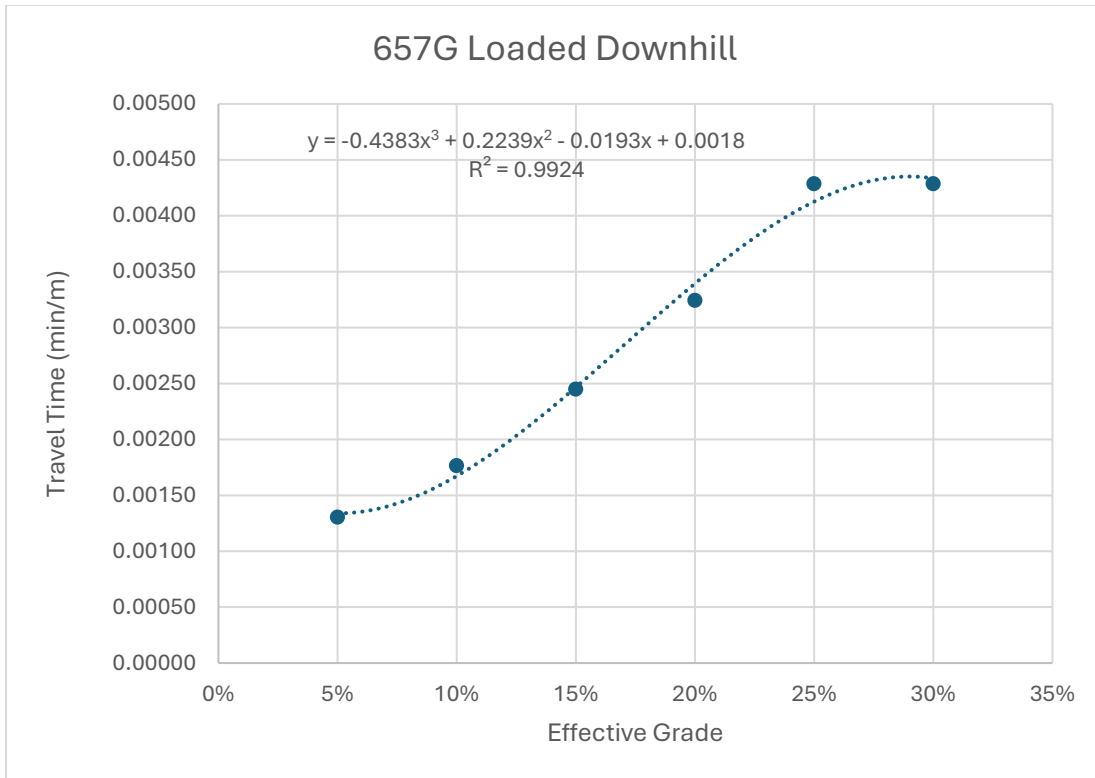
## Scraper Haul Travel Time



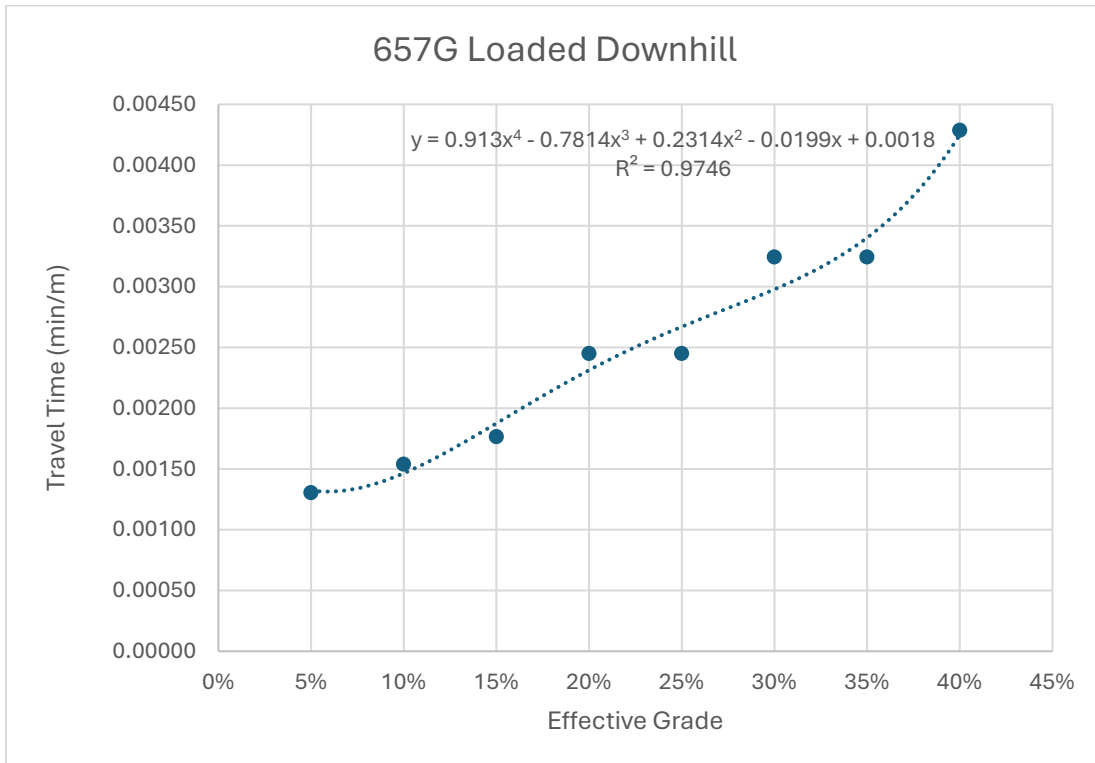
Caterpillar Performance Handbook Edition 50, 21-23



Caterpillar Performance Handbook Edition 50, 21-23

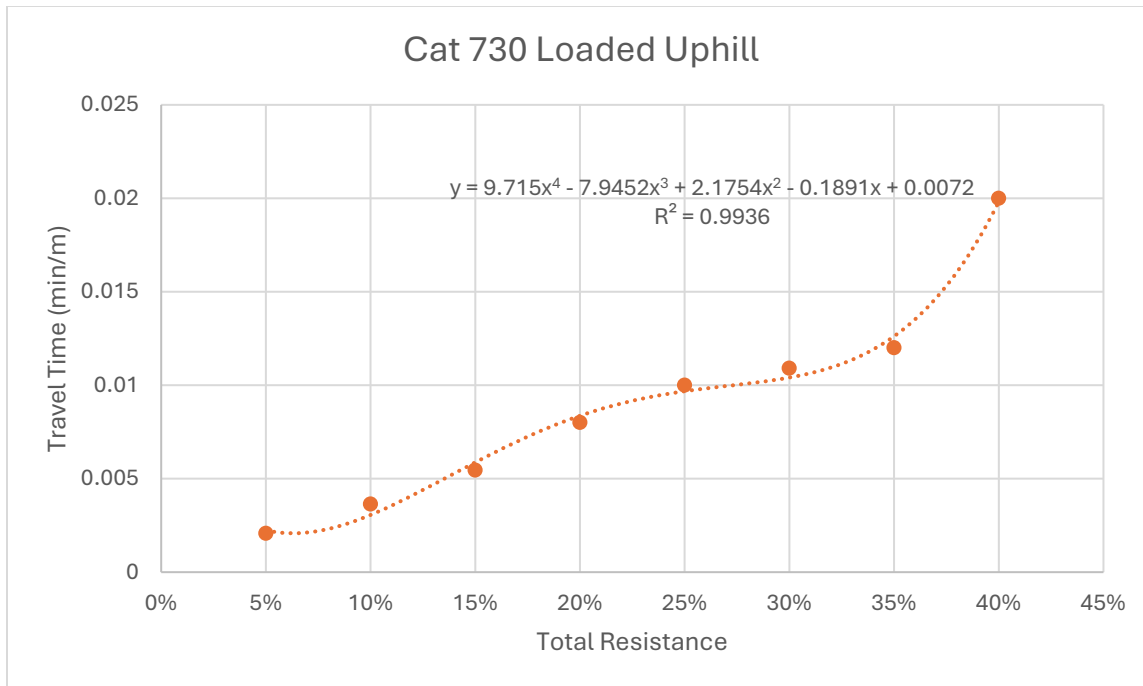


Caterpillar Performance Handbook Edition 50, 21-24

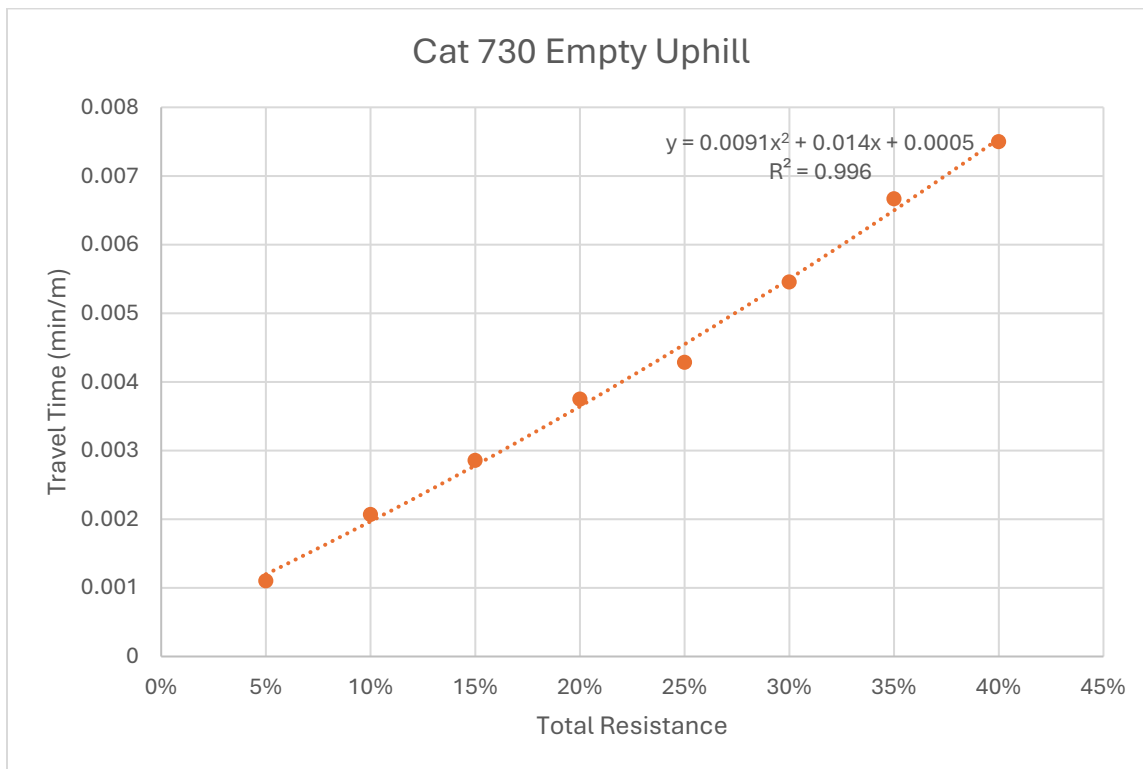


Caterpillar Performance Handbook Edition 50, 21-24

## Truck Haul Travel Time

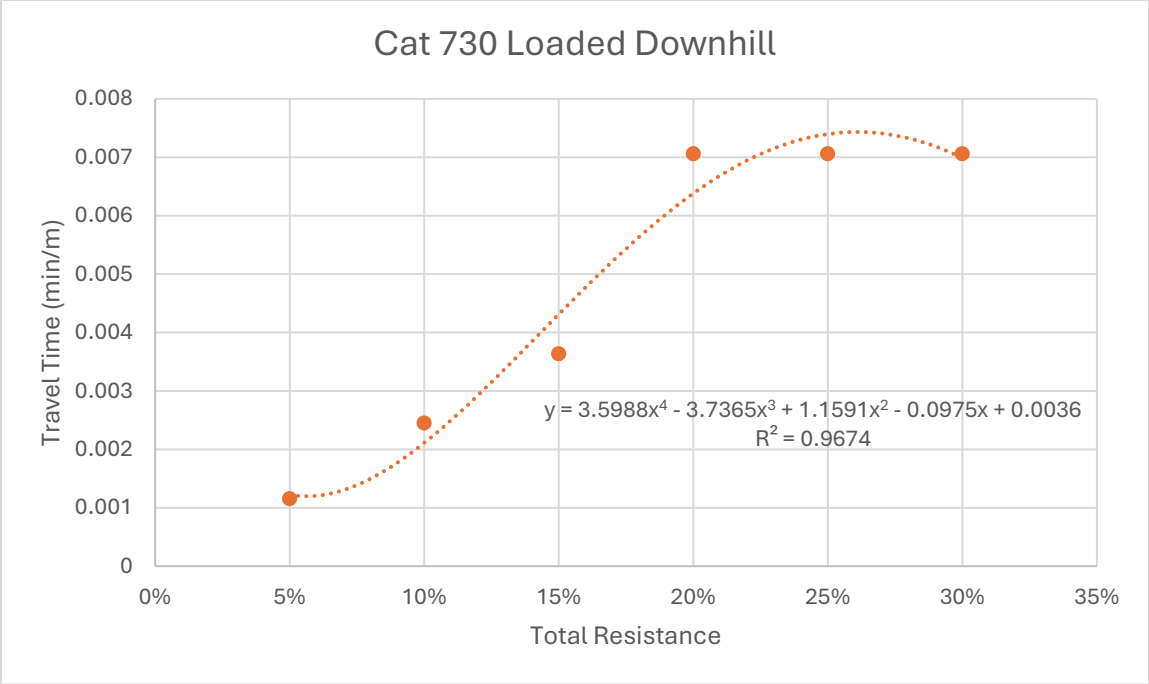


Caterpillar Performance Handbook Edition 49, 1-17

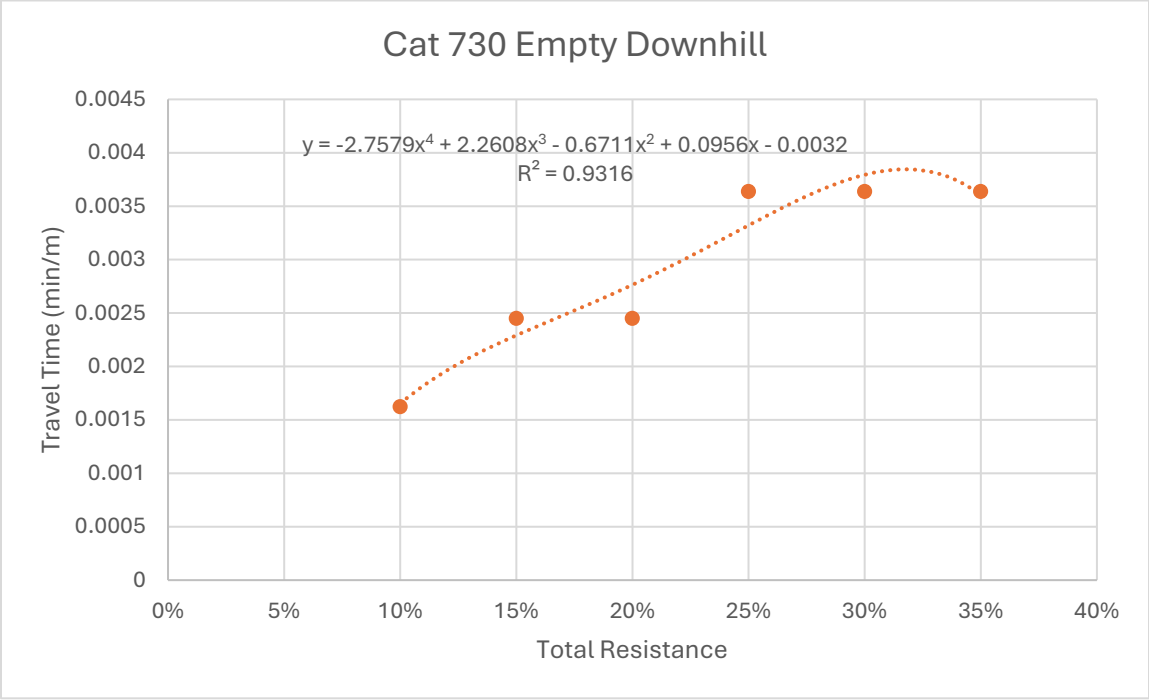


Caterpillar Performance Handbook Edition 49, 1-17

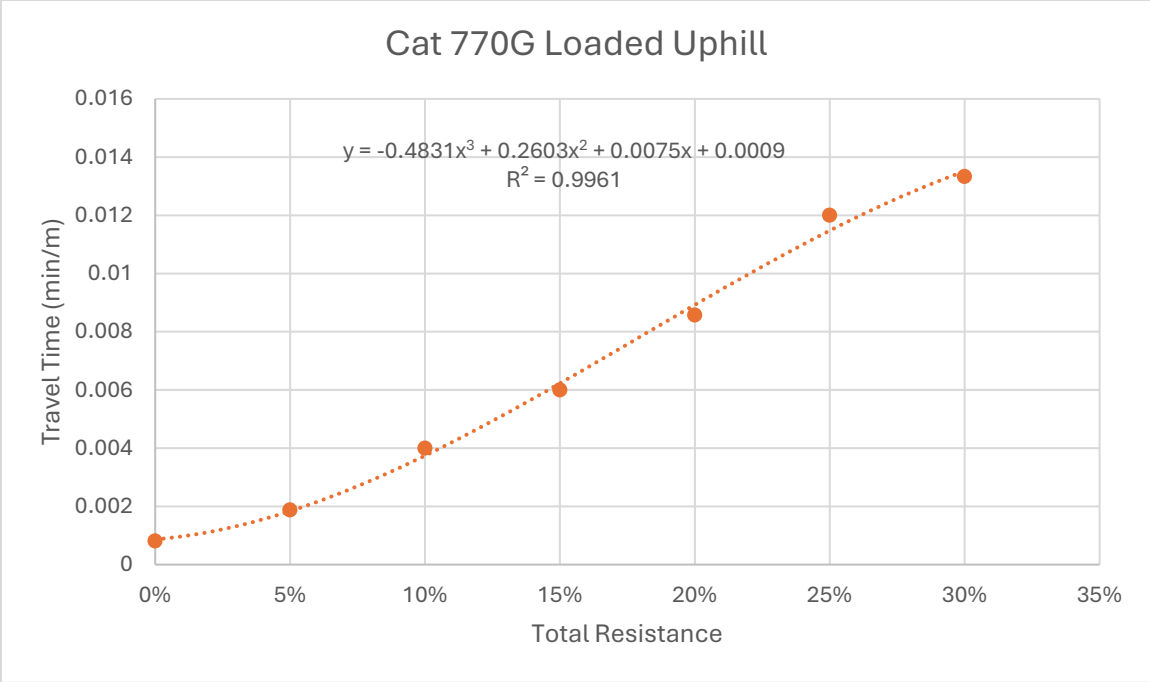




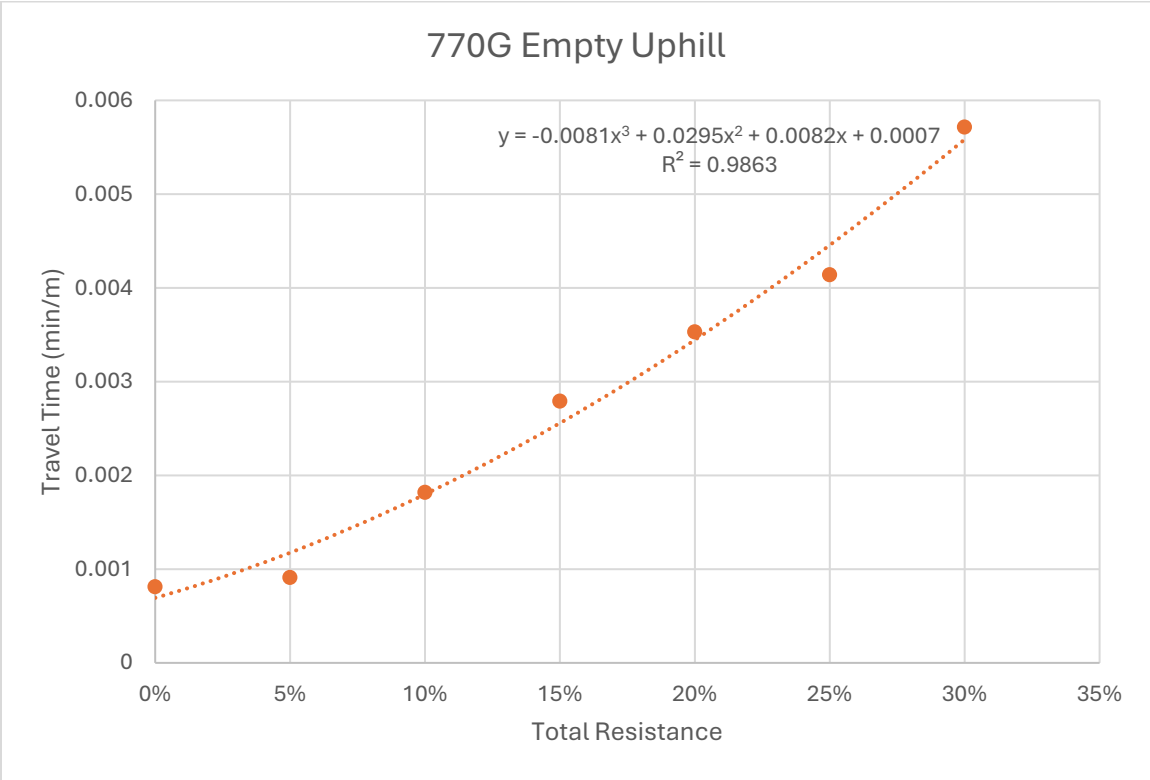
Caterpillar Performance Handbook Edition 49, 1-18



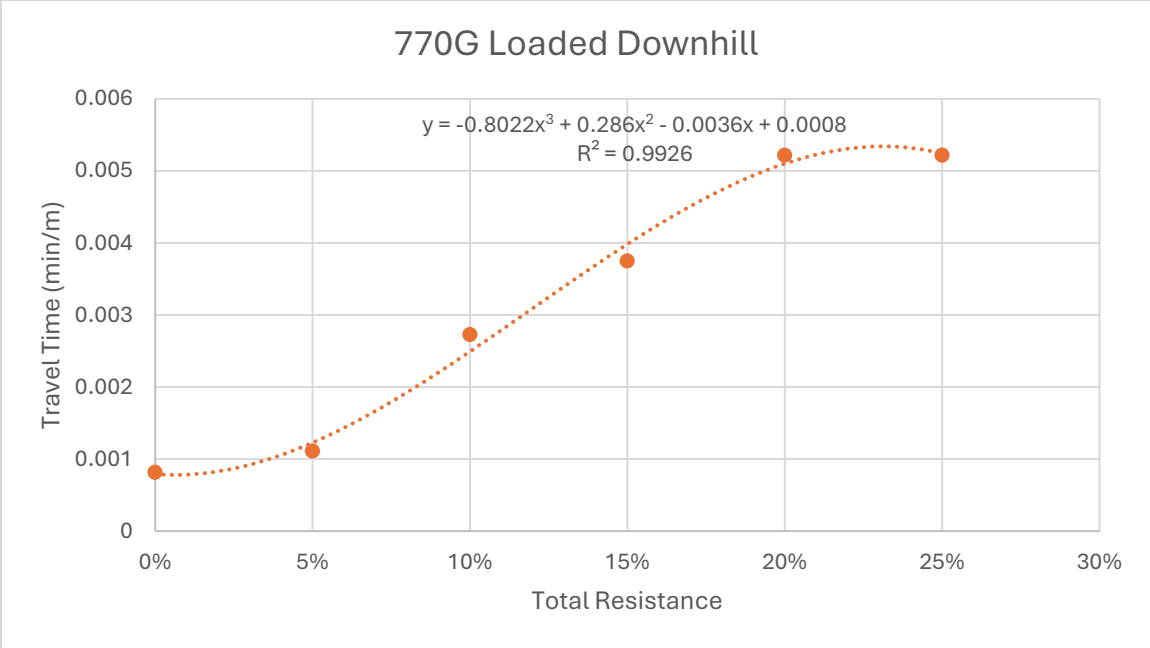
Caterpillar Performance Handbook Edition 49, 1-18



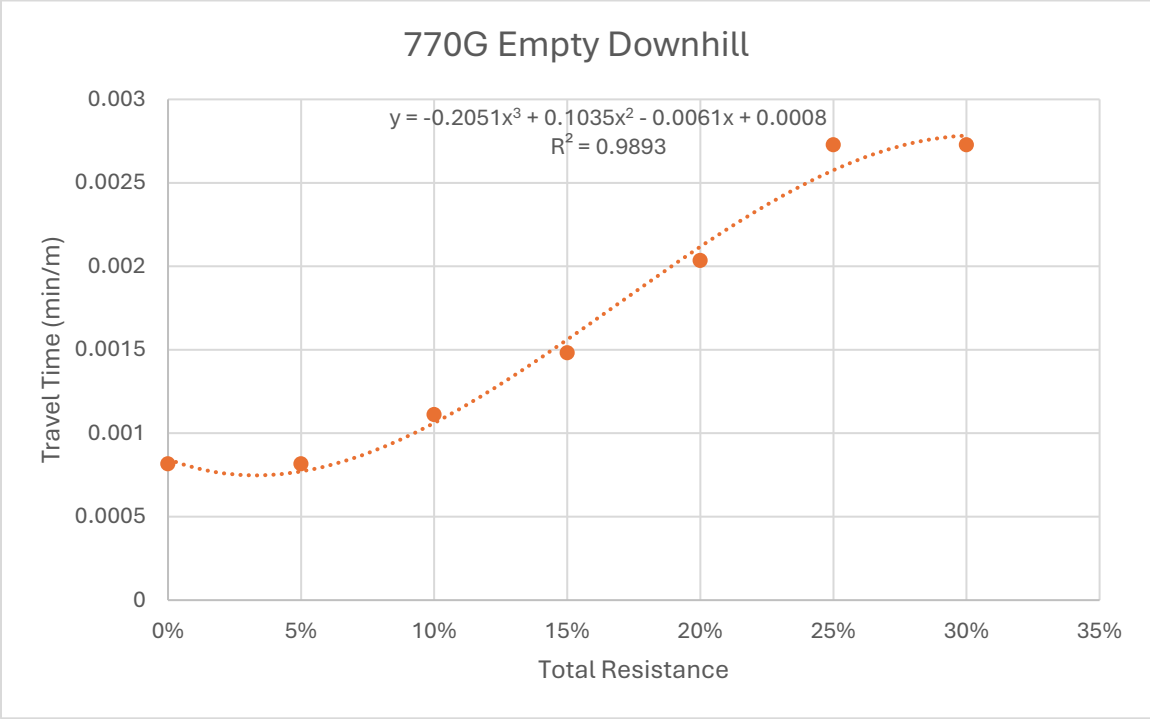
Caterpillar Performance Handbook Edition 49, 10-22



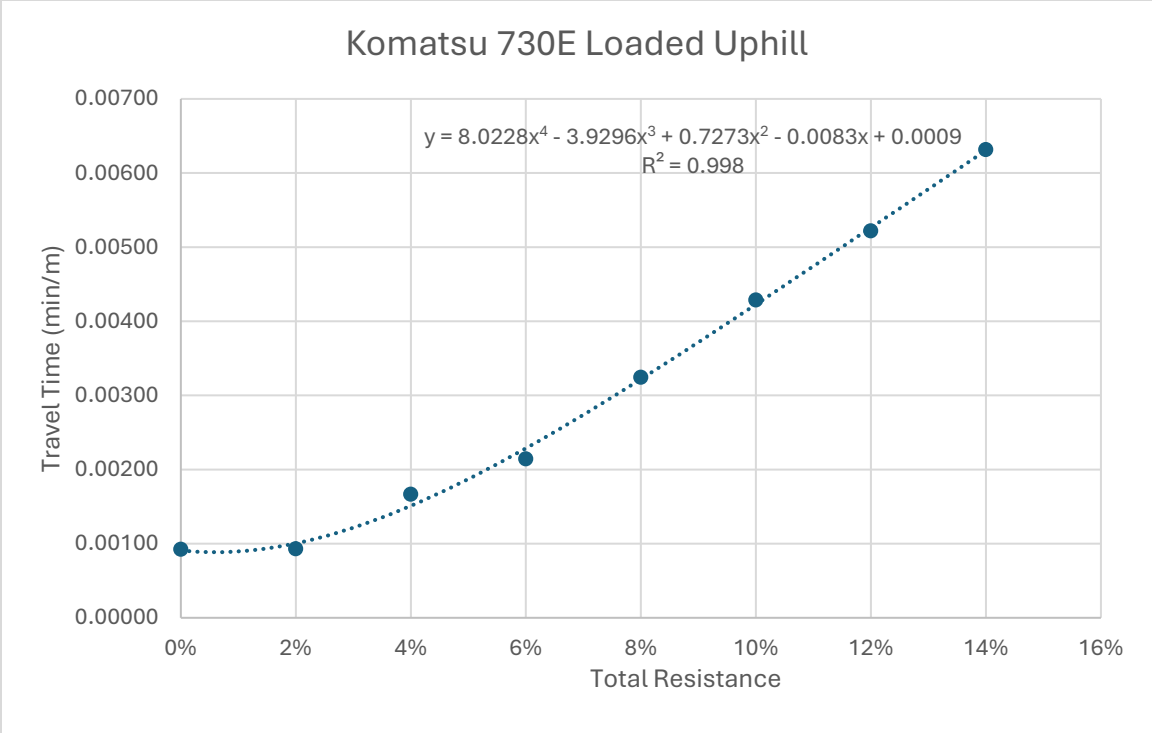
Caterpillar Performance Handbook Edition 49, 10-22



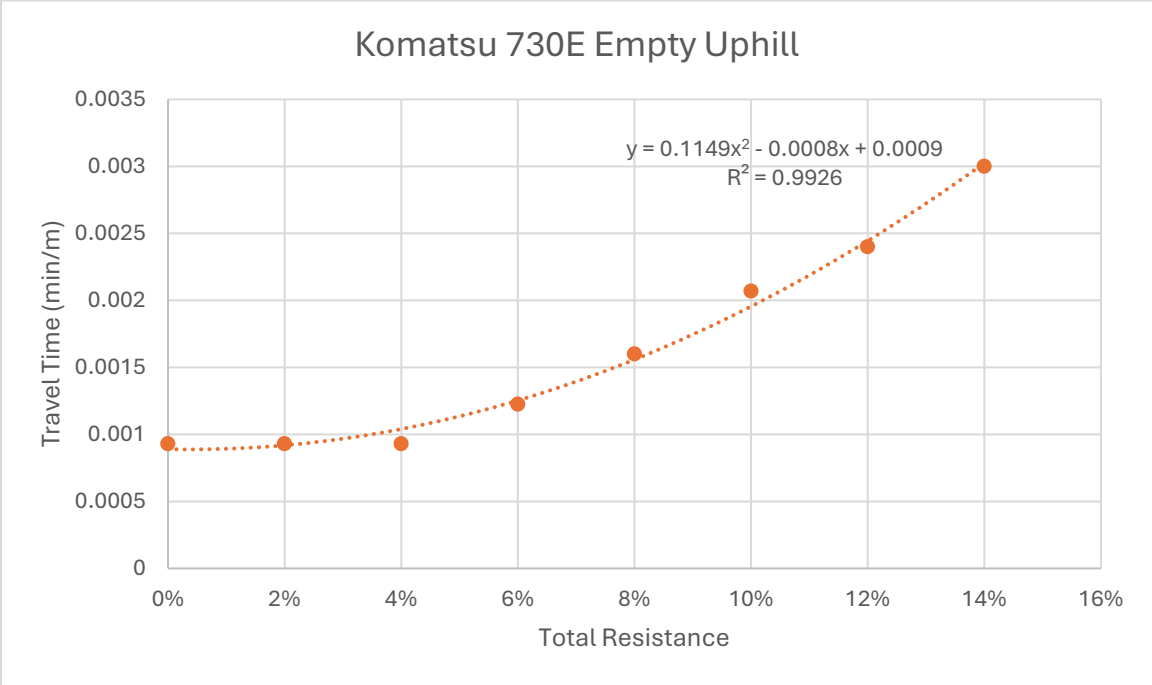
Caterpillar Performance Handbook Edition 49, 10-23



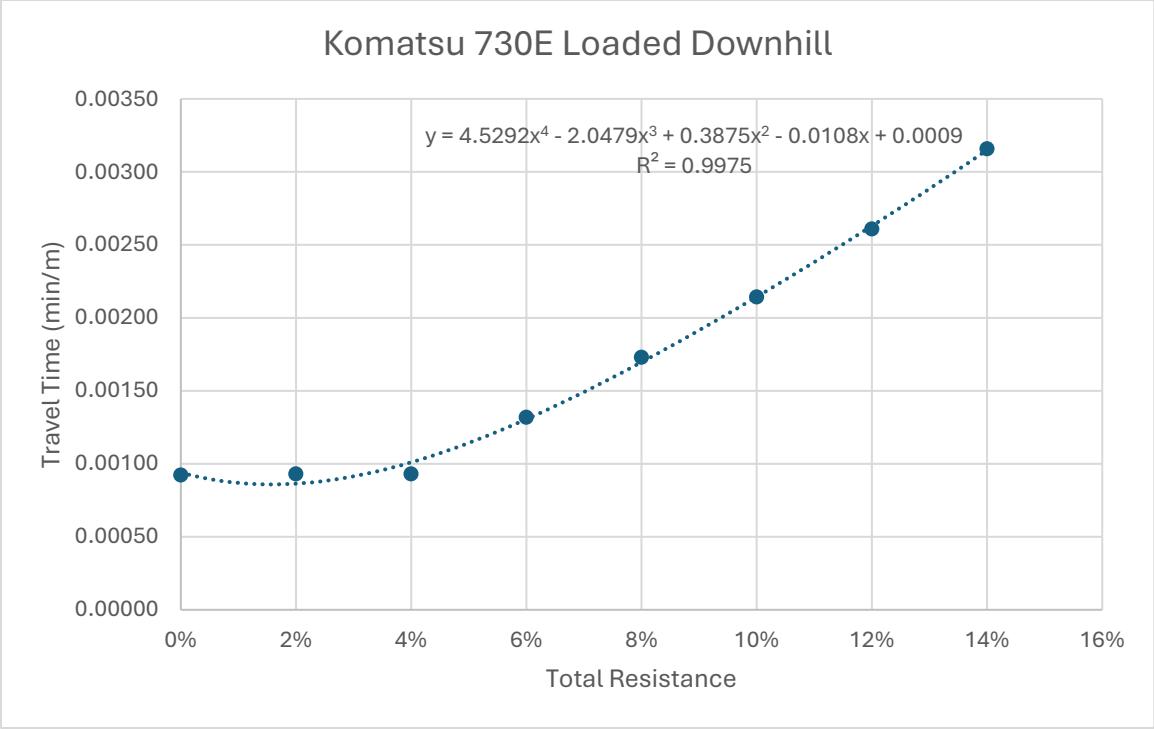
Caterpillar Performance Handbook Edition 49, 10-23



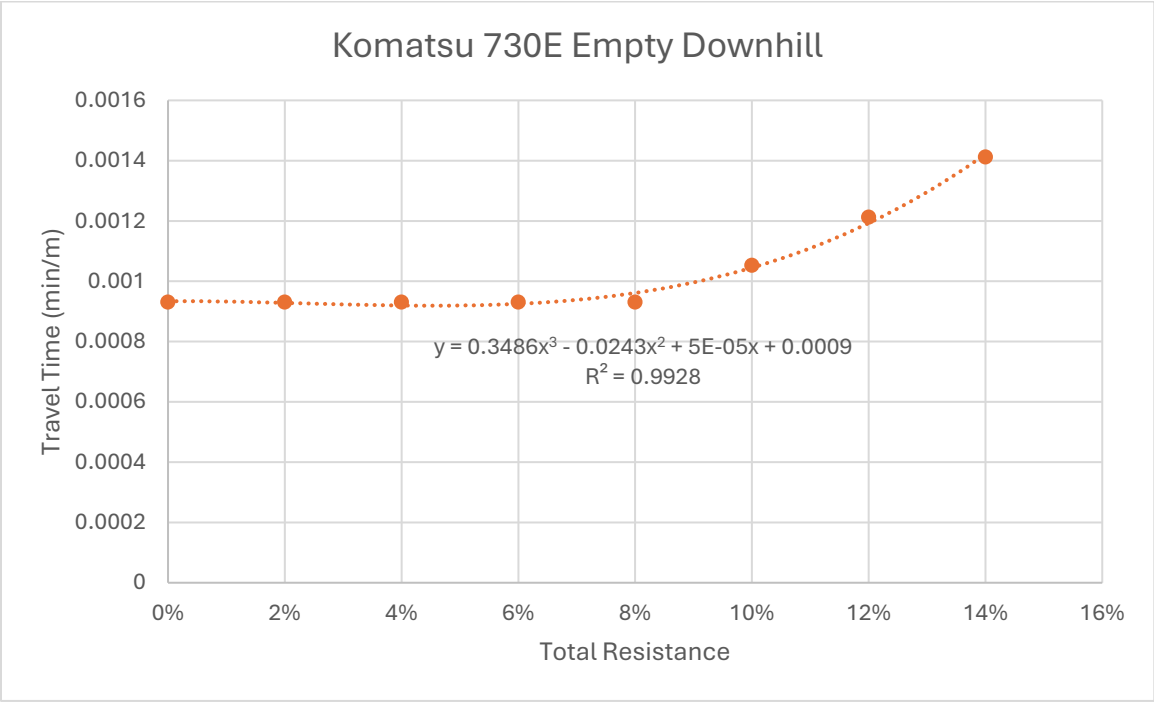
Komatsu 730E Specification Brochure, 14



Komatsu 730E Specification Brochure, 14



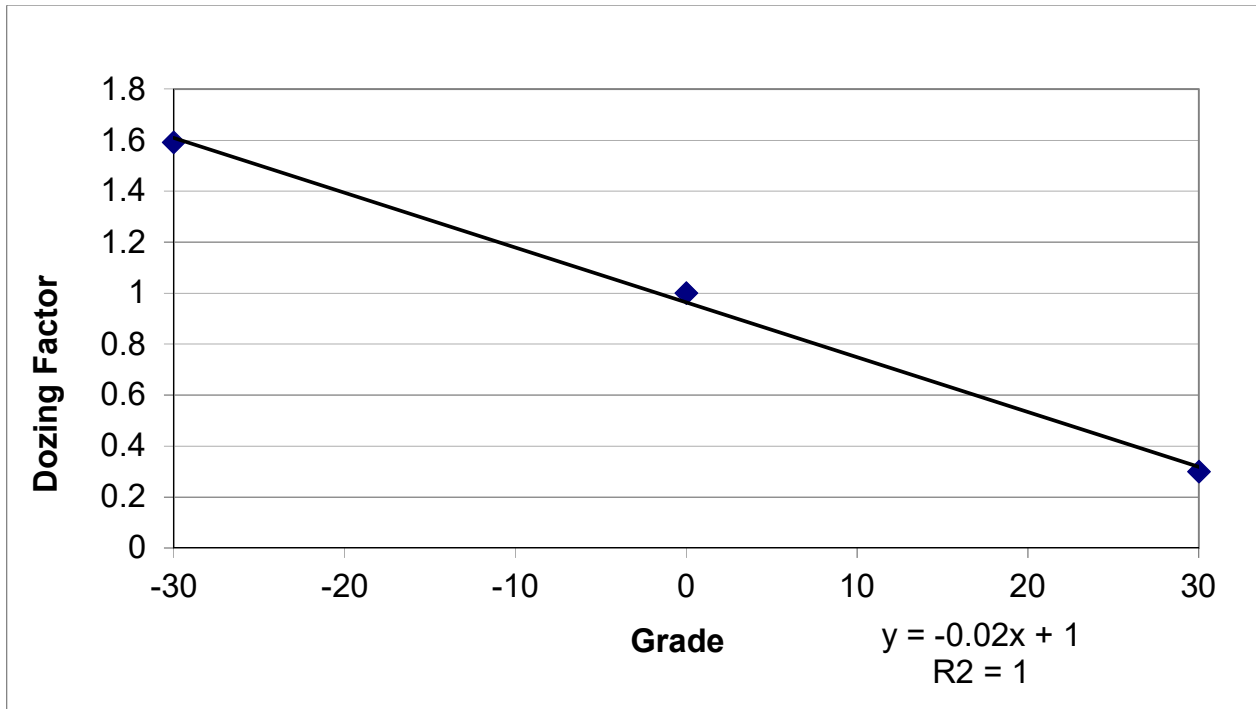
Komatsu 730E Specification Brochure, 14



Komatsu 730E Specification Brochure, 14

**Grade vs. Dozing Factor**

Grade %	Dozing Factor
0	1
-30	1.59
30	0.3



# **Attachment 4.4**

**Reference  
Sheets:  
RS Means  
CPH  
Brochures**

RS Means Online Data

**Demolition/Remediation - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
024113400190	Selective demolition, metal drainage piping, CMP, steel, 48"-60", diameter, excludes excavation	L.F.	\$ -	\$ 11.45	\$ 9.86	\$ 21.31	Year 2024	NEW MEXICO / LAS CRUCES (880)
024116130100	Building demolition, large urban projects, mixture of types, excludes foundation demolition, dump fees	C.F.	\$ -	\$ 0.14	\$ 0.24	\$ 0.38	Year 2024	NEW MEXICO / LAS CRUCES (880)
024116170400	Building footings and foundations, floors, concrete slab on grade, plain concrete, 6" thick, excludes disposal costs and dump fees	S.F.	\$ -	\$ 0.21	\$ 0.61	\$ 0.82	Year 2024	NEW MEXICO / LAS CRUCES (880)
130505750530	Steel tank, single wall, above ground, 5,000 thru 10,000 gallon, selective demolition, excluding foundation, pumps or piping	Ea.	\$ -	\$ 670.19	\$ 1,264.50	\$ 1,934.69	Year 2024	NEW MEXICO / LAS CRUCES (880)
130505750540	Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping	Ea.	\$ -	\$ 927.30	\$ 2,107.50	\$ 3,034.80	Year 2024	NEW MEXICO / LAS CRUCES (880)
260505100390	Non metallic sheathed cable, (Romex), #10, 3 wire, electrical demolition, remove	L.F.	\$ -	\$ 0.94	\$ -	\$ 0.94	Year 2024	NEW MEXICO / LAS CRUCES (880)
024113800200	Selective demolition, utility poles & cross arms, utility poles, wood, 35'-45' high	Ea.	\$ -	\$ 218.31	\$ 33.72	\$ 252.03	Year 2024	NEW MEXICO / LAS CRUCES (880)
028120101120/1130	Hazardous waste cleanup/pickup/disposal, solid pickup, bulk material, minimum/maximum	Ton	\$ -	\$ -	\$ -	\$ 392.50	Year 2024	NEW MEXICO / LAS CRUCES (880)
028120101260/1270	Hazardous waste cleanup/pickup/disposal, transportation to disposal site, truckload = 80 drums or 25 C.Y. or 18 tons, minimum/maximum	Mile	\$ -	\$ -	\$ -	\$ 5.60	Year 2024	NEW MEXICO / LAS CRUCES (880)
024113230900	Utility removal, hydrants, fire, remove only, excludes hauling	Ea.	\$ -	\$ 371.51	\$ 112.12	\$ 483.63	Year 2024	NEW MEXICO / LAS CRUCES (880)
026510300320	Removal of underground storage tanks, petroleum storage tanks, non-leaking, remove sludge, water and remaining product from tank bottom of tank with vacuum truck, 9,000 - 12,000 gallon tank	Ea.	\$ -	\$ 113.85	\$ 240.26	\$ 354.11	Year 2024	NEW MEXICO / LAS CRUCES (880)
260505101570	Transformer, dry type, primary, 3 phase, to 600V, 750 kVA, electrical demolition, remove, including removal of supports, wire & conduit terminations	Ea.	\$ -	\$ 958.10	\$ 154.27	\$ 1,112.37	Year 2024	NEW MEXICO / LAS CRUCES (880)
015433406300	Rent steam cleaner 100 gph	Week	\$ -	\$ -	\$ -	\$ 240.55	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Revegetation - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
015433201500	Rent disc harrow attachment for tractor, Excl. Hourly Oper. Cost.	Month	\$ -	\$ -	\$ 3,051.61	\$ 3,051.61	Year 2024	NEW MEXICO / LAS CRUCES (880)
329343100560	Planting, trees, shrubs, and ground cover, medium soil, bare root seedlings, 3" to 5", includes planting only	Ea.	\$ -	\$ 0.45	\$ -	\$ 0.45	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Concrete cutoff wall (dissipater [dissipation basin]) & Grade Control Wall - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
033053406200	Structural concrete, in place, gravity retaining wall (3000 psi), 4' high, includes forms(4 uses), Grade 60 rebar, concrete (Portland cement Type I), placing and finishing	C.Y.	\$ 206.49	\$ 111.75	\$ 11.38	\$ 329.62	Year 2024	NEW MEXICO / LAS CRUCES (880)
033053403945	Structural concrete, in place, continuous strip footing (3000 psi), 36" wide x 12" deep, unreinforced, includes forms(4 uses), concrete (Portland cement Type I), placing and finishing, excludes reinforcing	C.Y.	\$ 176.40	\$ 47.59	\$ 0.38	\$ 224.37	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Perimeter Items - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
323126200020	Wire fencing & gates, wire fencing general, barbed wire, galvanized, domestic steel, standard, 12-3/4 ga.	M.L.F.	\$ 184.99	\$ -	\$ -	\$ 184.99	Year 2024	NEW MEXICO / LAS CRUCES (880)
323113200800	Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC, 6' high, includes excavation, & concrete, excludes barbed wire	L.F.	\$ 25.14	\$ 3.15	\$ 1.60	\$ 29.89	Year 2024	NEW MEXICO / LAS CRUCES (880)
323113205070	Fence, chain link industrial, double swing gates, 6' high, 20' opening, includes excavation, posts & hardware in concrete	Opng.	\$ 965.35	\$ 302.21	\$ 154.27	\$ 1,421.83	Year 2024	NEW MEXICO / LAS CRUCES (880)
101453200600	Signs, guide and directional signs, reflectorized, 12" x 18", excludes posts	Ea.	\$ 39.50	\$ 21.08	\$ 8.22	\$ 68.80	Year 2024	NEW MEXICO / LAS CRUCES (880)

**Excavation/Hauling - accessed July 29, 2024**

Line Number	Description	Unit	Material	Labor	Equipment	Total	Data Release	CCI Location
312316466010	Excavating, bulk, dozer, open site, bank measure, common earth, 700 HP dozer, 50' haul	B.C.Y.	\$ -	\$ 0.18	\$ 1.32	\$ 1.50	Year 2024	NEW MEXICO / LAS CRUCES (880)
312316466070	Excavating, bulk, dozer, open site, bank measure, common earth, 700 HP dozer, 300' haul	B.C.Y.	\$ -	\$ 0.61	\$ 4.43	\$ 5.04	Year 2024	NEW MEXICO / LAS CRUCES (880)
312323156075	Borrow clay, till, or blasted rock, 5 C.Y. bucket, loading and/or spreading, front end loader, track mounted	B.C.Y.	\$ 16.78	\$ 0.30	\$ 0.85	\$ 17.93	Year 2024	NEW MEXICO / LAS CRUCES (880)
312323205040	Cycle hauling (wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 22 C.Y. truck, cycle 1 mile, 5 MPH, excludes loading equipment	L.C.Y.	\$ -	\$ 0.93	\$ 3.55	\$ 4.48	Year 2024	NEW MEXICO / LAS CRUCES (880)



# MASTERFORMAT City Cost Indexes ~ Year 2024 Base

DIVISION			NEW JERSEY																	
			NEW BRUNSWICK			NEWARK			PATERSON			POINT PLEASANT			SUMMIT			TRENTON		
			088 - 089			070 - 071			074 - 075			087			079			085 - 086		
			MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		99.1	99.1		106.4	106.4		99.2	99.2		99.1	99.1		99.2	99.2		105.6	105.6	
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		103.5	98.5	100.2	110.0	115.1	113.3	104.6	105.6	105.3	104.7	98.4	100.6	103.0	105.7	104.7	95.0	107.6	103.2
0310	Concrete Forming & Accessories		102.1	142.9	135.8	97.7	143.3	135.3	96.5	142.9	134.8	98.3	142.3	134.6	96.8	143.0	134.9	99.6	142.3	134.8
0320	Concrete Reinforcing		90.2	146.8	113.3	82.9	146.9	109.1	79.6	146.8	107.1	90.2	146.8	113.3	61.3	146.8	96.2	117.7	134.3	124.5
0330	Cast-in-Place Concrete		96.4	135.2	109.4	72.7	137.4	94.4	64.0	134.8	87.7	96.4	134.8	109.2	53.4	134.9	80.7	92.2	136.4	107.0
03	CONCRETE		97.8	140.2	115.2	79.3	140.7	104.5	73.4	139.7	100.6	97.6	139.7	114.9	65.9	139.8	96.2	94.3	138.2	112.3
04	MASONRY		107.9	138.9	126.0	120.5	139.0	131.3	116.1	138.9	129.4	95.5	138.3	120.4	119.9	138.9	131.0	106.7	138.0	124.9
05	METALS		102.5	130.5	108.3	106.0	124.3	109.8	100.0	125.3	105.3	102.5	130.0	108.2	99.0	125.4	104.6	107.2	124.4	110.8
06	WOOD, PLASTICS & COMPOSITES		107.9	143.0	125.2	96.4	143.3	119.5	97.8	143.0	120.0	103.1	143.0	122.7	98.5	143.0	120.4	96.4	143.0	119.4
07	THERMAL & MOISTURE PROTECTION		96.8	137.0	110.2	96.9	139.4	111.1	95.1	132.7	107.7	96.8	133.7	109.2	95.3	137.4	109.4	97.3	136.9	110.6
08	OPENINGS		92.4	139.6	103.9	98.2	139.8	108.3	101.2	139.6	110.5	94.4	140.8	105.7	103.0	139.6	111.9	97.9	136.7	107.3
0920	Plaster & Gypsum Board		113.7	144.1	133.0	108.1	144.1	131.0	116.1	144.1	133.9	109.9	144.1	131.6	111.7	144.1	132.3	108.1	144.1	131.0
0950, 0980	Ceilings & Acoustic Treatment		99.8	144.1	124.6	112.2	144.1	130.1	111.9	144.1	129.9	99.8	144.1	124.6	95.9	144.1	122.9	110.8	144.1	129.4
0960	Flooring		106.6	181.9	125.9	110.8	181.9	129.0	93.9	181.9	116.4	104.4	150.3	116.2	94.1	181.9	116.6	110.8	177.3	127.9
0970, 0990	Wall Finishes & Painting/Coating		84.4	141.7	118.1	99.9	141.7	124.5	87.3	141.7	119.3	84.4	150.3	123.1	87.3	141.7	119.3	99.9	150.3	129.5
09	FINISHES		99.7	150.6	124.8	107.3	150.8	128.8	101.2	150.6	126.6	98.6	145.9	121.9	96.8	150.6	123.4	106.2	150.6	128.2
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44, 46		100.0	127.7	105.9	100.0	128.4	106.1	100.0	127.7	105.9	100.0	118.1	103.9	100.0	127.7	105.9	100.0	118.3	103.9
21, 22, 23	FIRE SUPPRESSION, PLUMBING & HVAC		99.4	133.9	111.8	99.9	134.9	112.5	99.9	134.9	112.5	99.4	133.4	111.7	99.4	134.9	112.2	100.0	133.4	112.0
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.		94.3	141.1	114.7	101.2	136.0	116.3	95.9	141.6	115.8	93.9	130.5	109.8	93.5	141.6	114.4	101.2	126.6	112.2
MF2018	WEIGHTED AVERAGE		99.2	135.7	113.0	100.3	136.1	113.8	97.2	135.9	111.8	98.6	132.9	111.6	95.7	136.1	110.9	101.2	132.9	113.2

DIVISION			NEW MEXICO																	
			VINELAND			ALBUQUERQUE			CARRIZOZO			CLOVIS			FARMINGTON			GALLUP		
			080,083			870 - 872			883			881			874			873		
			MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		99.5	99.5		102.5	102.5		108.9	108.9		108.9	108.9		102.5	102.5		102.5	102.5	
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		96.2	97.5	97.0	89.6	96.2	93.9	106.2	97.0	100.2	95.6	97.0	96.5	94.4	96.2	95.6	98.4	96.2	97.0
0310	Concrete Forming & Accessories		96.3	142.1	134.1	97.0	67.0	72.2	95.1	66.9	71.8	95.1	66.9	71.8	97.0	67.0	72.2	97.0	67.0	72.2
0320	Concrete Reinforcing		89.1	134.3	107.6	163.7	67.6	124.4	128.6	67.6	103.7	130.1	67.6	104.6	178.9	67.6	133.4	171.2	67.6	128.9
0330	Cast-in-Place Concrete		84.0	135.0	101.1	90.5	67.1	82.7	88.5	68.4	81.8	88.5	68.4	81.7	91.4	67.1	83.3	86.0	67.1	79.7
03	CONCRETE		87.2	137.6	107.9	109.1	68.1	92.3	119.3	68.9	98.6	107.7	68.9	91.8	113.9	68.1	95.1	120.2	68.1	98.8
04	MASONRY		98.7	138.4	121.8	103.9	57.6	76.9	112.1	57.8	80.5	112.2	57.8	80.5	110.3	57.6	79.6	100.1	57.6	75.3
05	METALS		102.3	125.1	107.1	119.5	85.6	112.4	103.9	92.0	101.4	103.6	92.0	101.2	115.6	85.6	109.3	115.7	85.6	109.4
06	WOOD, PLASTICS & COMPOSITES		101.1	143.0	121.7	92.7	68.0	80.6	88.0	68.0	78.2	88.0	68.0	78.2	92.8	68.0	80.6	92.8	68.0	80.6
07	THERMAL & MOISTURE PROTECTION		96.3	133.9	108.9	90.8	67.3	82.9	96.6	69.6	87.5	95.5	69.6	86.8	91.1	67.3	83.1	92.1	67.3	83.8
08	OPENINGS		93.9	137.9	104.6	97.8	66.3	90.1	90.8	66.3	84.8	91.0	66.3	85.0	100.3	66.3	92.0	100.3	66.3	92.0
0920	Plaster & Gypsum Board		108.5	144.1	131.1	99.8	66.9	78.9	83.9	66.9	73.1	83.9	66.9	73.1	86.1	66.9	73.9	86.1	66.9	73.9
0950, 0980	Ceilings & Acoustic Treatment		99.8	144.1	124.6	108.3	66.9	85.1	102.4	66.9	82.5	102.4	66.9	82.5	101.5	66.9	82.1	101.5	66.9	82.1
0960	Flooring		103.9	150.3	115.8	98.3	66.8	90.2	99.4	66.8	91.0	99.4	66.8	91.0	99.6	66.8	91.2	99.6	66.8	91.2
0970, 0990	Wall Finishes & Painting/Coating		84.4	150.3	123.1	95.6	52.6	70.3	90.1	52.6	68.1	90.1	52.6	68.1	89.2	52.6	67.7	89.2	52.6	67.7
09	FINISHES		97.8	145.9	121.6	99.0	65.4	82.4	98.4	65.3	82.0	97.3	65.3	81.5	95.6	65.4	80.7	96.6	65.4	81.2
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44, 46		100.0	118.3	103.9	100.0	86.8	97.2	100.0	86.6	97.2	100.0	86.6	97.2	100.0	86.8	97.2	100.0	86.8	97.2
21, 22, 23	FIRE SUPPRESSION, PLUMBING & HVAC		99.4	133.7	111.8	100.3	66.4	88.1	95.5	66.4	85.1	95.5	66.4	85.1	100.2	66.4	88.0	95.7	66.4	85.1
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.		93.9	137.7	113.0	76.1	68.9	73.0	85.1	68.9	78.1	83.8	68.9	77.4	74.9	68.9	72.3	74.6	68.9	72.1
MF2018	WEIGHTED AVERAGE		97.2	133.1	110.8	101.5	70.6	89.8	100.0	71.3	89.1	98.0	71.3	87.9	101.5	70.6	89.8	101.0	70.6	89.5

DIVISION			NEW MEXICO																	
			LAS CRUCES			LAS VEGAS			ROSWELL			SANTA FE			SOCORRO			TRUTH/CONSEQUENCES		
			880			877			882			875			878			879		
			MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		84.3	84.3		102.5	102.5		108.9	108.9		108.2	108.2		102.5	102.5		79.2	79.2	
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		98.1	76.6	84.1	91.4	96.2	94.6	99.7	97.0	98.0	95.1	104.0	100.9	88.7	96.2	93.6	101.9	75.9	84.9
0310	Concrete Forming & Accessories		92.5	65.8	70.5	97.0	67.0	72.2	95.1	66.9	71.8	97.6	67.2	72.5	97.0	67.0	72.2	94.6	65.9	70.9
0320	Concrete Reinforcing		125.7	67.5	101.9	174.2	67.6	130.6	130.1	67.6	104.6	174.3	67.7	130.7	177.5	67.6	132.6	170.1	67.5	128.2
0330	Cast-in-Place Concrete		83.6	61.4	76.2	88.8	67.1	81.6	88.5	68.4	81.8	94.4	69.4	86.0	87.0	67.1	80.4	95.5	60.6	83.8
03	CONCRETE		86.3	65.6	77.8	111.1	68.1	93.4	108.5	68.9	92.2	118.0	68.9	97.8	110.2	68.1	92.9	103.1	65.0	87.5
04	MASONRY		107.7	57.4	78.4	100.4	57.6	75.5	123.4	57.8	85.2	97.1	57.7	74.2	100.3	57.6	75.4	96.9	57.3	73.9
05	METALS		100.9	85.1	97.6	115.4	85.6	109.2	103.8	92.0	101.3	113.2	84.0	107.1	115.7	85.6	109.4	114.6	79.7	107.3
06	WOOD, PLASTICS & COMPOSITES		76.4	66.9	71.7	92.8	68.0	80.6	88.0	68.0	78.2	91.5	68.3	80.1	92.8	68.0	80.6	81.9	66.9	74.6
07	THERMAL & MOISTURE PROTECTION		86.4	65.0	79.2	90.8	67.3	82.9	95.6	69.6	86.9	93.0	69.3	85.0	90.8	67.3	82.9	83.3	63.6	76.7
08	OPENINGS		87.2	65.7	82.0	96.8	66.3	89.4	90.8	66.3	84.8	98.1	66.5	90.4	96.7	66.3	89.3	89.9	65.8	84.0
0920	Plaster & Gypsum Board		83.6	66.9	72.9	86.1	66.9	73.9	83.9	66.9	73.1	96.7	66.9	77.7	86.1	66.9	73.9	88.9	66.9	74.9
0950, 0980	Ceilings & Acoustic Treatment		99.2	66.9	81.1	101.5	66.9	82.1	102.4	66.9	82.5	100.3	66.9	81.6	101.5	66.9	82.1	100.4	66.9	81.7
0960	Flooring		127.6	66.8	112.0	99.6	66.8	91.2	99.4	66.8	91.0	109.7	66.8	98.7	99.6	66.8	91.2	128.3	66.8	112.5
0970, 0990	Wall Finishes & Painting/Coating		80.9	52.6	64.2	89.2	52.6	67.7	90.1	52.6	68.1	99.9	52.6	72.1	89.2	52.6	67.7	83.4	52.6	65.3
09	FINISHES		109.1	64.4	87.0	95.5	65.4	80.6	97.4	65.3	81.6	102.1	65.6	84.1	95.5	65.4	80.6	109.7	64.6	

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew A-1</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Concrete Saw, Gas Manual		119.32		131.25	14.91	16.41
8 L.H., Daily Totals		\$511.32		\$711.65	\$63.91	\$88.96
<b>Crew A-1A</b>						
1 Skilled Worker	\$63.50	\$508.00	\$95.00	\$760.00	\$63.50	\$95.00
1 Shot Blaster, 20"		238.10		261.91	29.76	32.74
8 L.H., Daily Totals		\$746.10		\$1021.91	\$93.26	\$127.74
<b>Crew A-1B</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Concrete Saw		194.70		214.17	24.34	26.77
8 L.H., Daily Totals		\$586.70		\$794.57	\$73.34	\$99.32
<b>Crew A-1C</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Chain Saw, Gas, 18"		75.85		83.44	9.48	10.43
8 L.H., Daily Totals		\$467.85		\$663.84	\$58.48	\$82.98
<b>Crew A-1D</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Vibrating Plate, Gas, 18"		132.53		145.78	16.57	18.22
8 L.H., Daily Totals		\$524.53		\$726.18	\$65.57	\$90.77
<b>Crew A-1E</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Vibrating Plate, Gas, 21"		152.80		168.08	19.10	21.01
8 L.H., Daily Totals		\$544.80		\$748.48	\$68.10	\$93.56
<b>Crew A-1F</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Rammer/Tamper, Gas, 8"		99.37		109.31	12.42	13.66
8 L.H., Daily Totals		\$491.37		\$689.71	\$61.42	\$86.21
<b>Crew A-1G</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Rammer/Tamper, Gas, 15"		113.54		124.89	14.19	15.61
8 L.H., Daily Totals		\$505.54		\$705.29	\$63.19	\$88.16
<b>Crew A-1H</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Exterior Steam Cleaner		88.34		97.17	11.04	12.15
8 L.H., Daily Totals		\$480.34		\$677.57	\$60.04	\$84.70
<b>Crew A-1J</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Cultivator, Walk-Behind, 5 H.P.		78.27		86.10	9.78	10.76
8 L.H., Daily Totals		\$470.27		\$666.50	\$58.78	\$83.31
<b>Crew A-1K</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Cultivator, Walk-Behind, 8 H.P.		95.36		104.89	11.92	13.11
8 L.H., Daily Totals		\$487.36		\$685.29	\$60.92	\$85.66
<b>Crew A-1M</b>						
1 Building Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Snow Blower, Walk-Behind		78.03		85.83	9.75	10.73
8 L.H., Daily Totals		\$470.03		\$666.23	\$58.75	\$83.28

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew A-2</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.05	\$75.70
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	17.53	19.29
24 L.H., Daily Totals		\$1646.03		\$2279.72	\$68.58	\$94.99
<b>Crew A-2A</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.05	\$75.70
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92		
1 Concrete Saw		194.70		214.17	25.65	28.21
24 L.H., Daily Totals		\$1840.73		\$2493.88	\$76.70	\$103.91
<b>Crew A-2B</b>						
1 Truck Driver (light)	\$55.15	\$441.20	\$82.00	\$656.00	\$55.15	\$82.00
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	52.60	57.86
8 L.H., Daily Totals		\$862.03		\$1118.92	\$107.75	\$139.86
<b>Crew A-3A</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49	29.49	32.44
8 L.H., Daily Totals		\$731.90		\$995.09	\$91.49	\$124.39
<b>Crew A-3B</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$61.13	\$90.75
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78		
1 F.E. Loader, W.M., 2.5 C.Y.		815.12		896.63	112.64	123.90
16 L.H., Daily Totals		\$2780.19		\$3434.41	\$173.76	\$214.65
<b>Crew A-3C</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	49.33	54.26
8 L.H., Daily Totals		\$890.64		\$1169.70	\$111.33	\$146.21
<b>Crew A-3D</b>						
1 Truck Driver (light)	\$55.15	\$441.20	\$82.00	\$656.00	\$55.15	\$82.00
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Flatbed Trailer, 25 Ton		157.04		172.75	49.12	54.03
8 L.H., Daily Totals		\$834.15		\$1088.24	\$104.27	\$136.03
<b>Crew A-3E</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.92	\$93.42
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49	14.74	16.22
16 L.H., Daily Totals		\$1242.70		\$1754.29	\$77.67	\$109.64
<b>Crew A-3F</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.92	\$93.42
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Lowbed Trailer, 75 Ton		295.27		324.79	69.04	75.95
16 L.H., Daily Totals		\$2111.46		\$2709.92	\$131.97	\$169.37

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew A-3G</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.92	\$93.42
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Truck Tractor, 6x4, 450 H.P.		699.67		769.64		
1 Lowbed Trailer, 75 Ton		295.27		324.79	76.93	84.62
16 L.H., Daily Totals		\$2237.64		\$2848.73	\$139.85	\$178.05
<b>Crew A-3H</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$68.60	\$101.75
1 Hyd. Crane, 12 Ton (Daily)		2167.46		2384.21	270.93	298.03
8 L.H., Daily Totals		\$2716.26		\$3198.21	\$339.53	\$399.78
<b>Crew A-3I</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$68.60	\$101.75
1 Hyd. Crane, 25 Ton (Daily)		2294.03		2523.44	286.75	315.43
8 L.H., Daily Totals		\$2842.83		\$3337.44	\$355.35	\$417.18
<b>Crew A-3J</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$68.60	\$101.75
1 Hyd. Crane, 40 Ton (Daily)		2477.80		2725.59	309.73	340.70
8 L.H., Daily Totals		\$3026.60		\$3539.59	\$378.33	\$442.45
<b>Crew A-3K</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$63.50	\$94.17
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 55 Ton (Daily)		2491.74		2740.91		
1 P/U Truck, 3/4 Ton (Daily)		165.25		181.77	166.06	182.67
16 L.H., Daily Totals		\$3672.99		\$4429.49	\$229.56	\$276.84
<b>Crew A-3L</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$63.50	\$94.17
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 80 Ton (Daily)		2681.89		2950.08		
1 P/U Truck, 3/4 Ton (Daily)		165.25		181.77	177.95	195.74
16 L.H., Daily Totals		\$3863.14		\$4638.66	\$241.45	\$289.92
<b>Crew A-3M</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$63.50	\$94.17
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 100 Ton (Daily)		2811.00		3092.10		
1 P/U Truck, 3/4 Ton (Daily)		165.25		181.77	186.02	204.62
16 L.H., Daily Totals		\$3992.24		\$4780.67	\$249.52	\$298.79
<b>Crew A-3N</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$68.60	\$101.75
1 Tower Crane (monthly)		1961.62		2157.79	245.20	269.72
8 L.H., Daily Totals		\$2510.42		\$2971.79	\$313.80	\$371.47
<b>Crew A-3P</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 A.T. Forklift, 31' reach, 45' lift		632.52		695.77	79.07	86.97
8 L.H., Daily Totals		\$1128.52		\$1431.37	\$141.07	\$178.92
<b>Crew A-3Q</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Flatbed Trailer, 3 Ton		81.23		89.36	39.64	43.61
8 L.H., Daily Totals		\$813.14		\$1084.45	\$101.64	\$135.56

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew A-3R</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Forklift, Smooth Floor, 8,000 Lb.		326.55		359.21	40.82	44.90
8 L.H., Daily Totals		\$822.55		\$1094.81	\$102.82	\$136.85
<b>Crew A-4</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$57.60	\$85.20
1 Painter, Ordinary	51.70	413.60	76.30	610.40		
24 L.H., Daily Totals		\$1382.40		\$2044.80	\$57.60	\$85.20
<b>Crew A-5</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$49.68	\$73.60
.25 Truck Driver (light)	55.15	110.30	82.00	164.00		
.25 Flatbed Truck, Gas, 1.5 Ton		105.21		115.73	5.84	6.43
18 L.H., Daily Totals		\$999.51		\$1440.53	\$55.53	\$80.03
<b>Crew A-6</b>						
1 Instrument Man	\$63.50	\$508.00	\$95.00	\$760.00	\$60.85	\$90.47
1 Rodman/Chainman	58.20	465.60	85.95	687.60		
1 Level, Electronic		36.40		40.04	2.27	2.50
16 L.H., Daily Totals		\$1010.00		\$1487.64	\$63.12	\$92.98
<b>Crew A-7</b>						
1 Chief of Party	\$74.00	\$592.00	\$110.20	\$881.60	\$65.23	\$97.05
1 Instrument Man	63.50	508.00	95.00	760.00		
1 Rodman/Chainman	58.20	465.60	85.95	687.60		
1 Level, Electronic		36.40		40.04	1.52	1.67
24 L.H., Daily Totals		\$1602.00		\$2369.24	\$66.75	\$98.72
<b>Crew A-8</b>						
1 Chief of Party	\$74.00	\$592.00	\$110.20	\$881.60	\$63.48	\$94.28
1 Instrument Man	63.50	508.00	95.00	760.00		
2 Rodmen/Chainmen	58.20	931.20	85.95	1375.20		
1 Level, Electronic		36.40		40.04	1.14	1.25
32 L.H., Daily Totals		\$2067.60		\$3056.84	\$64.61	\$95.53
<b>Crew A-9</b>						
1 Asbestos Foreman	\$67.60	\$540.80	\$103.00	\$824.00	\$67.16	\$102.34
7 Asbestos Workers	67.10	3757.60	102.25	5726.00		
64 L.H., Daily Totals		\$4298.40		\$6550.00	\$67.16	\$102.34
<b>Crew A-10A</b>						
1 Asbestos Foreman	\$67.60	\$540.80	\$103.00	\$824.00	\$67.27	\$102.50
2 Asbestos Workers	67.10	1073.60	102.25	1636.00		
24 L.H., Daily Totals		\$1614.40		\$2460.00	\$67.27	\$102.50
<b>Crew A-10B</b>						
1 Asbestos Foreman	\$67.60	\$540.80	\$103.00	\$824.00	\$67.22	\$102.44
3 Asbestos Workers	67.10	1610.40	102.25	2454.00		
32 L.H., Daily Totals		\$2151.20		\$3278.00	\$67.22	\$102.44
<b>Crew A-10C</b>						
3 Asbestos Workers	\$67.10	\$1610.40	\$102.25	\$2454.00	\$67.10	\$102.25
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	17.53	19.29
24 L.H., Daily Totals		\$2031.23		\$2916.92	\$84.63	\$121.54

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew A-10D</b>						
2 Asbestos Workers	\$67.10	\$1073.60	\$102.25	\$1636.00	\$65.30	\$98.21
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hydraulic Crane, 33 Ton		2519.14		2771.05	78.72	86.60
32 L.H., Daily Totals		\$4608.74		\$5913.85	\$144.02	\$184.81
<b>Crew A-11</b>						
1 Asbestos Foreman	\$67.60	\$540.80	\$103.00	\$824.00	\$67.16	\$102.34
7 Asbestos Workers	67.10	3757.60	102.25	5726.00		
2 Chip. Hammers, 12 Lb., Elec.		58.85		64.73	.92	1.01
64 L.H., Daily Totals		\$4357.25		\$6614.73	\$68.08	\$103.36
<b>Crew A-12</b>						
1 Asbestos Foreman	\$67.60	\$540.80	\$103.00	\$824.00	\$67.16	\$102.34
7 Asbestos Workers	67.10	3757.60	102.25	5726.00		
1 Trk-Mtd Vac, 14 CY, 1500 Gal.		619.88		681.87		
1 Flatbed Truck, 20,000 GWW		234.51		257.97	13.35	14.68
64 L.H., Daily Totals		\$5152.79		\$7489.83	\$80.51	\$117.03
<b>Crew A-13</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Trk-Mtd Vac, 14 CY, 1500 Gal.		619.88		681.87		
1 Flatbed Truck, 20,000 GWW		234.51		257.97	106.80	117.48
8 L.H., Daily Totals		\$1350.39		\$1675.43	\$168.80	\$209.43
<b>Crew B-1</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Laborers	49.00	784.00	72.55	1160.80		
24 L.H., Daily Totals		\$1192.00		\$1764.80	\$49.67	\$73.53
<b>Crew B-1A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Laborers	49.00	784.00	72.55	1160.80		
2 Cutting Torches		29.68		32.65		
2 Sets of Gases		401.58		441.74	17.97	19.77
24 L.H., Daily Totals		\$1623.26		\$2239.19	\$67.64	\$93.30
<b>Crew B-1B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.40	\$80.59
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
2 Cutting Torches		29.68		32.65		
2 Sets of Gases		401.58		441.74		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	82.98	91.28
32 L.H., Daily Totals		\$4396.27		\$5499.82	\$137.38	\$171.87
<b>Crew B-1C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Laborers	49.00	784.00	72.55	1160.80		
1 Telescoping Boom Lift, to 60'		467.60		514.36	19.48	21.43
24 L.H., Daily Totals		\$1659.60		\$2279.16	\$69.15	\$94.96
<b>Crew B-1D</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$49.00	\$72.55
1 Small Work Boat, Gas, 50 H.P.		139.24		153.16		
1 Pressure Washer, 7 GPM		118.36		130.20	16.10	17.71
16 L.H., Daily Totals		\$1041.60		\$1444.16	\$65.10	\$90.26

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-1E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.50	\$73.29
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Work Boat, Diesel, 200 H.P.		1644.62		1809.08		
2 Pressure Washers, 7 GPM		236.73		260.40	58.79	64.67
32 L.H., Daily Totals		\$3465.35		\$4414.68	\$108.29	\$137.96
<b>Crew B-1F</b>						
2 Skilled Workers	\$63.50	\$1016.00	\$95.00	\$1520.00	\$58.67	\$87.52
1 Laborer	49.00	392.00	72.55	580.40		
1 Small Work Boat, Gas, 50 H.P.		139.24		153.16		
1 Pressure Washer, 7 GPM		118.36		130.20	10.73	11.81
24 L.H., Daily Totals		\$1665.60		\$2383.76	\$69.40	\$99.32
<b>Crew B-1G</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$49.00	\$72.55
1 Small Work Boat, Gas, 50 H.P.		139.24		153.16	8.70	9.57
16 L.H., Daily Totals		\$923.24		\$1313.96	\$57.70	\$82.12
<b>Crew B-1H</b>						
2 Skilled Workers	\$63.50	\$1016.00	\$95.00	\$1520.00	\$58.67	\$87.52
1 Laborer	49.00	392.00	72.55	580.40		
1 Small Work Boat, Gas, 50 H.P.		139.24		153.16	5.80	6.38
24 L.H., Daily Totals		\$1547.24		\$2253.56	\$64.47	\$93.90
<b>Crew B-1J</b>						
1 Labor Foreman (inside)	\$49.50	\$396.00	\$73.30	\$586.40	\$49.25	\$72.92
1 Laborer	49.00	392.00	72.55	580.40		
16 L.H., Daily Totals		\$788.00		\$1166.80	\$49.25	\$72.92
<b>Crew B-1K</b>						
1 Carpenter Foreman (inside)	\$61.05	\$488.40	\$90.40	\$723.20	\$60.80	\$90.03
1 Carpenter	60.55	484.40	89.65	717.20		
16 L.H., Daily Totals		\$972.80		\$1440.40	\$60.80	\$90.03
<b>Crew B-2</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.40	\$73.14
4 Laborers	49.00	1568.00	72.55	2321.60		
40 L.H., Daily Totals		\$1976.00		\$2925.60	\$49.40	\$73.14
<b>Crew B-2A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Laborers	49.00	784.00	72.55	1160.80		
1 Telescoping Boom Lift, to 60'		467.60		514.36	19.48	21.43
24 L.H., Daily Totals		\$1659.60		\$2279.16	\$69.15	\$94.96
<b>Crew B-3</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.75	\$81.20
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
2 Dump Trucks, 12 C.Y., 400 H.P.		1974.15		2171.56	68.49	75.33
48 L.H., Daily Totals		\$5915.33		\$7513.67	\$123.24	\$156.53
<b>Crew B-3A</b>						
4 Laborers	\$49.00	\$1568.00	\$72.55	\$2321.60	\$52.20	\$77.32
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24	29.85	32.83
40 L.H., Daily Totals		\$3281.85		\$4406.04	\$82.05	\$110.15

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-3B</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$55.06	\$81.65
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Backhoe Loader, 80 H.P.		455.51		501.06		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	45.08	49.59
32 L.H., Daily Totals		\$3204.58		\$4199.64	\$100.14	\$131.24
<b>Crew B-3C</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$53.00	\$78.51
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Crawler Loader, 4 C.Y.		1859.78		2045.75	58.12	63.93
32 L.H., Daily Totals		\$3555.78		\$4558.15	\$111.12	\$142.44
<b>Crew B-4</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.71	\$75.13
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Truck Tractor, 220 H.P.		357.02		392.72		
1 Flatbed Trailer, 40 Ton		215.61		237.17	11.93	13.12
48 L.H., Daily Totals		\$3006.63		\$4236.29	\$62.64	\$88.26
<b>Crew B-5</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.86	\$79.79
4 Laborers	49.00	1568.00	72.55	2321.60		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Air Compressor, 250 cfm		226.90		249.59		
2 Breakers, Pavement, 60 lb.		79.92		87.92		
2 -50' Air Hoses, 1.5"		47.13		51.84		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50	29.77	32.75
56 L.H., Daily Totals		\$4683.13		\$6301.85	\$83.63	\$112.53
<b>Crew B-5A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.29	\$80.48
6 Laborers	49.00	2352.00	72.55	3482.40		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Air Compressor, 365 cfm		344.62		379.09		
2 Breakers, Pavement, 60 lb.		79.92		87.92		
8 -50' Air Hoses, 1"		72.21		79.44		
2 Dump Trucks, 8 C.Y., 220 H.P.		1012.60		1113.86	15.72	17.29
96 L.H., Daily Totals		\$6721.36		\$9386.30	\$70.01	\$97.77
<b>Crew B-5B</b>						
1 Powderman	\$63.50	\$508.00	\$95.00	\$760.00	\$60.88	\$90.52
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
3 Truck Drivers (heavy)	57.25	1374.00	85.10	2042.40		
1 F.E. Loader, W.M., 2.5 C.Y.		815.12		896.63		
3 Dump Trucks, 12 C.Y., 400 H.P.		2961.22		3257.35		
1 Air Compressor, 365 cfm		344.62		379.09	85.85	94.44
48 L.H., Daily Totals		\$7042.96		\$8877.86	\$146.73	\$184.96

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-5C</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$56.69	\$84.08
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
2 Dump Trucks, 12 C.Y., 400 H.P.		1974.15		2171.56		
1 Crawler Loader, 4 C.Y.		1859.78		2045.75		
1 S.P. Crane, 4x4, 25 Ton		966.17		1062.78	75.00	82.50
64 L.H., Daily Totals		\$8428.09		\$10660.90	\$131.69	\$166.58
<b>Crew B-5D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.28	\$80.45
4 Laborers	49.00	1568.00	72.55	2321.60		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Air Compressor, 250 cfm		226.90		249.59		
2 Breakers, Pavement, 60 lb.		79.92		87.92		
2 -50' Air Hoses, 1.5"		47.13		51.84		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	41.47	45.62
64 L.H., Daily Totals		\$6128.21		\$8068.43	\$95.75	\$126.07
<b>Crew B-5E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.28	\$80.45
4 Laborers	49.00	1568.00	72.55	2321.60		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Water Tank Trailer, 5000 Gal.		176.44		194.08		
1 High Pressure Water Jet 40 KSI		938.04		1031.84		
2 -50' Air Hoses, 1.5"		47.13		51.84		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	54.09	59.50
64 L.H., Daily Totals		\$6935.86		\$8956.85	\$108.37	\$139.95
<b>Crew B-6</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$53.33	\$79.02
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Backhoe Loader, 48 H.P.		291.00		320.10	12.13	13.34
24 L.H., Daily Totals		\$1571.00		\$2216.50	\$65.46	\$92.35
<b>Crew B-6A</b>						
.5 Labor Foreman (outside)	\$51.00	\$204.00	\$75.50	\$302.00	\$55.80	\$82.68
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Vacuum Truck, 5000 Gal.		425.19		467.71	21.26	23.39
20 L.H., Daily Totals		\$1541.19		\$2121.31	\$77.06	\$106.07
<b>Crew B-6B</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$49.67	\$73.53
4 Laborers	49.00	1568.00	72.55	2321.60		
1 S.P. Crane, 4x4, 5 Ton		402.11		442.32		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92		
1 Butt Fusion Mach., 4"-12" diam.		345.30		379.83	24.34	26.77
48 L.H., Daily Totals		\$3552.24		\$4814.67	\$74.01	\$100.31

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-6C</b>						
2 Labor Foreman (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$49.67	\$73.53
4 Laborers	49.00	1568.00	72.55	2321.60		
1 S.P. Crane, 4x4, 12 Ton		663.72		730.09		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Butt Fusion Mach., 8"-24" diam.		826.87		909.56		
48 L.H., Daily Totals		\$4394.15		\$5740.76	\$91.54	\$119.60
<b>Crew B-6D</b>						
.5 Labor Foreman (outside)	\$51.00	\$204.00	\$75.50	\$302.00	\$55.80	\$82.68
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Hydro Excavator, 12 C.Y.		1458.21		1604.03		
20 L.H., Daily Totals		\$2574.21		\$3257.63		
<b>Crew B-7</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.00	\$77.02
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Brush Chipper, 12", 130 H.P.		507.44		558.18		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
2 Chain Saws, Gas, 36" Long		110.97		122.06		
48 L.H., Daily Totals		\$4427.59		\$5821.55	\$92.24	\$121.28
<b>Crew B-7A</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$53.33	\$79.02
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Rake w/Tractor		227.75		250.53		
2 Chain Saws, Gas, 18"		151.70		166.87		
24 L.H., Daily Totals		\$1659.46		\$2313.80		
<b>Crew B-7B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.75	\$78.17
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Brush Chipper, 12", 130 H.P.		507.44		558.18		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
2 Chain Saws, Gas, 36" Long		110.97		122.06		
1 Dump Truck, 8 C.Y., 220 H.P.		506.30		556.93		
56 L.H., Daily Totals		\$5391.89		\$7059.28	\$96.28	\$126.06
<b>Crew B-7C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.75	\$78.17
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Brush Chipper, 12", 130 H.P.		507.44		558.18		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50		
2 Chain Saws, Gas, 36" Long		110.97		122.06		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78		
56 L.H., Daily Totals		\$5872.66		\$7588.13	\$104.87	\$135.50

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-8</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.49	\$83.78		
2 Laborers	49.00	784.00	72.55	1160.80				
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60				
1 Hyd. Crane, 25 Ton		2335.01		2568.51				
1 Crawler Loader, 3 C.Y.		1313.18		1444.50				
2 Dump Trucks, 12 C.Y., 400 H.P.		1974.15		2171.56				
64 L.H., Daily Totals		\$9237.54		\$11546.17	\$144.34	\$180.41		
<b>Crew B-9</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.40	\$73.14		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Air Compressor, 250 cfm		226.90		249.59				
2 Breakers, Pavement, 60 lb.		79.92		87.92				
2 -50' Air Hoses, 1.5"		47.13		51.84				
40 L.H., Daily Totals		\$2329.95		\$3314.95	\$58.25	\$82.87		
<b>Crew B-9A</b>								
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.75	\$76.73		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80				
1 Water Tank Trailer, 5000 Gal.		176.44		194.08				
1 Truck Tractor, 220 H.P.		357.02		392.72				
2 -50' Discharge Hoses, 3"		10.57		11.63				
24 L.H., Daily Totals		\$1786.02		\$2440.03	\$74.42	\$101.67		
<b>Crew B-9B</b>								
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.75	\$76.73		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80				
2 -50' Discharge Hoses, 3"		10.57		11.63				
1 Water Tank Trailer, 5000 Gal.		176.44		194.08				
1 Truck Tractor, 220 H.P.		357.02		392.72				
1 Pressure Washer		135.59		149.14				
24 L.H., Daily Totals		\$1921.61		\$2589.17	\$80.07	\$107.88		
<b>Crew B-9D</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.40	\$73.14		
4 Common Laborers	49.00	1568.00	72.55	2321.60				
1 Air Compressor, 250 cfm		226.90		249.59				
2 -50' Air Hoses, 1.5"		47.13		51.84				
2 Air Powered Tampers		107.08		117.78				
40 L.H., Daily Totals		\$2357.10		\$3344.81	\$58.93	\$83.62		
<b>Crew B-9E</b>								
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$52.90	\$77.67		
1 Laborer	49.00	392.00	72.55	580.40				
1 Chip. Hammers, 12 Lb., Elec.		29.42		32.37				
16 L.H., Daily Totals		\$875.82		\$1275.17			\$54.74	\$79.70
<b>Crew B-10</b>								
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45		
.5 Laborer	49.00	196.00	72.55	290.20				
12 L.H., Daily Totals		\$716.00		\$1061.40				
<b>Crew B-10A</b>								
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45		
.5 Laborer	49.00	196.00	72.55	290.20				
1 Roller, 2-Drum, W.B., 7.5 H.P.		175.19		192.71				
12 L.H., Daily Totals		\$891.19		\$1254.11			\$74.27	\$104.51

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-10B</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 200 H.P.		1443.21		1587.53	120.27	132.29
12 L.H., Daily Totals		\$2159.21		\$2648.93	\$179.93	\$220.74
<b>Crew B-10C</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Vibratory Roller, Towed, 23 Ton		696.00		765.60	178.27	196.09
12 L.H., Daily Totals		\$2855.22		\$3414.54	\$237.93	\$284.54
<b>Crew B-10D</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Sheepsft. Roller, Towed		516.41		568.05	163.30	179.63
12 L.H., Daily Totals		\$2675.62		\$3216.99	\$222.97	\$268.08
<b>Crew B-10E</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Tandem Roller, 5 Ton		264.37		290.81	22.03	24.23
12 L.H., Daily Totals		\$980.37		\$1352.21	\$81.70	\$112.68
<b>Crew B-10F</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Tandem Roller, 10 Ton		319.84		351.82	26.65	29.32
12 L.H., Daily Totals		\$1035.84		\$1413.22	\$86.32	\$117.77
<b>Crew B-10G</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Sheepsfoot Roller, 240 H.P.		807.49		888.24	67.29	74.02
12 L.H., Daily Totals		\$1523.49		\$1949.64	\$126.96	\$162.47
<b>Crew B-10H</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Diaphragm Water Pump, 2"		65.04		71.55		
1 -20' Suction Hose, 2"		4.61		5.07		
2 -50' Discharge Hoses, 2"		9.05		9.96	6.56	7.21
12 L.H., Daily Totals		\$794.70		\$1147.97	\$66.23	\$95.66
<b>Crew B-10I</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Diaphragm Water Pump, 4"		157.09		172.80		
1 -20' Suction Hose, 4"		19.59		21.55		
2 -50' Discharge Hoses, 4"		29.12		32.03	17.15	18.87
12 L.H., Daily Totals		\$921.80		\$1287.78	\$76.82	\$107.32
<b>Crew B-10J</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Centrifugal Water Pump, 3"		86.40		95.04		
1 -20' Suction Hose, 3"		9.86		10.84		
2 -50' Discharge Hoses, 3"		10.57		11.63	8.90	9.79
12 L.H., Daily Totals		\$822.83		\$1178.91	\$68.57	\$98.24

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-10K</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Centr. Water Pump, 6"		410.89		451.98		
1 -20' Suction Hose, 6"		29.00		31.90		
2 -50' Discharge Hoses, 6"		41.25		45.38	40.09	44.10
12 L.H., Daily Totals		\$1197.14		\$1590.65	\$99.76	\$132.55
<b>Crew B-10L</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 80 H.P.		634.87		698.36	52.91	58.20
12 L.H., Daily Totals		\$1350.87		\$1759.76	\$112.57	\$146.65
<b>Crew B-10M</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 300 H.P.		2393.85		2633.23	199.49	219.44
12 L.H., Daily Totals		\$3109.85		\$3694.63	\$259.15	\$307.89
<b>Crew B-10N</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, T.M., 1.5 C.Y.		562.32		618.55	46.86	51.55
12 L.H., Daily Totals		\$1278.32		\$1679.95	\$106.53	\$140.00
<b>Crew B-10O</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, T.M., 2.25 C.Y.		1179.94		1297.93	98.33	108.16
12 L.H., Daily Totals		\$1895.94		\$2359.33	\$157.99	\$196.61
<b>Crew B-10P</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Crawler Loader, 3 C.Y.		1313.18		1444.50	109.43	120.38
12 L.H., Daily Totals		\$2029.18		\$2505.90	\$169.10	\$208.83
<b>Crew B-10Q</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Crawler Loader, 4 C.Y.		1859.78		2045.75	154.98	170.48
12 L.H., Daily Totals		\$2575.78		\$3107.15	\$214.65	\$258.93
<b>Crew B-10R</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, W.M., 1 C.Y.		368.36		405.20	30.70	33.77
12 L.H., Daily Totals		\$1084.36		\$1466.60	\$90.36	\$122.22
<b>Crew B-10S</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, W.M., 1.5 C.Y.		582.76		641.03	48.56	53.42
12 L.H., Daily Totals		\$1298.76		\$1702.43	\$108.23	\$141.87
<b>Crew B-10T</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, W.M., 2.5 C.Y.		815.12		896.63	67.93	74.72
12 L.H., Daily Totals		\$1531.12		\$1958.03	\$127.59	\$163.17

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-10U</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, W.M., 5.5 C.Y.		1235.36		1358.90	102.95	113.24
12 L.H., Daily Totals		\$1951.36		\$2420.30	\$162.61	\$201.69
<b>Crew B-10V</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 700 H.P.		4734.34		5207.77	394.53	433.98
12 L.H., Daily Totals		\$5450.34		\$6269.17	\$454.20	\$522.43
<b>Crew B-10W</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 105 H.P.		790.84		869.92	65.90	72.49
12 L.H., Daily Totals		\$1506.84		\$1931.32	\$125.57	\$160.94
<b>Crew B-10X</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 410 H.P.		2969.84		3266.82	247.49	272.24
12 L.H., Daily Totals		\$3685.84		\$4328.22	\$307.15	\$360.69
<b>Crew B-10Y</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Vibr. Roller, Towed, 12 Ton		364.55		401.00	30.38	33.42
12 L.H., Daily Totals		\$1080.55		\$1462.40	\$90.05	\$121.87
<b>Crew B-11A</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Dozer, 200 H.P.		1443.21		1587.53	90.20	99.22
16 L.H., Daily Totals		\$2355.21		\$2939.13	\$147.20	\$183.70
<b>Crew B-11B</b>						
1 Equipment Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$55.50	\$82.25
1 Laborer	49.00	392.00	72.55	580.40		
1 Air Powered Tamper		53.54		58.89		
1 Air Compressor, 365 cfm		344.62		379.09		
2 -50' Air Hoses, 1.5"		47.13		51.84	27.83	30.61
16 L.H., Daily Totals		\$1333.29		\$1805.82	\$83.33	\$112.86
<b>Crew B-11C</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Backhoe Loader, 48 H.P.		291.00		320.10	18.19	20.01
16 L.H., Daily Totals		\$1203.00		\$1671.70	\$75.19	\$104.48
<b>Crew B-11J</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Ripper, Beam & 1 Shank		104.87		115.36	76.27	83.90
16 L.H., Daily Totals		\$2132.34		\$2693.97	\$133.27	\$168.37

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-11K</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Trencher, Chain Type, 8' D		2168.88		2385.77	135.56	149.11
16 L.H., Daily Totals		\$3080.88		\$3737.37	\$192.56	\$233.59
<b>Crew B-11L</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02	69.72	76.69
16 L.H., Daily Totals		\$2027.47		\$2578.62	\$126.72	\$161.16
<b>Crew B-11M</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Laborer	49.00	392.00	72.55	580.40		
1 Backhoe Loader, 80 H.P.		455.51		501.06	28.47	31.32
16 L.H., Daily Totals		\$1367.51		\$1852.66	\$85.47	\$115.79
<b>Crew B-11N</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.28	\$86.54
2 Equipment Operators (med.)	65.00	1040.00	96.40	1542.40		
6 Truck Drivers (heavy)	57.25	2748.00	85.10	4084.80		
1 F.E. Loader, W.M., 5.5 C.Y.		1235.36		1358.90		
1 Dozer, 410 H.P.		2969.84		3266.82		
6 Dump Trucks, Off Hwy., 50 Ton		13862.06		15248.27	250.93	276.03
72 L.H., Daily Totals		\$22263.27		\$26105.19	\$309.21	\$362.57
<b>Crew B-11Q</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 140 H.P.		793.32		872.66	66.11	72.72
12 L.H., Daily Totals		\$1509.32		\$1934.06	\$125.78	\$161.17
<b>Crew B-11R</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 200 H.P.		1443.21		1587.53	120.27	132.29
12 L.H., Daily Totals		\$2159.21		\$2648.93	\$179.93	\$220.74
<b>Crew B-11S</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 300 H.P.		2393.85		2633.23		
1 Ripper, Beam & 1 Shank		104.87		115.36	208.23	229.05
12 L.H., Daily Totals		\$3214.72		\$3809.99	\$267.89	\$317.50
<b>Crew B-11T</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 410 H.P.		2969.84		3266.82		
1 Ripper, Beam & 2 Shanks		160.60		176.66	260.87	286.96
12 L.H., Daily Totals		\$3846.44		\$4504.88	\$320.54	\$375.41
<b>Crew B-11U</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 Dozer, 520 H.P.		3524.54		3876.99	293.71	323.08
12 L.H., Daily Totals		\$4240.54		\$4938.39	\$353.38	\$411.53



# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-11V</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$49.00	\$72.55
1 Roller, 2-Drum, W.B., 7.5 H.P.		175.19		192.71	7.30	8.03
24 L.H., Daily Totals		\$1351.19		\$1933.91	\$56.30	\$80.58
<b>Crew B-11W</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$57.21	\$85.00
1 Common Laborer	49.00	392.00	72.55	580.40		
10 Truck Drivers (heavy)	57.25	4580.00	85.10	6808.00		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Vibratory Roller, Towed, 23 Ton		696.00		765.60		
10 Dump Trucks, 8 C.Y., 220 H.P.		5062.99		5569.29	75.02	82.53
96 L.H., Daily Totals		\$12694.21		\$16082.03	\$132.23	\$167.52
<b>Crew B-11Y</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.56	\$80.83
5 Common Laborers	49.00	1960.00	72.55	2902.00		
3 Equipment Operators (med.)	65.00	1560.00	96.40	2313.60		
1 Dozer, 80 H.P.		634.87		698.36		
2 Rollers, 2-Drum, W.B., 7.5 H.P.		350.39		385.43		
4 Vibrating Plates, Gas, 21"		611.21		672.33	22.17	24.39
72 L.H., Daily Totals		\$5524.47		\$7575.71	\$76.73	\$105.22
<b>Crew B-12A</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 1 C.Y.		970.66		1067.72	60.67	66.73
16 L.H., Daily Totals		\$1911.46		\$2462.12	\$119.47	\$153.88
<b>Crew B-12B</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24	74.62	82.08
16 L.H., Daily Totals		\$2134.65		\$2707.64	\$133.42	\$169.23
<b>Crew B-12C</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 2 C.Y.		1463.59		1609.95	91.47	100.62
16 L.H., Daily Totals		\$2404.39		\$3004.35	\$150.27	\$187.77
<b>Crew B-12D</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 3.5 C.Y.		2152.24		2367.46	134.51	147.97
16 L.H., Daily Totals		\$3093.04		\$3761.86	\$193.31	\$235.12
<b>Crew B-12E</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, .5 C.Y.		625.49		688.03	39.09	43.00
16 L.H., Daily Totals		\$1566.29		\$2082.43	\$97.89	\$130.15
<b>Crew B-12F</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, .75 C.Y.		887.82		976.60	55.49	61.04
16 L.H., Daily Totals		\$1828.62		\$2371.00	\$114.29	\$148.19

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-12G</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 15 Ton		937.18		1030.89		
1 Clamshell Bucket, .5 C.Y.		38.86		42.75	61.00	67.10
16 L.H., Daily Totals		\$1916.84		\$2468.04	\$119.80	\$154.25
<b>Crew B-12H</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 25 Ton		1332.93		1466.22		
1 Clamshell Bucket, 1 C.Y.		48.81		53.69	86.36	94.99
16 L.H., Daily Totals		\$2322.53		\$2914.31	\$145.16	\$182.14
<b>Crew B-12I</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 20 Ton		1171.12		1288.23		
1 Dragline Bucket, .75 C.Y.		29.64		32.61	75.05	82.55
16 L.H., Daily Totals		\$2141.56		\$2715.23	\$133.85	\$169.70
<b>Crew B-12J</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Gradall, 5/8 C.Y.		920.64		1012.70	57.54	63.29
16 L.H., Daily Totals		\$1861.44		\$2407.10	\$116.34	\$150.44
<b>Crew B-12K</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Gradall, 3 Ton, 1 C.Y.		1584.74		1743.21	99.05	108.95
16 L.H., Daily Totals		\$2525.54		\$3137.61	\$157.85	\$196.10
<b>Crew B-12L</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 15 Ton		937.18		1030.89		
1 F.E. Attachment, .5 C.Y.		75.55		83.10	63.30	69.62
16 L.H., Daily Totals		\$1953.52		\$2508.39	\$122.10	\$156.77
<b>Crew B-12M</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 20 Ton		1171.12		1288.23		
1 F.E. Attachment, .75 C.Y.		81.47		89.62	78.29	86.12
16 L.H., Daily Totals		\$2193.39		\$2772.25	\$137.09	\$173.27
<b>Crew B-12N</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 25 Ton		1332.93		1466.22		
1 F.E. Attachment, 1 C.Y.		89.26		98.19	88.89	97.78
16 L.H., Daily Totals		\$2362.99		\$2958.81	\$147.69	\$184.93
<b>Crew B-12O</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 F.E. Attachment, 1.5 C.Y.		101.32		111.45	95.33	104.86
16 L.H., Daily Totals		\$2466.04		\$3072.16	\$154.13	\$192.01

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-12P</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 Dragline Bucket, 1.5 C.Y.		41.56		45.71	91.59	100.75
16 L.H., Daily Totals		\$2406.28		\$3006.42	\$150.39	\$187.90
<b>Crew B-12Q</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 5/8 C.Y.		772.58		849.84	48.29	53.12
16 L.H., Daily Totals		\$1713.38		\$2244.24	\$107.09	\$140.26
<b>Crew B-12S</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Hyd. Excavator, 2.5 C.Y.		1800.54		1980.59	112.53	123.79
16 L.H., Daily Totals		\$2741.34		\$3374.99	\$171.33	\$210.94
<b>Crew B-12T</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 75 Ton		2275.15		2502.66		
1 F.E. Attachment, 3 C.Y.		131.99		145.19	150.45	165.49
16 L.H., Daily Totals		\$3347.94		\$4042.25	\$209.25	\$252.64
<b>Crew B-12V</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$58.80	\$87.15
1 Laborer	49.00	392.00	72.55	580.40		
1 Crawler Crane, 75 Ton		2275.15		2502.66		
1 Dragline Bucket, 3 C.Y.		53.93		59.32	145.57	160.12
16 L.H., Daily Totals		\$3269.88		\$3956.39	\$204.37	\$247.27
<b>Crew B-12Y</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$55.53	\$82.28
2 Laborers	49.00	784.00	72.55	1160.80		
1 Hyd. Excavator, 3.5 C.Y.		2152.24		2367.46	89.68	98.64
24 L.H., Daily Totals		\$3485.04		\$4342.26	\$145.21	\$180.93
<b>Crew B-12Z</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$55.53	\$82.28
2 Laborers	49.00	784.00	72.55	1160.80		
1 Hyd. Excavator, 2.5 C.Y.		1800.54		1980.59	75.02	82.52
24 L.H., Daily Totals		\$3133.34		\$3955.39	\$130.56	\$164.81
<b>Crew B-13</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.43	\$79.15
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 25 Ton		2335.01		2568.51	41.70	45.87
56 L.H., Daily Totals		\$5327.01		\$7000.91	\$95.13	\$125.02

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-13A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.21	\$83.37
2 Laborers	49.00	784.00	72.55	1160.80		
2 Equipment Operators (med.)	65.00	1040.00	96.40	1542.40		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Crawler Crane, 75 Ton		2275.15		2502.66		
1 Crawler Loader, 4 C.Y.		1859.78		2045.75		
2 Dump Trucks, 8 C.Y., 220 H.P.		1012.60		1113.86	91.92	101.11
56 L.H., Daily Totals		\$8295.52		\$10331.07	\$148.13	\$184.48
<b>Crew B-13B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.43	\$79.15
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 55 Ton		2551.41		2806.55	45.56	50.12
56 L.H., Daily Totals		\$5543.41		\$7238.95	\$98.99	\$129.27
<b>Crew B-13C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.43	\$79.15
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 100 Ton		1625.12		1787.63	29.02	31.92
56 L.H., Daily Totals		\$4617.12		\$6220.03	\$82.45	\$111.07
<b>Crew B-13D</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Excavator, 1 C.Y.		970.66		1067.72		
1 Trench Box		135.66		149.23	69.15	76.06
16 L.H., Daily Totals		\$2047.12		\$2611.35	\$127.95	\$163.21
<b>Crew B-13E</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24		
1 Trench Box		135.66		149.23	83.09	91.40
16 L.H., Daily Totals		\$2270.32		\$2856.87	\$141.89	\$178.55
<b>Crew B-13F</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Excavator, 3.5 C.Y.		2152.24		2367.46		
1 Trench Box		135.66		149.23	142.99	157.29
16 L.H., Daily Totals		\$3228.70		\$3911.09	\$201.79	\$244.44
<b>Crew B-13G</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Excavator, .75 C.Y.		887.82		976.60		
1 Trench Box		135.66		149.23	63.97	70.36
16 L.H., Daily Totals		\$1964.29		\$2520.24	\$122.77	\$157.51
<b>Crew B-13H</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Gradall, 5/8 C.Y.		920.64		1012.70		
1 Trench Box		135.66		149.23	66.02	72.62
16 L.H., Daily Totals		\$1997.10		\$2556.33	\$124.82	\$159.77

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-13I</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Gradall, 3 Ton, 1 C.Y.		1584.74		1743.21		
1 Trench Box		135.66		149.23	107.53	118.28
16 L.H., Daily Totals		\$2661.20		\$3286.84	\$166.33	\$205.43
<b>Crew B-13J</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$58.80	\$87.15
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Excavator, 2.5 C.Y.		1800.54		1980.59		
1 Trench Box		135.66		149.23	121.01	133.11
16 L.H., Daily Totals		\$2877.00		\$3524.22	\$179.81	\$220.26
<b>Crew B-13K</b>						
2 Equip. Oper. (crane)	\$68.60	\$1097.60	\$101.75	\$1628.00	\$68.60	\$101.75
1 Hyd. Excavator, .75 C.Y.		887.82		976.60		
1 Hyd. Hammer, 4000 ft-lb		740.58		814.63		
1 Hyd. Excavator, .75 C.Y.		887.82		976.60	157.26	172.99
16 L.H., Daily Totals		\$3613.82		\$4395.84	\$225.86	\$274.74
<b>Crew B-13L</b>						
2 Equip. Oper. (crane)	\$68.60	\$1097.60	\$101.75	\$1628.00	\$68.60	\$101.75
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24		
1 Hyd. Hammer, 5000 ft-lb		789.23		868.16		
1 Hyd. Excavator, .75 C.Y.		887.82		976.60	179.43	197.38
16 L.H., Daily Totals		\$3968.51		\$4786.00	\$248.03	\$299.13
<b>Crew B-13M</b>						
2 Equip. Oper. (crane)	\$68.60	\$1097.60	\$101.75	\$1628.00	\$68.60	\$101.75
1 Hyd. Excavator, 2.5 C.Y.		1800.54		1980.59		
1 Hyd. Hammer, 8000 ft-lb		1048.67		1153.54		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24	252.69	277.96
16 L.H., Daily Totals		\$5140.66		\$6075.37	\$321.29	\$379.71
<b>Crew B-13N</b>						
2 Equip. Oper. (crane)	\$68.60	\$1097.60	\$101.75	\$1628.00	\$68.60	\$101.75
1 Hyd. Excavator, 3.5 C.Y.		2152.24		2367.46		
1 Hyd. Hammer, 12,000 ft-lb		1178.21		1296.03		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24	282.77	311.05
16 L.H., Daily Totals		\$5621.90		\$6604.73	\$351.37	\$412.80
<b>Crew B-14</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.50	\$76.28
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Backhoe Loader, 48 H.P.		291.00		320.10	6.06	6.67
48 L.H., Daily Totals		\$2763.00		\$3981.30	\$57.56	\$82.94
<b>Crew B-14A</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.07	\$92.02
.5 Laborer	49.00	196.00	72.55	290.20		
1 Hyd. Excavator, 4.5 C.Y.		3948.55		4343.41	329.05	361.95
12 L.H., Daily Totals		\$4693.35		\$5447.61	\$391.11	\$453.97
<b>Crew B-14B</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.07	\$92.02
.5 Laborer	49.00	196.00	72.55	290.20		
1 Hyd. Excavator, 6 C.Y.		4018.32		4420.15	334.86	368.35
12 L.H., Daily Totals		\$4763.12		\$5524.35	\$396.93	\$460.36

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-14C</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.07	\$92.02
.5 Laborer	49.00	196.00	72.55	290.20		
1 Hyd. Excavator, 7 C.Y.		4386.20		4824.82	365.52	402.07
12 L.H., Daily Totals		\$5131.00		\$5929.02	\$427.58	\$494.08
<b>Crew B-14F</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.07	\$92.02
.5 Laborer	49.00	196.00	72.55	290.20		
1 Hyd. Shovel, 7 C.Y.		4752.62		5227.88	396.05	435.66
12 L.H., Daily Totals		\$5497.42		\$6332.08	\$458.12	\$527.67
<b>Crew B-14G</b>						
1 Equip. Oper. (crane)	\$68.60	\$548.80	\$101.75	\$814.00	\$62.07	\$92.02
.5 Laborer	49.00	196.00	72.55	290.20		
1 Hyd. Shovel, 12 C.Y.		6903.08		7593.39	575.26	632.78
12 L.H., Daily Totals		\$7647.88		\$8697.59	\$637.32	\$724.80
<b>Crew B-14J</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, 8 C.Y.		2697.40		2967.14	224.78	247.26
12 L.H., Daily Totals		\$3413.40		\$4028.54	\$284.45	\$335.71
<b>Crew B-14K</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.67	\$88.45
.5 Laborer	49.00	196.00	72.55	290.20		
1 F.E. Loader, 10 C.Y.		2937.91		3231.70	244.83	269.31
12 L.H., Daily Totals		\$3653.91		\$4293.10	\$304.49	\$357.76
<b>Crew B-15</b>						
1 Equipment Oper. (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$58.29	\$86.54
.5 Laborer	49.00	196.00	72.55	290.20		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
2 Dump Trucks, 12 C.Y., 400 H.P.		1974.15		2171.56		
1 Dozer, 200 H.P.		1443.21		1587.53	122.05	134.25
28 L.H., Daily Totals		\$5049.36		\$6182.10	\$180.33	\$220.79
<b>Crew B-16</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.56	\$76.42
2 Laborers	49.00	784.00	72.55	1160.80		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	30.85	33.93
32 L.H., Daily Totals		\$2637.07		\$3531.38	\$82.41	\$110.36
<b>Crew B-17</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$54.31	\$80.54
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Backhoe Loader, 48 H.P.		291.00		320.10		
1 Dump Truck, 8 C.Y., 220 H.P.		506.30		556.93	24.92	27.41
32 L.H., Daily Totals		\$2535.30		\$3454.23	\$79.23	\$107.94
<b>Crew B-17A</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$52.50	\$77.93
6 Laborers	49.00	2352.00	72.55	3482.40		
1 Skilled Worker Foreman (out)	65.50	524.00	98.00	784.00		
1 Skilled Worker	63.50	508.00	95.00	760.00		
80 L.H., Daily Totals		\$4200.00		\$6234.40	\$52.50	\$77.93

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-17B</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$54.31	\$80.54
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Backhoe Loader, 48 H.P.		291.00		320.10		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	39.94	43.93
32 L.H., Daily Totals		\$3016.08		\$3983.08	\$94.25	\$124.47
<b>Crew B-17C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.98	\$80.00
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (heavy)	68.60	548.80	101.75	814.00		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Hyd. Excavator, 2 C.Y.		1463.59		1609.95		
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78		
1 P/U, 3/4 ton, Tool Truck		165.25		181.77	54.50	59.95
48 L.H., Daily Totals		\$5206.72		\$6717.51	\$108.47	\$139.95
<b>Crew B-18</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Laborers	49.00	784.00	72.55	1160.80		
1 Vibrating Plate, Gas, 21"		152.80		168.08	6.37	7.00
24 L.H., Daily Totals		\$1344.80		\$1932.88	\$56.03	\$80.54
<b>Crew B-19</b>						
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.92	\$96.84
4 Pile Drivers	62.75	2008.00	96.30	3081.60		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 Lead, 90' High		423.85		466.24		
1 Hammer, Diesel, 22k ft-lb		505.25		555.77	36.77	40.44
64 L.H., Daily Totals		\$6443.81		\$8785.91	\$100.68	\$137.28
<b>Crew B-19A</b>						
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.92	\$96.84
4 Pile Drivers	62.75	2008.00	96.30	3081.60		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 75 Ton		2275.15		2502.66		
1 Lead, 90' High		423.85		466.24		
1 Hammer, Diesel, 41k ft-lb		667.86		734.64	52.61	57.87
64 L.H., Daily Totals		\$7457.66		\$9901.14	\$116.53	\$154.71
<b>Crew B-19B</b>						
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.92	\$96.84
4 Pile Drivers	62.75	2008.00	96.30	3081.60		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 Lead, 90' High		423.85		466.24		
1 Hammer, Diesel, 22k ft-lb		505.25		555.77		
1 Barge, 400 Ton		991.44		1090.58	52.26	57.48
64 L.H., Daily Totals		\$7435.25		\$9876.49	\$116.18	\$154.32

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-19C</b>						
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.92	\$96.84
4 Pile Drivers	62.75	2008.00	96.30	3081.60		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 75 Ton		2275.15		2502.66		
1 Lead, 90' High		423.85		466.24		
1 Hammer, Diesel, 41k ft-lb		667.86		734.64		
1 Barge, 400 Ton		991.44		1090.58	68.10	74.91
64 L.H., Daily Totals		\$8449.09		\$10991.72	\$132.02	\$171.75
<b>Crew B-20</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.50	\$81.02
1 Skilled Worker	63.50	508.00	95.00	760.00		
1 Laborer	49.00	392.00	72.55	580.40		
24 L.H., Daily Totals		\$1308.00		\$1944.40	\$54.50	\$81.02
<b>Crew B-20A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.59	\$86.97
1 Laborer	49.00	392.00	72.55	580.40		
1 Plumber	74.65	597.20	111.05	888.40		
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
32 L.H., Daily Totals		\$1874.80		\$2783.20	\$58.59	\$86.97
<b>Crew B-21</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.51	\$83.98
1 Skilled Worker	63.50	508.00	95.00	760.00		
1 Laborer	49.00	392.00	72.55	580.40		
.5 Equip. Oper. (crane)	68.60	274.40	101.75	407.00		
.5 S.P. Crane, 4x4, 5 Ton		201.05		221.16	7.18	7.90
28 L.H., Daily Totals		\$1783.45		\$2572.56	\$63.69	\$91.88
<b>Crew B-21A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$60.59	\$89.93
1 Laborer	49.00	392.00	72.55	580.40		
1 Plumber	74.65	597.20	111.05	888.40		
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 S.P. Crane, 4x4, 12 Ton		663.72		730.09	16.59	18.25
40 L.H., Daily Totals		\$3087.32		\$4327.29	\$77.18	\$108.18
<b>Crew B-21B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.32	\$78.98
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	55.61	61.17
40 L.H., Daily Totals		\$4357.01		\$5605.83	\$108.93	\$140.15
<b>Crew B-21C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.43	\$79.15
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
2 Cutting Torches		29.68		32.65		
2 Sets of Gases		401.58		441.74		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70	57.53	63.29
56 L.H., Daily Totals		\$6213.90		\$7976.49	\$110.96	\$142.44

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-22</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$57.32	\$85.16		
1 Skilled Worker	63.50	508.00	95.00	760.00				
1 Laborer	49.00	392.00	72.55	580.40				
.75 Equip. Oper. (crane)	68.60	411.60	101.75	610.50				
.75 S.P. Crane, 4x4, 5 Ton		301.58		331.74				
30 L.H., Daily Totals		\$2021.18		\$2886.64			\$67.37	\$96.22
<b>Crew B-22A</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.22	\$83.47		
1 Skilled Worker	63.50	508.00	95.00	760.00				
2 Laborers	49.00	784.00	72.55	1160.80				
1 Equipment Operator, Crane	68.60	548.80	101.75	814.00				
1 S.P. Crane, 4x4, 5 Ton		402.11		442.32				
1 Butt Fusion Mach., 4"-12" diam.		345.30		379.83				
40 L.H., Daily Totals		\$2996.21		\$4160.95	\$74.91	\$104.02		
<b>Crew B-22B</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.22	\$83.47		
1 Skilled Worker	63.50	508.00	95.00	760.00				
2 Laborers	49.00	784.00	72.55	1160.80				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 S.P. Crane, 4x4, 5 Ton		402.11		442.32				
1 Butt Fusion Mach., 8"-24" diam.		826.87		909.56				
40 L.H., Daily Totals		\$3477.78		\$4690.68	\$86.94	\$117.27		
<b>Crew B-22C</b>								
1 Skilled Worker	\$63.50	\$508.00	\$95.00	\$760.00	\$56.25	\$83.78		
1 Laborer	49.00	392.00	72.55	580.40				
1 Butt Fusion Mach., 2"-8" diam.		289.74		318.72				
16 L.H., Daily Totals		\$1189.74		\$1659.12			\$74.36	\$103.69
<b>Crew B-23</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.40	\$73.14		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Drill Rig, Truck-Mounted		908.08		998.89				
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51				
40 L.H., Daily Totals		\$3403.64		\$4496.00			\$85.09	\$112.40
<b>Crew B-23A</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.00	\$81.48		
1 Laborer	49.00	392.00	72.55	580.40				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
1 Drill Rig, Truck-Mounted		908.08		998.89				
1 Pickup Truck, 3/4 Ton		233.60		256.96				
24 L.H., Daily Totals		\$2461.69		\$3211.46			\$102.57	\$133.81
<b>Crew B-23B</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.00	\$81.48		
1 Laborer	49.00	392.00	72.55	580.40				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
1 Drill Rig, Truck-Mounted		908.08		998.89				
1 Pickup Truck, 3/4 Ton		233.60		256.96				
1 Centr. Water Pump, 6"		410.89		451.98				
24 L.H., Daily Totals		\$2872.57		\$3663.43	\$119.69	\$152.64		
<b>Crew B-24</b>								
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$55.45	\$81.67		
1 Laborer	49.00	392.00	72.55	580.40				
1 Carpenter	60.55	484.40	89.65	717.20				
24 L.H., Daily Totals		\$1330.80		\$1960.00			\$55.45	\$81.67

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-25</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.55	\$79.32
7 Laborers	49.00	2744.00	72.55	4062.80		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Asphalt Paver, 130 H.P.		2452.08		2697.29		
1 Tandem Roller, 10 Ton		319.84		351.82		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71		
88 L.H., Daily Totals		\$7950.92		\$10543.22	\$90.35	\$119.81
<b>Crew B-25B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.50	\$80.75
7 Laborers	49.00	2744.00	72.55	4062.80		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
1 Asphalt Paver, 130 H.P.		2452.08		2697.29		
2 Tandem Rollers, 10 Ton		639.68		703.64		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71		
96 L.H., Daily Totals		\$8790.76		\$11666.24	\$91.57	\$121.52
<b>Crew B-25C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.67	\$80.99
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Asphalt Paver, 130 H.P.		2452.08		2697.29		
1 Tandem Roller, 10 Ton		319.84		351.82		
48 L.H., Daily Totals		\$5395.92		\$6936.71		
<b>Crew B-25D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.93	\$81.40
3 Laborers	49.00	1176.00	72.55	1741.20		
2.130 Equip. Oper. (medium)	65.00	1107.60	96.40	1642.66		
.13 Truck Driver (heavy)	57.25	59.54	85.10	88.50		
.13 Truck Tractor, 6x4, 380 H.P.		74.55		82.01		
.13 Dist. Tanker, 3000 Gallon		49.67		54.63		
1 Asphalt Paver, 130 H.P.		2452.08		2697.29		
1 Tandem Roller, 10 Ton		319.84		351.82		
50.08 L.H., Daily Totals		\$5647.28		\$7262.11	\$112.77	\$145.01
<b>Crew B-25E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.16	\$81.74
3 Laborers	49.00	1176.00	72.55	1741.20		
2.250 Equip. Oper. (medium)	65.00	1170.00	96.40	1735.20		
.25 Truck Driver (heavy)	57.25	114.50	85.10	170.20		
.25 Truck Tractor, 6x4, 380 H.P.		143.37		157.71		
.25 Dist. Tanker, 3000 Gallon		95.51		105.06		
1 Asphalt Paver, 130 H.P.		2452.08		2697.29		
1 Tandem Roller, 10 Ton		319.84		351.82		
52 L.H., Daily Totals		\$5879.30		\$7562.48	\$113.06	\$145.43
<b>Crew B-26</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.44	\$80.58
6 Laborers	49.00	2352.00	72.55	3482.40		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Paving Mach. & Equip.		2866.28		3152.91		
88 L.H., Daily Totals		\$8772.55		\$11471.13	\$99.69	\$130.35

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-26A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.44	\$80.58
6 Laborers	49.00	2352.00	72.55	3482.40		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Paving Mach. & Equip.		2866.28		3152.91		
1 Concrete Saw		194.70		214.17	47.46	52.21
88 L.H., Daily Totals		\$8967.25		\$11685.30	\$101.90	\$132.79
<b>Crew B-26B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.32	\$81.90
6 Laborers	49.00	2352.00	72.55	3482.40		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Paving Mach. & Equip.		2866.28		3152.91		
1 Concrete Pump, 110' Boom		1113.77		1225.15	53.08	58.39
96 L.H., Daily Totals		\$10406.32		\$13467.47	\$108.40	\$140.29
<b>Crew B-26C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.38	\$79.00
6 Laborers	49.00	2352.00	72.55	3482.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Paving Mach. & Equip.		2866.28		3152.91		
1 Concrete Saw		194.70		214.17	38.26	42.09
80 L.H., Daily Totals		\$7331.78		\$9687.08	\$91.65	\$121.09
<b>Crew B-27</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.50	\$73.29
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Berm Machine		905.59		996.15	28.30	31.13
32 L.H., Daily Totals		\$2489.59		\$3341.35	\$77.80	\$104.42
<b>Crew B-28</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$56.70	\$83.95
1 Laborer	49.00	392.00	72.55	580.40		
24 L.H., Daily Totals		\$1360.80		\$2014.80	\$56.70	\$83.95
<b>Crew B-29</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.43	\$79.15
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Gradall, 5/8 C.Y.		920.64		1012.70	16.44	18.08
56 L.H., Daily Totals		\$3912.64		\$5445.10	\$69.87	\$97.23
<b>Crew B-30</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$59.83	\$88.87
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Hyd. Excavator, 1.5 C.Y.		1193.85		1313.24		
2 Dump Trucks, 12 C.Y., 400 H.P.		1974.15		2171.56	132.00	145.20
24 L.H., Daily Totals		\$4604.00		\$5617.60	\$191.83	\$234.07

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-31</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.71	\$76.56
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Carpenter	60.55	484.40	89.65	717.20		
1 Air Compressor, 250 cfm		226.90		249.59		
1 Sheeting Driver		8.45		9.29		
2-50' Air Hoses, 1.5"		47.13		51.84	7.06	7.77
40 L.H., Daily Totals		\$2350.87		\$3373.12	\$58.77	\$84.33
<b>Crew B-32</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$61.00	\$90.44
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Tandem Roller, 10 Ton		319.84		351.82		
1 Dozer, 200 H.P.		1443.21		1587.53	89.95	98.95
32 L.H., Daily Totals		\$4830.52		\$6060.37	\$150.95	\$189.39
<b>Crew B-32A</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$59.67	\$88.45
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Roller, Vibratory, 25 Ton		554.08		609.48	69.56	76.52
24 L.H., Daily Totals		\$3101.55		\$3959.30	\$129.23	\$164.97
<b>Crew B-32B</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$59.67	\$88.45
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Roller, Vibratory, 25 Ton		554.08		609.48	83.22	91.54
24 L.H., Daily Totals		\$3429.29		\$4319.82	\$142.89	\$179.99
<b>Crew B-32C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$57.33	\$84.97
2 Laborers	49.00	784.00	72.55	1160.80		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Tandem Roller, 10 Ton		319.84		351.82		
1 Dozer, 200 H.P.		1443.21		1587.53	59.97	65.97
48 L.H., Daily Totals		\$5630.52		\$7244.77	\$117.30	\$150.93
<b>Crew B-33A</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 Scraper, Towed, 7 C.Y.		148.13		162.95		
1.25 Dozers, 300 H.P.		2992.31		3291.54	224.32	246.75
14 L.H., Daily Totals		\$3986.45		\$4708.69	\$284.75	\$336.33
<b>Crew B-33B</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 Scraper, Towed, 10 C.Y.		185.01		203.51		
1.25 Dozers, 300 H.P.		2992.31		3291.54	226.95	249.65
14 L.H., Daily Totals		\$4023.32		\$4749.26	\$287.38	\$339.23

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-33C</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 Scraper, Towed, 15 C.Y.		204.64		225.10		
1.25 Dozers, 300 H.P.		2992.31		3291.54	228.35	251.19
14 L.H., Daily Totals		\$4042.95		\$4770.84	\$288.78	\$340.77
<b>Crew B-33D</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 S.P. Scraper, 14 C.Y.		2274.69		2502.16		
.25 Dozer, 300 H.P.		598.46		658.31	205.22	225.75
14 L.H., Daily Totals		\$3719.15		\$4414.66	\$265.65	\$315.33
<b>Crew B-33E</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 S.P. Scraper, 21 C.Y.		3274.37		3601.81		
.25 Dozer, 300 H.P.		598.46		658.31	276.63	304.29
14 L.H., Daily Totals		\$4718.84		\$5514.32	\$337.06	\$393.88
<b>Crew B-33F</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 Elev. Scraper, 11 C.Y.		1072.14		1179.36		
.25 Dozer, 300 H.P.		598.46		658.31	119.33	131.26
14 L.H., Daily Totals		\$2516.60		\$3091.86	\$179.76	\$220.85
<b>Crew B-33G</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.5 Laborer	49.00	196.00	72.55	290.20		
.25 Equip. Oper. (medium)	65.00	130.00	96.40	192.80		
1 Elev. Scraper, 22 C.Y.		2100.37		2310.40		
.25 Dozer, 300 H.P.		598.46		658.31	192.77	212.05
14 L.H., Daily Totals		\$3544.83		\$4222.91	\$253.20	\$301.64
<b>Crew B-33H</b>						
.5 Laborer	\$49.00	\$196.00	\$72.55	\$290.20	\$60.43	\$89.59
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
.25 Equipment Operator (med.)	65.00	130.00	96.40	192.80		
1 S.P. Scraper, 44 C.Y.		3614.77		3976.25		
.25 Dozer, 410 H.P.		742.46		816.71	311.23	342.35
14 L.H., Daily Totals		\$5203.23		\$6047.15	\$371.66	\$431.94
<b>Crew B-33J</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 S.P. Scraper, 14 C.Y.		2274.69		2502.16	284.34	312.77
8 L.H., Daily Totals		\$2794.69		\$3273.36	\$349.34	\$409.17
<b>Crew B-33K</b>						
1 Equipment Operator (med.)	\$65.00	\$520.00	\$96.40	\$771.20	\$60.43	\$89.59
.25 Equipment Operator (med.)	65.00	130.00	96.40	192.80		
.5 Laborer	49.00	196.00	72.55	290.20		
1 S.P. Scraper, 31 C.Y.		3927.98		4320.78		
.25 Dozer, 410 H.P.		742.46		816.71	333.60	366.96
14 L.H., Daily Totals		\$5516.44		\$6391.69	\$394.03	\$456.55

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-34A</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, 8 C.Y., 220 H.P.		506.30		556.93	63.29	69.62
8 L.H., Daily Totals		\$964.30		\$1237.73	\$120.54	\$154.72
<b>Crew B-34B</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, 12 C.Y., 400 H.P.		987.07		1085.78	123.38	135.72
8 L.H., Daily Totals		\$1445.07		\$1766.58	\$180.63	\$220.82
<b>Crew B-34C</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Dump Trailer, 16.5 C.Y.		158.30		174.13	91.47	100.62
8 L.H., Daily Totals		\$1189.79		\$1485.77	\$148.72	\$185.72
<b>Crew B-34D</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Dump Trailer, 20 C.Y.		175.64		193.20	93.64	103.00
8 L.H., Daily Totals		\$1207.13		\$1504.84	\$150.89	\$188.10
<b>Crew B-34E</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, Off Hwy., 25 Ton		1534.54		1688.00	191.82	211.00
8 L.H., Daily Totals		\$1992.54		\$2368.80	\$249.07	\$296.10
<b>Crew B-34F</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, Off Hwy., 35 Ton		1574.25		1731.67	196.78	216.46
8 L.H., Daily Totals		\$2032.25		\$2412.47	\$254.03	\$301.56
<b>Crew B-34G</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, Off Hwy., 50 Ton		2310.34		2541.38	288.79	317.67
8 L.H., Daily Totals		\$2768.34		\$3222.18	\$346.04	\$402.77
<b>Crew B-34H</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, Off Hwy., 65 Ton		2617.83		2879.61	327.23	359.95
8 L.H., Daily Totals		\$3075.83		\$3560.41	\$384.48	\$445.05
<b>Crew B-34I</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, 18 C.Y., 450 H.P.		827.40		910.14	103.42	113.77
8 L.H., Daily Totals		\$1285.40		\$1590.94	\$160.67	\$198.87
<b>Crew B-34J</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Dump Truck, Off Hwy., 100 Ton		3168.73		3485.60	396.09	435.70
8 L.H., Daily Totals		\$3626.73		\$4166.40	\$453.34	\$520.80
<b>Crew B-34K</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Truck Tractor, 6x4, 450 H.P.		699.67		769.64		
1 Lowbed Trailer, 75 Ton		295.27		324.79	124.37	136.80
8 L.H., Daily Totals		\$1452.94		\$1775.24	\$181.62	\$221.90

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-34L</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	52.60	57.86
8 L.H., Daily Totals		\$916.83		\$1198.52	\$114.60	\$149.81
<b>Crew B-34M</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	64.94	71.44
8 L.H., Daily Totals		\$1015.55		\$1307.11	\$126.94	\$163.39
<b>Crew B-34N</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$61.13	\$90.75
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Flatbed Trailer, 40 Ton		215.61		237.17	49.32	54.25
16 L.H., Daily Totals		\$1767.10		\$2320.01	\$110.44	\$145.00
<b>Crew B-34P</b>						
1 Pipe Fitter	\$75.55	\$604.40	\$112.40	\$899.20	\$65.23	\$96.93
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Backhoe Loader, 48 H.P.		291.00		320.10	33.77	37.15
24 L.H., Daily Totals		\$2376.16		\$3218.01	\$99.01	\$134.08
<b>Crew B-34Q</b>						
1 Pipe Fitter	\$75.55	\$604.40	\$112.40	\$899.20	\$66.43	\$98.72
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Flatbed Trailer, 25 Ton		157.04		172.75		
1 Dump Truck, 8 C.Y., 220 H.P.		506.30		556.93		
1 Hyd. Crane, 25 Ton		2335.01		2568.51	124.93	137.42
24 L.H., Daily Totals		\$4592.75		\$5667.39	\$191.36	\$236.14
<b>Crew B-34R</b>						
1 Pipe Fitter	\$75.55	\$604.40	\$112.40	\$899.20	\$66.43	\$98.72
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Flatbed Trailer, 25 Ton		157.04		172.75		
1 Dump Truck, 8 C.Y., 220 H.P.		506.30		556.93		
1 Hyd. Crane, 25 Ton		2335.01		2568.51		
1 Hyd. Excavator, 1 C.Y.		970.66		1067.72	165.38	181.91
24 L.H., Daily Totals		\$5563.41		\$6735.11	\$231.81	\$280.63
<b>Crew B-34S</b>						
2 Pipe Fitters	\$75.55	\$1208.80	\$112.40	\$1798.40	\$69.24	\$102.91
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Flatbed Trailer, 40 Ton		215.61		237.17		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Hyd. Crane, 80 Ton		2742.60		3016.86		
1 Hyd. Excavator, 2 C.Y.		1463.59		1609.95	156.10	171.71
32 L.H., Daily Totals		\$7210.89		\$8788.02	\$225.34	\$274.63
<b>Crew B-34T</b>						
2 Pipe Fitters	\$75.55	\$1208.80	\$112.40	\$1798.40	\$69.24	\$102.91
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Flatbed Trailer, 40 Ton		215.61		237.17		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Hyd. Crane, 80 Ton		2742.60		3016.86	110.37	121.40
32 L.H., Daily Totals		\$5747.30		\$7178.07	\$179.60	\$224.31

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-34U</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$59.63	\$88.53
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Truck Tractor, 220 H.P.		357.02		392.72		
1 Flatbed Trailer, 25 Ton		157.04		172.75	32.13	35.34
16 L.H., Daily Totals		\$1468.06		\$1981.87	\$91.75	\$123.87
<b>Crew B-34V</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$62.62	\$92.93
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Truck Tractor, 6x4, 450 H.P.		699.67		769.64		
1 Equipment Trailer, 50 Ton		349.51		384.46		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49	53.55	58.90
24 L.H., Daily Totals		\$2787.88		\$3643.99	\$116.16	\$151.83
<b>Crew B-34W</b>						
5 Truck Drivers (heavy)	\$57.25	\$2290.00	\$85.10	\$3404.00	\$60.13	\$89.28
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (mechanic)	68.75	550.00	101.95	815.60		
1 Laborer	49.00	392.00	72.55	580.40		
4 Truck Tractors, 6x4, 380 H.P.		2293.95		2523.34		
2 Equipment Trailers, 50 Ton		699.01		768.91		
2 Flatbed Trailers, 40 Ton		431.23		474.35		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 S.P. Crane, 4x4, 20 Ton		790.69		869.76	61.82	68.00
72 L.H., Daily Totals		\$8780.38		\$11323.85	\$121.95	\$157.28
<b>Crew B-35</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$62.83	\$93.36
1 Skilled Worker	63.50	508.00	95.00	760.00		
2 Welders	74.65	1194.40	111.05	1776.80		
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
2 Welder, Electric, 300 amp		143.54		157.90		
1 Hyd. Excavator, .75 C.Y.		887.82		976.60	18.42	20.26
56 L.H., Daily Totals		\$4549.77		\$6362.50	\$81.25	\$113.62
<b>Crew B-35A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$59.16	\$87.86
2 Laborers	49.00	784.00	72.55	1160.80		
1 Skilled Worker	63.50	508.00	95.00	760.00		
1 Welder (plumber)	74.65	597.20	111.05	888.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Welder, Gas Engine, 300 amp		163.86		180.24		
1 Crawler Crane, 75 Ton		2275.15		2502.66	43.55	47.91
56 L.H., Daily Totals		\$5752.20		\$7602.90	\$102.72	\$135.77
<b>Crew B-36</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.80	\$82.68
2 Laborers	49.00	784.00	72.55	1160.80		
2 Equip. Oper. (medium)	65.00	1040.00	96.40	1542.40		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Aggregate Spreader		70.27		77.30		
1 Tandem Roller, 10 Ton		319.84		351.82	45.83	50.42
40 L.H., Daily Totals		\$4065.32		\$5323.85	\$101.63	\$133.10



# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-36A</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.43	\$86.60		
2 Laborers	49.00	784.00	72.55	1160.80				
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80				
1 Dozer, 200 H.P.		1443.21		1587.53				
1 Aggregate Spreader		70.27		77.30				
1 Tandem Roller, 10 Ton		319.84		351.82				
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71				
56 L.H., Daily Totals		\$5572.32		\$7379.96			\$99.51	\$131.79
<b>Crew B-36B</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00			\$58.28	\$86.41
2 Laborers	49.00	784.00	72.55	1160.80				
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80				
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80				
1 Grader, 30,000 Lbs.		1115.47		1227.02				
1 F.E. Loader, Crl, 1.5 C.Y.		765.01		841.51				
1 Dozer, 300 H.P.		2393.85		2633.23				
1 Roller, Vibratory, 25 Ton		554.08		609.48				
1 Truck Tractor, 6x4, 450 H.P.		699.67		769.64				
1 Water Tank Trailer, 5000 Gal.		176.44		194.08				
64 L.H., Daily Totals		\$9434.52		\$11805.37	\$147.41	\$184.46		
<b>Crew B-36C</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$60.65	\$89.96		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60				
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80				
1 Grader, 30,000 Lbs.		1115.47		1227.02				
1 Dozer, 300 H.P.		2393.85		2633.23				
1 Roller, Vibratory, 25 Ton		554.08		609.48				
1 Truck Tractor, 6x4, 450 H.P.		699.67		769.64				
1 Water Tank Trailer, 5000 Gal.		176.44		194.08				
40 L.H., Daily Totals		\$7365.51		\$9031.86			123.49	135.84
<b>Crew B-36D</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$61.50	\$91.17		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60				
1 Grader, 30,000 Lbs.		1115.47		1227.02				
1 Dozer, 300 H.P.		2393.85		2633.23				
1 Roller, Vibratory, 25 Ton		554.08		609.48				
32 L.H., Daily Totals		\$6031.40		\$7387.34			126.98	139.68
<b>Crew B-37</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00			\$51.50	\$76.28
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Tandem Roller, 5 Ton		264.37		290.81				
48 L.H., Daily Totals		\$2736.37		\$3952.01	5.51	6.06		
<b>Crew B-37A</b>								
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.05	\$75.70		
1 Truck Driver (light)	55.15	441.20	82.00	656.00				
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92				
1 Tar Kettle, T.M.		209.32		230.25				
24 L.H., Daily Totals		\$1855.35		\$2509.97			26.26	28.88
<b>Crew B-37B</b>								
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$50.54	\$74.91		
1 Truck Driver (light)	55.15	441.20	82.00	656.00				
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92				
1 Tar Kettle, T.M.		209.32		230.25				
32 L.H., Daily Totals		\$2247.35		\$3090.37	19.69	21.66		

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-37C</b>								
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$52.08	\$77.28		
2 Truck Drivers (light)	55.15	882.40	82.00	1312.00				
2 Flatbed Trucks, Gas, 1.5 Ton		841.67		925.83				
1 Tar Kettle, T.M.		209.32		230.25				
32 L.H., Daily Totals		\$2717.38		\$3628.88	\$84.92	\$113.40		
<b>Crew B-37D</b>								
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$52.08	\$77.28		
1 Truck Driver (light)	55.15	441.20	82.00	656.00				
1 Pickup Truck, 3/4 Ton		233.60		256.96				
16 L.H., Daily Totals		\$1066.80		\$1493.36	14.60	16.06		
<b>Crew B-37E</b>								
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$54.90	\$81.43		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
2 Truck Drivers (light)	55.15	882.40	82.00	1312.00				
4 Barrels w/ Flasher		11.80		12.98				
1 Concrete Saw		194.70		214.17				
1 Rotary Hammer Drill		56.41		62.05				
1 Hammer Drill Bit		27.39		30.12				
1 Loader, Skid Steer, 30 H.P.		268.41		295.25				
1 Conc. Hammer Attach.		130.51		143.56				
1 Vibrating Plate, Gas, 18"		132.53		145.78				
2 Flatbed Trucks, Gas, 1.5 Ton		841.67		925.83				
56 L.H., Daily Totals		\$4737.81		\$6389.75	29.70	32.67		
<b>Crew B-37F</b>								
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$50.54	\$74.91		
1 Truck Driver (light)	55.15	441.20	82.00	656.00				
4 Barrels w/ Flasher		11.80		12.98				
1 Concrete Mixer, 10 C.F.		170.44		187.48				
1 Air Compressor, 60 cfm		204.02		224.42				
1 -50' Air Hose, 3/4"		7.10		7.81				
1 Spade (Chipper)		9.80		10.78				
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92				
32 L.H., Daily Totals		\$2441.19		\$3303.59			25.75	28.32
<b>Crew B-37G</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.50	\$76.28		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Berm Machine		905.59		996.15				
1 Tandem Roller, 5 Ton		264.37		290.81				
48 L.H., Daily Totals		\$3641.96		\$4948.16	24.37	26.81		
<b>Crew B-37H</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.50	\$76.28		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Tandem Roller, 5 Ton		264.37		290.81				
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92				
1 Tar Kettle, T.M.		209.32		230.25				
48 L.H., Daily Totals		\$3366.52		\$4645.18	18.64	20.50		

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-37I</b>								
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$54.90	\$81.43		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
2 Truck Drivers (light)	55.15	882.40	82.00	1312.00				
4 Barrels w/ Flasher		11.80		12.98				
1 Concrete Saw		194.70		214.17				
1 Rotary Hammer Drill		56.41		62.05				
1 Hammer Drill Bit		27.39		30.12				
1 Air Compressor, 60 cfm		204.02		224.42				
1 -50' Air Hose, 3/4"		7.10		7.81				
1 Spade (Chipper)		9.80		10.78				
1 Loader, Skid Steer, 30 H.P.		268.41		295.25				
1 Conc. Hammer Attach.		130.51		143.56				
1 Concrete Mixer, 10 C.F.		170.44		187.48				
1 Vibrating Plate, Gas, 18"		132.53		145.78				
2 Flatbed Trucks, Gas, 1.5 Ton		841.67		925.83				
56 L.H., Daily Totals		\$5129.16		\$6820.24			36.69	40.36
<b>Crew B-37J</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.50	\$76.28		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Air Compressor, 60 cfm		204.02		224.42				
1 -50' Air Hose, 3/4"		7.10		7.81				
2 Concrete Mixers, 10 C.F.		340.88		374.97				
2 Flatbed Trucks, Gas, 1.5 Ton		841.67		925.83				
1 Shot Blaster, 20"		238.10		261.91				
48 L.H., Daily Totals		\$4103.76		\$5456.14			34.00	37.39
<b>Crew B-37K</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00			\$51.50	\$76.28
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Air Compressor, 60 cfm		204.02		224.42				
1 -50' Air Hose, 3/4"		7.10		7.81				
2 Flatbed Trucks, Gas, 1.5 Ton		841.67		925.83				
1 Shot Blaster, 20"		238.10		261.91				
48 L.H., Daily Totals		\$3762.88		\$5081.17	26.89	29.58		
<b>Crew B-38</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.20	\$81.79		
2 Laborers	49.00	784.00	72.55	1160.80				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
1 Backhoe Loader, 48 H.P.		291.00		320.10				
1 Hyd. Hammer (1200 lb.)		202.66		222.92				
1 F.E. Loader, W.M., 4 C.Y.		866.60		953.26				
1 Pmnt. Rem. Bucket		72.92		80.21				
40 L.H., Daily Totals		\$3641.17		\$4848.09			\$91.03	\$121.20
<b>Crew B-39</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00			\$51.50	\$76.28
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60				
1 Air Compressor, 250 cfm		226.90		249.59				
2 Breakers, Pavement, 60 lb.		79.92		87.92				
2 -50' Air Hoses, 1.5"		47.13		51.84				
48 L.H., Daily Totals		\$2825.95		\$4050.55	7.37	8.11		

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew B-40</b>								
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.42	\$96.77		
4 Pile Drivers	62.75	2008.00	96.30	3081.60				
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Crawler Crane, 40 Ton		1423.92		1566.31				
1 Vibratory Hammer & Gen.		2635.22		2898.74				
64 L.H., Daily Totals		\$8149.93		\$10662.65			\$127.34	\$166.60
<b>Crew B-40B</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00			\$54.17	\$80.25
3 Laborers	49.00	1176.00	72.55	1741.20				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Lattice Boom Crane, 40 Ton		2459.62		2705.58				
48 L.H., Daily Totals		\$5059.62		\$6557.58	51.24	56.37		
<b>Crew B-41</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.68	\$75.05		
4 Laborers	49.00	1568.00	72.55	2321.60				
.25 Equip. Oper. (crane)	68.60	137.20	101.75	203.50				
.25 Equip. Oper. (oiler)	58.40	116.80	86.60	173.20				
.25 Crawler Crane, 40 Ton		355.98		391.58				
44 L.H., Daily Totals		\$2585.98		\$3693.88	8.09	8.90		
<b>Crew B-42</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.13	\$82.11		
4 Laborers	49.00	1568.00	72.55	2321.60				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Welder	67.05	536.40	102.80	822.40				
1 Hyd. Crane, 25 Ton		2335.01		2568.51				
1 Welder, Gas Engine, 300 amp		163.86		180.24				
1 Horz. Boring Csg. Mch.		460.22		506.24				
64 L.H., Daily Totals		\$6487.48		\$8509.79			46.24	50.86
<b>Crew B-43</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.17	\$80.25		
3 Laborers	49.00	1176.00	72.55	1741.20				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Drill Rig, Truck-Mounted		908.08		998.89				
48 L.H., Daily Totals		\$3508.08		\$4850.89	18.92	20.81		
<b>Crew B-44</b>								
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$62.74	\$95.08		
4 Pile Drivers	62.75	2008.00	96.30	3081.60				
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00				
1 Laborer	49.00	392.00	72.55	580.40				
1 Crawler Crane, 40 Ton		1423.92		1566.31				
1 Lead, 60' High		241.46		265.61				
1 Hammer, Diesel, 15K ft.lbs.		712.59		783.85				
64 L.H., Daily Totals		\$6393.58		\$8700.97			37.16	40.87
<b>Crew B-45</b>								
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20			\$61.13	\$90.75
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80				
1 Dist. Tanker, 3000 Gallon		382.04		420.25				
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83				
16 L.H., Daily Totals		\$1933.53		\$2503.08	59.72	65.69		
					\$120.85	\$156.44		

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-46</b>						
1 Pile Driver Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$56.21	\$84.94
2 Pile Drivers	62.75	1004.00	96.30	1540.80		
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Chain Saw, Gas, 36" Long		55.48		61.03	1.16	1.27
48 L.H., Daily Totals		\$2753.48		\$4138.23	\$57.36	\$86.21
<b>Crew B-47</b>						
1 Blast Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.00	\$80.00
1 Driller	49.00	392.00	72.55	580.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Track Drill, 4"		1245.86		1370.45		
1 Air Compressor, 600 cfm		490.62		539.68		
2 -50' Air Hoses, 3"		91.44		100.58	76.16	83.78
24 L.H., Daily Totals		\$3123.92		\$3930.71	\$130.16	\$163.78
<b>Crew B-47A</b>						
1 Drilling Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$59.33	\$87.95
1 Equip. Oper. (heavy)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Air Track Drill, 5"		1245.86		1370.45	51.91	57.10
24 L.H., Daily Totals		\$2669.86		\$3481.25	\$111.24	\$145.05
<b>Crew B-47C</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$55.50	\$82.25
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Compressor, 750 C.F.M.		802.76		883.04		
2 -50' Air Hoses, 3"		91.44		100.58		
1 Air Track Drill, 4"		1245.86		1370.45	133.75	147.13
16 L.H., Daily Totals		\$3028.06		\$3670.07	\$189.25	\$229.38
<b>Crew B-47E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.50	\$73.29
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	16.24	17.86
32 L.H., Daily Totals		\$2103.55		\$2916.71	\$65.74	\$91.15
<b>Crew B-47G</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.75	\$78.14
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Track Drill, 4"		1245.86		1370.45		
1 Air Compressor, 600 cfm		490.62		539.68		
2 -50' Air Hoses, 3"		91.44		100.58		
1 Gunite Pump Rig		368.88		405.77	68.65	75.52
32 L.H., Daily Totals		\$3884.81		\$4916.89	\$121.40	\$153.65
<b>Crew B-47H</b>						
1 Skilled Worker Foreman (out)	\$65.50	\$524.00	\$98.00	\$784.00	\$64.00	\$95.75
3 Skilled Workers	63.50	1524.00	95.00	2280.00		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	16.24	17.86
32 L.H., Daily Totals		\$2567.55		\$3635.51	\$80.24	\$113.61

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-48</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.29	\$81.92
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Centr. Water Pump, 6"		410.89		451.98		
1 -20' Suction Hose, 6"		29.00		31.90		
1 -50' Discharge Hose, 6"		20.63		22.69		
1 Drill Rig, Truck-Mounted		908.08		998.89	24.44	26.88
56 L.H., Daily Totals		\$4464.60		\$6093.06	\$79.72	\$108.80
<b>Crew B-49</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.14	\$86.76
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
2 Equip. Oper. (oilers)	58.40	934.40	86.60	1385.60		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
2 Pile Drivers	62.75	1004.00	96.30	1540.80		
1 Hyd. Crane, 25 Ton		2335.01		2568.51		
1 Centr. Water Pump, 6"		410.89		451.98		
1 -20' Suction Hose, 6"		29.00		31.90		
1 -50' Discharge Hose, 6"		20.63		22.69		
1 Drill Rig, Truck-Mounted		908.08		998.89	42.09	46.30
88 L.H., Daily Totals		\$8819.60		\$11709.16	\$100.22	\$133.06
<b>Crew B-50</b>						
2 Pile Driver Foremen (outside)	\$64.75	\$1036.00	\$99.40	\$1590.40	\$60.61	\$91.74
6 Pile Drivers	62.75	3012.00	96.30	4622.40		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 Lead, 60' High		241.46		265.61		
1 Hammer, Diesel, 15K ft.-lbs.		712.59		783.85		
1 Air Compressor, 600 cfm		490.62		539.68		
2 -50' Air Hoses, 3"		91.44		100.58		
1 Chain Saw, Gas, 36" Long		55.48		61.03	26.92	29.62
112 L.H., Daily Totals		\$9804.32		\$13591.87	\$87.54	\$121.36
<b>Crew B-51</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.36	\$74.62
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	8.77	9.64
48 L.H., Daily Totals		\$2838.03		\$4044.52	\$59.13	\$84.26
<b>Crew B-52</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$56.13	\$82.99
1 Carpenter	60.55	484.40	89.65	717.20		
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Cement Finisher	56.80	454.40	82.80	662.40		
.5 Rodman (reinf.)	67.05	268.20	100.00	400.00		
.5 Equip. Oper. (medium)	65.00	260.00	96.40	385.60		
.5 Crawler Loader, 3 C.Y.		656.59		722.25	11.72	12.90
56 L.H., Daily Totals		\$3799.99		\$5369.45	\$67.86	\$95.88
<b>Crew B-53</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Trencher, Chain, 12 H.P.		210.98		232.08	26.37	29.01
8 L.H., Daily Totals		\$706.98		\$967.68	\$88.37	\$120.96

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-54</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Trencher, Chain, 40 H.P.		402.94		443.23	50.37	55.40
8 L.H., Daily Totals		\$898.94		\$1178.83	\$112.37	\$147.35
<b>Crew B-54A</b>						
.17 Labor Foreman (outside)	\$51.00	\$69.36	\$75.50	\$102.68	\$62.97	\$93.36
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Wheel Trencher, 67 H.P.		1307.45		1438.19	139.68	153.65
9.36 L.H., Daily Totals		\$1896.81		\$2312.07	\$202.65	\$247.02
<b>Crew B-54B</b>						
.25 Labor Foreman (outside)	\$51.00	\$102.00	\$75.50	\$151.00	\$62.20	\$92.22
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Wheel Trencher, 150 H.P.		1405.45		1545.99	140.54	154.60
10 L.H., Daily Totals		\$2027.45		\$2468.19	\$202.75	\$246.82
<b>Crew B-54C</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$57.00	\$84.47
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Wheel Trencher, 67 H.P.		1307.45		1438.19	81.72	89.89
16 L.H., Daily Totals		\$2219.45		\$2789.79	\$138.72	\$174.36
<b>Crew B-54D</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$57.00	\$84.47
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Rock Trencher, 6" Width		1036.61		1140.27	64.79	71.27
16 L.H., Daily Totals		\$1948.61		\$2491.87	\$121.79	\$155.74
<b>Crew B-54E</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$57.00	\$84.47
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Rock Trencher, 18" Width		1143.77		1258.15	71.49	78.63
16 L.H., Daily Totals		\$2055.77		\$2609.75	\$128.49	\$163.11
<b>Crew B-55</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.05	\$75.70
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Truck-Mounted Earth Auger		473.37		520.71		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	41.37	45.51
24 L.H., Daily Totals		\$2218.12		\$2909.02	\$92.42	\$121.21
<b>Crew B-56</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$55.50	\$82.25
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Track Drill, 4"		1245.86		1370.45		
1 Air Compressor, 600 cfm		490.62		539.68		
1 -50' Air Hose, 3"		45.72		50.29	111.39	122.53
16 L.H., Daily Totals		\$2670.20		\$3276.42	\$166.89	\$204.78

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-57</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.33	\$83.48
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 25 Ton		1332.93		1466.22		
1 Clamshell Bucket, 1 C.Y.		48.81		53.69		
1 Centr. Water Pump, 6"		410.89		451.98		
1 -20' Suction Hose, 6"		29.00		31.90		
20 -50' Discharge Hoses, 6"		412.52		453.77	46.54	51.20
48 L.H., Daily Totals		\$4938.13		\$6464.75	\$102.88	\$134.68
<b>Crew B-58</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$53.33	\$79.02
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Backhoe Loader, 48 H.P.		291.00		320.10		
1 Small Helicopter, w/ Pilot		6015.09		6616.60	262.75	289.03
24 L.H., Daily Totals		\$7586.09		\$8833.10	\$316.09	\$368.05
<b>Crew B-59</b>						
1 Truck Driver (heavy)	\$57.25	\$458.00	\$85.10	\$680.80	\$57.25	\$85.10
1 Truck Tractor, 220 H.P.		357.02		392.72		
1 Water Tank Trailer, 5000 Gal.		176.44		194.08	66.68	73.35
8 L.H., Daily Totals		\$991.45		\$1267.60	\$123.93	\$158.45
<b>Crew B-59A</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.75	\$76.73
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Water Tank Trailer, 5000 Gal.		176.44		194.08		
1 Truck Tractor, 220 H.P.		357.02		392.72	22.23	24.45
24 L.H., Daily Totals		\$1775.45		\$2428.40	\$73.98	\$101.18
<b>Crew B-60</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$57.14	\$84.69
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
2 Equip. Oper. (light)	62.00	992.00	91.95	1471.20		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 40 Ton		1423.92		1566.31		
1 Lead, 60" High		241.46		265.61		
1 Hammer, Diesel, 15K ft.-lbs.		712.59		783.85		
1 Backhoe Loader, 48 H.P.		291.00		320.10	47.66	52.43
56 L.H., Daily Totals		\$5868.98		\$7678.67	\$104.80	\$137.12
<b>Crew B-61</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.00	\$77.02
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Cement Mixer, 2 C.Y.		125.24		137.76		
1 Air Compressor, 160 cfm		209.86		230.85	8.38	9.22
40 L.H., Daily Totals		\$2415.10		\$3449.41	\$60.38	\$86.24
<b>Crew B-62</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$53.33	\$79.02
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Loader, Skid Steer, 30 H.P.		268.41		295.25	11.18	12.30
24 L.H., Daily Totals		\$1548.41		\$2191.65	\$64.52	\$91.32

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-62A</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$53.33	\$79.02
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Loader, Skid Steer, 30 H.P.		268.41		295.25		
1 Trencher Attachment		114.67		126.14	15.96	17.56
24 L.H., Daily Totals		\$1663.08		\$2317.79	\$69.30	\$96.57
<b>Crew B-63</b>						
4 Laborers	\$49.00	\$1568.00	\$72.55	\$2321.60	\$51.60	\$76.43
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Loader, Skid Steer, 30 H.P.		268.41		295.25	6.71	7.38
40 L.H., Daily Totals		\$2332.41		\$3352.45	\$58.31	\$83.81
<b>Crew B-63B</b>						
1 Labor Foreman (inside)	\$49.50	\$396.00	\$73.30	\$586.40	\$52.38	\$77.59
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	12.33	13.57
32 L.H., Daily Totals		\$2070.64		\$2916.90	\$64.71	\$91.15
<b>Crew B-64</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$52.08	\$77.28
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Power Mulcher (small)		275.58		303.13		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	43.53	47.88
16 L.H., Daily Totals		\$1529.61		\$2002.45	\$95.60	\$125.15
<b>Crew B-65</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$52.08	\$77.28
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Power Mulcher (Large)		658.73		724.60		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92	67.47	74.22
16 L.H., Daily Totals		\$1912.76		\$2423.92	\$119.55	\$151.49
<b>Crew B-66</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Loader-Backhoe, 40 H.P.		232.56		255.82	29.07	31.98
8 L.H., Daily Totals		\$728.56		\$991.42	\$91.07	\$123.93
<b>Crew B-67</b>						
1 Millwright	\$64.95	\$519.60	\$93.75	\$750.00	\$63.48	\$92.85
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 R.T. Forklift, 5,000 Lb., diesel		376.35		413.98	23.52	25.87
16 L.H., Daily Totals		\$1391.95		\$1899.58	\$87.00	\$118.72
<b>Crew B-67B</b>						
1 Millwright Foreman (inside)	\$65.45	\$523.60	\$94.45	\$755.60	\$65.20	\$94.10
1 Millwright	64.95	519.60	93.75	750.00		
16 L.H., Daily Totals		\$1043.20		\$1505.60	\$65.20	\$94.10
<b>Crew B-68</b>						
2 Millwrights	\$64.95	\$1039.20	\$93.75	\$1500.00	\$63.97	\$93.15
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 R.T. Forklift, 5,000 Lb., diesel		376.35		413.98	15.68	17.25
24 L.H., Daily Totals		\$1911.55		\$2649.58	\$79.65	\$110.40
<b>Crew B-68A</b>						
1 Millwright Foreman (inside)	\$65.45	\$523.60	\$94.45	\$755.60	\$65.12	\$93.98
2 Millwrights	64.95	1039.20	93.75	1500.00		
1 Forklift, Smooth Floor, 8,000 Lb.		326.55		359.21	13.61	14.97
24 L.H., Daily Totals		\$1889.35		\$2614.81	\$78.72	\$108.95

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-68B</b>						
1 Millwright Foreman (inside)	\$65.45	\$523.60	\$94.45	\$755.60	\$69.72	\$102.38
2 Millwrights	64.95	1039.20	93.75	1500.00		
2 Electricians	71.70	1147.20	106.30	1700.80		
2 Plumbers	74.65	1194.40	111.05	1776.80		
1 R.T. Forklift, 5,000 Lb., gas		476.54		524.19	8.51	9.36
56 L.H., Daily Totals		\$4380.94		\$6257.39	\$78.23	\$111.74
<b>Crew B-68C</b>						
1 Millwright Foreman (inside)	\$65.45	\$523.60	\$94.45	\$755.60	\$69.19	\$101.39
1 Millwright	64.95	519.60	93.75	750.00		
1 Electrician	71.70	573.60	106.30	850.40		
1 Plumber	74.65	597.20	111.05	888.40		
1 R.T. Forklift, 5,000 Lb., gas		476.54		524.19	14.89	16.38
32 L.H., Daily Totals		\$2690.54		\$3768.59	\$84.08	\$117.77
<b>Crew B-68D</b>						
1 Labor Foreman (inside)	\$49.50	\$396.00	\$73.30	\$586.40	\$53.50	\$79.27
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 R.T. Forklift, 5,000 Lb., gas		476.54		524.19	19.86	21.84
24 L.H., Daily Totals		\$1760.54		\$2426.59	\$73.36	\$101.11
<b>Crew B-68E</b>						
1 Struc. Steel Foreman (inside)	\$67.55	\$540.40	\$103.55	\$828.40	\$67.15	\$102.95
3 Struc. Steel Workers	67.05	1609.20	102.80	2467.20		
1 Welder	67.05	536.40	102.80	822.40		
1 Forklift, Smooth Floor, 8,000 Lb.		326.55		359.21	8.16	8.98
40 L.H., Daily Totals		\$3012.55		\$4477.21	\$75.31	\$111.93
<b>Crew B-68F</b>						
1 Skilled Worker Foreman (out)	\$65.50	\$524.00	\$98.00	\$784.00	\$64.17	\$96.00
2 Skilled Workers	63.50	1016.00	95.00	1520.00		
1 R.T. Forklift, 5,000 Lb., gas		476.54		524.19	19.86	21.84
24 L.H., Daily Totals		\$2016.54		\$2828.19	\$84.02	\$117.84
<b>Crew B-68G</b>						
2 Structural Steel Workers	\$67.05	\$1072.80	\$102.80	\$1644.80	\$67.05	\$102.80
1 R.T. Forklift, 5,000 Lb., gas		476.54		524.19	29.78	32.76
16 L.H., Daily Totals		\$1549.34		\$2168.99	\$96.83	\$135.56
<b>Crew B-69</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.17	\$80.25
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 80 Ton		2742.60		3016.86	57.14	62.85
48 L.H., Daily Totals		\$5342.60		\$6868.86	\$111.30	\$143.10
<b>Crew B-69A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.30	\$78.72
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Concrete Finisher	56.80	454.40	82.80	662.40		
1 Curb/Gutter Paver, 2-Track		1107.32		1218.05	23.07	25.38
48 L.H., Daily Totals		\$3665.72		\$4996.85	\$76.37	\$104.10

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-69B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.30	\$78.72
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Curb/Gutter Paver, 4-Track		1176.89		1294.58	24.52	26.97
48 L.H., Daily Totals		\$3735.29		\$5073.38	\$77.82	\$105.70
<b>Crew B-70</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.14	\$83.19
3 Laborers	49.00	1176.00	72.55	1741.20		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Ripper, Beam & 1 Shank		104.87		115.36		
1 Road Sweeper, S.P., 8' wide		581.33		639.46		
1 F.E. Loader, W.M., 1.5 C.Y.		582.76		641.03	42.58	46.84
56 L.H., Daily Totals		\$5528.43		\$7281.67	\$98.72	\$130.03
<b>Crew B-70A</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$61.80	\$91.63
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
1 Grader, 40,000 Lbs.		1244.68		1369.15		
1 F.E. Loader, W.M., 2.5 C.Y.		815.12		896.63		
1 Dozer, 80 H.P.		634.87		698.36		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71	79.04	86.95
40 L.H., Daily Totals		\$5633.68		\$7143.04	\$140.84	\$178.58
<b>Crew B-71</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.14	\$83.19
3 Laborers	49.00	1176.00	72.55	1741.20		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Pmt. Profiler, 750 H.P.		3893.02		4282.32		
1 Road Sweeper, S.P., 8' wide		581.33		639.46		
1 F.E. Loader, W.M., 1.5 C.Y.		582.76		641.03	90.31	99.34
56 L.H., Daily Totals		\$8201.10		\$10221.61	\$146.45	\$182.53
<b>Crew B-72</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$57.25	\$84.84
3 Laborers	49.00	1176.00	72.55	1741.20		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
1 Pmt. Profiler, 750 H.P.		3893.02		4282.32		
1 Hammermill, 250 H.P.		851.28		936.41		
1 Windrow Loader		1534.30		1687.73		
1 Mix Paver, 165 H.P.		1332.39		1465.63		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71	126.22	138.84
64 L.H., Daily Totals		\$11741.99		\$14315.79	\$183.47	\$223.68
<b>Crew B-73</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$59.25	\$87.83
2 Laborers	49.00	784.00	72.55	1160.80		
5 Equip. Oper. (medium)	65.00	2600.00	96.40	3856.00		
1 Road Mixer, 310 H.P.		2194.69		2414.16		
1 Tandem Roller, 10 Ton		319.84		351.82		
1 Hammermill, 250 H.P.		851.28		936.41		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
.5 F.E. Loader, W.M., 1.5 C.Y.		291.38		320.52		
.5 Truck Tractor, 220 H.P.		178.51		196.36		
.5 Water Tank Trailer, 5000 Gal.		88.22		97.04	78.74	86.61
64 L.H., Daily Totals		\$8831.39		\$11164.12	\$137.99	\$174.44

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-74</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$59.31	\$87.98
1 Laborer	49.00	392.00	72.55	580.40		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Ripper, Beam & 1 Shank		104.87		115.36		
2 Stabilizers, 310 H.P.		1811.65		1992.82		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Chem. Spreader, Towed		91.24		100.37		
1 Roller, Vibratory, 25 Ton		554.08		609.48		
1 Water Tank Trailer, 5000 Gal.		176.44		194.08		
1 Truck Tractor, 220 H.P.		357.02		392.72	73.91	81.30
64 L.H., Daily Totals		\$8526.32		\$10834.16	\$133.22	\$169.28
<b>Crew B-75</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$59.61	\$88.39
1 Laborer	49.00	392.00	72.55	580.40		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Grader, 30,000 Lbs.		1115.47		1227.02		
1 Ripper, Beam & 1 Shank		104.87		115.36		
2 Stabilizers, 310 H.P.		1811.65		1992.82		
1 Dist. Tanker, 3000 Gallon		382.04		420.25		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Roller, Vibratory, 25 Ton		554.08		609.48	81.10	89.21
56 L.H., Daily Totals		\$7879.60		\$9945.76	\$140.71	\$177.60
<b>Crew B-76</b>						
1 Dock Builder Foreman (outside)	\$64.75	\$518.00	\$99.40	\$795.20	\$63.79	\$96.78
5 Dock Builders	62.75	2510.00	96.30	3852.00		
2 Equip. Oper. (crane)	68.60	1097.60	101.75	1628.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 50 Ton		1782.71		1960.98		
1 Barge, 400 Ton		991.44		1090.58		
1 Hammer, Diesel, 15K ft.-lbs.		712.59		783.85		
1 Lead, 60' High		241.46		265.61		
1 Air Compressor, 600 cfm		490.62		539.68		
2 -50' Air Hoses, 3"		91.44		100.58	59.86	65.85
72 L.H., Daily Totals		\$8903.06		\$11709.28	\$123.65	\$162.63
<b>Crew B-76A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.88	\$78.33
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Crawler Crane, 50 Ton		1782.71		1960.98		
1 Barge, 400 Ton		991.44		1090.58	43.35	47.68
64 L.H., Daily Totals		\$6158.14		\$8064.35	\$96.22	\$126.01
<b>Crew B-77</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.63	\$75.03
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Crack Cleaner, 25 H.P.		173.35		190.69		
1 Crack Filler, Trailer Mtd.		209.88		230.87		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	22.57	24.83
40 L.H., Daily Totals		\$2927.99		\$3994.27	\$73.20	\$99.86

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-78</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.36	\$74.62
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, S.P., 40 Gallon		78.05		85.86		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Pickup Truck, 3/4 Ton		233.60		256.96	17.32	19.05
48 L.H., Daily Totals		\$3248.41		\$4495.93	\$67.68	\$93.67
<b>Crew B-78A</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Line Rem. (Metal Balls) 115 H.P.		1712.49		1883.74	214.06	235.47
8 L.H., Daily Totals		\$2208.49		\$2619.34	\$276.06	\$327.42
<b>Crew B-78B</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$50.44	\$74.71
.25 Equip. Oper. (light)	62.00	124.00	91.95	183.90		
1 Pickup Truck, 3/4 Ton		233.60		256.96		
1 Line Rem., 11 H.P., Walk Behind		198.93		218.82		
.25 Road Sweeper, S.P., 8' wide		145.33		159.87	32.10	35.31
18 L.H., Daily Totals		\$1485.86		\$1980.35	\$82.55	\$110.02
<b>Crew B-78C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.36	\$74.62
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Pickup Truck, 3/4 Ton		233.60		256.96	30.46	33.51
48 L.H., Daily Totals		\$3879.47		\$5190.10	\$80.82	\$108.13
<b>Crew B-78D</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$50.02	\$74.08
7 Laborers	49.00	2744.00	72.55	4062.80		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
3 Pickup Trucks, 3/4 Ton		700.81		770.89		
1 Air Compressor, 60 cfm		204.02		224.42		
1 -50' Air Hose, 3/4"		7.10		7.81		
1 Breaker, Pavement, 60 lb.		39.96		43.96	27.26	29.98
80 L.H., Daily Totals		\$6181.75		\$8325.41	\$77.27	\$104.07
<b>Crew B-78E</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$49.85	\$73.83
9 Laborers	49.00	3528.00	72.55	5223.60		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
4 Pickup Trucks, 3/4 Ton		934.41		1027.85		
2 Air Compressors, 60 cfm		408.04		448.84		
2 -50' Air Hoses, 3/4"		14.19		15.61		
2 Breakers, Pavement, 60 lb.		79.92		87.92	27.76	30.54
96 L.H., Daily Totals		\$7450.43		\$10019.36	\$77.61	\$104.37

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-78F</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$49.73	\$73.65
11 Laborers	49.00	4312.00	72.55	6384.40		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
7 Pickup Trucks, 3/4 Ton		1635.21		1798.73		
3 Air Compressors, 60 cfm		612.06		673.26		
3 -50' Air Hoses, 3/4"		21.29		23.42		
3 Breakers, Pavement, 60 lb.		119.89		131.88	32.30	35.53
112 L.H., Daily Totals		\$9186.32		\$12227.23	\$82.02	\$109.17
<b>Crew B-79</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.63	\$75.03
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Heating Kettle, 115 Gallon		177.14		194.85		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
2 Pickup Trucks, 3/4 Ton		467.20		513.92	46.83	51.51
40 L.H., Daily Totals		\$3898.21		\$5061.51	\$97.46	\$126.54
<b>Crew B-79A</b>						
1.5 Equip. Oper. (light)	\$62.00	\$744.00	\$91.95	\$1103.40	\$62.00	\$91.95
.5 Line Remov. (Grinder) 115 H.P.		876.48		964.13		
1 Line Rem. (Metal Balls) 115 H.P.		1712.49		1883.74	215.75	237.32
12 L.H., Daily Totals		\$3332.97		\$3951.26	\$277.75	\$329.27
<b>Crew B-79B</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Set of Gases		200.79		220.87	25.10	27.61
8 L.H., Daily Totals		\$592.79		\$801.27	\$74.10	\$100.16
<b>Crew B-79C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.16	\$74.32
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Heating Kettle, 115 Gallon		177.14		194.85		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
3 Pickup Trucks, 3/4 Ton		700.81		770.89		
1 Air Compressor, 60 cfm		204.02		224.42		
1 -50' Air Hose, 3/4"		7.10		7.81		
1 Breaker, Pavement, 60 lb.		39.96		43.96	42.10	46.31
56 L.H., Daily Totals		\$5166.89		\$6755.46	\$92.27	\$120.63
<b>Crew B-79D</b>						
2 Labor Foremen (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$50.27	\$74.47
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Heating Kettle, 115 Gallon		177.14		194.85		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
4 Pickup Trucks, 3/4 Ton		934.41		1027.85		
1 Air Compressor, 60 cfm		204.02		224.42		
1 -50' Air Hose, 3/4"		7.10		7.81		
1 Breaker, Pavement, 60 lb.		39.96		43.96	40.49	44.54
64 L.H., Daily Totals		\$5808.49		\$7616.42	\$90.76	\$119.01

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-79E</b>						
2 Labor Foreman (outside)	\$51.00	\$816.00	\$75.50	\$1208.00	\$50.02	\$74.08
7 Laborers	49.00	2744.00	72.55	4062.80		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Paint Striper, T.M., 120 Gal.		709.11		780.03		
1 Heating Kettle, 115 Gallon		177.14		194.85		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
5 Pickup Trucks, 3/4 Ton		1168.01		1284.81		
2 Air Compressors, 60 cfm		408.04		448.84		
2-50' Air Hoses, 3/4"		14.19		15.61		
2 Breakers, Pavement, 60 lb.		79.92		87.92	38.45	42.29
80 L.H., Daily Totals		\$7077.17		\$9310.37	\$88.46	\$116.38
<b>Crew B-80</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.29	\$80.50
1 Laborer	49.00	392.00	72.55	580.40		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Earth Auger, Truck-Mtd.		162.91		179.20	21.33	23.46
32 L.H., Daily Totals		\$2419.67		\$3326.71	\$75.61	\$103.96
<b>Crew B-80A</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$49.00	\$72.55
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	21.65	23.81
24 L.H., Daily Totals		\$1695.55		\$2312.71	\$70.65	\$96.36
<b>Crew B-80B</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$52.25	\$77.40
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Crane, Flatbed Mounted, 3 Ton		581.20		639.32	18.16	19.98
32 L.H., Daily Totals		\$2253.20		\$3116.12	\$70.41	\$97.38
<b>Crew B-80C</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$51.05	\$75.70
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92		
1 Manual Fence Post Auger, Gas		55.37		60.91	19.84	21.83
24 L.H., Daily Totals		\$1701.41		\$2340.63	\$70.89	\$97.53
<b>Crew B-81</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$57.08	\$84.68
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Hydromulcher, T.M., 3000 Gal.		772.89		850.18		
1 Truck Tractor, 220 H.P.		357.02		392.72	47.08	51.79
24 L.H., Daily Totals		\$2499.91		\$3275.30	\$104.16	\$136.47
<b>Crew B-81A</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$52.08	\$77.28
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Hydromulcher, T.M., 600 Gal.		244.10		268.51		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	47.73	52.50
16 L.H., Daily Totals		\$1596.86		\$2076.42	\$99.80	\$129.78
<b>Crew B-82</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$55.50	\$82.25
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Horiz. Borer, 6 H.P.		119.62		131.58	7.48	8.22
16 L.H., Daily Totals		\$1007.62		\$1447.58	\$62.98	\$90.47

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-82A</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$55.50	\$82.25
2 Equip. Oper. (light)	62.00	992.00	91.95	1471.20		
2 Dump Truck, 8 C.Y., 220 H.P.		1012.60		1113.86		
1 Flatbed Trailer, 25 Ton		157.04		172.75		
1 Horiz. Dir. Drill, 20k lb. Thrust		714.31		785.74		
1 Mud Trailer for HDD, 1500 Gal.		724.86		797.34		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Flatbed Trailer, 3 Ton		81.23		89.36		
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	103.77	114.15
32 L.H., Daily Totals		\$5096.58		\$6284.64	\$159.27	\$196.40
<b>Crew B-82B</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$55.50	\$82.25
2 Equip. Oper. (light)	62.00	992.00	91.95	1471.20		
2 Dump Truck, 8 C.Y., 220 H.P.		1012.60		1113.86		
1 Flatbed Trailer, 25 Ton		157.04		172.75		
1 Horiz. Dir. Drill, 30k lb. Thrust		773.44		850.78		
1 Mud Trailer for HDD, 1500 Gal.		724.86		797.34		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Flatbed Trailer, 3 Ton		81.23		89.36		
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	105.62	116.18
32 L.H., Daily Totals		\$5155.71		\$6349.68	\$161.12	\$198.43
<b>Crew B-82C</b>						
2 Laborers	\$49.00	\$784.00	\$72.55	\$1160.80	\$55.50	\$82.25
2 Equip. Oper. (light)	62.00	992.00	91.95	1471.20		
2 Dump Truck, 8 C.Y., 220 H.P.		1012.60		1113.86		
1 Flatbed Trailer, 25 Ton		157.04		172.75		
1 Horiz. Dir. Drill, 50k lb. Thrust		910.87		1001.95		
1 Mud Trailer for HDD, 1500 Gal.		724.86		797.34		
1 Pickup Truck, 4x4, 3/4 Ton		235.90		259.49		
1 Flatbed Trailer, 3 Ton		81.23		89.36		
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	109.91	120.90
32 L.H., Daily Totals		\$5293.14		\$6500.85	\$165.41	\$203.15
<b>Crew B-82D</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$62.00	\$91.95
1 Mud Trailer for HDD, 1500 Gal.		724.86		797.34	90.61	99.67
8 L.H., Daily Totals		\$1220.86		\$1532.94	\$152.61	\$191.62
<b>Crew B-83</b>						
1 Tugboat Captain	\$65.00	\$520.00	\$96.40	\$771.20	\$57.00	\$84.47
1 Tugboat Hand	49.00	392.00	72.55	580.40		
1 Tugboat, 250 H.P.		834.93		918.43	52.18	57.40
16 L.H., Daily Totals		\$1746.93		\$2270.03	\$109.18	\$141.88
<b>Crew B-84</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 Rotary Mower/Tractor		251.43		276.57	31.43	34.57
8 L.H., Daily Totals		\$771.43		\$1047.77	\$96.43	\$130.97
<b>Crew B-85</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$53.85	\$79.83
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Telescoping Boom Lift, to 80'		750.11		825.12		
1 Brush Chipper, 12", 130 H.P.		507.44		558.18		
1 Pruning Saw, Rotary		29.66		32.62	32.18	35.40
40 L.H., Daily Totals		\$3441.20		\$4609.12	\$86.03	\$115.23



# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-86</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 Stump Chipper, S.P.		260.03		286.03	32.50	35.75
8 L.H., Daily Totals		\$780.03		\$1057.23	\$97.50	\$132.15
<b>Crew B-86A</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 Grader, 30,000 Lbs.		1115.47		1227.02	139.43	153.38
8 L.H., Daily Totals		\$1635.47		\$1998.22	\$204.43	\$249.78
<b>Crew B-86B</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 Dozer, 200 H.P.		1443.21		1587.53	180.40	198.44
8 L.H., Daily Totals		\$1963.21		\$2358.73	\$245.40	\$294.84
<b>Crew B-87</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$61.80	\$91.63
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
2 Feller Bunchers, 100 H.P.		2249.91		2474.90		
1 Log Chipper, 22" Tree		720.82		792.90		
1 Dozer, 105 H.P.		790.84		869.92		
1 Chain Saw, Gas, 36" Long		55.48		61.03	95.43	104.97
40 L.H., Daily Totals		\$6289.05		\$7863.96	\$157.23	\$196.60
<b>Crew B-88</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$62.71	\$92.99
6 Equip. Oper. (medium)	65.00	3120.00	96.40	4627.20		
2 Feller Bunchers, 100 H.P.		2249.91		2474.90		
1 Log Chipper, 22" Tree		720.82		792.90		
2 Log Skidders, 50 H.P.		986.54		1085.20		
1 Dozer, 105 H.P.		790.84		869.92		
1 Chain Saw, Gas, 36" Long		55.48		61.03	85.78	94.36
56 L.H., Daily Totals		\$8315.60		\$10491.56	\$148.49	\$187.35
<b>Crew B-89</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$58.58	\$86.97
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51		
1 Concrete Saw		194.70		214.17		
1 Water Tank, 65 Gal.		106.22		116.84	51.28	56.41
16 L.H., Daily Totals		\$1757.67		\$2294.12	\$109.85	\$143.38
<b>Crew B-89A</b>						
1 Skilled Worker	\$63.50	\$508.00	\$95.00	\$760.00	\$56.25	\$83.78
1 Laborer	49.00	392.00	72.55	580.40		
1 Core Drill (Large)		155.93		171.52	9.75	10.72
16 L.H., Daily Totals		\$1055.93		\$1511.92	\$66.00	\$94.50
<b>Crew B-89B</b>						
1 Equip. Oper. (light)	\$62.00	\$496.00	\$91.95	\$735.60	\$58.58	\$86.97
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Wall Saw, Hydraulic, 10 H.P.		115.88		127.47		
1 Generator, Diesel, 100 kW		614.28		675.70		
1 Water Tank, 65 Gal.		106.22		116.84		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	84.75	93.22
16 L.H., Daily Totals		\$2293.13		\$2883.12	\$143.32	\$180.19
<b>Crew B-89C</b>						
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$56.80	\$82.80
1 Masonry cut-off saw, gas		85.15		93.66	10.64	11.71
8 L.H., Daily Totals		\$539.55		\$756.06	\$67.44	\$94.51

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-90</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.56	\$80.91
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Equip. Oper. (light)	62.00	992.00	91.95	1471.20		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Road Mixer, 310 H.P.		2194.69		2414.16		
1 Dist. Truck, 2000 Gal.		346.74		381.41	39.71	43.68
64 L.H., Daily Totals		\$6033.43		\$7973.57	\$94.27	\$124.59
<b>Crew B-90A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.43	\$86.60
2 Laborers	49.00	784.00	72.55	1160.80		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
2 Graders, 30,000 Lbs.		2230.94		2454.03		
1 Tandem Roller, 10 Ton		319.84		351.82		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71	53.89	59.28
56 L.H., Daily Totals		\$6289.78		\$8169.16	\$112.32	\$145.88
<b>Crew B-90B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$57.33	\$84.97
2 Laborers	49.00	784.00	72.55	1160.80		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71		
1 Road Mixer, 310 H.P.		2194.69		2414.16	55.45	61.00
48 L.H., Daily Totals		\$5413.69		\$7006.26	\$112.79	\$145.96
<b>Crew B-90C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.80	\$82.75
4 Laborers	49.00	1568.00	72.55	2321.60		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
3 Truck Drivers (heavy)	57.25	1374.00	85.10	2042.40		
3 Road Mixers, 310 H.P.		6584.06		7242.47	74.82	82.30
88 L.H., Daily Totals		\$11494.06		\$14524.07	\$130.61	\$165.05
<b>Crew B-90D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.75	\$81.18
6 Laborers	49.00	2352.00	72.55	3482.40		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
3 Truck Drivers (heavy)	57.25	1374.00	85.10	2042.40		
3 Road Mixers, 310 H.P.		6584.06		7242.47	63.31	69.64
104 L.H., Daily Totals		\$12278.06		\$15684.87	\$118.06	\$150.82
<b>Crew B-90E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.47	\$82.22
4 Laborers	49.00	1568.00	72.55	2321.60		
3 Equip. Oper. (medium)	65.00	1560.00	96.40	2313.60		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Road Mixer, 310 H.P.		2194.69		2414.16	30.48	33.53
72 L.H., Daily Totals		\$6188.69		\$8334.16	\$85.95	\$115.75
<b>Crew B-91</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$58.28	\$86.41
2 Laborers	49.00	784.00	72.55	1160.80		
4 Equip. Oper. (medium)	65.00	2080.00	96.40	3084.80		
1 Truck Driver (heavy)	57.25	458.00	85.10	680.80		
1 Dist. Tanker, 3000 Gallon		382.04		420.25		
1 Truck Tractor, 6x4, 380 H.P.		573.49		630.83		
1 Aggreg. Spreader, S.P.		985.21		1083.74		
1 Roller, Pneum. Whl., 12 Ton		467.01		513.71		
1 Tandem Roller, 10 Ton		319.84		351.82	42.62	46.88
64 L.H., Daily Totals		\$6457.59		\$8530.74	\$100.90	\$133.29

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-91B</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$57.00	\$84.47
1 Equipment Oper. (med.)	65.00	520.00	96.40	771.20		
1 Road Sweeper, Vac. Assist.		1975.20		2172.72	123.45	135.80
16 L.H., Daily Totals		\$2887.20		\$3524.32	\$180.45	\$220.27
<b>Crew B-91C</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$52.08	\$77.28
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Catch Basin Cleaning Truck		622.72		684.99	38.92	42.81
16 L.H., Daily Totals		\$1455.92		\$1921.39	\$91.00	\$120.09
<b>Crew B-91D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$56.58	\$83.88
5 Laborers	49.00	1960.00	72.55	2902.00		
5 Equip. Oper. (medium)	65.00	2600.00	96.40	3856.00		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
1 Aggreg. Spreader, S.P.		985.21		1083.74		
2 Truck Tractors, 6x4, 380 H.P.		1146.97		1261.67		
2 Dist. Tankers, 3000 Gallon		764.08		840.49		
2 Pavement Brushes, Towed		202.16		222.37		
2 Rollers Pneum. Whl., 12 Ton		934.01		1027.41	38.77	42.65
104 L.H., Daily Totals		\$9916.44		\$13159.28	\$95.35	\$126.53
<b>Crew B-92</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.50	\$73.29
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Crack Cleaner, 25 H.P.		173.35		190.69		
1 Air Compressor, 60 cfm		204.02		224.42		
1 Tar Kettle, T.M.		209.32		230.25		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	34.57	38.03
32 L.H., Daily Totals		\$2690.24		\$3562.07	\$84.07	\$111.31
<b>Crew B-93</b>						
1 Equip. Oper. (medium)	\$65.00	\$520.00	\$96.40	\$771.20	\$65.00	\$96.40
1 Feller Buncher, 100 H.P.		1124.96		1237.45	140.62	154.68
8 L.H., Daily Totals		\$1644.96		\$2008.65	\$205.62	\$251.08
<b>Crew B-94A</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Diaphragm Water Pump, 2"		65.04		71.55		
1 -20' Suction Hose, 2"		4.61		5.07		
2 -50' Discharge Hoses, 2"		9.05		9.96	9.84	10.82
8 L.H., Daily Totals		\$470.70		\$666.97	\$58.84	\$83.37
<b>Crew B-94B</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Diaphragm Water Pump, 4"		157.09		172.80		
1 -20' Suction Hose, 4"		19.59		21.55		
2 -50' Discharge Hoses, 4"		29.12		32.03	25.73	28.30
8 L.H., Daily Totals		\$597.80		\$806.78	\$74.73	\$100.85
<b>Crew B-94C</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Centrifugal Water Pump, 3"		86.40		95.04		
1 -20' Suction Hose, 3"		9.86		10.84		
2 -50' Discharge Hoses, 3"		10.57		11.63	13.35	14.69
8 L.H., Daily Totals		\$498.83		\$697.91	\$62.35	\$87.24

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew B-94D</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Centr. Water Pump, 6"		410.89		451.98		
1 -20' Suction Hose, 6"		29.00		31.90		
2 -50' Discharge Hoses, 6"		41.25		45.38	60.14	66.16
8 L.H., Daily Totals		\$873.14		\$1109.65	\$109.14	\$138.71
<b>Crew C-1</b>						
3 Carpenters	\$60.55	\$1453.20	\$89.65	\$2151.60	\$57.66	\$85.38
1 Laborer	49.00	392.00	72.55	580.40		
32 L.H., Daily Totals		\$1845.20		\$2732.00	\$57.66	\$85.38
<b>Crew C-2</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$58.96	\$87.29
4 Carpenters	60.55	1937.60	89.65	2868.80		
1 Laborer	49.00	392.00	72.55	580.40		
48 L.H., Daily Totals		\$2830.00		\$4190.00	\$58.96	\$87.29
<b>Crew C-2A</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$58.33	\$86.15
3 Carpenters	60.55	1453.20	89.65	2151.60		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Laborer	49.00	392.00	72.55	580.40		
48 L.H., Daily Totals		\$2800.00		\$4135.20	\$58.33	\$86.15
<b>Crew C-3</b>						
1 Rodman Foreman (outside)	\$69.05	\$552.40	\$102.95	\$823.60	\$62.16	\$92.50
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
2 Laborers	49.00	784.00	72.55	1160.80		
3 Stressing Equipment		53.25		58.57		
.5 Grouting Equipment		102.15		112.36	2.43	2.67
64 L.H., Daily Totals		\$4133.39		\$6090.93	\$64.58	\$95.17
<b>Crew C-4</b>						
1 Rodman Foreman (outside)	\$69.05	\$552.40	\$102.95	\$823.60	\$67.55	\$100.74
3 Rodmen (reinf.)	67.05	1609.20	100.00	2400.00		
3 Stressing Equipment		53.25		58.57	1.66	1.83
32 L.H., Daily Totals		\$2214.85		\$3282.17	\$69.21	\$102.57
<b>Crew C-4A</b>						
2 Rodmen (reinf.)	\$67.05	\$1072.80	\$100.00	\$1600.00	\$67.05	\$100.00
4 Stressing Equipment		71.00		78.09	4.44	4.88
16 L.H., Daily Totals		\$1143.80		\$1678.09	\$71.49	\$104.88
<b>Crew C-5</b>						
1 Rodman Foreman (outside)	\$69.05	\$552.40	\$102.95	\$823.60	\$66.32	\$98.76
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 25 Ton		2335.01		2568.51	41.70	45.87
56 L.H., Daily Totals		\$6049.01		\$8098.91	\$108.02	\$144.62
<b>Crew C-6</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$50.63	\$74.75
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Cement Finisher	56.80	454.40	82.80	662.40		
2 Gas Engine Vibrators		62.39		68.63	1.30	1.43
48 L.H., Daily Totals		\$2492.79		\$3656.63	\$51.93	\$76.18

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-6A</b>						
2 Cement Finishers	\$56.80	\$908.80	\$82.80	\$1324.80	\$56.80	\$82.80
1 Concrete Vibrator, Elec, 2 HP		43.55		47.90	2.72	2.99
16 L.H., Daily Totals		\$952.35		\$1372.70	\$59.52	\$85.79
<b>Crew C-7</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.91	\$78.23
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
2 Gas Engine Vibrators		62.39		68.63		
1 Concrete Bucket, 1 C.Y.		52.84		58.12		
1 Hyd. Crane, 55 Ton		2551.41		2806.55	37.04	40.74
72 L.H., Daily Totals		\$6476.24		\$8565.70	\$89.95	\$118.97
<b>Crew C-7A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.31	\$76.06
5 Laborers	49.00	1960.00	72.55	2902.00		
2 Truck Drivers (heavy)	57.25	916.00	85.10	1361.60		
2 Conc. Transit Mixers		1479.61		1627.57	23.12	25.43
64 L.H., Daily Totals		\$4763.61		\$6495.17	\$74.43	\$101.49
<b>Crew C-7B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.88	\$78.33
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Equipment Operator, Crane	68.60	548.80	101.75	814.00		
1 Equipment Oiler	58.40	467.20	86.60	692.80		
1 Conc. Bucket, 2 C.Y.		79.23		87.16		
1 Lattice Boom Crane, 165 Ton		2779.06		3056.96	44.66	49.13
64 L.H., Daily Totals		\$6242.29		\$8156.92	\$97.54	\$127.45
<b>Crew C-7C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.25	\$78.88
5 Laborers	49.00	1960.00	72.55	2902.00		
2 Equipment Operators (med.)	65.00	1040.00	96.40	1542.40		
2 F.E. Loaders, W.M., 4 C.Y.		1733.19		1906.51	27.08	29.79
64 L.H., Daily Totals		\$5141.19		\$6954.91	\$80.33	\$108.67
<b>Crew C-7D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.57	\$76.38
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Concrete Conveyer		204.02		224.43	3.64	4.01
56 L.H., Daily Totals		\$3092.02		\$4501.63	\$55.21	\$80.39
<b>Crew C-8</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.80	\$79.31
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Concrete Pump (Small)		861.85		948.03	15.39	16.93
56 L.H., Daily Totals		\$3874.65		\$5389.23	\$69.19	\$96.24
<b>Crew C-8A</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$51.93	\$76.46
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
48 L.H., Daily Totals		\$2492.80		\$3670.00	\$51.93	\$76.46

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-8B</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.60	\$77.91
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Vibrating Power Screed		88.86		97.75		
1 Roller, Vibratory, 25 Ton		554.08		609.48		
1 Dozer, 200 H.P.		1443.21		1587.53	52.15	57.37
40 L.H., Daily Totals		\$4190.15		\$5411.17	\$104.75	\$135.28
<b>Crew C-8C</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.30	\$78.72
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Shotcrete Pump Rig, 12 C.Y./hr		675.78		743.36		
1 Air Compressor, 160 cfm		209.86		230.85		
4 -50' Air Hoses, 1"		36.11		39.72		
4 -50' Air Hoses, 2"		127.66		140.43	21.86	24.05
48 L.H., Daily Totals		\$3607.81		\$4933.15	\$75.16	\$102.77
<b>Crew C-8D</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.70	\$80.70
1 Laborer	49.00	392.00	72.55	580.40		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equipment Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Compressor, 250 cfm		226.90		249.59		
2 -50' Air Hoses, 1"		18.05		19.86	7.65	8.42
32 L.H., Daily Totals		\$1995.35		\$2851.85	\$62.35	\$89.12
<b>Crew C-8E</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.80	\$77.98
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equipment Oper. (light)	62.00	496.00	91.95	735.60		
1 Shotcrete Rig, 35 C.Y./hr		826.00		908.60		
1 Air Compressor, 250 cfm		226.90		249.59		
4 -50' Air Hoses, 1"		36.11		39.72		
4 -50' Air Hoses, 2"		127.66		140.43	25.35	27.88
48 L.H., Daily Totals		\$3751.06		\$5081.53	\$78.15	\$105.87
<b>Crew C-9</b>						
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$54.20	\$79.96
2 Laborers	49.00	784.00	72.55	1160.80		
1 Equipment Oper. (light)	62.00	496.00	91.95	735.60		
1 Grout Pump, 50 C.F./hr.		165.21		181.73		
1 Air Compressor, 160 cfm		209.86		230.85		
2 -50' Air Hoses, 1"		18.05		19.86		
2 -50' Air Hoses, 2"		63.83		70.21	14.28	15.71
32 L.H., Daily Totals		\$2191.36		\$3061.45	\$68.48	\$95.67
<b>Crew C-10</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$54.20	\$79.38
2 Cement Finishers	56.80	908.80	82.80	1324.80		
24 L.H., Daily Totals		\$1300.80		\$1905.20	\$54.20	\$79.38
<b>Crew C-10B</b>						
3 Laborers	\$49.00	\$1176.00	\$72.55	\$1741.20	\$52.12	\$76.65
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Concrete Mixer, 10 C.F.		170.44		187.48		
2 Trowels, 48" Walk-Behind		246.40		271.04	10.42	11.46
40 L.H., Daily Totals		\$2501.64		\$3524.52	\$62.54	\$88.11

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-10C</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$54.20	\$79.38
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Trowel, 48" Walk-Behind		123.20		135.52	5.13	5.65
24 L.H., Daily Totals		\$1424.00		\$2040.72	\$59.33	\$85.03
<b>Crew C-10D</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$54.20	\$79.38
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Vibrating Power Screenshot		88.86		97.75		
1 Trowel, 48" Walk-Behind		123.20		135.52	8.84	9.72
24 L.H., Daily Totals		\$1512.86		\$2138.47	\$63.04	\$89.10
<b>Crew C-10E</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$54.20	\$79.38
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Vibrating Power Screenshot		88.86		97.75		
1 Cement Trowel, 96" Ride-On		248.89		273.78	14.07	15.48
24 L.H., Daily Totals		\$1638.56		\$2276.73	\$68.27	\$94.86
<b>Crew C-10F</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$54.20	\$79.38
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Telescoping Boom Lift, to 60'		467.60		514.36	19.48	21.43
24 L.H., Daily Totals		\$1768.40		\$2419.56	\$73.68	\$100.81
<b>Crew C-11</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.48	\$101.22
6 Struc. Steel Workers	67.05	3218.40	102.80	4934.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Lattice Boom Crane, 150 Ton		2687.58		2956.34	37.33	41.06
72 L.H., Daily Totals		\$7474.38		\$10244.34	\$103.81	\$142.28
<b>Crew C-12</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$60.30	\$89.31
3 Carpenters	60.55	1453.20	89.65	2151.60		
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	46.34	50.97
48 L.H., Daily Totals		\$5118.61		\$6733.43	\$106.64	\$140.28
<b>Crew C-13</b>						
1 Struc. Steel Worker	\$67.05	\$536.40	\$102.80	\$822.40	\$64.88	\$98.42
1 Welder	67.05	536.40	102.80	822.40		
1 Carpenter	60.55	484.40	89.65	717.20		
1 Welder, Gas Engine, 300 amp		163.86		180.24	6.83	7.51
24 L.H., Daily Totals		\$1721.06		\$2542.24	\$71.71	\$105.93
<b>Crew C-14</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$59.45	\$88.06
5 Carpenters	60.55	2422.00	89.65	3586.00		
4 Laborers	49.00	1568.00	72.55	2321.60		
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 80 Ton		2742.60		3016.86	19.05	20.95
144 L.H., Daily Totals		\$11303.40		\$15696.86	\$78.50	\$109.01

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-14A</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$60.77	\$90.05
16 Carpenters	60.55	7750.40	89.65	11475.20		
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
2 Laborers	49.00	784.00	72.55	1160.80		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gas Engine Vibrator		31.20		34.32		
1 Concrete Pump (Small)		861.85		948.03	4.47	4.91
200 L.H., Daily Totals		\$13047.85		\$18992.75	\$65.24	\$94.96
<b>Crew C-14B</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$60.62	\$89.77
16 Carpenters	60.55	7750.40	89.65	11475.20		
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
2 Laborers	49.00	784.00	72.55	1160.80		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gas Engine Vibrator		31.20		34.32		
1 Concrete Pump (Small)		861.85		948.03	4.29	4.72
208 L.H., Daily Totals		\$13502.25		\$19655.15	\$64.91	\$94.50
<b>Crew C-14C</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$58.05	\$85.96
6 Carpenters	60.55	2906.40	89.65	4303.20		
2 Rodmen (reinf.)	67.05	1072.80	100.00	1600.00		
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Gas Engine Vibrator		31.20		34.32	.28	.31
112 L.H., Daily Totals		\$6533.20		\$9662.32	\$58.33	\$86.27
<b>Crew C-14D</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$60.25	\$89.22
18 Carpenters	60.55	8719.20	89.65	12909.60		
2 Rodmen (reinf.)	67.05	1072.80	100.00	1600.00		
2 Laborers	49.00	784.00	72.55	1160.80		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gas Engine Vibrator		31.20		34.32		
1 Concrete Pump (Small)		861.85		948.03	4.47	4.91
200 L.H., Daily Totals		\$12943.85		\$18827.15	\$64.72	\$94.14
<b>Crew C-14E</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$59.60	\$88.40
2 Carpenters	60.55	968.80	89.65	1434.40		
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00		
3 Laborers	49.00	1176.00	72.55	1741.20		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Gas Engine Vibrator		31.20		34.32	.35	.39
88 L.H., Daily Totals		\$5276.40		\$7813.12	\$59.96	\$88.79
<b>Crew C-14F</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$54.42	\$79.71
2 Laborers	49.00	784.00	72.55	1160.80		
6 Cement Finishers	56.80	2726.40	82.80	3974.40		
1 Gas Engine Vibrator		31.20		34.32	.43	.48
72 L.H., Daily Totals		\$3949.60		\$5773.52	\$54.86	\$80.19

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-14G</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.74	\$78.83
2 Laborers	49.00	784.00	72.55	1160.80		
4 Cement Finishers	56.80	1817.60	82.80	2649.60		
1 Gas Engine Vibrator		31.20		34.32	.56	.61
56 L.H., Daily Totals		\$3040.80		\$4448.72	\$54.30	\$79.44
<b>Crew C-14H</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$59.42	\$87.88
2 Carpenters	60.55	968.80	89.65	1434.40		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
1 Laborer	49.00	392.00	72.55	580.40		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Gas Engine Vibrator		31.20		34.32	.65	.71
48 L.H., Daily Totals		\$2883.20		\$4252.32	\$60.07	\$88.59
<b>Crew C-14L</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$56.55	\$83.63
6 Carpenters	60.55	2906.40	89.65	4303.20		
4 Laborers	49.00	1568.00	72.55	2321.60		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Gas Engine Vibrator		31.20		34.32	.33	.36
96 L.H., Daily Totals		\$5460.40		\$8062.32	\$56.88	\$83.98
<b>Crew C-14M</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$58.81	\$87.03
2 Carpenters	60.55	968.80	89.65	1434.40		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
2 Laborers	49.00	784.00	72.55	1160.80		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gas Engine Vibrator		31.20		34.32		
1 Concrete Pump (Small)		861.85		948.03	13.95	15.35
64 L.H., Daily Totals		\$4657.05		\$6551.95	\$72.77	\$102.37
<b>Crew C-15</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$56.81	\$83.91
2 Carpenters	60.55	968.80	89.65	1434.40		
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Rodman (reinf.)	67.05	536.40	100.00	800.00		
72 L.H., Daily Totals		\$4090.40		\$6041.20	\$56.81	\$83.91
<b>Crew C-16</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$53.80	\$79.31
3 Laborers	49.00	1176.00	72.55	1741.20		
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gunite Pump Rig		368.88		405.77		
2 -50' Air Hoses, 3/4"		14.19		15.61		
2 -50' Air Hoses, 2"		63.83		70.21	7.98	8.78
56 L.H., Daily Totals		\$3459.71		\$4932.80	\$61.78	\$88.09
<b>Crew C-16A</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$56.90	\$83.64
2 Cement Finishers	56.80	908.80	82.80	1324.80		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Gunite Pump Rig		368.88		405.77		
2 -50' Air Hoses, 3/4"		14.19		15.61		
2 -50' Air Hoses, 2"		63.83		70.21		
1 Telescoping Boom Lift, to 60'		467.60		514.36	28.58	31.44
32 L.H., Daily Totals		\$2735.31		\$3682.36	\$85.48	\$115.07

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-17</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$63.90	\$95.60
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
80 L.H., Daily Totals		\$5112.00		\$7648.00	\$63.90	\$95.60
<b>Crew C-17A</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$63.96	\$95.68
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
.13 Equip. Oper. (crane)	68.60	71.34	101.75	105.82		
.13 Hyd. Crane, 80 Ton		356.54		392.19	4.40	4.84
81.04 L.H., Daily Totals		\$5539.88		\$8146.01	\$68.36	\$100.52
<b>Crew C-17B</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$64.01	\$95.75
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
.25 Equip. Oper. (crane)	68.60	137.20	101.75	203.50		
.25 Hyd. Crane, 80 Ton		685.65		754.22		
.25 Trowel, 48" Walk-Behind		30.80		33.88	8.74	9.61
82 L.H., Daily Totals		\$5965.65		\$8639.60	\$72.75	\$105.36
<b>Crew C-17C</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$64.07	\$95.83
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
.38 Equip. Oper. (crane)	68.60	208.54	101.75	309.32		
.38 Hyd. Crane, 80 Ton		1042.19		1146.41	12.55	13.81
83.04 L.H., Daily Totals		\$6362.73		\$9103.73	\$76.62	\$109.63
<b>Crew C-17D</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$64.12	\$95.89
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
.5 Equip. Oper. (crane)	68.60	274.40	101.75	407.00		
.5 Hyd. Crane, 80 Ton		1371.30		1508.43	16.32	17.96
84 L.H., Daily Totals		\$6757.70		\$9563.43	\$80.45	\$113.85
<b>Crew C-17E</b>						
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$63.90	\$95.60
8 Skilled Workers	63.50	4064.00	95.00	6080.00		
1 Hyd. Jack with Rods		42.48		46.73	.53	.58
80 L.H., Daily Totals		\$5154.48		\$7694.73	\$64.43	\$96.18
<b>Crew C-18</b>						
.13 Labor Foreman (outside)	\$51.00	\$53.04	\$75.50	\$78.52	\$49.23	\$72.89
1 Laborer	49.00	392.00	72.55	580.40		
1 Concrete Cart, 10 C.F.		155.28		170.81	17.18	18.90
9.04 L.H., Daily Totals		\$600.32		\$829.73	\$66.41	\$91.78
<b>Crew C-19</b>						
.13 Labor Foreman (outside)	\$51.00	\$53.04	\$75.50	\$78.52	\$49.23	\$72.89
1 Laborer	49.00	392.00	72.55	580.40		
1 Concrete Cart, 18 C.F.		130.70		143.77	14.46	15.90
9.04 L.H., Daily Totals		\$575.74		\$802.69	\$63.69	\$88.79
<b>Crew C-20</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.23	\$77.18
5 Laborers	49.00	1960.00	72.55	2902.00		
1 Cement Finisher	56.80	454.40	82.80	662.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
2 Gas Engine Vibrators		62.39		68.63		
1 Concrete Pump (Small)		861.85		948.03	14.44	15.89
64 L.H., Daily Totals		\$4266.64		\$5956.27	\$66.67	\$93.07

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour			
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P		
<b>Crew C-21</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$52.23	\$77.18		
5 Laborers	49.00	1960.00	72.55	2902.00				
1 Cement Finisher	56.80	454.40	82.80	662.40				
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20				
2 Gas Engine Vibrators		62.39		68.63				
1 Concrete Conveyer		204.02		224.43				
64 L.H., Daily Totals		\$3608.82		\$5232.66			\$56.39	\$81.76
<b>Crew C-22</b>								
1 Rodman Foreman (outside)	\$69.05	\$552.40	\$102.95	\$823.60	\$67.25	\$100.27		
4 Rodmen (reinf.)	67.05	2145.60	100.00	3200.00				
.13 Equip. Oper. (crane)	68.60	71.34	101.75	105.82				
.13 Equip. Oper. (oiler)	58.40	60.74	86.60	90.06				
.13 Hyd. Crane, 25 Ton		303.55		333.91				
42.08 L.H., Daily Totals		\$3133.63		\$4553.39			\$74.47	\$108.21
<b>Crew C-23</b>								
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$63.90	\$95.44		
6 Skilled Workers	63.50	3048.00	95.00	4560.00				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70				
80 L.H., Daily Totals		\$7902.64		\$10704.50			\$98.78	\$133.81
<b>Crew C-23A</b>								
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$55.20	\$81.79		
2 Laborers	49.00	784.00	72.55	1160.80				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Crawler Crane, 100 Ton		1625.12		1787.63				
3 Conc. Buckets, 8 C.Y.		444.62		489.08				
40 L.H., Daily Totals		\$4277.74		\$5548.31			\$106.94	\$138.71
<b>Crew C-24</b>								
2 Skilled Worker Foremen (out)	\$65.50	\$1048.00	\$98.00	\$1568.00	\$63.90	\$95.44		
6 Skilled Workers	63.50	3048.00	95.00	4560.00				
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00				
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80				
1 Lattice Boom Crane, 150 Ton		2687.58		2956.34				
80 L.H., Daily Totals		\$7799.58		\$10591.14			\$97.49	\$132.39
<b>Crew C-25</b>								
2 Rodmen (reinf.)	\$67.05	\$1072.80	\$100.00	\$1600.00	\$54.02	\$83.03		
2 Rodmen Helpers	41.00	656.00	66.05	1056.80				
32 L.H., Daily Totals		\$1728.80		\$2656.80				
<b>Crew C-27</b>								
2 Cement Finishers	\$56.80	\$908.80	\$82.80	\$1324.80	\$56.80	\$82.80		
1 Concrete Saw		194.70		214.17				
16 L.H., Daily Totals		\$1103.50		\$1538.97			\$68.97	\$96.19
<b>Crew C-28</b>								
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$56.80	\$82.80		
1 Portable Air Compressor, Gas		37.25		40.98				
8 L.H., Daily Totals		\$491.65		\$703.38			\$61.46	\$87.92
<b>Crew C-29</b>								
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55		
1 Pressure Washer		135.59		149.14				
8 L.H., Daily Totals		\$527.59		\$729.54			\$65.95	\$91.19

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew C-30</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Concrete Mixer, 10 C.F.		170.44		187.48		
8 L.H., Daily Totals		\$562.44		\$767.88		
<b>Crew C-31</b>						
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$56.80	\$82.80
1 Grout Pump		368.88		405.77		
8 L.H., Daily Totals		\$823.28		\$1068.17		
<b>Crew C-32</b>						
1 Cement Finisher	\$56.80	\$454.40	\$82.80	\$662.40	\$52.90	\$77.67
1 Laborer	49.00	392.00	72.55	580.40		
1 Crack Chaser Saw, Gas, 6 H.P.		87.84		96.62		
1 Vacuum Pick-Up System		87.74		96.51		
16 L.H., Daily Totals		\$1021.98		\$1435.93		
<b>Crew D-1</b>						
1 Bricklayer	\$59.65	\$477.20	\$89.10	\$712.80	\$54.08	\$80.78
1 Bricklayer Helper	48.50	388.00	72.45	579.60		
16 L.H., Daily Totals		\$865.20		\$1292.40		
<b>Crew D-2</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$55.68	\$83.10
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
.5 Carpenter	60.55	242.20	89.65	358.60		
44 L.H., Daily Totals		\$2449.80		\$3656.20		
<b>Crew D-3</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$55.45	\$82.78
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
.25 Carpenter	60.55	121.10	89.65	179.30		
42 L.H., Daily Totals		\$2328.70		\$3476.90		
<b>Crew D-4</b>						
1 Bricklayer	\$59.65	\$477.20	\$89.10	\$712.80	\$54.66	\$81.49
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Grout Pump, 50 C.F./hr.		165.21		181.73		
32 L.H., Daily Totals		\$1914.41		\$2789.33		
<b>Crew D-5</b>						
1 Bricklayer	\$59.65	\$477.20	\$89.10	\$712.80	\$59.65	\$89.10
8 L.H., Daily Totals		\$477.20		\$712.80		
<b>Crew D-6</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$54.33	\$81.13
3 Bricklayer Helpers	48.50	1164.00	72.45	1738.80		
.25 Carpenter	60.55	121.10	89.65	179.30		
50 L.H., Daily Totals		\$2716.70		\$4056.50		
<b>Crew D-7</b>						
1 Tile Layer	\$57.20	\$457.60	\$83.25	\$666.00	\$51.65	\$75.17
1 Tile Layer Helper	46.10	368.80	67.10	536.80		
16 L.H., Daily Totals		\$826.40		\$1202.80		
<b>Crew D-8</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$55.19	\$82.44
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
40 L.H., Daily Totals		\$2207.60		\$3297.60		

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew D-9</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$54.08	\$80.78
3 Bricklayer Helpers	48.50	1164.00	72.45	1738.80		
48 L.H., Daily Totals		\$2595.60		\$3877.20	\$54.08	\$80.78
<b>Crew D-10</b>						
1 Bricklayer Foreman (outside)	\$61.65	\$493.20	\$92.10	\$736.80	\$59.60	\$88.85
1 Bricklayer	59.65	477.20	89.10	712.80		
1 Bricklayer Helper	48.50	388.00	72.45	579.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 S.P. Crane, 4x4, 12 Ton		663.72		730.09	20.74	22.82
32 L.H., Daily Totals		\$2570.92		\$3573.29	\$80.34	\$111.67
<b>Crew D-11</b>						
1 Bricklayer Foreman (outside)	\$61.65	\$493.20	\$92.10	\$736.80	\$56.60	\$84.55
1 Bricklayer	59.65	477.20	89.10	712.80		
1 Bricklayer Helper	48.50	388.00	72.45	579.60		
24 L.H., Daily Totals		\$1358.40		\$2029.20	\$56.60	\$84.55
<b>Crew D-12</b>						
1 Bricklayer Foreman (outside)	\$61.65	\$493.20	\$92.10	\$736.80	\$54.58	\$81.53
1 Bricklayer	59.65	477.20	89.10	712.80		
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
32 L.H., Daily Totals		\$1746.40		\$2608.80	\$54.58	\$81.53
<b>Crew D-13</b>						
1 Bricklayer Foreman (outside)	\$61.65	\$493.20	\$92.10	\$736.80	\$57.91	\$86.25
1 Bricklayer	59.65	477.20	89.10	712.80		
2 Bricklayer Helpers	48.50	776.00	72.45	1159.20		
1 Carpenter	60.55	484.40	89.65	717.20		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 S.P. Crane, 4x4, 12 Ton		663.72		730.09	13.83	15.21
48 L.H., Daily Totals		\$3443.32		\$4870.09	\$71.74	\$101.46
<b>Crew D-14</b>						
3 Bricklayers	\$59.65	\$1431.60	\$89.10	\$2138.40	\$56.86	\$84.94
1 Bricklayer Helper	48.50	388.00	72.45	579.60		
32 L.H., Daily Totals		\$1819.60		\$2718.00	\$56.86	\$84.94
<b>Crew E-1</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.03	\$100.20
1 Welder	67.05	536.40	102.80	822.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Welder, Gas Engine, 300 amp		163.86		180.24	6.83	7.51
24 L.H., Daily Totals		\$1748.66		\$2585.04	\$72.86	\$107.71
<b>Crew E-2</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.32	\$100.77
4 Struc. Steel Workers	67.05	2145.60	102.80	3289.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70	49.83	54.82
56 L.H., Daily Totals		\$6504.64		\$8712.90	\$116.15	\$155.59
<b>Crew E-3</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.72	\$103.82
1 Struc. Steel Worker	67.05	536.40	102.80	822.40		
1 Welder	67.05	536.40	102.80	822.40		
1 Welder, Gas Engine, 300 amp		163.86		180.24	6.83	7.51
24 L.H., Daily Totals		\$1789.06		\$2671.84	\$74.54	\$111.33

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew E-3A</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.72	\$103.82
1 Struc. Steel Worker	67.05	536.40	102.80	822.40		
1 Welder	67.05	536.40	102.80	822.40		
1 Welder, Gas Engine, 300 amp		163.86		180.24		
1 Telescoping Boom Lift, to 40'		344.31		378.74	21.17	23.29
24 L.H., Daily Totals		\$2133.36		\$3050.58	\$88.89	\$127.11
<b>Crew E-4</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.55	\$103.56
3 Struc. Steel Workers	67.05	1609.20	102.80	2467.20		
1 Welder, Gas Engine, 300 amp		163.86		180.24	5.12	5.63
32 L.H., Daily Totals		\$2325.46		\$3494.24	\$72.67	\$109.20
<b>Crew E-5</b>						
2 Struc. Steel Foremen (outside)	\$69.05	\$1104.80	\$105.85	\$1693.60	\$66.74	\$101.69
5 Struc. Steel Workers	67.05	2682.00	102.80	4112.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Welder	67.05	536.40	102.80	822.40		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70		
1 Welder, Gas Engine, 300 amp		163.86		180.24	36.93	40.62
80 L.H., Daily Totals		\$8293.69		\$11384.74	\$103.67	\$142.31
<b>Crew E-6</b>						
3 Struc. Steel Foremen (outside)	\$69.05	\$1657.20	\$105.85	\$2540.40	\$66.67	\$101.62
9 Struc. Steel Workers	67.05	4827.60	102.80	7401.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Welder	67.05	536.40	102.80	822.40		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70		
1 Welder, Gas Engine, 300 amp		163.86		180.24		
1 Air Compressor, 160 cfm		209.86		230.85		
2 Impact Wrenches		108.74		119.61	25.57	28.13
128 L.H., Daily Totals		\$11806.29		\$16607.20	\$92.24	\$129.74
<b>Crew E-7</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.74	\$101.69
4 Struc. Steel Workers	67.05	2145.60	102.80	3289.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Welder Foreman (outside)	69.05	552.40	105.85	846.80		
2 Welders	67.05	1072.80	102.80	1644.80		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70		
2 Welder, Gas Engine, 300 amp		327.71		360.48	38.98	42.88
80 L.H., Daily Totals		\$8457.55		\$11564.98	\$105.72	\$144.56
<b>Crew E-8</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.42	\$101.11
4 Struc. Steel Workers	67.05	2145.60	102.80	3289.60		
1 Welder Foreman (outside)	69.05	552.40	105.85	846.80		
4 Welders	67.05	2145.60	102.80	3289.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70		
4 Welder, Gas Engine, 300 amp		655.42		720.97	33.14	36.45
104 L.H., Daily Totals		\$10354.06		\$14305.87	\$99.56	\$137.56

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew E-9</b>						
2 Struc. Steel Foremen (outside)	\$69.05	\$1104.80	\$105.85	\$1693.60	\$66.67	\$101.62
5 Struc. Steel Workers	67.05	2682.00	102.80	4112.00		
1 Welder Foreman (outside)	69.05	552.40	105.85	846.80		
5 Welders	67.05	2682.00	102.80	4112.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Lattice Boom Crane, 90 Ton		2790.64		3069.70		
5 Welder, Gas Engine, 300 amp		819.28		901.21	28.20	31.02
128 L.H., Daily Totals		\$12143.12		\$16977.71	\$94.87	\$132.64
<b>Crew E-10</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.05	\$104.33
1 Welder	67.05	536.40	102.80	822.40		
1 Welder, Gas Engine, 300 amp		163.86		180.24		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	42.71	46.98
16 L.H., Daily Totals		\$1772.21		\$2420.95	\$110.76	\$151.31
<b>Crew E-11</b>						
2 Painters, Struc. Steel	\$53.00	\$848.00	\$83.40	\$1334.40	\$54.25	\$82.83
1 Building Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Compressor, 250 cfm		226.90		249.59		
1 Sandblaster, Portable, 3 C.F.		86.99		95.69		
1 Set Sand Blasting Accessories		17.69		19.45	10.36	11.40
32 L.H., Daily Totals		\$2067.58		\$3015.13	\$64.61	\$94.22
<b>Crew E-11A</b>						
2 Painters, Struc. Steel	\$53.00	\$848.00	\$83.40	\$1334.40	\$54.25	\$82.83
1 Building Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Compressor, 250 cfm		226.90		249.59		
1 Sandblaster, Portable, 3 C.F.		86.99		95.69		
1 Set Sand Blasting Accessories		17.69		19.45		
1 Telescoping Boom Lift, to 60'		467.60		514.36	24.97	27.47
32 L.H., Daily Totals		\$2535.18		\$3529.49	\$79.22	\$110.30
<b>Crew E-11B</b>						
2 Painters, Struc. Steel	\$53.00	\$848.00	\$83.40	\$1334.40	\$51.67	\$79.78
1 Building Laborer	49.00	392.00	72.55	580.40		
2 Paint Sprayer, 8 C.F.M.		105.19		115.71		
1 Telescoping Boom Lift, to 60'		467.60		514.36	23.87	26.25
24 L.H., Daily Totals		\$1812.79		\$2544.87	\$75.53	\$106.04
<b>Crew E-12</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$65.53	\$98.90
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Welder, Gas Engine, 300 amp		163.86		180.24	10.24	11.27
16 L.H., Daily Totals		\$1212.26		\$1762.64	\$75.77	\$110.17
<b>Crew E-13</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.70	\$101.22
.5 Equip. Oper. (light)	62.00	248.00	91.95	367.80		
1 Welder, Gas Engine, 300 amp		163.86		180.24	13.65	15.02
12 L.H., Daily Totals		\$964.26		\$1394.84	\$80.35	\$116.24
<b>Crew E-14</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$69.05	\$105.85
1 Welder, Gas Engine, 300 amp		163.86		180.24	20.48	22.53
8 L.H., Daily Totals		\$716.26		\$1027.04	\$89.53	\$128.38

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew E-16</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.05	\$104.33
1 Welder	67.05	536.40	102.80	822.40		
1 Welder, Gas Engine, 300 amp		163.86		180.24	10.24	11.27
16 L.H., Daily Totals		\$1252.66		\$1849.44	\$78.29	\$115.59
<b>Crew E-17</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.05	\$104.33
1 Structural Steel Worker	67.05	536.40	102.80	822.40		
16 L.H., Daily Totals		\$1088.80		\$1669.20	\$68.05	\$104.33
<b>Crew E-18</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.04	\$102.13
3 Structural Steel Workers	67.05	1609.20	102.80	2467.20		
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Lattice Boom Crane, 20 Ton		906.32		996.96	22.66	24.92
40 L.H., Daily Totals		\$3587.92		\$5082.16	\$89.70	\$127.05
<b>Crew E-19</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.03	\$100.20
1 Structural Steel Worker	67.05	536.40	102.80	822.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Lattice Boom Crane, 20 Ton		906.32		996.96	37.76	41.54
24 L.H., Daily Totals		\$2491.12		\$3401.76	\$103.80	\$141.74
<b>Crew E-20</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.41	\$101.03
5 Structural Steel Workers	67.05	2682.00	102.80	4112.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Lattice Boom Crane, 40 Ton		2459.62		2705.58	38.43	42.27
64 L.H., Daily Totals		\$6710.02		\$9171.18	\$104.84	\$143.30
<b>Crew E-22</b>						
1 Skilled Worker Foreman (out)	\$65.50	\$524.00	\$98.00	\$784.00	\$64.17	\$96.00
2 Skilled Workers	63.50	1016.00	95.00	1520.00		
24 L.H., Daily Totals		\$1540.00		\$2304.00	\$64.17	\$96.00
<b>Crew E-24</b>						
3 Structural Steel Workers	\$67.05	\$1609.20	\$102.80	\$2467.20	\$66.54	\$101.20
1 Equipment Operator (med.)	65.00	520.00	96.40	771.20		
1 Hyd. Crane, 25 Ton		2335.01		2568.51	72.97	80.27
32 L.H., Daily Totals		\$4464.21		\$5806.91	\$139.51	\$181.47
<b>Crew E-25</b>						
1 Welder Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$69.05	\$105.85
1 Cutting Torch		14.84		16.32	1.86	2.04
8 L.H., Daily Totals		\$567.24		\$863.12	\$70.91	\$107.89
<b>Crew E-26</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.50	\$104.51
1 Struc. Steel Worker	67.05	536.40	102.80	822.40		
1 Welder	67.05	536.40	102.80	822.40		
.25 Electrician	71.70	143.40	106.30	212.60		
.25 Plumber	74.65	149.30	111.05	222.10		
1 Welder, Gas Engine, 300 amp		163.86		180.24	5.85	6.44
28 L.H., Daily Totals		\$2081.76		\$3106.54	\$74.35	\$110.95



# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew E-27</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$66.41	\$101.03
5 Struc. Steel Workers	67.05	2682.00	102.80	4112.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 12 Ton		2224.21		2446.63		
1 Hyd. Crane, 80 Ton		2742.60		3016.86	77.61	85.37
64 L.H., Daily Totals		\$9217.21		\$11929.09	\$144.02	\$186.39
<b>Crew F-3</b>						
4 Carpenters	\$60.55	\$1937.60	\$89.65	\$2868.80	\$62.16	\$92.07
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	55.61	61.17
40 L.H., Daily Totals		\$4710.61		\$6129.43	\$117.77	\$153.24
<b>Crew F-4</b>						
4 Carpenters	\$60.55	\$1937.60	\$89.65	\$2868.80	\$61.53	\$91.16
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 55 Ton		2551.41		2806.55	53.15	58.47
48 L.H., Daily Totals		\$5505.01		\$7182.15	\$114.69	\$149.63
<b>Crew F-5</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$61.05	\$90.39
3 Carpenters	60.55	1453.20	89.65	2151.60		
32 L.H., Daily Totals		\$1953.60		\$2892.40	\$61.05	\$90.39
<b>Crew F-6</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$57.54	\$85.23
2 Building Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	55.61	61.17
40 L.H., Daily Totals		\$4525.81		\$5855.83	\$113.15	\$146.40
<b>Crew F-7</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$54.77	\$81.10
2 Building Laborers	49.00	784.00	72.55	1160.80		
32 L.H., Daily Totals		\$1752.80		\$2595.20	\$54.77	\$81.10
<b>Crew G-1</b>						
1 Roofer Foreman (outside)	\$55.70	\$445.60	\$89.75	\$718.00	\$50.36	\$81.15
4 Roofers Composition	53.70	1718.40	86.55	2769.60		
2 Roofer Helpers	41.00	656.00	66.05	1056.80		
1 Application Equipment		198.46		218.30		
1 Tar Kettle/Pot		232.32		255.55		
1 Crew Truck		297.60		327.36	13.01	14.31
56 L.H., Daily Totals		\$3548.38		\$5345.61	\$63.36	\$95.46
<b>Crew G-2</b>						
1 Plasterer	\$55.20	\$441.60	\$81.75	\$654.00	\$51.20	\$75.82
1 Plasterer Helper	49.40	395.20	73.15	585.20		
1 Building Laborer	49.00	392.00	72.55	580.40		
1 Grout Pump, 50 C.F./hr.		165.21		181.73	6.88	7.57
24 L.H., Daily Totals		\$1394.01		\$2001.33	\$58.08	\$83.39

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew G-2A</b>						
1 Roofer Composition	\$53.70	\$429.60	\$86.55	\$692.40	\$47.90	\$75.05
1 Roofer Helper	41.00	328.00	66.05	528.40		
1 Building Laborer	49.00	392.00	72.55	580.40		
1 Foam Spray Rig, Trailer-Mtd.		607.05		667.75		
1 Pickup Truck, 3/4 Ton		233.60		256.96	35.03	38.53
24 L.H., Daily Totals		\$1990.25		\$2725.91	\$82.93	\$113.58
<b>Crew G-3</b>						
2 Sheet Metal Workers	\$72.25	\$1156.00	\$108.70	\$1739.20	\$60.63	\$90.63
2 Building Laborers	49.00	784.00	72.55	1160.80		
32 L.H., Daily Totals		\$1940.00		\$2900.00	\$60.63	\$90.63
<b>Crew G-4</b>						
1 Labor Foreman (outside)	\$51.00	\$408.00	\$75.50	\$604.00	\$49.67	\$73.53
2 Building Laborers	49.00	784.00	72.55	1160.80		
1 Flatbed Truck, Gas, 1.5 Ton		420.83		462.92		
1 Air Compressor, 160 cfm		209.86		230.85	26.28	28.91
24 L.H., Daily Totals		\$1822.69		\$2458.56	\$75.95	\$102.44
<b>Crew G-5</b>						
1 Roofer Foreman (outside)	\$55.70	\$445.60	\$89.75	\$718.00	\$49.02	\$78.99
2 Roofers Composition	53.70	859.20	86.55	1384.80		
2 Roofer Helpers	41.00	656.00	66.05	1056.80		
1 Application Equipment		198.46		218.30	4.96	5.46
40 L.H., Daily Totals		\$2159.26		\$3377.90	\$53.98	\$84.45
<b>Crew G-6A</b>						
2 Roofers Composition	\$53.70	\$859.20	\$86.55	\$1384.80	\$53.70	\$86.55
1 Small Compressor, Electric		36.59		40.25		
2 Pneumatic Nailers		55.26		60.79	5.74	6.31
16 L.H., Daily Totals		\$951.05		\$1485.84	\$59.44	\$92.86
<b>Crew G-7</b>						
1 Carpenter	\$60.55	\$484.40	\$89.65	\$717.20	\$60.55	\$89.65
1 Small Compressor, Electric		36.59		40.25		
1 Pneumatic Nailer		27.63		30.39	8.03	8.83
8 L.H., Daily Totals		\$548.62		\$787.84	\$68.58	\$98.48
<b>Crew H-1</b>						
2 Glaziers	\$58.20	\$931.20	\$85.95	\$1375.20	\$62.63	\$94.38
2 Struc. Steel Workers	67.05	1072.80	102.80	1644.80		
32 L.H., Daily Totals		\$2004.00		\$3020.00	\$62.63	\$94.38
<b>Crew H-2</b>						
2 Glaziers	\$58.20	\$931.20	\$85.95	\$1375.20	\$55.13	\$81.48
1 Building Laborer	49.00	392.00	72.55	580.40		
24 L.H., Daily Totals		\$1323.20		\$1955.60	\$55.13	\$81.48
<b>Crew H-3</b>						
1 Glazier	\$58.20	\$465.60	\$85.95	\$687.60	\$52.50	\$78.17
1 Helper	46.80	374.40	70.40	563.20		
16 L.H., Daily Totals		\$840.00		\$1250.80	\$52.50	\$78.17
<b>Crew H-4</b>						
1 Carpenter	\$60.55	\$484.40	\$89.65	\$717.20	\$57.28	\$85.28
1 Carpenter Helper	46.80	374.40	70.40	563.20		
.5 Electrician	71.70	286.80	106.30	425.20		
20 L.H., Daily Totals		\$1145.60		\$1705.60	\$57.28	\$85.28

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew J-1</b>						
3 Plasterers	\$55.20	\$1324.80	\$81.75	\$1962.00	\$52.88	\$78.31
2 Plasterer Helpers	49.40	790.40	73.15	1170.40		
1 Mixing Machine, 6 C.F.		117.50		129.25	2.94	3.23
40 L.H., Daily Totals		\$2232.70		\$3261.65	\$55.82	\$81.54
<b>Crew J-2</b>						
3 Plasterers	\$55.20	\$1324.80	\$81.75	\$1962.00	\$54.19	\$79.98
2 Plasterer Helpers	49.40	790.40	73.15	1170.40		
1 Lather	60.75	486.00	88.35	706.80		
1 Mixing Machine, 6 C.F.		117.50		129.25	2.45	2.69
48 L.H., Daily Totals		\$2718.70		\$3968.45	\$56.64	\$82.68
<b>Crew J-3</b>						
1 Terrazzo Worker	\$57.30	\$458.40	\$83.40	\$667.20	\$52.85	\$77.00
1 Terrazzo Helper	48.40	387.20	70.60	564.80		
1 Floor Grinder, 22" Path		110.44		121.48		
1 Terrazzo Mixer		242.32		266.55	22.05	24.25
16 L.H., Daily Totals		\$1198.35		\$1620.03	\$74.90	\$101.25
<b>Crew J-4</b>						
2 Cement Finishers	\$56.80	\$908.80	\$82.80	\$1324.80	\$54.20	\$79.38
1 Laborer	49.00	392.00	72.55	580.40		
1 Floor Grinder, 22" Path		110.44		121.48		
1 Floor Edger, 7" Path		115.00		126.50		
1 Vacuum Pick-Up System		87.74		96.51	13.05	14.35
24 L.H., Daily Totals		\$1613.98		\$2249.70	\$67.25	\$93.74
<b>Crew J-4A</b>						
2 Cement Finishers	\$56.80	\$908.80	\$82.80	\$1324.80	\$52.90	\$77.67
2 Laborers	49.00	784.00	72.55	1160.80		
1 Floor Grinder, 22" Path		110.44		121.48		
1 Floor Edger, 7" Path		115.00		126.50		
1 Vacuum Pick-Up System		87.74		96.51		
1 Floor Auto Scrubber		239.27		263.20	17.26	18.99
32 L.H., Daily Totals		\$2245.25		\$3093.30	\$70.16	\$96.67
<b>Crew J-4B</b>						
1 Laborer	\$49.00	\$392.00	\$72.55	\$580.40	\$49.00	\$72.55
1 Floor Auto Scrubber		239.27		263.20	29.91	32.90
8 L.H., Daily Totals		\$631.27		\$843.60	\$78.91	\$105.45
<b>Crew J-6</b>						
2 Painters	\$51.70	\$827.20	\$76.30	\$1220.80	\$53.60	\$79.28
1 Building Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Air Compressor, 250 cfm		226.90		249.59		
1 Sandblaster, Portable, 3 C.F.		86.99		95.69		
1 Set Sand Blasting Accessories		17.69		19.45	10.36	11.40
32 L.H., Daily Totals		\$2046.78		\$2901.53	\$63.96	\$90.67
<b>Crew J-7</b>						
2 Painters	\$51.70	\$827.20	\$76.30	\$1220.80	\$51.70	\$76.30
1 Floor Belt Sander		67.16		73.87		
1 Floor Sanding Edger		50.37		55.40	7.35	8.08
16 L.H., Daily Totals		\$944.72		\$1350.07	\$59.05	\$84.38

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew K-1</b>						
1 Carpenter	\$60.55	\$484.40	\$89.65	\$717.20	\$57.85	\$85.83
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	32.47	35.72
16 L.H., Daily Totals		\$1445.15		\$1944.71	\$90.32	\$121.54
<b>Crew K-2</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$63.75	\$96.88
1 Struc. Steel Worker	67.05	536.40	102.80	822.40		
1 Truck Driver (light)	55.15	441.20	82.00	656.00		
1 Flatbed Truck, Gas, 3 Ton		519.55		571.51	21.65	23.81
24 L.H., Daily Totals		\$2049.55		\$2896.71	\$85.40	\$120.70
<b>Crew L-1</b>						
1 Electrician	\$71.70	\$573.60	\$106.30	\$850.40	\$73.17	\$108.68
1 Plumber	74.65	597.20	111.05	888.40		
16 L.H., Daily Totals		\$1170.80		\$1738.80	\$73.17	\$108.68
<b>Crew L-2</b>						
1 Carpenter	\$60.55	\$484.40	\$89.65	\$717.20	\$53.67	\$80.03
1 Carpenter Helper	46.80	374.40	70.40	563.20		
16 L.H., Daily Totals		\$858.80		\$1280.40	\$53.67	\$80.03
<b>Crew L-3</b>						
1 Carpenter	\$60.55	\$484.40	\$89.65	\$717.20	\$66.26	\$98.58
.5 Electrician	71.70	286.80	106.30	425.20		
.5 Sheet Metal Worker	72.25	289.00	108.70	434.80		
16 L.H., Daily Totals		\$1060.20		\$1577.20	\$66.26	\$98.58
<b>Crew L-3A</b>						
1 Carpenter Foreman (outside)	\$62.55	\$500.40	\$92.60	\$740.80	\$65.78	\$97.97
.5 Sheet Metal Worker	72.25	289.00	108.70	434.80		
12 L.H., Daily Totals		\$789.40		\$1175.60	\$65.78	\$97.97
<b>Crew L-4</b>						
2 Skilled Workers	\$63.50	\$1016.00	\$95.00	\$1520.00	\$57.93	\$86.80
1 Helper	46.80	374.40	70.40	563.20		
24 L.H., Daily Totals		\$1390.40		\$2083.20	\$57.93	\$86.80
<b>Crew L-5</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.56	\$103.09
5 Struc. Steel Workers	67.05	2682.00	102.80	4112.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 25 Ton		2335.01		2568.51	41.70	45.87
56 L.H., Daily Totals		\$6118.21		\$8341.31	\$109.25	\$148.95
<b>Crew L-5A</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$67.94	\$103.30
2 Structural Steel Workers	67.05	1072.80	102.80	1644.80		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 S.P. Crane, 4x4, 25 Ton		966.17		1062.78	30.19	33.21
32 L.H., Daily Totals		\$3140.17		\$4368.38	\$98.13	\$136.51

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew L-5B</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$69.41	\$104.13
2 Structural Steel Workers	67.05	1072.80	102.80	1644.80		
2 Electricians	71.70	1147.20	106.30	1700.80		
2 Steamfitters/Pipefitters	75.55	1208.80	112.40	1798.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (oiler)	58.40	467.20	86.60	692.80		
1 Hyd. Crane, 80 Ton		2742.60		3016.86	38.09	41.90
72 L.H., Daily Totals		\$7739.80		\$10514.46	\$107.50	\$146.03
<b>Crew L-6</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$73.67	\$109.47
.5 Electrician	71.70	286.80	106.30	425.20		
12 L.H., Daily Totals		\$884.00		\$1313.60	\$73.67	\$109.47
<b>Crew L-7</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$58.84	\$87.14
1 Building Laborer	49.00	392.00	72.55	580.40		
.5 Electrician	71.70	286.80	106.30	425.20		
28 L.H., Daily Totals		\$1647.60		\$2440.00	\$58.84	\$87.14
<b>Crew L-8</b>						
2 Carpenters	\$60.55	\$968.80	\$89.65	\$1434.40	\$63.37	\$93.93
.5 Plumber	74.65	298.60	111.05	444.20		
20 L.H., Daily Totals		\$1267.40		\$1878.60	\$63.37	\$93.93
<b>Crew L-9</b>						
1 Labor Foreman (inside)	\$49.50	\$396.00	\$73.30	\$586.40	\$55.64	\$83.19
2 Building Laborers	49.00	784.00	72.55	1160.80		
1 Struc. Steel Worker	67.05	536.40	102.80	822.40		
.5 Electrician	71.70	286.80	106.30	425.20		
36 L.H., Daily Totals		\$2003.20		\$2994.80	\$55.64	\$83.19
<b>Crew L-10</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.23	\$103.47
1 Structural Steel Worker	67.05	536.40	102.80	822.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	92.68	101.94
24 L.H., Daily Totals		\$3861.81		\$4929.83	\$160.91	\$205.41
<b>Crew L-11</b>						
2 Wreckers	\$49.00	\$784.00	\$73.75	\$1180.00	\$57.15	\$85.30
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Hyd. Excavator, 2.5 C.Y.		1800.54		1980.59		
1 Loader, Skid Steer, 78 H.P.		394.64		434.10	68.60	75.46
32 L.H., Daily Totals		\$4023.97		\$5144.29	\$125.75	\$160.76
<b>Crew M-1</b>						
3 Elevator Constructors	\$100.00	\$2400.00	\$147.70	\$3544.80	\$95.00	\$140.32
1 Elevator Apprentice	80.00	640.00	118.20	945.60		
5 Hand Tools		355.94		391.53	11.12	12.24
32 L.H., Daily Totals		\$3395.94		\$4881.93	\$106.12	\$152.56

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew M-3</b>						
1 Electrician Foreman (outside)	\$73.70	\$589.60	\$109.25	\$874.00	\$75.05	\$111.01
1 Common Laborer	49.00	392.00	72.55	580.40		
.25 Equipment Operator (med.)	65.00	130.00	96.40	192.80		
1 Elevator Constructor	100.00	800.00	147.70	1181.60		
1 Elevator Apprentice	80.00	640.00	118.20	945.60		
.25 S.P. Crane, 4x4, 20 Ton		197.67		217.44	5.81	6.40
34 L.H., Daily Totals		\$2749.27		\$3991.84	\$80.86	\$117.41
<b>Crew M-4</b>						
1 Electrician Foreman (outside)	\$73.70	\$589.60	\$109.25	\$874.00	\$74.32	\$109.95
1 Common Laborer	49.00	392.00	72.55	580.40		
.25 Equipment Operator, Crane	68.60	137.20	101.75	203.50		
.25 Equip. Oper. (oiler)	58.40	116.80	86.60	173.20		
1 Elevator Constructor	100.00	800.00	147.70	1181.60		
1 Elevator Apprentice	80.00	640.00	118.20	945.60		
.25 S.P. Crane, 4x4, 40 Ton		296.78		326.46	8.24	9.07
36 L.H., Daily Totals		\$2972.38		\$4284.76	\$82.57	\$119.02
<b>Crew Q-1</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$67.17	\$99.92
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
16 L.H., Daily Totals		\$1074.80		\$1598.80	\$67.17	\$99.92
<b>Crew Q-1A</b>						
.25 Plumber Foreman (outside)	\$76.65	\$153.30	\$114.05	\$228.10	\$75.05	\$111.65
1 Plumber	74.65	597.20	111.05	888.40		
10 L.H., Daily Totals		\$750.50		\$1116.50	\$75.05	\$111.65
<b>Crew Q-1C</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$66.45	\$98.75
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Trencher, Chain Type, 8' D		2168.88		2385.77	90.37	99.41
24 L.H., Daily Totals		\$3763.68		\$4755.77	\$156.82	\$198.16
<b>Crew Q-2</b>						
2 Plumbers	\$74.65	\$1194.40	\$111.05	\$1776.80	\$69.67	\$103.63
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
24 L.H., Daily Totals		\$1672.00		\$2487.20	\$69.67	\$103.63
<b>Crew Q-3</b>						
1 Plumber Foreman (inside)	\$75.15	\$601.20	\$111.80	\$894.40	\$71.04	\$105.68
2 Plumbers	74.65	1194.40	111.05	1776.80		
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
32 L.H., Daily Totals		\$2273.20		\$3381.60	\$71.04	\$105.68
<b>Crew Q-4</b>						
1 Plumber Foreman (inside)	\$75.15	\$601.20	\$111.80	\$894.40	\$71.04	\$105.68
1 Plumber	74.65	597.20	111.05	888.40		
1 Welder (plumber)	74.65	597.20	111.05	888.40		
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Welder, Electric, 300 amp		71.77		78.95	2.24	2.47
32 L.H., Daily Totals		\$2344.97		\$3460.55	\$73.28	\$108.14
<b>Crew Q-5</b>						
1 Steamfitter	\$75.55	\$604.40	\$112.40	\$899.20	\$68.00	\$101.18
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
16 L.H., Daily Totals		\$1088.00		\$1618.80	\$68.00	\$101.18

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew Q-6</b>						
2 Steamfitters	\$75.55	\$1208.80	\$112.40	\$1798.40	\$70.52	\$104.92
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
24 L.H., Daily Totals		\$1692.40		\$2518.00	\$70.52	\$104.92
<b>Crew Q-7</b>						
1 Steamfitter Foreman (inside)	\$76.05	\$608.40	\$113.15	\$905.20	\$71.90	\$106.97
2 Steamfitters	75.55	1208.80	112.40	1798.40		
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
32 L.H., Daily Totals		\$2300.80		\$3423.20	\$71.90	\$106.97
<b>Crew Q-8</b>						
1 Steamfitter Foreman (inside)	\$76.05	\$608.40	\$113.15	\$905.20	\$71.90	\$106.97
1 Steamfitter	75.55	604.40	112.40	899.20		
1 Welder (steamfitter)	75.55	604.40	112.40	899.20		
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Welder, Electric, 300 amp		71.77		78.95	2.24	2.47
32 L.H., Daily Totals		\$2372.57		\$3502.15	\$74.14	\$109.44
<b>Crew Q-9</b>						
1 Sheet Metal Worker	\$72.25	\$578.00	\$108.70	\$869.60	\$65.03	\$97.83
1 Sheet Metal Apprentice	57.80	462.40	86.95	695.60		
16 L.H., Daily Totals		\$1040.40		\$1565.20	\$65.03	\$97.83
<b>Crew Q-10</b>						
2 Sheet Metal Workers	\$72.25	\$1156.00	\$108.70	\$1739.20	\$67.43	\$101.45
1 Sheet Metal Apprentice	57.80	462.40	86.95	695.60		
24 L.H., Daily Totals		\$1618.40		\$2434.80	\$67.43	\$101.45
<b>Crew Q-11</b>						
1 Sheet Metal Foreman (inside)	\$72.75	\$582.00	\$109.45	\$875.60	\$68.76	\$103.45
2 Sheet Metal Workers	72.25	1156.00	108.70	1739.20		
1 Sheet Metal Apprentice	57.80	462.40	86.95	695.60		
32 L.H., Daily Totals		\$2200.40		\$3310.40	\$68.76	\$103.45
<b>Crew Q-12</b>						
1 Sprinkler Installer	\$74.65	\$597.20	\$111.10	\$888.80	\$67.17	\$99.97
1 Sprinkler Apprentice	59.70	477.60	88.85	710.80		
16 L.H., Daily Totals		\$1074.80		\$1599.60	\$67.17	\$99.97
<b>Crew Q-13</b>						
1 Sprinkler Foreman (inside)	\$75.15	\$601.20	\$111.85	\$894.80	\$71.04	\$105.72
2 Sprinkler Installers	74.65	1194.40	111.10	1777.60		
1 Sprinkler Apprentice	59.70	477.60	88.85	710.80		
32 L.H., Daily Totals		\$2273.20		\$3383.20	\$71.04	\$105.72
<b>Crew Q-14</b>						
1 Asbestos Worker	\$67.10	\$536.80	\$102.25	\$818.00	\$60.40	\$92.03
1 Asbestos Apprentice	53.70	429.60	81.80	654.40		
16 L.H., Daily Totals		\$966.40		\$1472.40	\$60.40	\$92.03
<b>Crew Q-15</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$67.17	\$99.92
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Welder, Electric, 300 amp		71.77		78.95	4.49	4.93
16 L.H., Daily Totals		\$1146.57		\$1677.75	\$71.66	\$104.86

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew Q-16</b>						
2 Plumbers	\$74.65	\$1194.40	\$111.05	\$1776.80	\$69.67	\$103.63
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Welder, Electric, 300 amp		71.77		78.95	2.99	3.29
24 L.H., Daily Totals		\$1743.77		\$2566.15	\$72.66	\$106.92
<b>Crew Q-17</b>						
1 Steamfitter	\$75.55	\$604.40	\$112.40	\$899.20	\$68.00	\$101.18
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Welder, Electric, 300 amp		71.77		78.95	4.49	4.93
16 L.H., Daily Totals		\$1159.77		\$1697.75	\$72.49	\$106.11
<b>Crew Q-17A</b>						
1 Steamfitter	\$75.55	\$604.40	\$112.40	\$899.20	\$68.20	\$101.37
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63		
1 Welder, Electric, 300 amp		71.77		78.95	95.67	105.23
24 L.H., Daily Totals		\$3932.78		\$4958.38	\$163.87	\$206.60
<b>Crew Q-18</b>						
2 Steamfitters	\$75.55	\$1208.80	\$112.40	\$1798.40	\$70.52	\$104.92
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Welder, Electric, 300 amp		71.77		78.95	2.99	3.29
24 L.H., Daily Totals		\$1764.17		\$2596.95	\$73.51	\$108.21
<b>Crew Q-19</b>						
1 Steamfitter	\$75.55	\$604.40	\$112.40	\$899.20	\$69.23	\$102.88
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Electrician	71.70	573.60	106.30	850.40		
24 L.H., Daily Totals		\$1661.60		\$2469.20	\$69.23	\$102.88
<b>Crew Q-20</b>						
1 Sheet Metal Worker	\$72.25	\$578.00	\$108.70	\$869.60	\$66.36	\$99.52
1 Sheet Metal Apprentice	57.80	462.40	86.95	695.60		
.5 Electrician	71.70	286.80	106.30	425.20		
20 L.H., Daily Totals		\$1327.20		\$1990.40	\$66.36	\$99.52
<b>Crew Q-21</b>						
2 Steamfitters	\$75.55	\$1208.80	\$112.40	\$1798.40	\$70.81	\$105.26
1 Steamfitter Apprentice	60.45	483.60	89.95	719.60		
1 Electrician	71.70	573.60	106.30	850.40		
32 L.H., Daily Totals		\$2266.00		\$3368.40	\$70.81	\$105.26
<b>Crew Q-22</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$67.17	\$99.92
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	139.01	152.91
16 L.H., Daily Totals		\$3299.01		\$4045.43	\$206.19	\$252.84
<b>Crew Q-22A</b>						
1 Plumber	\$74.65	\$597.20	\$111.05	\$888.40	\$62.99	\$93.54
1 Plumber Apprentice	59.70	477.60	88.80	710.40		
1 Laborer	49.00	392.00	72.55	580.40		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	69.51	76.46
32 L.H., Daily Totals		\$4239.81		\$5439.83	\$132.49	\$169.99

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew Q-23</b>						
1 Plumber Foreman (outside)	\$76.65	\$613.20	\$114.05	\$912.40	\$72.10	\$107.17
1 Plumber	74.65	597.20	111.05	888.40		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Lattice Boom Crane, 20 Ton		906.32		996.96	37.76	41.54
24 L.H., Daily Totals		\$2636.72		\$3568.96	\$109.86	\$148.71
<b>Crew R-1</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$67.00	\$99.33
3 Electricians	71.70	1720.80	106.30	2551.20		
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
48 L.H., Daily Totals		\$3216.00		\$4767.60	\$67.00	\$99.33
<b>Crew R-1A</b>						
1 Electrician	\$71.70	\$573.60	\$106.30	\$850.40	\$64.53	\$95.65
1 Electrician Apprentice	57.35	458.80	85.00	680.00		
16 L.H., Daily Totals		\$1032.40		\$1530.40	\$64.53	\$95.65
<b>Crew R-1B</b>						
1 Electrician	\$71.70	\$573.60	\$106.30	\$850.40	\$62.13	\$92.10
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
24 L.H., Daily Totals		\$1491.20		\$2210.40	\$62.13	\$92.10
<b>Crew R-1C</b>						
2 Electricians	\$71.70	\$1147.20	\$106.30	\$1700.80	\$64.53	\$95.65
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
1 Portable cable puller, 8000 lb.		129.89		142.88	4.06	4.46
32 L.H., Daily Totals		\$2194.69		\$3203.68	\$68.58	\$100.11
<b>Crew R-2</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$67.23	\$99.67
3 Electricians	71.70	1720.80	106.30	2551.20		
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 S.P. Crane, 4x4, 5 Ton		402.11		442.32	7.18	7.90
56 L.H., Daily Totals		\$4166.91		\$6023.92	\$74.41	\$107.57
<b>Crew R-3</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$71.28	\$105.69
1 Electrician	71.70	573.60	106.30	850.40		
.5 Equip. Oper. (crane)	68.60	274.40	101.75	407.00		
.5 S.P. Crane, 4x4, 5 Ton		201.05		221.16	10.05	11.06
20 L.H., Daily Totals		\$1626.65		\$2334.96	\$81.33	\$116.75
<b>Crew R-4</b>						
1 Struc. Steel Foreman (outside)	\$69.05	\$552.40	\$105.85	\$846.80	\$68.38	\$104.11
3 Struc. Steel Workers	67.05	1609.20	102.80	2467.20		
1 Electrician	71.70	573.60	106.30	850.40		
1 Welder, Gas Engine, 300 amp		163.86		180.24	4.10	4.51
40 L.H., Daily Totals		\$2899.06		\$4344.64	\$72.48	\$108.62

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew R-5</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$62.69	\$93.31
4 Electrician Linemen	71.70	2294.40	106.30	3401.60		
2 Electrician Operators	71.70	1147.20	106.30	1700.80		
4 Electrician Groundmen	46.80	1497.60	70.40	2252.80		
1 Crew Truck		297.60		327.36		
1 Flatbed Truck, 20,000 GWV		234.51		257.97		
1 Pickup Truck, 3/4 Ton		233.60		256.96		
.2 Hyd. Crane, 55 Ton		510.28		561.31		
.2 Hyd. Crane, 12 Ton		444.84		489.33		
.2 Earth Auger, Truck-Mtd.		32.58		35.84		
1 Tractor w/Winch		433.49		476.84	24.85	27.34
88 L.H., Daily Totals		\$7703.71		\$10617.20	\$87.54	\$120.65
<b>Crew R-6</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$62.69	\$93.31
4 Electrician Linemen	71.70	2294.40	106.30	3401.60		
2 Electrician Operators	71.70	1147.20	106.30	1700.80		
4 Electrician Groundmen	46.80	1497.60	70.40	2252.80		
1 Crew Truck		297.60		327.36		
1 Flatbed Truck, 20,000 GWV		234.51		257.97		
1 Pickup Truck, 3/4 Ton		233.60		256.96		
.2 Hyd. Crane, 55 Ton		510.28		561.31		
.2 Hyd. Crane, 12 Ton		444.84		489.33		
.2 Earth Auger, Truck-Mtd.		32.58		35.84		
1 Tractor w/Winch		433.49		476.84		
3 Cable Trailers		633.56		696.92		
.5 Tensioning Rig		80.32		88.35		
.5 Cable Pulling Rig		393.26		432.58		
88 L.H., Daily Totals		\$8810.85		\$11835.05	\$100.12	\$134.49
<b>Crew R-7</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$51.03	\$76.51
5 Electrician Groundmen	46.80	1872.00	70.40	2816.00		
1 Crew Truck		297.60		327.36	6.20	6.82
48 L.H., Daily Totals		\$2747.20		\$3999.76	\$57.23	\$83.33
<b>Crew R-8</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$63.48	\$94.46
3 Electrician Linemen	71.70	1720.80	106.30	2551.20		
2 Electrician Groundmen	46.80	748.80	70.40	1126.40		
1 Pickup Truck, 3/4 Ton		233.60		256.96		
1 Crew Truck		297.60		327.36	11.07	12.17
48 L.H., Daily Totals		\$3578.40		\$5118.32	\$74.55	\$106.63
<b>Crew R-9</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$59.31	\$88.44
1 Electrician Lineman	71.70	573.60	106.30	850.40		
2 Electrician Operators	71.70	1147.20	106.30	1700.80		
4 Electrician Groundmen	46.80	1497.60	70.40	2252.80		
1 Pickup Truck, 3/4 Ton		233.60		256.96		
1 Crew Truck		297.60		327.36	8.30	9.13
64 L.H., Daily Totals		\$4327.20		\$6244.72	\$67.61	\$97.57
<b>Crew R-10</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$67.63	\$100.44
4 Electrician Linemen	71.70	2294.40	106.30	3401.60		
1 Electrician Groundman	46.80	374.40	70.40	563.20		
1 Crew Truck		297.60		327.36		
3 Tram Cars		251.07		276.18	11.43	12.57
48 L.H., Daily Totals		\$3795.07		\$5424.74	\$79.06	\$113.02

# Crews - Standard

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew R-11</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$68.09	\$100.94
4 Electricians	71.70	2294.40	106.30	3401.60		
1 Equip. Oper. (crane)	68.60	548.80	101.75	814.00		
1 Common Laborer	49.00	392.00	72.55	580.40		
1 Crew Truck		297.60		327.36		
1 Hyd. Crane, 12 Ton		2224.21		2446.63	45.03	49.54
56 L.H., Daily Totals		\$6334.61		\$8426.39	\$113.12	\$150.47
<b>Crew R-12</b>						
1 Carpenter Foreman (inside)	\$61.05	\$488.40	\$90.40	\$723.20	\$57.39	\$85.31
4 Carpenters	60.55	1937.60	89.65	2868.80		
4 Common Laborers	49.00	1568.00	72.55	2321.60		
1 Equip. Oper. (medium)	65.00	520.00	96.40	771.20		
1 Steel Worker	67.05	536.40	102.80	822.40		
1 Dozer, 200 H.P.		1443.21		1587.53		
1 Pickup Truck, 3/4 Ton		233.60		256.96	19.05	20.96
88 L.H., Daily Totals		\$6727.21		\$9351.70	\$76.45	\$106.27
<b>Crew R-13</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$69.11	\$102.47
3 Electricians	71.70	1720.80	106.30	2551.20		
.25 Equip. Oper. (crane)	68.60	137.20	101.75	203.50		
1 Equipment Oiler	58.40	467.20	86.60	692.80		
.25 Hydraulic Crane, 33 Ton		629.79		692.76	14.99	16.49
42 L.H., Daily Totals		\$3532.59		\$4996.66	\$84.11	\$118.97
<b>Crew R-15</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$70.17	\$104.03
4 Electricians	71.70	2294.40	106.30	3401.60		
1 Equipment Oper. (light)	62.00	496.00	91.95	735.60		
1 Telescoping Boom Lift, to 40'		344.31		378.74	7.17	7.89
48 L.H., Daily Totals		\$3712.31		\$5372.34	\$77.34	\$111.92
<b>Crew R-15A</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$62.60	\$92.78
2 Electricians	71.70	1147.20	106.30	1700.80		
2 Common Laborers	49.00	784.00	72.55	1160.80		
1 Equip. Oper. (light)	62.00	496.00	91.95	735.60		
1 Telescoping Boom Lift, to 40'		344.31		378.74	7.17	7.89
48 L.H., Daily Totals		\$3349.11		\$4832.34	\$69.77	\$100.67
<b>Crew R-18</b>						
.25 Electrician Foreman	\$72.20	\$144.40	\$107.05	\$214.10	\$62.91	\$93.25
1 Electrician	71.70	573.60	106.30	850.40		
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
26 L.H., Daily Totals		\$1635.60		\$2424.50	\$62.91	\$93.25
<b>Crew R-19</b>						
.5 Electrician Foreman	\$72.20	\$288.80	\$107.05	\$428.20	\$71.80	\$106.45
2 Electricians	71.70	1147.20	106.30	1700.80		
20 L.H., Daily Totals		\$1436.00		\$2129.00	\$71.80	\$106.45
<b>Crew R-21</b>						
1 Electrician Foreman	\$72.20	\$577.60	\$107.05	\$856.40	\$71.66	\$106.24
3 Electricians	71.70	1720.80	106.30	2551.20		
.1 Equip. Oper. (medium)	65.00	52.00	96.40	77.12		
.1 S.P. Crane, 4x4, 25 Ton		96.62		106.28	2.95	3.24
32.8 L.H., Daily Totals		\$2447.02		\$3591.00	\$74.60	\$109.48

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
<b>Crew R-22</b>						
.66 Electrician Foreman	\$72.20	\$381.22	\$107.05	\$565.22	\$65.61	\$97.26
2 Electricians	71.70	1147.20	106.30	1700.80		
2 Electrician Apprentices	57.35	917.60	85.00	1360.00		
37.28 L.H., Daily Totals		\$2446.02		\$3626.02	\$65.61	\$97.26
<b>Crew R-30</b>						
.25 Electrician Foreman (outside)	\$73.70	\$147.40	\$109.25	\$218.50	\$57.88	\$85.76
1 Electrician	71.70	573.60	106.30	850.40		
2 Laborers (Semi-Skilled)	49.00	784.00	72.55	1160.80		
26 L.H., Daily Totals		\$1505.00		\$2229.70	\$57.88	\$85.76
<b>Crew R-31</b>						
1 Electrician	\$71.70	\$573.60	\$106.30	\$850.40	\$71.70	\$106.30
1 Core Drill, Electric, 2.5 H.P.		63.75		70.13	7.97	8.77
8 L.H., Daily Totals		\$637.35		\$920.53	\$79.67	\$115.07
<b>Crew W-41E</b>						
.5 Plumber Foreman (outside)	\$76.65	\$306.60	\$114.05	\$456.20	\$64.79	\$96.25
1 Plumber	74.65	597.20	111.05	888.40		
1 Laborer	49.00	392.00	72.55	580.40		
20 L.H., Daily Totals		\$1295.80		\$1925.00	\$64.79	\$96.25

# CATERPILLAR PERFORMANCE HANDBOOK

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2022

Performance information in this booklet is intended for estimating purposes only. Because of the many variables peculiar to individual jobs (including material characteristics, operator efficiency, underfoot conditions, altitude, etc.), neither Caterpillar nor its dealers warrant that the machines described will perform as estimated.

**NOTE: Always refer to the appropriate Operation and Maintenance Manual for specific product information.**

Materials and specifications are subject to change without notice.

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**USE OF BRAKE PERFORMANCE CURVES**

The speed that can be maintained when the machine is descending a grade with retarder applied can be determined from the retarder curves in this section when gross machine weight and total effective grade are known.

Select appropriate grade distance chart that covers total downhill haul; don't break haul into individual segments.

To determine brake performance: Read from gross weight down to the percent effective grade. (Effective grade equals actual % grade *minus* 1% for each 10 kg/metric ton (20 lb/U.S. ton) of rolling resistance.) From this weight-effective grade point, read horizontally to the curve with the highest obtainable speed range, then down to maximum descent speed brakes can safely handle without exceeding cooling capacity. When braking, engine RPM should be maintained at the highest possible level without overspeeding. If cooling oil overheats, reduce ground speed to allow transmission to shift to next lower speed range.

Brake Performance Curves are made in compliance with ISO 10268 and applicable to Sea Level and 32° C (90° F) temperature. Contact Factory for Application Specific Performance.

**USE OF RIMPULL-SPEED-GRADEABILITY CURVES**

For best results, use Caterpillar Fleet Production and Cost Analysis (FPC) to simulate cycle time, fuel burn, and production for Application Specific Performance inquiries. Contact Factory Representative for more information.

(See Wheel Tractor Scraper Section)

**Total Effective Grade** (or Total Resistance) is grade assistance *minus* rolling resistance.

10 kg/metric ton (20 lb/U.S. ton) = 1% adverse grade.

*Example* —

With a favorable grade of 20% and rolling resistance of 50 kg/metric ton (100 lb/U.S. ton), find Total Effective Grade.

$$\begin{aligned} (50 \text{ kg/metric ton}) &= 50 \div 10 = 5\% \text{ Effective Grade} \\ &\text{(from Rolling Resistance)} \\ 100 \text{ lb/ton} &= 100 \div 20 = 5\% \text{ Effective Grade} \\ 20\% \text{ (grade)} - 5\% \text{ (resistance)} &= \\ 15\% \text{ Total Effective Grade} \end{aligned}$$

**TYPICAL FIXED TIMES FOR HAULING UNITS**

Wait time, delays and operator efficiency all impact cycle time. Minimizing truck exchange time can have a significant effect on productivity.

Fixed time for hauling units include:

1. Truck load time (various with loading tool)
2. Truck maneuver in load area (Truck exchange) (Typically 0.6-0.8 min.)
3. Maneuver and dump time at dump point (Typically 1.0-1.2 min.)

Total cycle time is the combination of:

1. The above fixed time
2. Hauling time (Loaded)
3. Return time (Empty)

*Example* — assume load tool spots hauler with full bucket

	<b>988F</b>	<b>5130B</b>
cycle times	.60	.45
First pass (dump time)	.10 min.	.05 min.
2 passes (full cycle)	.70	.50
3 passes "	1.30	.95
4 passes "	1.90	1.40
5 passes "	2.50	1.85
6 passes "	3.10	2.30
7 passes "	3.70	2.75
8 passes "	4.30	3.20
9 passes "	4.90	3.65
10 passes "	5.40	4.10

**NOTE:** Other sizes of loading tools will have different cycle times. See Wheel Loader section for **average** cycle times for truck loading.



## PRODUCTION

The motor grader is used in a variety of applications in a variety of industries. Therefore, there are many ways to measure its operating capacity, or production. One method expresses a motor grader's production in relation to the area covered by the moldboard.

### Formula:

$$A = S \times (L_e - L_o) \times 1000 \times E \text{ (Metric)}$$

$$A = S \times (L_e - L_o) \times 5280 \times E \text{ (English)}$$

where A: Hourly operating area (m<sup>2</sup>/h or ft<sup>2</sup>/h)

S: Operating speed (km/h or mph)

L<sub>e</sub>: Effective blade length (m or ft)

L<sub>o</sub>: Width of overlap (m or ft)

E: Job efficiency

## Operating Speeds:

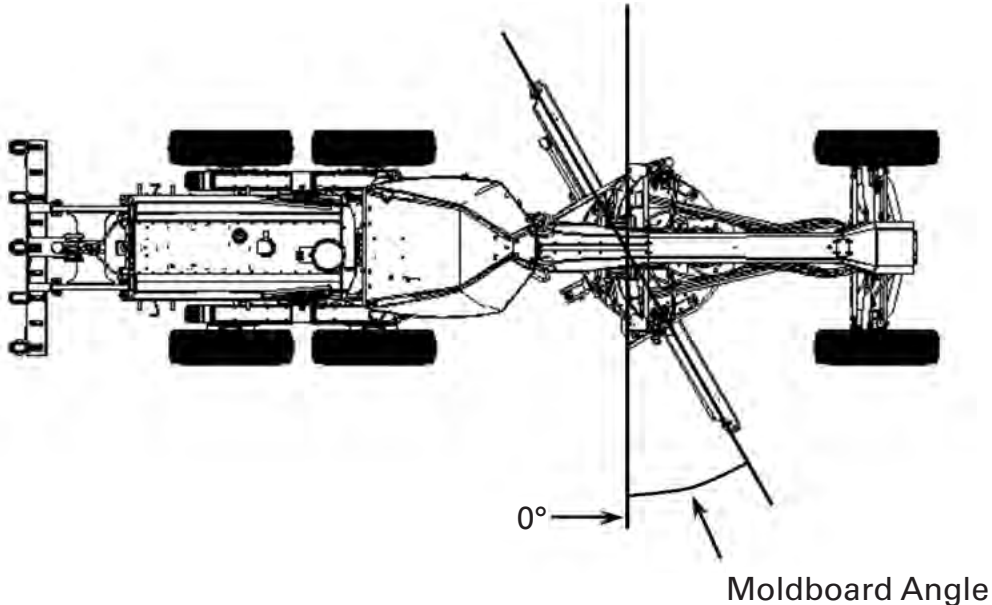
Typical operating speeds by application

Finish Grading:	0-4 km/h	(0-2.5 mph)
Heavy Blading:	0-9 km/h	(0-6 mph)
Ditch Repair:	0-5 km/h	(0-3 mph)
Ripping:	0-5 km/h	(0-3 mph)
Road Maintenance:	5-16 km/h	(3-9.5 mph)
Haul Road Maintenance:	5-16 km/h	(3-9.5 mph)
Snow Plowing:	7-21 km/h	(4-13 mph)
Snow Winging:	15-28 km/h	(9-17 mph)

## Effective Blade Length:

Since the moldboard is usually angled when moving material, an effective blade length must be computed to account for this angle. This is the actual width of material swept by the moldboard.

**NOTE:** Angles are measured as shown below. The effective length becomes shorter as the angle increases.



Moldboard Length, m (ft)	Effective Length, m (ft) 30 degree blade angle	Effective Length, m (ft) 45 degree blade angle
3.658 (12)	3.17 (10.4)	2.59 (8.5)
4.267 (14)	3.70 (12.1)	3.02 (9.9)
4.877 (16)	4.22 (13.9)	3.45 (11.3)
7.315 (24)	6.33 (20.8)	5.17 (17.0)

For other blade lengths and carry angles:  
Effective length = COS [Radians (Blade L)] 3 Blade Length

**Width of Overlap:**

The width of overlap is generally 0.6 m (2.0 ft). This overlap accounts for the need to keep the tires out of the windrow on the return pass.

**Job Efficiency:**

Job efficiencies vary based on job conditions, operator skill, etc.

A good estimation for efficiency is approximately 0.70 to 0.85, but actual operating conditions should be used to determine the best value.

Example problem:

A Cat motor grader with a 3.66 m (12 ft) moldboard is performing road maintenance on a township road. The machine is working at an average speed of 13 km/h (8 mph) with a moldboard carry angle of 30 degrees. What is the motor grader’s production based on coverage area?

**Note:** Due to the long passes involved in road maintenance — fewer turnarounds — a higher job efficiency of 0.90 is chosen.

**Solution:**

From the table, the effective blade length is 3.17 m (10.4 ft).

*Metric*

$$\begin{aligned} \text{Production, A} &= 13 \text{ km/h} \times (3.17 \text{ m} - 0.6 \text{ m}) \times \\ &1000 \times 0.90 \\ &= \mathbf{30\ 069 \text{ m}^2/\text{hr} (3.07 \text{ hectares/hr})} \end{aligned}$$

*English*

$$\begin{aligned} \text{Production, A} &= 8 \text{ mph} \times (10.4 \text{ ft} - 2.0 \text{ ft}) \times \\ &5280 \times 0.90 \\ &= \mathbf{319,334 \text{ ft}^2/\text{hr} (7.33 \text{ acres/hr})} \end{aligned}$$

To pinpoint the theoretical number of motor graders required to properly maintain your haul roads, based on your specific mining applications, please download the haul road maintenance calculator on <https://catminer.cat.com>.

Haul road maintenance impacts cycle time, tire, frame and drive train components, safety and ultimately your cost per ton. To achieve optimal truck productivity, your haul roads must be properly maintained.

- Moderate: ● Road Maintenance  
 ● Pad Cleaning  
 ● Rock Clearing  
 ● Shoulder Sweeping

- Difficult: ● Ripping  
 ● Spreading Dump Material  
 ● Road Profiling/Reshaping

**BLADE PULL**

This specification is also known as drawbar pull. This spec can be calculated as follows:

Variables:

Rear weight of machine = Wr

Tire traction coefficient = T (Look up the table entitled “Coefficient of Traction Factors”)

$$Wr \times T = \text{Blade Pull}$$

Example problem:

Calculate the blade pull for a 140M Global Version machine operating in a quarry pit...

*Metric*

RW = 10 501 kg

T = 0.65

$$10\,501 \times 0.65 = 6825.65$$

*English*

RW = 23,151 lb

T = 0.65

$$23,151 \times 0.65 = 15,048.15$$

**BLADE DOWN PRESSURE**

This spec can be calculated as follows:

Variables:

Blade to front axle length = BA

Wheel base length = WB

Weight on front wheels = FW

Blade down pressure = BD

$$\frac{WB}{(WB - BA)} \times FW = BD$$

Example problem:

Calculate the blade down pressure for a 140M Global Version machine...

*Metric*

BA = 2565 mm                      FW = 4223 kg

WB = 6086 mm                    BD = ?

$$\frac{6086}{(6086 - 2565)} \times 4223 = 7299 \text{ kg}$$

*English*

BA = 101 in

FW = 9310 lb

WB = 240 in

BD = ?

$$\frac{240}{(240 - 101)} \times 9310 = 16,075 \text{ lb}$$

This specification is only a minor indicator of a motor grader’s productivity. It alone gives no measure of overall machine productivity. When considering motor grader production you need an optimum balance between the machine’s front and rear weights. If a machine has too much weight on the front axle, it might have a high blade down pressure spec. It will, however, lack the essential rear weight and traction needed to push through the load. Too much weight in the rear and it will not have the necessary weight in the front during heavy cuts to maintain proper steering control.

Cat machines are built with this optimum balance in mind. A Cat motor grader is engineered with the proper weight distribution necessary for maximum productivity.

**Effective Blade Length\***

		Moldboard							
		3.66 m (12')		4.27 m (14')		4.88 m (16')		7.32 m (24')	
Angle°		m	ft	m	ft	m	ft	m	ft
	0°	3.66	12.00	4.27	14.00	4.88	16.00	7.32	24.00
	5°	3.64	11.95	4.25	13.95	4.86	15.94	7.29	23.91
	10°	3.60	11.82	4.20	13.79	4.80	15.76	7.21	23.64
	15°	3.53	11.59	4.12	13.52	4.71	15.45	7.07	23.18
	20°	3.44	11.28	4.01	13.16	4.58	15.04	6.87	22.55
	25°	3.32	10.88	3.87	12.69	4.42	14.50	6.63	21.75
	30°	3.17	10.39	3.69	12.12	4.22	13.86	6.33	20.78
	35°	3.00	9.83	3.50	11.47	4.00	13.11	5.99	19.66
	40°	2.80	9.19	3.27	10.72	3.74	12.26	5.61	18.39
45°	2.59	8.49	3.02	9.90	3.45	11.31	5.17	16.97	

\*Effective blade length is the amount of blade coverage the machine is capable of when the blade is at a given angle.

**CYCLE TIME FACTORS**

A basic cycle time (Load, Dump, Maneuver) of 0.25-0.35 minutes is average for a track loader [the basic cycle for large track loaders, 2 m<sup>3</sup> (2.6 yd<sup>3</sup>) and up, can be slightly longer], but variations can be authenticated in the field. The following values for many variable elements are based on normal operations. Adding or subtracting any of the variable times will give the total basic cycle time.

**Estimating Cycle Time**

Cycle time of a track loader needs to be determined to find loads per hour. Total cycle time includes the following segments:

Load Time + Maneuver Time + Travel Time + Dump Time

<b>Load Time —</b>	
<b>Material</b>	<b>Minutes</b>
Uniform aggregates	0.03-0.05
Moist mixed aggregates	0.03-0.06
Moist loam	0.03-0.07
Soil, boulders, roots	0.04-0.20
Cemented materials	0.05-0.20

**Maneuver Time** — includes basic travel, four changes of direction and turning time, and will be about 0.20 minutes with a competent operator.

**Travel Time** — in a load and carry operation is comprised of haul and return times which can be determined by the travel charts in this section.

**Dump Time** — is dictated by the size and strength of the dump target and varies from 0.00 to 0.10 minutes. Typical dump times into highway trucks are from 0.04 to 0.07 minutes.

**NOTE:** When comparing hydrostatic track loaders with former power shift models (using the production estimating method) two factors must be considered: (1) The hydrostatic track loaders on the average outcycle power shift models by up to 10 percent due to faster machine speed and easier operation. (2) Larger, rear engine hydrostatic track loaders incorporate Z-bar linkage, which provides substantially better bucket fill factors. The degree to which each factor affects estimated production should be left to the user's judgment depending on the particular job application and conditions.

Example: Moist loam is being excavated from a bank and loaded into trucks.

	<b>Minutes</b>
Load — moist loam	0.05
Maneuver Time	0.20
Travel — none required	0.00
Dump	<u>0.05</u>
Total Cycle	0.30 min. or 200 cycles per 60 min. hour
	<i>Minutes added (+) or Subtracted (-) From Basic Cycle</i>

**Materials**

- Mixed . . . . . +0.02
- Up to 3 mm (1/8 in) . . . . . +0.02
- 3 mm (1/8 in) to  
20 mm (3/4 in) . . . . . -0.02
- 20 mm (3/4 in) to  
150 mm (6 in) . . . . . 0.00
- 150 mm (6 in) and over . . . . . +0.03 and Up
- Bank or broken . . . . . +0.04 and Up

**Pile**

- Conveyor or Dozer piled  
3 m (10 ft) and up . . . . . 0.00
- Conveyor or Dozer piled  
3 m (10 ft) or less . . . . . +0.01
- Dumped by truck . . . . . +0.02

**Miscellaneous**

- Common ownership of  
trucks and loaders . . . . . Up to -0.04
- Independently owned trucks . . . . . Up to +0.04
- Constant operation . . . . . Up to -0.04
- Inconsistent operation . . . . . Up to +0.04
- Small target . . . . . Up to +0.04
- Fragile target . . . . . Up to +0.05

Using actual job conditions and the above factors, total cycle time can be estimated. Convert total cycle time to cycles per hour.

$$\frac{\text{Cycles per hour at 100\% Efficiency}}{100\% \text{ Efficiency}} = \frac{60 \text{ Min}}{\text{Total Cycle Time in Minutes}}$$

Job efficiency is an important factor in machine selection. Efficiency is the actual number of minutes worked during an hour. Job efficiency accounts for operator breaks, and other work interruptions. See "Efficiency Considerations" in this section.

**Bucket Fill Factors**

The following indicates the approximate amounts of material as a percent of rated bucket capacity which will actually be delivered per bucket per cycle. This is known as “Bucket Fill Factor.”

Loose Material	Fill Factor
Mixed Moist Aggregates	95-110%
Uniform Aggregates up to 3 mm (1/8 in)	95-110
3 mm-9 mm (1/8 in-3/8 in)	90-110
12 mm-20 mm (1/2 in-3/4 in)	90-110
24 mm and over (1 in)	90-110
<b>Blasted Rock</b>	
Well	80-95%
Average	75-90
Poor	60-75
<b>Other</b>	
Rock Dirt Mixtures	100-120%
Moist Loam	100-120
Soil, Boulders, Roots	80-100
Cemented Materials	85-100

Fill factors on track loaders are affected by bucket penetration, breakout force, rack back angle, bucket profile and ground engaging tools such as bucket teeth and segments or bolt-on replaceable cutting edges.

**GENERAL PURPOSE BUCKET  
 W/TEETH & SEGMENTS  
 MAXIMUM OPERATING CAPACITIES**

MODEL	GENERAL PURPOSE BUCKET SIZE		MAXIMUM OPERATING CAPACITY	
	m <sup>3</sup>	yd <sup>3</sup>	kg	lb
953D/953K	1.85	2.4	3182	7015
963D/963K	2.45	3.2	4214	9290
973D	3.21	4.2	5521	12,174

**LOADER PRODUCTION**

Loader production equals quantity of material the bucket carries per load × number of bucket loads per hour.

**Estimating Bucket Load**

The quantity of material in a loader bucket is estimated by two methods, depending on whether the material being loaded is in a loose or bank state.

1. When the material is loose, as in stockpile loading, the bucket load is estimated in loose meters (or cubic yards) by a Bucket Fill Factor (see Tables Section or chart following this discussion). The quantity of material is determined as follows:

$$\text{Rated Bucket Capacity} \times \text{Bucket Fill Factor} = \text{Bucket Payload in Loose m}^3 \text{ (yd}^3\text{)}$$

For example, a 973 with a 3.2 m<sup>3</sup> (4.2 yd<sup>3</sup>) General Purpose bucket loading moist loam material will carry:

$$3.2 \text{ m}^3 \times 1.15 = 3.68 \text{ loose cubic meters}$$

$$(4.2 \text{ yd}^3 \times 1.15 = 4.83 \text{ loose cubic yards})$$

Once the potential bucket load has been determined, check the static tipping load ratings on the specific machine to determine if bucket load is in fact a safe operating load. (*Safe operating load as defined by SAE for track loaders should not exceed 35% of static tipping load.*)

Productivity in many applications is measured in tons. See Tables Section for material densities if conversion to tons is desired.

2. When material is in the bank state, as in excavation, productivity is measured in bank meters (cubic yards). Bucket load in Bm<sup>3</sup> (BCY) is estimated by applying one of the load factors from the Tables section to convert the excavated material in the bucket from Bm<sup>3</sup> (BCY) to Lm<sup>3</sup> (LCY) to allow for the digging and carrying characteristics of the material. The quantity of excavated material a bucket carries is then determined as follows:

$$\text{Rated Bucket Capacity} \times \text{Load Factor} \times \text{Bucket Fill Factor} = \text{Bucket Payload in Bm}^3 \text{ (BCY)}$$

Example: a 953D with a 1.85 m<sup>3</sup> (2.4 yd<sup>3</sup>) General Purpose bucket loading wet loam earth from bank:

$$1.85 \text{ m}^3 \times 0.79 \times 1.15 = 1.68 \text{ Bm}^3$$

$$(2.4 \text{ yd}^3 \times 0.79 \times 1.15 = 2.18 \text{ BCY})$$

- Estimating Production
- Alternative Machine Selection Method

### Estimating Production

Machine and job considerations include:

- Machine model and bucket size
- Material type, particle size, density and load factor (see Tables Section)
- Bucket fill factor
- Haul distance
- Underfoot conditions
- Altitude
- Dump target size, height, and type

*Example:*

**Conditions —**

Machine	953D
Bucket size	1.85 m <sup>3</sup> (2.4 yd <sup>3</sup> )
Material	Moist Loam
Bucket fill factor	1.15
Haul length	30 m (100 ft)
Dump target	Pile
Travel in forward speed	

**Cycle Time**

	<b>Minutes</b>
Load time	0.15
Maneuver time	0.20
Travel time (from curves)	0.40
Dump time	<u>0.05</u>
Total	0.80

**Loads Per Hour —**

$$\frac{60 \text{ min/hr}}{0.80 \text{ min/cycle}} = 75 \text{ cycles per hour @ } 100\% \text{ efficiency}$$

**Load Per Cycle —**

$$1.85 \text{ m}^3 \times 1.15 \text{ BFF} = 2.13 \text{ Lm}^3 \times 0.81 \text{ LF} = 1.72 \text{ Bm}^3$$

$$(2.4 \text{ yd}^3 \times 1.15 \text{ BFF} = 2.76 \text{ LCY} \times 0.81 \text{ LF} = 2.24 \text{ BCY})$$

**Hourly Production —**

$$1.72 \text{ Bm}^3 \times 75 \text{ cycles/h} = 129 \text{ Bm}^3/\text{h}$$

$$(2.24 \text{ BCY} \times 75 \text{ cycles/hr} = 168 \text{ BCY/hr})$$

More accurate production estimates can be made by recording actual machine cycle times in the same or similar application. Then visually verify the approximate bucket fill factor.

### Efficiency Considerations

Loader capacity should always be matched to peak production requirements of the job. Actual “on-the-job” loader productivity will be influenced by factors such as operator skill, personal delays, job layout and other delays. Experience and knowledge of local conditions will be the best indicators of actual job efficiency.

Operation	Working Hour	Efficiency Factor
Day	50 min/Hr	0.83

### An Alternative Machine Selection Method

Another method of selecting the right Track Loader and bucket to meet production requirements is by use of the nomographs on the following pages. The method is quicker and easier than the preceding example because it does not require as many calculations, yet the accuracy is about the same within the normal limits of input data.

Be careful when entering and reading data from the nomographs because some scales increase from bottom to top, while others are the reverse. Do not be overly concerned with the precision as affected by pencil line width or reading to the hundredth of a m<sup>3</sup> (yd<sup>3</sup>). Remember that bucket fill factor, material density, and cycle time are at best close estimates.

*Example problem*

A track loader must produce 200 Lm<sup>3</sup> (262 LCY) per hour. Estimated cycle time is 0.5 minutes, working 50 minutes per hour. Bucket fill factor is 110% and the material density is 1600 kg/Lm<sup>3</sup> (2700 lb/LCY).

Determine bucket size, machine model and hourly production in tons and yards.

### Solution

At full efficiency, it will cycle 120 times per hour. Since only an average 50 minutes are available, only 100 cycles will be completed per hour.

Starting on Scale A at 100 cycles per hour draw a straight line intersecting 200 m<sup>3</sup>/hr (262 yd<sup>3</sup>/hr) on Scale B and continuing the line on to Scale C giving 2.0 m<sup>3</sup> (2.62 yd<sup>3</sup>) required payload.

Follow steps 1 through 7 on the next two pages.

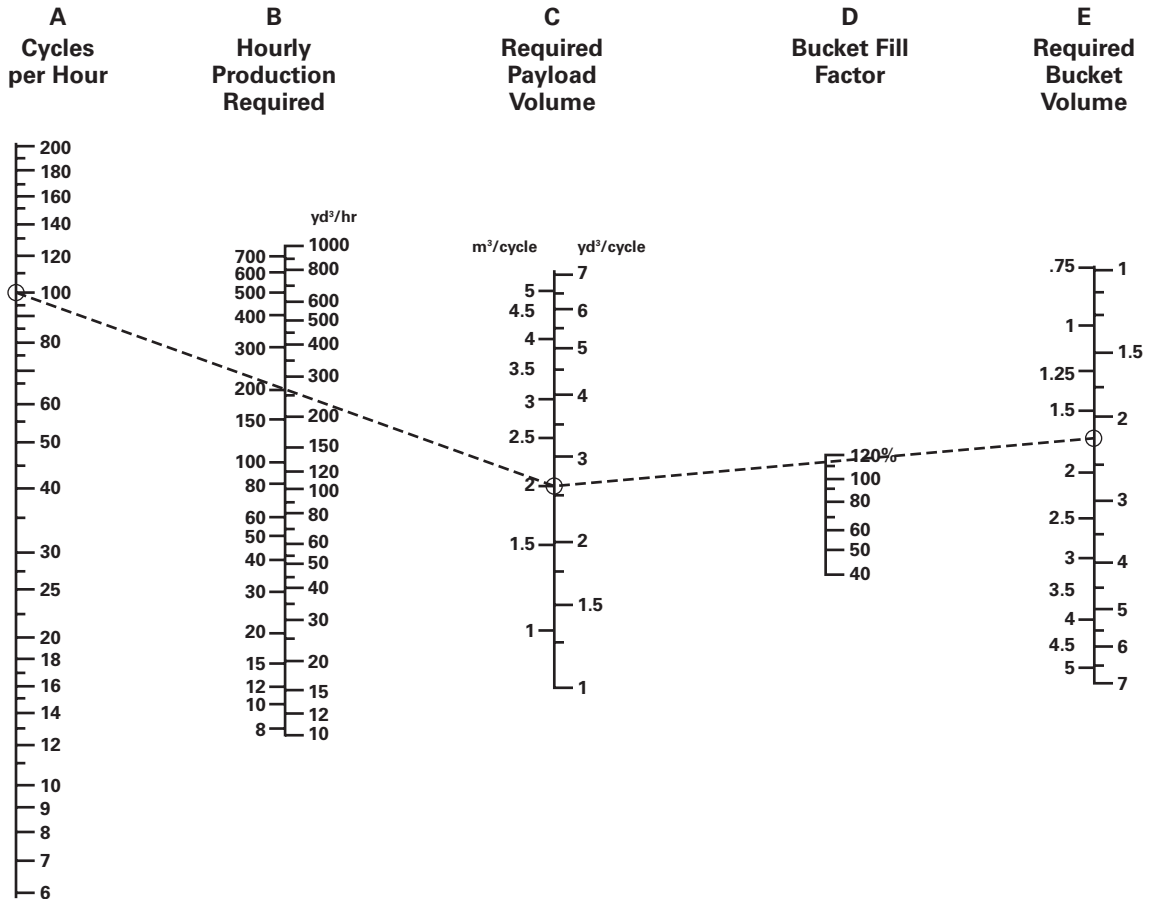


# Production and Machine Selection Nomograph

## Track Loaders

- To find required bucket payload and bucket size

- 1) Enter Scale A cycles per hour (100) and B hourly production 200 m<sup>3</sup>/hr (262 yd<sup>3</sup>/hr).
- 2) Connect A and B and extend to C to find required payload 2.0 m<sup>3</sup> (2.62 yd<sup>3</sup>).
- 3) Connect C to bucket fill factor on Scale D (110%) and extend to E to find required bucket size 1.8 m<sup>3</sup> (2.35 yd<sup>3</sup>).
- 4) Transfer Scale A and C readings to nomograph on following page.



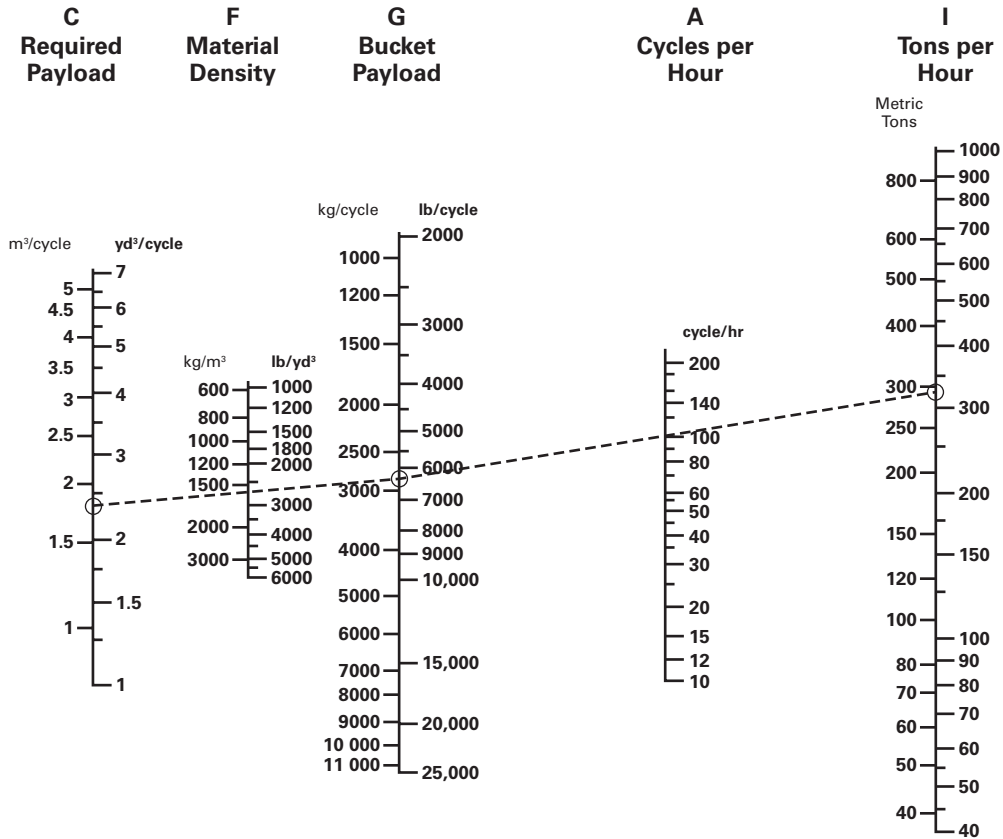
# Track Loaders

## Production and Machine Selection Nomograph

- To find payload weight for stability and output in tons per hour

- Connect C 1.8 m<sup>3</sup> (2.35 yd<sup>3</sup>) to F 1600 kg/m<sup>3</sup> (2700 lb/yd<sup>3</sup>) and extend to G to find payload weight 2880 kg (6345 lb).
- Compare G bucket payload weight 2880 kg (6345 lb) with maximum operating capacities table in this section to see if the 1.85 m<sup>3</sup> (2.4 yd<sup>3</sup>) bucket can handle the desired payload. Table indicates the 953D with a

- 1.85 m<sup>3</sup> (2.4 yd<sup>3</sup>) bucket equipped with bolt-on cutting edge or teeth and segments has a greater operating capacity of 3343 kg (7370 lb), therefore stability is okay.
- Extend Scale G reading 2880 kg (6345 lb) through Scale A (100) to Scale I to find tons per hour 288 metric ton/hr (317 U.S. ton/hr).





**BULLDOZER PRODUCTION OFF-THE-JOB**

You can estimate bulldozer production using the production curves that follow and the correction factors that are applicable. Use this formula:

$$\text{Production (Lm}^3\text{/hr)} = \text{Maximum production (LCY/hr)} \times \text{Correction factors}$$

The bulldozer production curves give maximum uncorrected production for universal, semi-universal, and straight blades and are based on the following conditions:

1. 100% efficiency (60 minute hour — level cycle).
2. Power shift machines with 0.05 min. fixed times.
3. Machine cuts for 15 m (50 feet), then drifts blade load to dump over a high wall. (Dump time — 0 sec.)
4. Soil density of 1370 kg/Lm<sup>3</sup> (2300 lb/LCY).
5. Coefficient of traction:\*
  - a. Track machines — 0.5 or better
  - b. Wheel machines — 0.4 or better
6. Hydraulic controlled blades used.
7. Dig 1F\*\*  
Carry 2F\*\*  
Return 2R\*\*

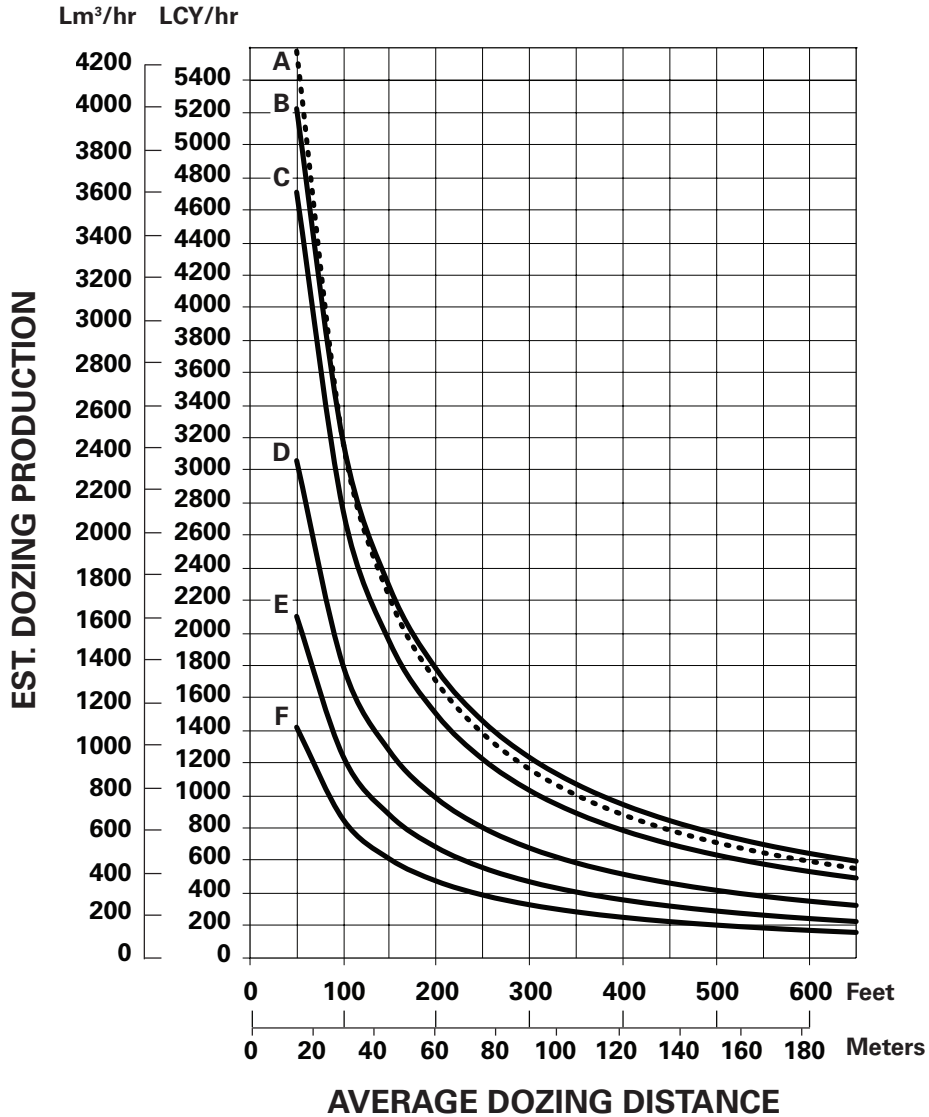
To obtain estimated production in bank cubic meters or bank cubic yards, appropriate load factor from the Tables section should be applied to the corrected production as calculated above.

$$\text{Production Bm}^3\text{/hr} = \frac{\text{Lm}^3\text{/hr}}{\text{(BCY/h)}} \times \text{LF}$$

\*Coefficient of traction assumed to be at least 0.4. While poor traction affects both track and wheel vehicles, causing them to take smaller blade loads, wheeled units are affected more severely and production falls much more rapidly. While no fixed rules can predict this production loss, a rough rule of thumb is that wheel dozer production falls off 4% for each one-hundredth decrease in coefficient of traction below 0.40. If, for example, coefficient of traction is 0.30, the difference is ten-hundredths (0.10), and production is 60% (10 × 4% = 40% decrease).

\*\*This gear sequence is based on level to downhill terrain, light to medium density material, and no blade extensions such as spill plates, rock guards, etc. Exceeding these conditions may require carry in 1F, but productivity should equal or exceed “standard conditions” due to the larger loads that can be carried in 1F.

**ESTIMATED DOZING PRODUCTION ● Universal Blades ● D8 through D11**

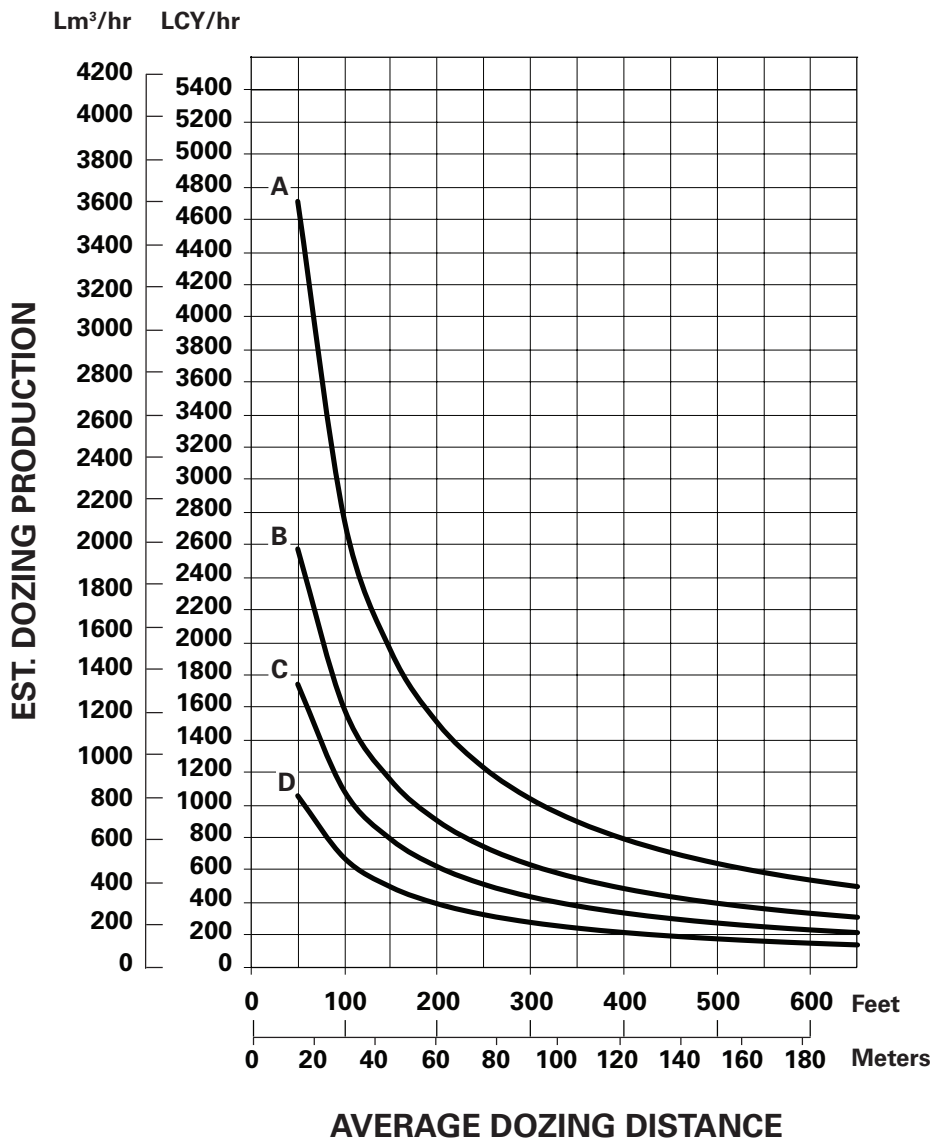


**KEY**

- A — D11 XU
- B — D11 CD
- C — D11 U
- D — D10 U
- E — D9 U
- F — D8 U

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

**ESTIMATED DOZING PRODUCTION ● Semi-Universal Blades ● D8 through D11**

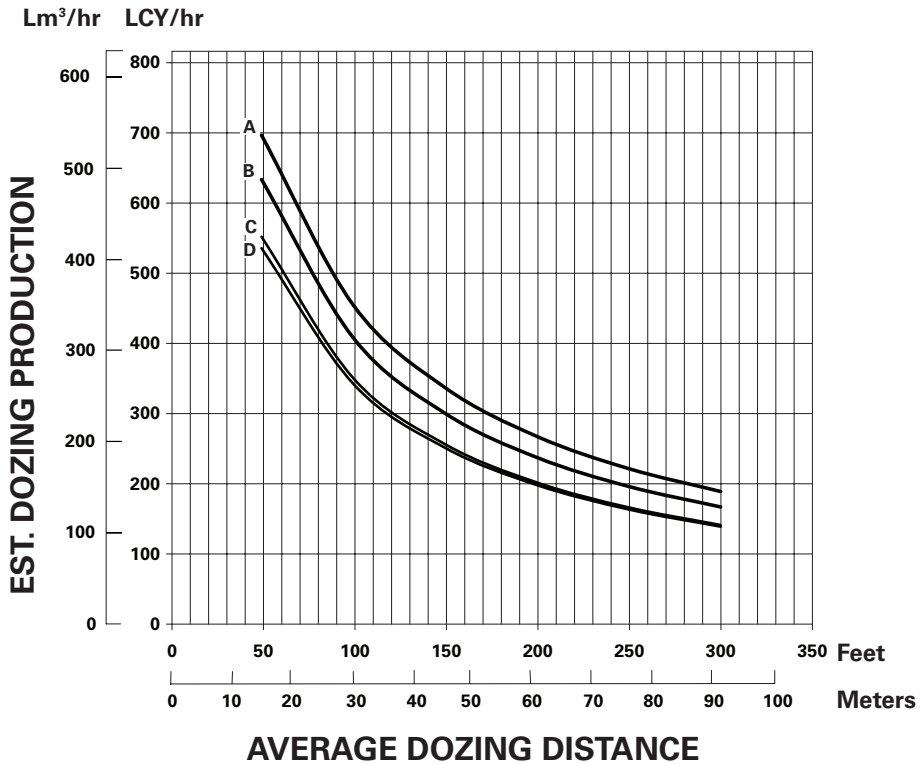


**KEY**

- A — D11 SU
- B — D10 SU
- C — D9 SU
- D — D8 SU

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

**ESTIMATED DOZING PRODUCTION ● Straight Blades ● D6 through D7**

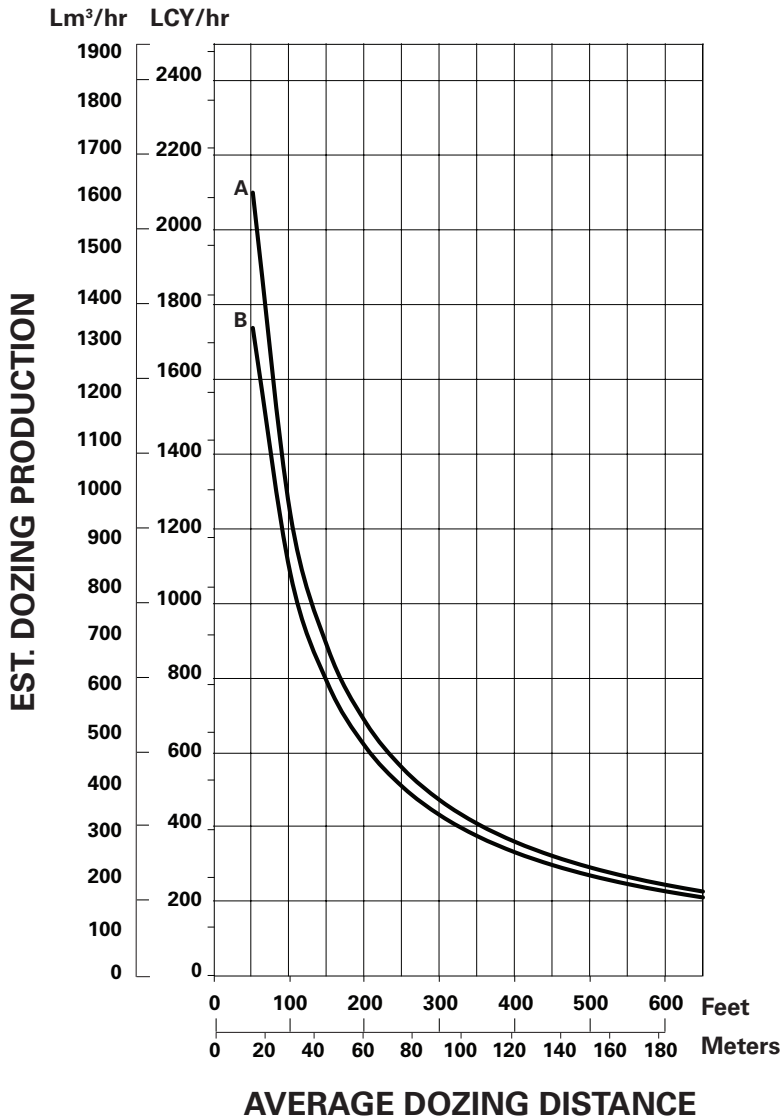


**KEY**

- A — D7E
- B — D7R11
- C — D6T
- D — D7G

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

**ESTIMATED DOZING PRODUCTION ● D9**

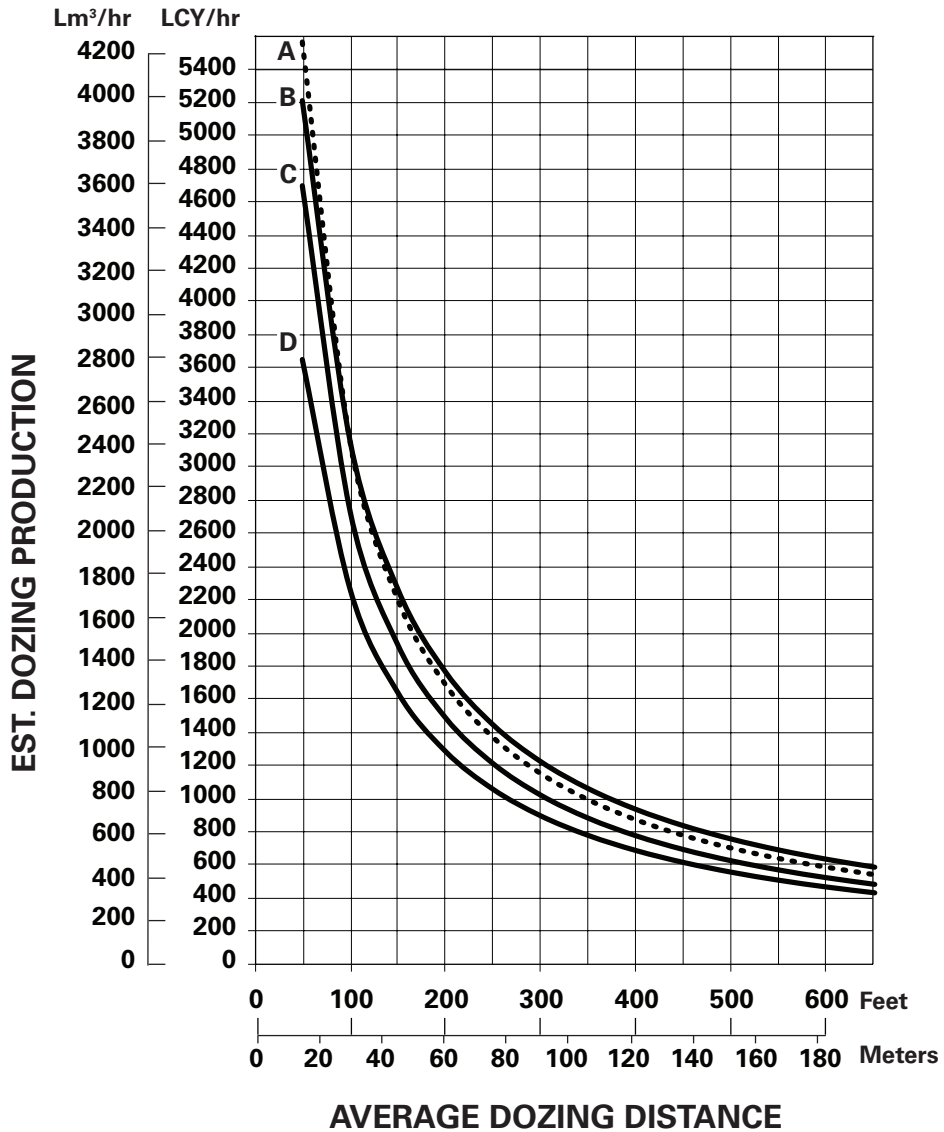


**KEY**

- A — D9 U
- B — D9 SU

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

**ESTIMATED DOZING PRODUCTION ● D11**



**KEY**

- A — D11 XU
- B — D11 CD
- C — D11 U
- D — D11 SU

**NOTE:** This chart is based on numerous field studies made under varying job conditions. Refer to correction factors following these charts.

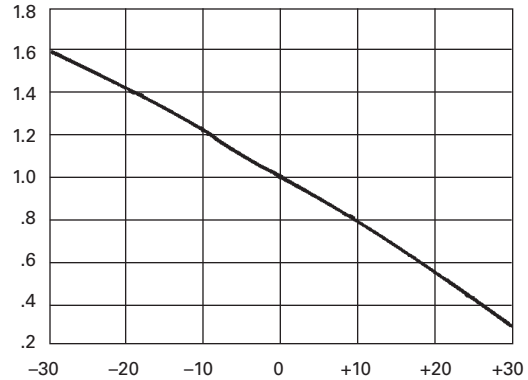
**JOB CONDITION CORRECTION FACTORS**

	TRACK-TYPE TRACTOR
<b>OPERATOR —</b>	
Excellent	1.00
Average	0.75
Poor	0.60
<b>MATERIAL —</b>	
Loose stockpile	1.20
Hard to cut; frozen —	
with tilt cylinder	0.80
without tilt cylinder	0.70
Hard to drift; “dead” (dry, non-cohesive material) or very sticky material	0.80
Rock, ripped or blasted	0.60-0.80
<b>SLOT DOZING</b>	
	1.20
<b>SIDE BY SIDE DOZING</b>	
	1.15-1.25
<b>VISIBILITY —</b>	
Dust, rain, snow, fog or darkness	0.80
<b>JOB EFFICIENCY —</b>	
50 min/hr	0.83
40 min/hr	0.67
<b>BULLDOZER*</b>	
Adjust based on SAE capacity relative to the base blade used in the Estimated Dozing Production graphs.	
<b>GRADES —</b> See following graph.	

\*NOTE: Angling blades and cushion blades are not considered production dozing tools. Depending on job conditions, the A-blade and C-blade will average 50-75% of straight blade production.

**% Grade vs. Dozing Factor**

(-) Downhill  
 (+) Uphill



**ESTIMATING DOZER PRODUCTION OFF-THE-JOB**

*Example problem:*

Determine average hourly production of a D8 SU (with tilt cylinder) moving hard-packed clay an average distance of 45 m (150 feet) down a 15% grade, using a slot dozing technique.

Estimated material weight is 1600 kg/Lm<sup>3</sup> (2650 lb/LCY). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 375 Lm<sup>3</sup>/h (490 LCY/hr) (example only)

Applicable Correction Factors:

- Hard-packed clay is “hard to cut” material . . . -0.80
- Grade correction (from graph) . . . . . -1.30
- Slot dozing . . . . . -1.20
- Average operator . . . . . -0.75
- Job efficiency (50 min/hr) . . . . . -0.83
- Weight correction. . . . . (2300/2650) -0.87

$$\begin{aligned}
 \text{Production} &= \text{Maximum Production} \times \text{Correction Factors} \\
 &= (490 \text{ LCY/hr}) (0.80) (1.30) (1.20) (0.75) \\
 &\quad (0.83) (0.87) \\
 &= 331.2 \text{ LCY/hr}
 \end{aligned}$$

To obtain production in metric units, the same procedure is used substituting maximum uncorrected production in Lm<sup>3</sup>.

$$\begin{aligned}
 &= 375 \text{ Lm}^3/\text{h} \times \text{Factors} \\
 &= 253.5 \text{ Lm}^3/\text{h}
 \end{aligned}$$

**TIP SELECTION FOR THE D8R/D8T, D9, D10 AND D11 RIPPERS**

Three tip configurations (short, intermediate and long) in two styles (centerline and penetration) are available for economical operation in a variety of conditions.

**RECOMMENDED TIP USAGE**

*Short* — Use in high impact conditions where breakage problems occur. The shorter the tip, the more it resists breakage.

*Intermediate* — Most effective in moderate impact conditions where abrasion is not excessive.

*Long* — Use in loose, abrasive materials where breakage is not a problem. Generally offers the most wear material.

**Centerline vs Penetration**

The materials being ripped and the tractor doing the ripping will both have an effect on which tip will do the best job. High density material requires a “penetration” tip. High impact material requires a “centerline” tip. The following is a general guide to tip application.

Ripping Condition	Tips to use			
	D8R/D8T	D9	D10	D11
Tandem Tractors . . . . .	Short	Short	Short	Short
Single Shank and Multi-shank				
Extreme Duty . . . . .	Int.	Short	Short	Short
Medium Duty . . . . .	Long	Int.	Int.	Int.
Abrasive Duty . . . . .	Long	Long	Long	Long

Always use the longest tip that will wear without excessive breakage. Different tips should be tried to determine the most economical.

**ESTIMATING RIPPING PRODUCTION**

Ripping costs must be compared to other methods of loosening the material — usually drilling and blasting — on a cost per ton or bank cubic yard basis. Thus, an accurate estimation of ripper production is needed to determine unit ripping costs.

There are three general methods of estimating ripping production:

1. The best method is to record the time spent ripping, then remove (using scrapers or loaders and trucks) and weigh the ripped material. The total weight divided by the time spent will give hourly production. If the contractor is paid by volume, then a density must be used and the accuracy is only as good as the density used. For payment by volume removed, method 2 may be desirable. Some care will be needed to assure that only ripped material is removed.
2. Another method is to cross-section the area and then record the time spent ripping. After the material has been removed, cross-section the area again to determine the volume of rock removed. The volume divided by the time spent ripping gives the ripping rate per minute or hour.
3. Timing the ripper over a measured distance is the least accurate method, but valuable for quick estimating on the job. An average cycle time should be determined from a number of timed cycles. Turn-around or back-up time must be included. Measure the average rip distance, rip spacing and depth of penetration. This data will give the volume per cycle from which the production in bank cubic yards can be calculated. Experience has shown results obtained from this method are about 10 to 20% higher than the more accurate method of cross-sectioning.

An example of the measured distance method for calculating ripper production is:

*Data* — D10T2 — No. 10 with one shank.

910 mm (36 in) between passes.

1.6 km/h (1 mph) average speed (including slippage and stalls).

Every 91 m (300 ft) requires 0.25 min to raise, pivot, turn, and lower again: 91 m (300 ft) = 1 pass.

610 mm (24 in) penetration.

Full time ripping (no pushing or dozing assignment).



Example of Estimating Production (Metric)

Time per pass:

1.6 km/h = 26.7 m/min. Then  $\frac{91 \text{ m}}{26.7 \text{ m/min}} = 3.41 \text{ min};$

3.41 min + 0.25 min (turn time) = 3.66 min/pass.

If the operator works an average of 45 min per h, it is possible to make =  $\frac{45}{3.66} = 12.3$  passes per h

Volume ripped: 91 m × 0.9 m × 0.6 m = 49.1 BCM per pass

Production = 49.1 × 12.3 = 604 BCM per h

Remember the results from this method are usually 10 to 20 per cent higher than the actual production that can be expected on the job.

Example of Estimating Production (English)

Time per pass:

MPH = 88 fpm. Then  $\frac{300 \text{ ft}}{88 \text{ fpm}} = 3.41 \text{ min};$

3.41 min + 0.25 min. (turn time) = 3.66 min/pass.

If the operator works an average of 45 min per h, it is possible to make =  $\frac{45}{3.66} = 12.3$  passes per h

Volume ripped:  $\frac{300 \times 3 \times 2}{27} = 66.7$  BCY per pass

Production = 66.7 × 12.3 = 820 BCY per hr



**NOTE:** The demands of heavy ripping will increase the normal owning and operating costs of the tractor.

These costs should be increased no less than 30-40% in heavy ripping applications to estimate rock loosening costs.

There is no ready answer or rule-of-thumb solution to predict ripping production. Even if everything is known about the seismic velocity of the material, its composition, job conditions, equipment and operator, only a "guesstimate" can be given. The final answer must come from a production study obtained on the job site.

Sample problem (Metric)

Determine the loosening costs in the following situation:

Machine	— D10T2 Tractor with No. 10 Single Shank Ripper
Rip Spacing	— 915 mm
Ripper Penetration	— 610 mm
Rip Distance	— 91 m
Rip Time	— 3.41 minutes
Maneuver Time	— 0.25 minutes
Seismic Velocity	— 1830 meters per second
Assume	60 min. hour

*Solution:*

1. Total Cycle Time = 3.41 + 0.25 = 3.66 min

$$\text{Cycles/hour} = \frac{60 \text{ min/hr}}{3.66 \text{ min/cycle}} = 16.4$$

2. Production per cycle = 91 m × 0.9 m × 0.6 m = 49.1 BCM/cycle

3. Production = 49.1 BCM/cycle × 16.4 cycles/h = 805 BCM/h

4. Remember results of this method are usually 10 to 20% high.

$$\begin{aligned} \text{Actual Production} &= 80\% \text{ of } 805 \text{ BCM/h} \\ &= 644 \text{ BCM/h} \end{aligned}$$

$$\text{Or } 90\% \text{ of } 805 \text{ BCM/h} = 725 \text{ BCM/h}$$

5. Owning and Operating Costs

A D10T2 (ripping only) could have a \$115.00/h O & O costs including \$30/h operator.

6. Loosening Costs

$$\$115.00/\text{hr} \div 644 \text{ BCM/h} = \$0.179/\text{BCM}$$

$$\$115.00/\text{hr} \div 725 \text{ BCM/h} = \$0.159/\text{BCM}$$

The loosening cost should range from 15.9¢ to 17.9¢/BCM

Sample problem (English)

Determine the loosening costs in the following situation:

Machine	— D10T2 Tractor with No. 10 Single Shank Ripper
Rip Spacing	— 3 feet
Ripper Penetration	— 2 feet
Rip Distance	— 300 feet
Rip Time	— 3.41 minutes
Maneuver Time	— 0.25 minutes
Seismic Velocity	— 6000 feet per second
Assume	60 min. hour

*Solution:*

1. Total Cycle Time = 3.41 + 0.25 = 3.66 min  

$$\text{Cycles/hour} = \frac{60 \text{ min/hr}}{3.66 \text{ min/cycle}} = 16.4$$
2. Production per cycle =  $\frac{300 \times 3 \times 2}{27} = 66.7 \text{ BCY/cycle}$
3. Production = 66.7 BCY/cycle  $\times$  16.4 cycles/hr  
 = 1094 BCY/hour
4. Remember results of this method are usually 10 to 20% high.  

$$\begin{aligned} \text{Actual Production} &= 80\% \times 1094 \\ &= 875 \text{ BCY/hr} \\ \text{or } 90\% \times 1094 &= 984 \text{ BCY/hr} \end{aligned}$$
5. Owning and Operating Costs  
 A D10T2 (ripping only) could have a \$115.00/hr  
 O & O costs including \$30/hr operator
6. Loosening Costs  

$$\begin{aligned} \$115.00/\text{hr} \div 875 \text{ BCY/hr} &= \$0.131/\text{BCY} \\ \$115.00/\text{hr} \div 984 \text{ BCY/hr} &= \$0.117/\text{BCY} \end{aligned}$$
 The loosening cost should range from 11.7¢ to 13.1¢/BCY



## USE OF SEISMIC VELOCITY CHARTS

The charts of ripper performance estimated by seismic wave velocities have been developed from field tests conducted in a variety of materials. Considering the extreme variations among materials and even among rocks of a specific classification, the charts must be recognized as being at best only one indicator of rippability.

Accordingly, consider the following precautions when evaluating the feasibility of ripping a given formation:

- Tooth penetration is often the key to ripping success, regardless of seismic velocity. This is particularly true in homogeneous materials such as mudstones and claystones and the fine-grained caliches. It is also true in tightly cemented formations such as conglomerates, some glacial tills and caliches containing rock fragments.

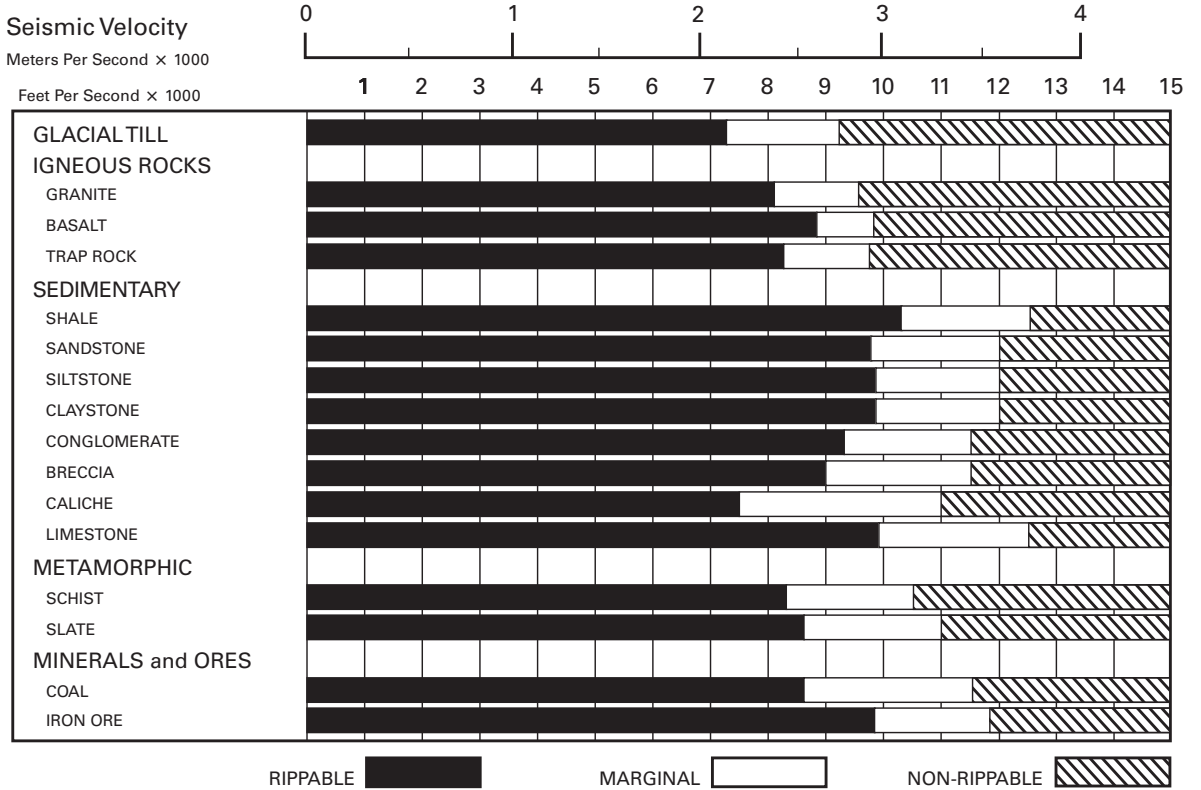
- Low seismic velocities of sedimentaries can indicate probable rippability. However, if the fractures and bedding joints do not allow tooth penetration, the material may not be ripped effectively.
- Pre-blasting or “popping” may induce sufficient fracturing to permit tooth entry, particularly in the caliches, conglomerates and some other rocks; but the economics should be checked carefully when considering popping in the higher grades of sandstones, limestones and granites.

Ripping is still more art than science, and much will depend on operator skill and experience. Ripping for scraper loading may call for different techniques than if the same material is to be dozed away. Cross-ripping requires a change in approach. The number of shanks used, length and depth of shank, tooth angle, direction, throttle position — all must be adjusted according to field conditions. Ripping success may well depend on the operator finding the proper combination for those conditions.

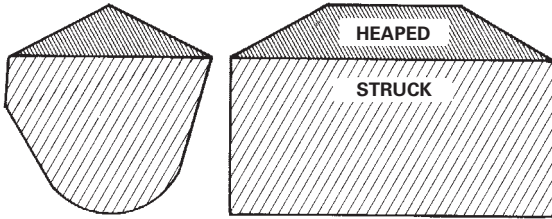
**NOTE:** For more detailed information of ripping please refer to *The Handbook of Ripping* (Media No. AEDK0752).

**D11**

- Multi- or Single Shank No. 11 Ripper
- Estimated by Seismic Wave Velocities



### SAE BUCKET RATING



### SAE Bucket Capacities

*Struck capacity* is that volume contained in a bucket after a load is leveled by drawing a straight edge resting on the cutting edge and the back of the bucket.

*Heaped capacity* is a struck capacity plus that additional material that would heap on the struck load at a 2:1 angle of repose with the struck line parallel to the ground.

SAE J742 (FEB85) specifies that the addition of any auxiliary spill guard to protect against spillage which might injure the operator will not be included in bucket capacity ratings. Buckets with irregular shaped cutting edges (vee edge) the strike plane should be drawn at one-third the distance of the protruding portion of the cutting edge. Cat rock buckets are built with integral see-through rock guards. Cat light material buckets come standard with bolt-on edges. These features which add to actual bucket capacity are included in published ratings.

### Dump Height

SAE J732 JUN92 specifies that dump height is the vertical distance from the ground to the lowest point of the cutting edge with the bucket hinge pin at maximum height and the bucket at a 45° dump angle. Dump angle is the angle in degrees that the longest flat section of the inside bottom of the bucket will rotate below horizontal.

## SELECTING A MACHINE

### Steps in selecting the proper size loader:

1. Determine production required or desired.
2. Determine loader cycle time and cycles per hour.  
A machine size must be assumed to select a basic cycle time.

3. Determine required payload per cycle in loose cubic yards and pounds (meters and kilograms).
4. Determine bucket size needed.
5. Make machine selection using bucket size and payload as criteria to meet production requirements.
6. Compare the loader cycle time used in calculations to the cycle time of the machine selected. If there is a difference, rework the process beginning at step 2.

### 1. Production Required

The production required of a wheel or track loader should be slightly greater than the production capability of the other critical units in the earth or material moving system. For example, if a hopper can handle 300 tons per hour, a loader capable of slightly more than 300 tons should be used. Required production should be carefully calculated so the proper machine and bucket selections are made.

### 2. Loader Cycle Times

When hauling loose granular material on a hard smooth operating surface, a .45-.55 minute basic cycle time is considered reasonable for Cat articulated loaders with a competent operator. This includes load, dump, four reversals of direction, full cycle of hydraulics and minimum travel.

Material type, pile height, and other factors may improve or reduce production, and should be added to or subtracted from the basic cycle time when applicable.

When hauls are involved, obtain the haul and return portion of the cycle from the estimated travel chart (this section). Add the haul and return times to the estimated basic cycle time to obtain total cycle time.

### CYCLE TIME FACTORS

A basic cycle time (Load, Dump, Maneuver) of .45-.55 minutes is average for an articulated loader [the basic cycle for large loaders, 3 m<sup>3</sup> (4 yd<sup>3</sup>) and up, can be slightly longer], but variations can be anticipated in the field. The following values for many variable elements are based on normal operations. Adding or subtracting any of the variable times will give the total basic cycle time.

Minutes added (+)  
 or Subtracted (-)  
 From Basic Cycle

<i>Machine</i>	
— Material handler . . . . .	-.05
<i>Materials</i>	
— Mixed . . . . .	+.02
— Up to 3 mm (1/8 in) . . . . .	+.02
— 3 mm (1/8 in) to 20 mm (3/4 in) . . . . .	-.02
— 20 mm (3/4 in) to 150 mm (6 in) . . . . .	.00
— 150 mm (6 in) and over . . . . .	+.03 and Up
— Bank or broken . . . . .	+.04 and Up
<i>Pile</i>	
— Conveyor or Dozer piled 3 m (10 ft) and up . . . . .	.00
— Conveyor or Dozer piled 3 m (10 ft) or less . . . . .	+.01
— Dumped by truck . . . . .	+.02
<i>Miscellaneous</i>	
— Common ownership of trucks and loaders . . . . .	Up to -.04
— Independently owned trucks . . . . .	Up to +.04
— Constant operation . . . . .	Up to -.04
— Inconsistent operation . . . . .	Up to +.04
— Small target . . . . .	Up to +.04
— Fragile target . . . . .	Up to +.05

Using actual job conditions and the above factors, total cycle time can be estimated. Convert total cycle time to cycles per hour.

$$\frac{\text{Cycles per hour at 100\% Efficiency}}{100\% \text{ Efficiency}} = \frac{60 \text{ min}}{\text{Total Cycle Time in Minutes}}$$

Job efficiency is an important factor in machine selection. Efficiency is the actual number of minutes worked during an hour. Job efficiency accounts for bathroom breaks and other work interruptions.

$$\frac{\text{Cycles per hour at 50 minutes per hour (83\% efficiency)}}{\text{Cycles per hour at 100\% efficiency}} = \frac{50 \text{ min} \times \text{actual work time}}{60 \text{ min hour}}$$

**TRUCK LOADING**

Average loader cycle times

910-962 . . . . .	0.45-0.50 min
966-980 . . . . .	0.50-0.55 min
986-990 . . . . .	0.55-0.60 min
992-994 . . . . .	0.60-0.70 min

**3. Required Payload Per Cycle**

Required payload per cycle is determined by dividing required hourly production by the number of cycles per hour.

**4. Bucket Selection**

After required payload per cycle has been calculated, the payload should be divided by the loose cubic yard (meter) material weight to determine number of loose cubic yards (meters) required per cycle.

The bulk of material handled does not weigh 1800 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>), so a reasonable knowledge of material weight is necessary for accurate production estimates. The Tables Section has average weight for certain materials when actual weights are not known.

The percentage of rated capacity a bucket carries in various materials is estimated below. The bucket size required to handle the required volume per cycle is found with the aid of the percentage of rated bucket capacity called "Bucket Fill Factor."

The bucket size needed is determined by dividing loose cubic meters (or yards) required per cycle by the bucket fill factor.

$$\text{Bucket size} = \frac{\text{Volume Required/Cycle}}{\text{Bucket Fill Factor}}$$

**BUCKET FILL FACTORS**

The following indicates the approximate amounts of material as a percent of rated bucket capacity which will actually be delivered per bucket per cycle. This is known as "Bucket Fill Factor."

Loose Material	Fill factor
Mixed moist aggregates . . . . .	95-100%
Uniform aggregates up to 3 mm (1/8 in) . . . . .	95-100
3 mm (1/8 in) to 9 mm (3/8 in) . . . . .	90-95
12 mm (1/2 in) to 20 mm (3/4 in) . . . . .	85-90
24 mm (1.0 in) and over . . . . .	85-90

## Wheel Loaders

### Machine Selection

- Bucket Fill Factors
- Example Problem

#### Blasted Rock

Well blasted . . . . .	80-95%
Average . . . . .	75-90
Poor . . . . .	60-75

#### Other

Rock dirt mixtures . . . . .	100-120%
Moist loam . . . . .	100-110
Soil, boulders, roots . . . . .	80-100
Cemented materials . . . . .	85-95

**NOTE:** Fill factors on wheel loaders are affected by bucket penetration, breakout force, rack back angle, bucket profile and ground engaging tools such as bucket teeth or bolt-on replaceable cutting edges.

#### Example:

12 mm (1/2 in) material and 3 m<sup>3</sup> (4 yd<sup>3</sup>) bucket.  
 0.90 × 3 m<sup>3</sup> = 2.75 Loose m<sup>3</sup> delivered per cycle.  
 0.90 × 4 yd<sup>3</sup> = 3.6 Loose yd<sup>3</sup> delivered per cycle.

**NOTE:** Check the static tipping load on the specific machine to determine if bucket load is in fact a safe operating load.

#### Bucket Selection

$$\text{Tons Required/Cycle} = \frac{\text{Tons Required/Hour}}{\text{Cycles/Hour}}$$

$$\frac{\text{Kg (Pounds) Required/Cycle}}{\text{kg (2000 lb)}} = \frac{\text{Tons Required/Cycle}}{\text{kg (2000 lb)}}$$

$$\text{Volume Required/Cycle} = \frac{\text{kg (Pounds) Cycle}}{\text{Material Weight kg/m}^3 \text{ (lb/yd}^3\text{)}}$$

Always select a machine with a greater capacity than the calculated required operating capacity. For most applications, payload above recommended and excessive counterweight can hinder machine performance and reduce dynamic stability and machine life.

For optimum performance in fast cycling situations such as truck loading, operating loads should not exceed the recommended capacity. To provide extra stability, calcium chloride (CaCl<sub>2</sub>) ballast may be desired when operating at recommended operating load, see SAE Loader rating pages in this section.

When selecting special application buckets, such as multi-purpose and side dump the additional bucket weight must be deducted from recommended capacity.

Specific circumstances may involve other conditions which would also affect loader capacity. Because of the greatly varied applications and conditions, your Cat dealer should be contacted for guidance.

#### Example problem:

#### JOB CONDITIONS

Application	Truck loading
Production Required	450 metric ton (496 Tons) per hour
Material	9 mm (3/8") gravel in 6 m (20 ft) high stockpile
Density	1660 kg/m <sup>3</sup> (2800 lb/yd <sup>3</sup> )

Trucks are 6-9 m<sup>3</sup> (8-12 yd<sup>3</sup>) capacity and are owned by three contractors. Loading is constant. Hard level surface for loader maneuvering.

1. **PRODUCTION REQUIRED:** Given
2. **CYCLE TIME:** Assume loader size between 910K and 962H for initial choice of basic cycle.

(Refer to Cycle Time Factors in this section)

Independent trucks	.04 min
Basic Cycle	.50 min
Material	-.02 min
Independent trucks	+.04 min
Constant operation	-.02 min
Total Cycle	.50 min

**NOTE:** Load and carry times not required in total cycle.

$$\begin{aligned} \text{Cycles/hr at 83\% efficiency} &= \frac{50 \text{ min actual work time}}{60 \text{ min per hr}} \\ &= 120 \text{ cycles/hr} \times \frac{1}{1.2} \\ &= 100 \text{ cycles/hr} \end{aligned}$$

3. **VOLUME REQUIRED PER CYCLE**

(Density in tons)

Density in this example was given. When not given, refer to Tables Section to obtain an estimated density for the material being handled.

$$\text{Metric: } \frac{1660 \text{ kg/m}^3}{1000 \text{ kg/ton}} = 1.66 \text{ ton/m}^3$$

$$\text{English: } \frac{2800 \text{ lb/yd}^3}{2000 \text{ lb/ton}} = 1.4 \text{ tons/yd}^3$$

**Production Rate Required**

$$\text{Metric: } \frac{450 \text{ tons/hr}}{1.66 \text{ tons/m}^3} = 271 \text{ m}^3/\text{hr}$$

$$\text{English: } \frac{496 \text{ tons/hr}}{1.4 \text{ tons/yd}^3} = 354 \text{ yd}^3/\text{hr}$$

**Volume Required per Cycle**

$$\text{Metric: } \frac{271 \text{ m}^3/\text{hr}}{100 \text{ cycles/hr}} = 2.71 \text{ m}^3/\text{cycle}$$

$$\text{English: } \frac{354 \text{ yd}^3/\text{hr}}{100 \text{ cycles/hr}} = 3.54 \text{ yd}^3/\text{cycle}$$

4. **DETERMINE BUCKET SIZE**

**BUCKET FILL FACTOR**

The volume of material required per cycle has been determined. Because of varying material fill factors, buckets do not always carry their rated load, a larger capacity bucket may be needed to carry the volume required. For fill factors, refer to Bucket Fill Factor Chart in this section.

Rated Bucket Capacity Required (Heaped)

$$\frac{2.71 \text{ m}^3/\text{cycle}}{0.95 \text{ fill factor}} = 2.85 \text{ m}^3$$

$$\frac{3.54 \text{ yd}^3/\text{cycle}}{0.95 \text{ fill factor}} = 3.73 \text{ yd}^3$$

A 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) bucket would provide the required capacity.

5. **MACHINE SELECTION**

The bucket size required and material density lead to the choice of a 950H with a 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) General Purpose Bucket (see bucket selection guide pages which follow.)

Finally, SAE payload criteria must be satisfied as follows:

The required operating capacity must not exceed one-half of the full turn static tipping load of the loader as equipped with a specific bucket.

The required operating capacity of the machine is determined by the volume the machine will carry per load times the density.

$$2.9 \text{ m}^3 \times 1660 \text{ kg/m}^3 = 4814 \text{ kg}$$

$$(3.75 \text{ yd}^3 \times 2800 \text{ lb/yd}^3 = 10,500 \text{ lb})$$

One half of full turn static tipping load for the 950H with a 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) General Purpose Bucket is 5410 kg (11,925 lb). SAE criteria is satisfied.



**An Alternative Method of Machine Selection**

Another method of selecting the right Wheel Loader and bucket to meet production requirements is by use of the nomographs on the following pages. The method is quicker and easier than the preceding example because it does not require as many calculations, yet the accuracy is about the same within the normal limits of input data.

Be careful when entering and reading data from the nomographs because some scales increase from bottom to top, while others are the reverse. Do not be overly concerned with the precision as affected by pencil line width or reading to the hundredth of a m<sup>3</sup> (yd<sup>3</sup>). Remember that bucket fill factor, material density and cycle time are at best close estimates.

Example problem:

A Wheel Loader must produce 230 m<sup>3</sup> (300 yd<sup>3</sup>) per hour in a truck loading application. Estimated cycle time is .6 minutes, working 45 minutes per hour. Bucket fill factor is 95% and material density is 1780 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>).

Determine bucket size and machine model.

Solution:

At full efficiency, the Wheel Loader will cycle 100 times per hour. Since only an average of 45 minutes are available, only 75 cycles will be completed.

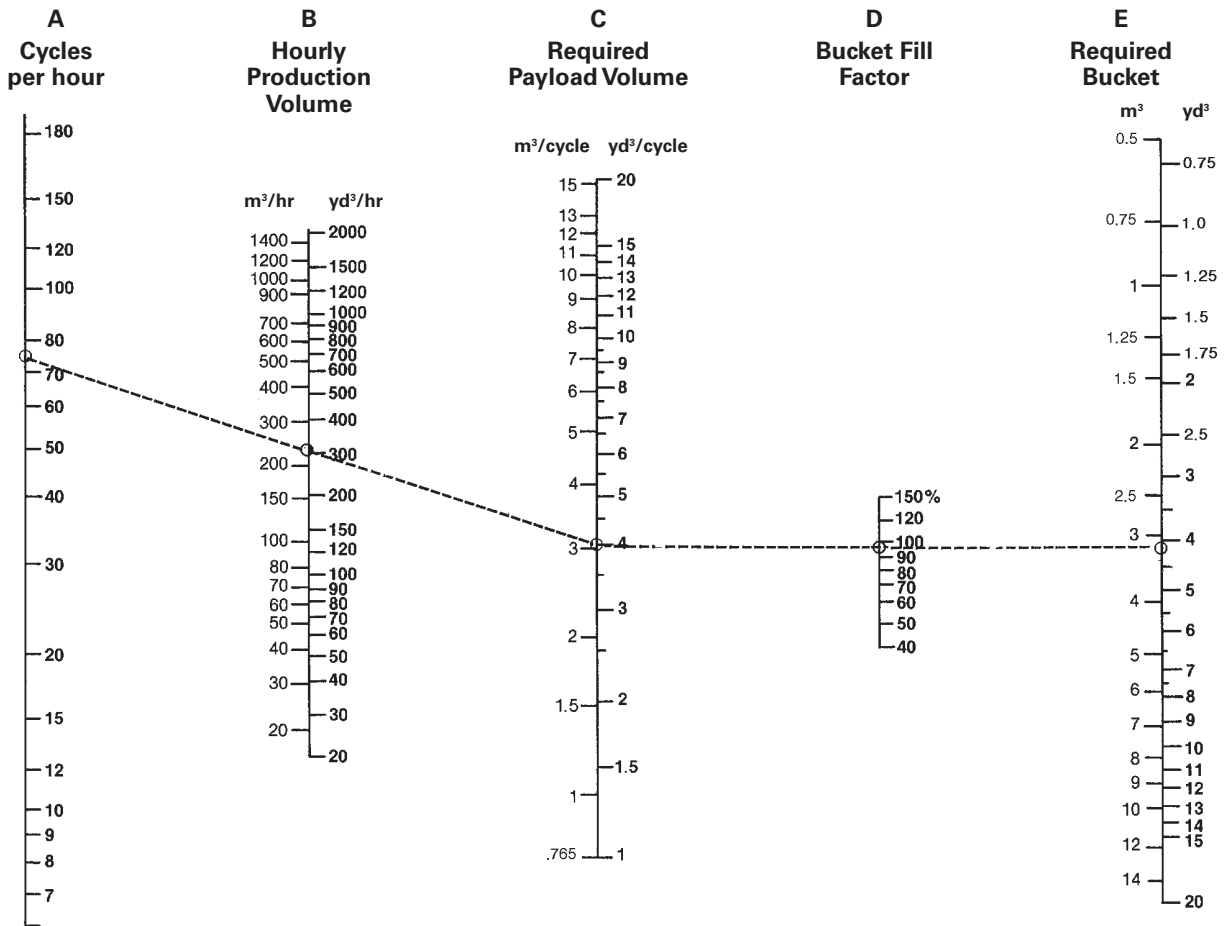
Starting on Scale A at 75 cycles per hour draw a straight line intersecting 230 m<sup>3</sup>/hr (300 yd<sup>3</sup>/hr) on Scale B and extending it on to Scale C giving 3 m<sup>3</sup>/cycle (4 yd<sup>3</sup>/cycle) required payload. Follow solution steps 1-10.

# Wheel Loaders

## Production and Machine Selection Nomograph

- To find required bucket payload and bucket size

1. Enter required hourly production on Scale B 230 m<sup>3</sup>/hr (300 yd<sup>3</sup>/hr).
2. Enter cycles per hour on Scale A (60 ÷ .6 = 100 × .75 = 75 cycles/hr).
3. Connect A through B to C. This shows a required payload of 3 m<sup>3</sup> (4 yd<sup>3</sup>) per cycle.
4. Enter estimated bucket fill factor on Scale D (0.95).
5. Connect C through Scale D to E for required bucket size 3 m<sup>3</sup> (4 yd<sup>3</sup>).
6. Transfer cycles per hour Scale A and required payload Scale C to the following page.





# Production and Machine Selection Nomograph

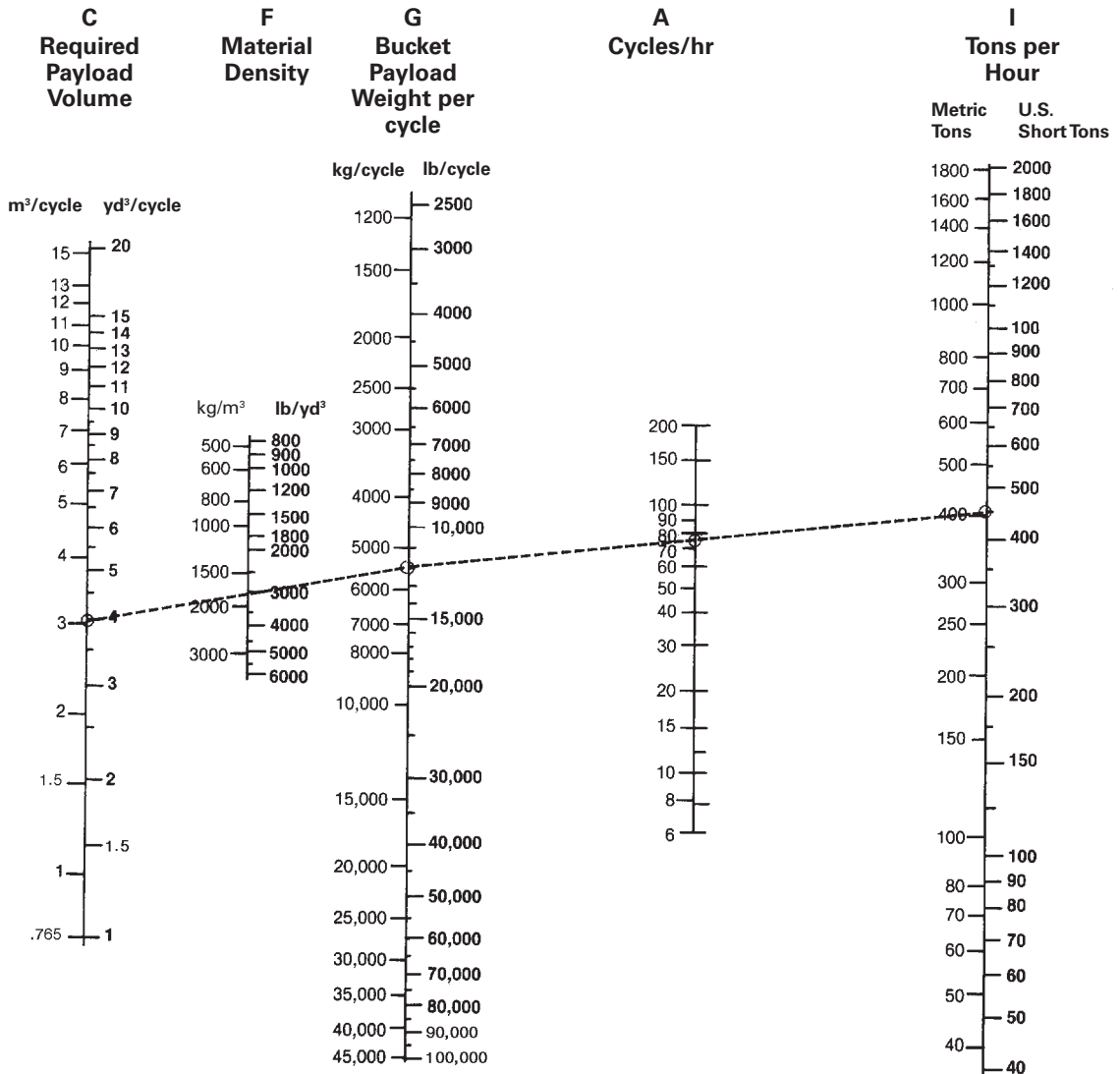
# Wheel Loaders

- To find payload weight and tons per hour

- Enter material density on Scale F 1780 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>).
- Connect C through Scale F to Scale G to give payload weight per cycle 5300 kg (11,500 lb).
- Compare Scale G quantity 5300 kg (11,500 lb) with recommended machine working range listed on the following bucket selection pages.

Operating capacity for the 950H with 3.1 m<sup>3</sup> (4 yd<sup>3</sup>) bucket is dependent on material density and bucket capacity (see bucket selection pages that follow).

- For hourly tonnage, draw a straight line from Scale G through Scale A to Scale I 400 metric tons (450 U.S. tons).



**TYPICAL FIXED TIMES FOR SCRAPERS**  
(Times may vary depending on job conditions)

Model	Loaded By	Load Time (Min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613G	Self	0.9	0.7
623K	Self	0.9	0.7
621K	One D8	0.5	0.7
627K	One D8	0.5	0.6
621K	One D9	0.4	0.7
627K	One D9	0.4	0.6
627K/PP	Self	0.9*	0.6
631K	One D9	0.6	0.7
637K	One D9	0.6	0.6
631K	One D10	0.5	0.7
637K	One D10	0.5	0.6
637K/PP	Self	1.0*	0.6
657	One D11	0.6	0.6
657	Push Pull Self	1.1*	0.6
637K	Coal	0.8	0.7
657	Coal	0.8	0.6

\*Load time per pair, including transfer time.

**NOTE:** Empty Weights shown on the Wheel Tractor-Scraper charts includes ROPS Canopy. When calculating TMPH loadings any additional weight must be considered in establishing mean tire loads.

**USE OF RETARDER CURVES**

*The following explanation applies to retarder curves for Wheel Tractor-Scrapers and Articulated Trucks.*

The speed that can be maintained (without use of service brake) when the machine is descending a grade with retarder fully on can be determined from the retarder curves in this section if gross machine weight and total effective grade are known.

**Total Effective Grade (or Total Resistance)** is grade assistance *minus* rolling resistance.

10 kg/metric ton (20 lb/U.S. ton) = 1% adverse grade.

Example

15% favorable grade with 5% rolling resistance. Find Total Effective Grade.

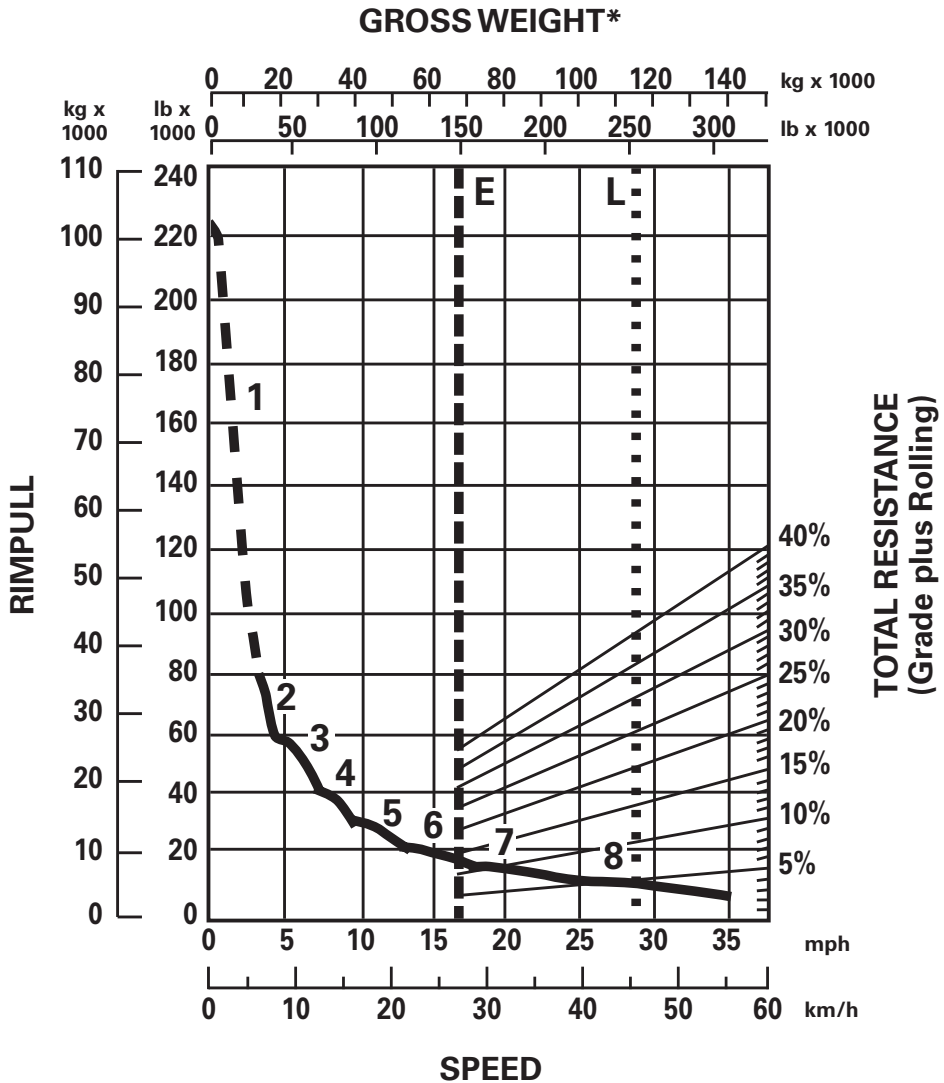
$$\text{Total Effective Grade} = 15\% \text{ Grade Assistance} - 5\%$$

$$\text{Rolling Resistance} = 10\% \text{ Total Effective Grade Assistance.}$$

Example problem:

A 651 with an estimated payload of 47 175 kg (104,000 lb) descends a 10% total effective grade. Find constant speed and gear range with maximum retarder effort. Find travel time if the slope is 610 m (2000 ft) long.

$$\begin{aligned} \text{Empty Weight} + \text{Payload} &= \text{Gross Weight} \\ &= 60\,950 \text{ kg} + 47\,175 \text{ kg} = 108\,125 \text{ kg} \\ &= (134,370 \text{ lb} + 104,000 \text{ lb} = 238,370 \text{ lb}) \end{aligned}$$



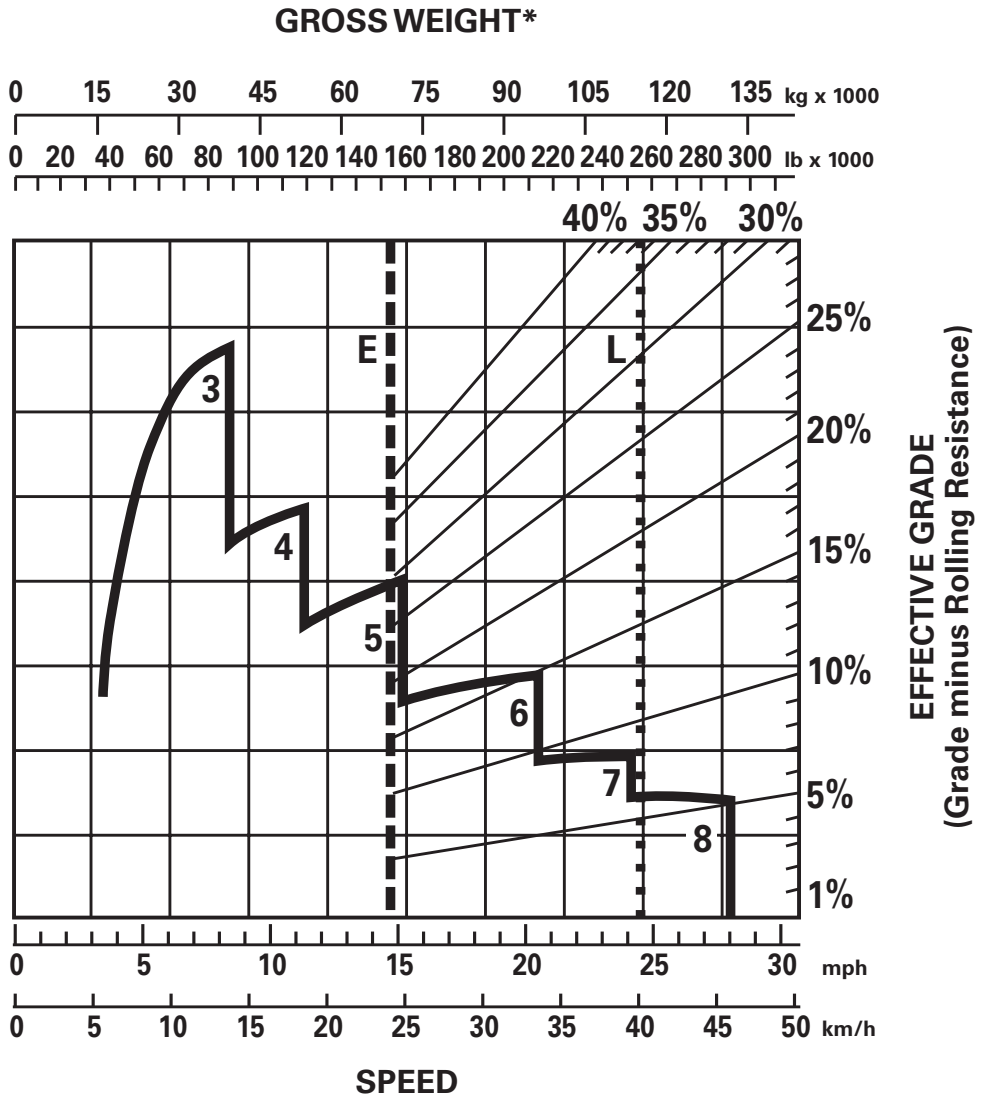
\*at sea level

**KEY**

- 1 — 1st Gear Torque Converter Drive
- 2 — 2nd Gear Torque Converter Drive
- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

**KEY**

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)



\*at sea level

**KEY**

- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

**KEY**

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)

# Tables

## SPEED CONVERSION

km/h Equivalents in m/min				MPH Equivalents in FPM			
km/h	m/min	km/h	m/min	mph	fpm	mph	fpm
1	16.7	21	350.0	1	88	21	1848
2	33.3	22	366.7	2	176	22	1936
3	50.0	23	383.3	3	264	23	2024
4	66.7	24	400.0	4	352	24	2112
5	83.3	25	416.7	5	440	25	2200
6	100.0	26	433.3	6	528	26	2288
7	116.7	27	450.0	7	616	27	2376
8	133.3	28	466.7	8	704	28	2464
9	150.0	29	483.3	9	792	29	2552
10	166.7	30	500.0	10	880	30	2640
11	183.3	31	516.7	11	968	31	2728
12	200.0	32	533.3	12	1056	32	2816
13	216.7	33	550.0	13	1144	33	2904
14	233.3	34	566.7	14	1232	34	2992
15	250.0	35	583.3	15	1320	35	3080
16	266.7	36	600.0	16	1408	36	3168
17	283.3	37	616.7	17	1496	37	3256
18	300.0	38	633.3	18	1584	38	3344
19	316.7	39	650.0	19	1672	39	3432
20	333.3	40	666.7	20	1760	40	3520

**NOTE:** Since 1 km/h equals 16.7 m/min (1000 ÷ 60), to interpolate add 1.67 m/min for each 0.1 km/h.

**NOTE:** Since 1 mph equals 88 fpm (5280 ÷ 60), to interpolate add 8.8 fpm for every 0.1 mph.

1 mph = 26.9 m/min.

## BEARING POWERS

MATERIAL	BEARING POWER			
	Bar	lb/in <sup>2</sup>	Metric t/m <sup>2</sup>	U.S. tons/ft <sup>2</sup>
Rock (semi- shattered) . . . . .	4.8	70	50	5
Rock (solid) . . . . .	24.1	350	240	24
Clay, dry . . . . .	3.8	55	40	4
medium dry . . . . .	1.9	27	20	2
soft . . . . .	1.0	14	10	1
Gravel, cemented . . . . .	7.6	110	80	8
Sand, compact dry . . . . .	3.8	55	40	4
clean dry . . . . .	1.9	27	20	2
Quicksand & alluvial soil . . . . .	0.5	7	5	0.5

## AGRICULTURAL COMMODITIES CONVERSION FACTORS

	lb	kg	Metric Ton
1 Bushel of Corn*	56	25.40	0.02540
1 Bushel of Soybean*	60	27.22	0.02721
1 Bushel of Oats*	32	14.51	0.01451
1 Bushel of Wheat*	60	27.22	0.02721
1 Bale of Cotton	478	216.81	0.21681
1 metric ton of Corn		39.37 Bushels*	
1 metric ton of Soybean		36.75 Bushels*	
1 metric ton of Oats		68.92 Bushels*	
1 metric ton of Wheat		36.75 Bushels*	
1 metric ton of Cotton		4.61 Bales	

\*Bushel is a volume measurement, 1 Bushel = 35.24 liters = 9.31 U.S. Gallons. In the agricultural mercantile exchange, the Bushel is widely used for grains as weight. For the above weights, the market assumes a standard density for each type of grain.

# **Caterpillar Performance Handbook**

# **49**

**CATERPILLAR<sup>®</sup>**

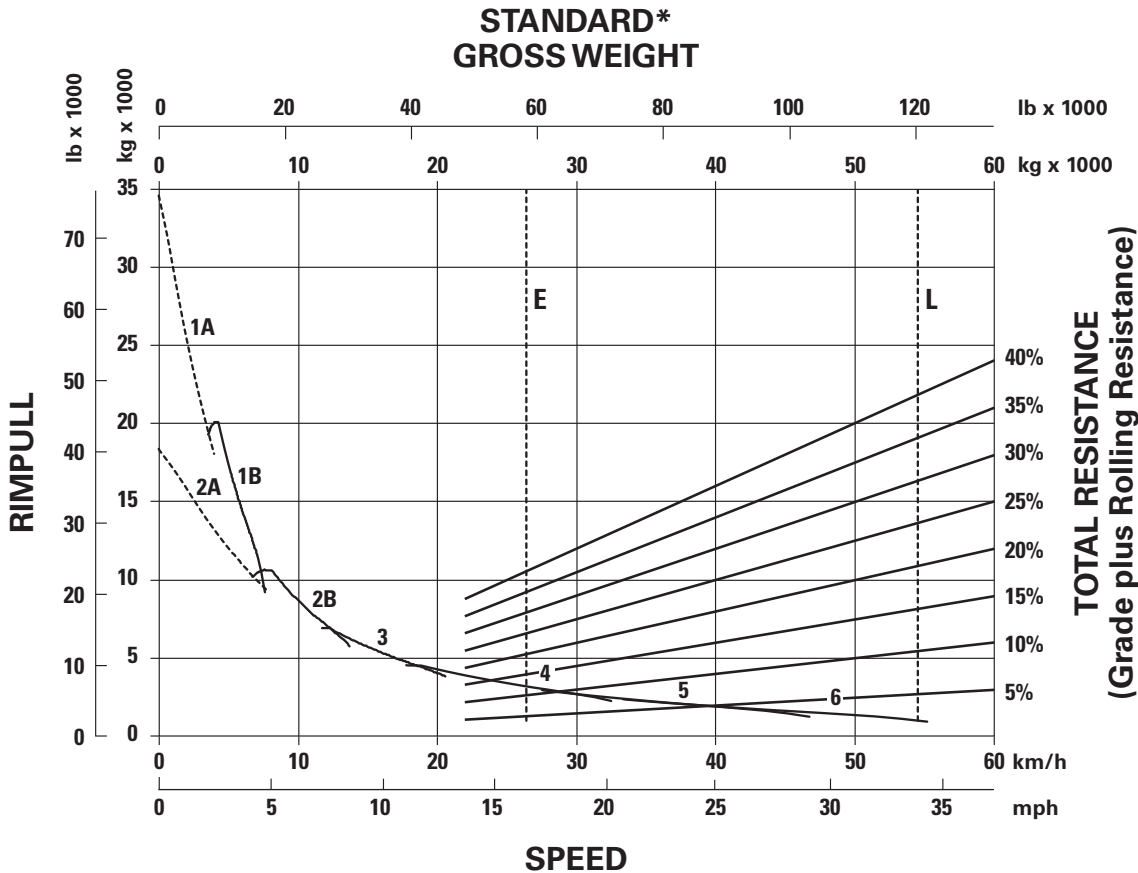
<b>MODEL</b>	<b>725C2</b>		<b>730C2</b>		<b>730C2 EJ</b>	
Gross Power — SAE J1995	239 kW	<b>320 hp</b>	280 kW	<b>375 hp</b>	280 kW	<b>375 hp</b>
Net Power — SAE J1349	234 kW	<b>314 hp</b>	274 kW	<b>367 hp</b>	274 kW	<b>367 hp</b>
Net Power — ISO 14396	236 kW	<b>316 hp</b>	276 kW	<b>370 hp</b>	276 kW	<b>370 hp</b>
Operating Weight (Empty)*	23 040 kg	<b>50,795 lb</b>	23 725 kg	<b>52,305 lb</b>	26 395 kg	<b>57,277 lb</b>
Top Speed (Loaded)	55 km/h	<b>34 mph</b>	55 km/h	<b>34 mph</b>	55 km/h	<b>34 mph</b>
Gross Machine Weight	47 040 kg	<b>103,707 lb</b>	51 725 kg	<b>114,034 lb</b>	54 515 kg	<b>119,270 lb</b>
Distribution Empty:						
Front		<b>63%</b>		<b>62%</b>		<b>59%</b>
Center		<b>19%</b>		<b>19%</b>		<b>21%</b>
Rear		<b>18%</b>		<b>19%</b>		<b>20%</b>
Distribution Loaded:						
Front		<b>36%</b>		<b>34%</b>		<b>30%</b>
Center		<b>32%</b>		<b>33%</b>		<b>35%</b>
Rear		<b>32%</b>		<b>33%</b>		<b>35%</b>
Max. Capacity**	24.0 t	<b>26.5 T</b>	28 t	<b>31 T</b>	28 t	<b>31 T</b>
Struck (SAE)	11 m <sup>3</sup>	<b>14.4 yd<sup>3</sup></b>	13.3 m <sup>3</sup>	<b>17.4 yd<sup>3</sup></b>	13.5 m <sup>3</sup>	<b>17.7 yd<sup>3</sup></b>
Heaped (2:1) (SAE)	15 m <sup>3</sup>	<b>19.6 yd<sup>3</sup></b>	17.5 m <sup>3</sup>	<b>23 yd<sup>3</sup></b>	16.9 m <sup>3</sup>	<b>22.1 yd<sup>3</sup></b>
Tailgate Heaped SAE 2:1	15.6 m <sup>3</sup>	<b>20.4 yd<sup>3</sup></b>	18.8 m <sup>3</sup>	<b>24.6 yd<sup>3</sup></b>	—	—
Tailgate Struck	11.1 m <sup>3</sup>	<b>14.5 yd<sup>3</sup></b>	13.9 m <sup>3</sup>	<b>18.2 yd<sup>3</sup></b>	—	—
Engine Model	<b>C9.3 ACERT</b>		<b>C13 ACERT</b>		<b>C13 ACERT</b>	
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Bore	115 mm	<b>4.53"</b>	130 mm	<b>5.12"</b>	130 mm	<b>5.12"</b>
Stroke	149 mm	<b>5.87"</b>	157 mm	<b>6.18"</b>	157 mm	<b>6.18"</b>
Displacement	9.3 L	<b>567 in<sup>3</sup></b>	12.5 L	<b>763 in<sup>3</sup></b>	12.5 L	<b>763 in<sup>3</sup></b>
Tires	<b>23.5R25</b>		<b>23.5R25</b>		<b>750/65/R26</b>	
Clearance Radius	8075 mm	<b>317.9"</b>	8075 mm	<b>317.9"</b>	8075 mm	<b>317.9"</b>
Fuel Tank Refill Capacity	412 L	<b>108.8 U.S. gal</b>	412 L	<b>108.8 U.S. gal</b>	412 L	<b>108.8 U.S. gal</b>
DEF Tank Capacity	20 L	<b>5.3 U.S. gal</b>	20 L	<b>5.3 U.S. gal</b>	20 L	<b>5.3 U.S. gal</b>
<b>General Dimensions (Empty):</b>						
Height to Cab Top	3482 mm	<b>137.1"</b>	3482 mm	<b>137.1"</b>	3461 mm	<b>136"</b>
Overall Length	10 547 mm	<b>415.2"</b>	10 555 mm	<b>415.6"</b>	10 376 mm	<b>408.5"</b>
Loading Height (Empty)	2725 mm	<b>107.3"</b>	2911 mm	<b>114.6"</b>	3025 mm	<b>119.1"</b>
Height at Full Dump	6306 mm	<b>248.3"</b>	6464 mm	<b>254.5"</b>	—	—
Body Length	5696 mm	<b>224.3"</b>	5783 mm	<b>227.7"</b>	5340 mm	<b>210.2"</b>
Width (Operating — Over Mirrors)	3704 mm	<b>145.8"</b>	3704 mm	<b>145.8"</b>	3704 mm	<b>145.8"</b>

\*Includes coolant, lubricant and full fuel tank.

\*\*Rating dependent on optional equipment. Maximum gross weight (empty weight plus payload) should not be exceeded.

● 750/65/R26 Tires

● Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final)



**KEY**

- 1A — 1st Gear (Converter Drive)
- 1B — 1st Gear (Direct Drive)
- 2A — 2nd Gear (Converter Drive)
- 2B — 2nd Gear (Direct Drive)
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear

**KEY**

- E — Empty 26 395 kg (58,190 lb)
- L — Loaded 54 515 kg (120,186 lb)

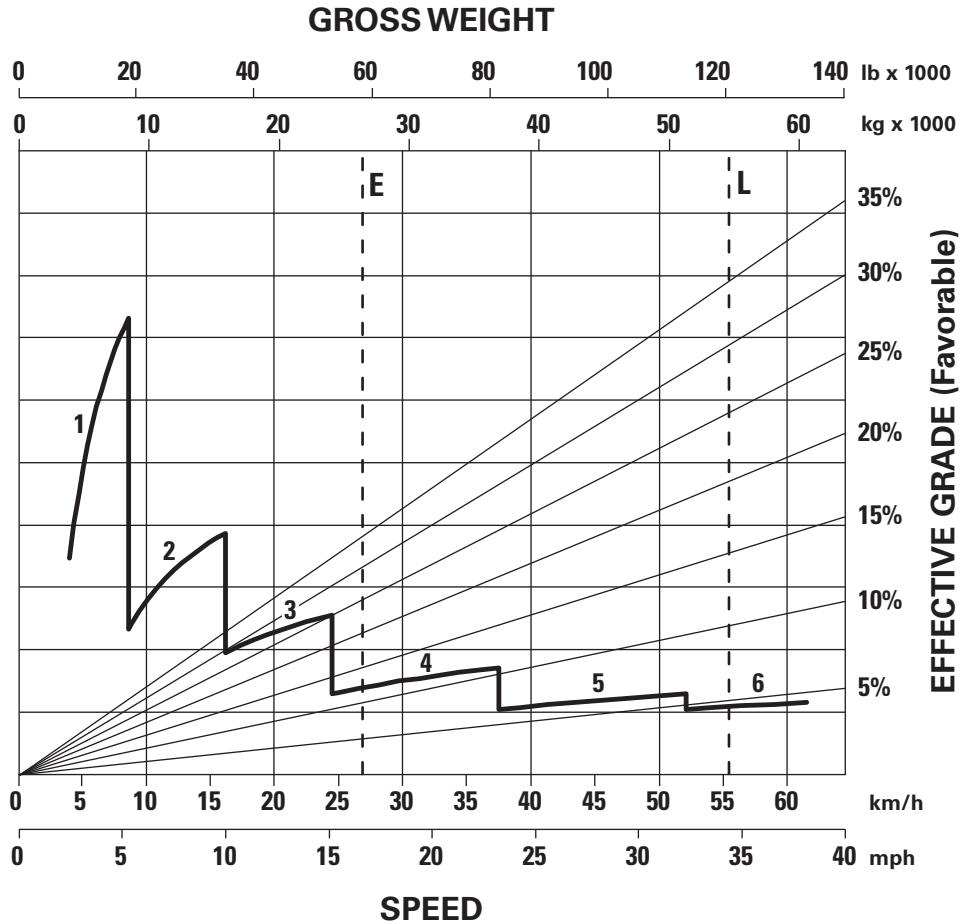
\*At sea level.



# Articulated Trucks

## 730C2 EJ Brake/Retarder Performance Curve

- 750/65/R26 Tires
- Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final)



### KEY

- 1 — 1st Gear
- 2 — 2nd Gear
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear

### KEY

- E — Empty 26 395 kg (58,190 lb)
- L — Loaded 54 515 kg (120,186 lb)

<b>MODEL</b>	<b>320D2</b>		<b>320D2 GC</b>		<b>320D2 L</b>	
Region Offerings	<b>Asia Pacific, China, Latin America</b>		<b>Africa, Middle East, CIS Asia Pacific, China, Latin America</b>		<b>Africa, Middle East, CIS Asia Pacific, China, Latin America</b>	
Engine Power:	<b>N/A</b>		<b>N/A</b>		<b>N/A</b>	
ISO 9249						
SAE J1349	109 kW	<b>146 hp</b>	80 kW	<b>107 hp</b>	109 kW	<b>146 hp</b>
Operating Weight*	20 900- 21 700 kg	<b>46,100- 49,200 lb</b>	20 000- 20 600 kg	<b>44,100- 45,400 lb</b>	21 400- 22 300 kg	<b>47,200- 49,200 lb</b>
Bucket Capacity Range (heaped)	1.0-1.56 m <sup>3</sup>	<b>1.3-2.04 yd<sup>3</sup></b>	0.9 m <sup>3</sup>	<b>1.17 yd<sup>3</sup></b>	1.0-1.56 m <sup>3</sup>	<b>1.3-2.04 yd<sup>3</sup></b>
Engine Model	<b>C7.1</b>		<b>C4.4</b>		<b>C7.1 ACERT</b>	
Emission Standards	<b>Tier 3/Stage III Equivalent/ China Nonroad Stage III</b>		<b>Tier 3/Stage III Equivalent/ China Nonroad Stage III</b>		<b>Tier 3/Stage III Equivalent/ China Nonroad Stage III</b>	
Rated Engine RPM	<b>1800</b>		<b>1800</b>		<b>1800</b>	
No. of Cylinders	<b>6</b>		<b>4</b>		<b>6</b>	
Bore	105 mm	<b>4.1"</b>	105 mm	<b>4.13"</b>	105 mm	<b>4.1"</b>
Stroke	135 mm	<b>5.3"</b>	127 mm	<b>5.00"</b>	135 mm	<b>5.3"</b>
Displacement	7.01 L	<b>428 in<sup>3</sup></b>	4.4 L	<b>269 in<sup>3</sup></b>	7.01 L	<b>428 in<sup>3</sup></b>
Max. Implement Hydraulic Pump Output at Rated RPM	2 × 202 L/min	<b>2 × 53.36 gpm</b>	2 × 214 L/min	<b>2 × 56.55 gpm</b>	2 × 202 L/min	<b>2 × 53.36 gpm</b>
Relief Valve Settings:						
Implement Circuits	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>
Travel Circuits	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>	—	
Swing Circuits	25 000 kPa	<b>3626 psi</b>	25 000 kPa	<b>3626 psi</b>	35 000 kPa	<b>5076 psi</b>
Pilot Circuits	3900 kPa	<b>566 psi</b>	3900 kPa	<b>566 psi</b>	25 000 kPa	<b>3626 psi</b>
Maximum Drawbar Pull	205 kN	<b>46,086 lbf</b>	206 kN	<b>46,311 lbf</b>	3900 kPa	<b>566 psi</b>
					205 kN	<b>46,086 lbf</b>
Maximum Travel Speed at Rated RPM	5.4 km/h	<b>3.3 mph</b>	5.8 km/h	<b>3.6 mph</b>	5.4 km/h	<b>3.3 mph</b>
Width of Standard Track Shoe	600 mm	<b>2'0"</b>	600 mm	<b>2'0"</b>	600 mm	<b>2'0"</b>
Overall Track Length	4080 mm	<b>13'5"</b>	4080 mm	<b>13'5"</b>	4460 mm	<b>14'8"</b>
Ground Contact Area with Std. Shoe	4.3 m <sup>2</sup>	<b>6600 in<sup>2</sup></b>	4.3 m <sup>2</sup>	<b>6600 in<sup>2</sup></b>	4.7 m <sup>2</sup>	<b>7285 in<sup>2</sup></b>
Track Gauge	2200 mm	<b>7'3"</b>	2200 mm	<b>7'3"</b>	2380 mm	<b>7'10"</b>
Fuel Tank Refill Capacity	410 L	<b>108.3 U.S. gal</b>	410 L	<b>108.3 U.S. gal</b>	410 L	<b>108.3 U.S. gal</b>
Hydraulic System (includes tank)	260 L	<b>68.7 U.S. gal</b>	260 L	<b>68.7 U.S. gal</b>	260 L	<b>68.7 U.S. gal</b>

\*Operating weight includes coolant, lubricants, full fuel tank, standard shoes, bucket and operator 75 kg (165 lb).

**NOTE:** Certain models may not be available in all Sales areas.

Specifications also vary by Sales area.

Contact your Cat dealer for details.

MODEL	320E		320E L		320E LRR	
Region Offerings	Japan		Japan		North America	
Engine Power:						
ISO 9249	114 kW	<b>153 hp</b>	114 kW	<b>153 hp</b>	N/A	
SAE J1349	107 kW	<b>144 hp</b>	107 kW	<b>144 hp</b>	114 kW	<b>153 hp</b>
Operating Weight*	21 700- 24 700 kg	<b>47,840- 54,500 lb</b>	21 700- 23 500 kg	<b>47,840- 51,800 lb</b>	23 700- 25 600 kg	<b>52,250- 56,440 lb</b>
Bucket Capacity Range (heaped)	0.8-1.0 m <sup>3</sup>	<b>1.05-1.31 yd<sup>3</sup></b>	0.46-1.43 m <sup>3</sup>	<b>0.6-1.87 yd<sup>3</sup></b>	0.55-1.59 m <sup>3</sup>	<b>0.72-2.08 yd<sup>3</sup></b>
Engine Model	<b>C6.6 ACERT</b>		<b>C6.6 ACERT</b>		<b>C6.6 ACERT</b>	
Emission Standards	<b>Japan 2011 (Tier 4 Interim) Equivalent</b>		<b>Japan 2011 (Tier 4 Interim) Equivalent</b>		<b>Tier 4 Interim Equivalent</b>	
Rated Engine RPM	<b>1800</b>		<b>1800</b>		<b>1800</b>	
No. of Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Bore	105 mm	<b>4.1"</b>	105 mm	<b>4.1"</b>	105 mm	<b>4.1"</b>
Stroke	127 mm	<b>5.0"</b>	127 mm	<b>5.0"</b>	127 mm	<b>5.0"</b>
Displacement	6.6 L	<b>403 in<sup>3</sup></b>	6.6 L	<b>403 in<sup>3</sup></b>	6.6 L	<b>403 in<sup>3</sup></b>
Max. Implement Hydraulic Pump Output at Rated RPM	428 L/min	<b>113.1 gpm</b>	428 L/min	<b>113.1 gpm</b>	428 L/min	<b>113.1 gpm</b>
Relief Valve Settings:						
Implement Circuits	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>
Heavy Lift	38 000 kPa	<b>5511 psi</b>	38 000 kPa	<b>5511 psi</b>	38 000 kPa	<b>5511 psi</b>
Travel Circuits	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>	35 000 kPa	<b>5076 psi</b>
Swing Circuits	25 000 kPa	<b>3626 psi</b>	25 000 kPa	<b>3626 psi</b>	25 000 kPa	<b>3626 psi</b>
Pilot Circuits	3920 kPa	<b>569 psi</b>	3920 kPa	<b>569 psi</b>	3920 kPa	<b>569 psi</b>
Maximum Drawbar Pull	205 kN	<b>46,086 lbf</b>	205 kN	<b>46,086 lbf</b>	205 kN	<b>46,086 lbf</b>
Maximum Travel Speed at Rated RPM	5.6 km/h	<b>3.5 mph</b>	5.6 km/h	<b>3.5 mph</b>	5.6 km/h	<b>3.5 mph</b>
Width of Standard Track Shoe	600 mm	<b>24"</b>	600 mm	<b>24"</b>	790 mm	<b>31"</b>
Overall Track Length	4075 mm	<b>14'7"</b>	4460 mm	<b>14'6"</b>	4460 mm	<b>14'7"</b>
Ground Contact Area with Std. Shoe	4.3 m <sup>2</sup>	<b>6600 in<sup>2</sup></b>	4.7 m <sup>2</sup>	<b>7300 in<sup>2</sup></b>	6.2 m <sup>2</sup>	<b>9600 in<sup>2</sup></b>
Track Gauge	2200 mm	<b>7'3"</b>	2380 mm	<b>7'10"</b>	2380 mm	<b>7'10"</b>
Fuel Tank Refill Capacity	410 L	<b>108.3 U.S. gal</b>	410 L	<b>108.3 U.S. gal</b>	290 L	<b>76.6 U.S. gal</b>
Hydraulic System (includes tank)	260 L	<b>68.7 U.S. gal</b>	260 L	<b>68.7 U.S. gal</b>	205 L	<b>54.2 U.S. gal</b>

\*Operating weight includes coolant, lubricants, full fuel tank, standard shoes, bucket and operator 75 kg (165 lb).

**NOTE:** Certain models may not be available in all Sales areas.

Specifications also vary by Sales area.  
Contact your Cat dealer for details.

Region Offerings	320D2/320D2 L		320D2 GC	
	Africa, Middle East, Asia Pacific, China, Latin America		Africa, Middle East, CIS, Asia Pacific, China, Latin America	
Buckets: (see data in bucket section)	kg	lb	kg	lb
<b>Booms:*</b>				
One-piece Reach	2150	4750	2000	4410
One-piece Reach HD	2510	5540	—	—
<b>Sticks:** (for Reach Boom)</b>				
Short Stick	950	2090	—	—
Short Stick HD	1070	2360	—	—
Medium Stick	970	2140	980	2160
Medium Stick HD	1140	2510	—	—
Long Stick	1220	2690	—	—
Long Stick HD	1000	2200	—	—
<b>Booms:*</b>				
One-piece Mass	2180	4810	—	—
<b>Sticks:** (for Mass Boom)</b>				
Mass Stick	1020	2250	—	—
<b>Other:</b>				
Upperstructure (complete w/o cwtw)	6300	14,300	5930	13,080
Undercarriage				
( ) Shoe Width — Standard	(600 mm/24 in)		(600 mm/24 in)	
	6660	14,680	6250	13,780
	(700 mm/28 in)		(790 mm/31 in)	
	7000	15,430	7040	15,520
	(790 mm/31 in)		—	—
	7240	15,960	—	—
( ) Shoe Width — Long	(600 mm/24 in)		—	—
	7190	15,850	—	—
	(700 mm/28 in)		—	—
	7560	16,670	—	—
	(790 mm/31 in)		—	—
	7830	17,260	—	—
Counterweight — Standard	3700	8160	3700	8160

\*Boom weights include boom, boom lines, boom cylinders and rod end pins, stick cylinder and head end pin.

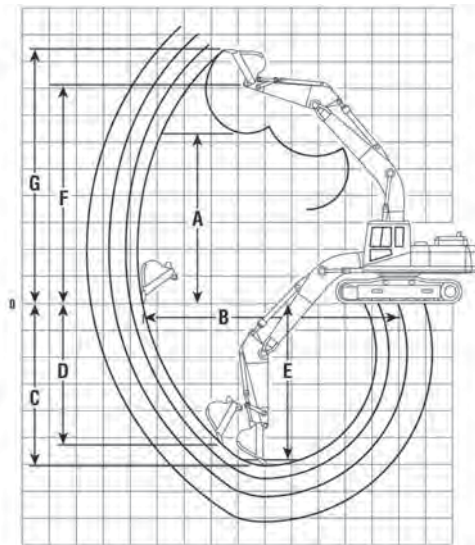
\*\*Stick weights include stick and stick lines.

Region Offerings	320E		320E LRR		320F L	
	Japan		North America		North America, Europe, Australia, New Zealand	
Buckets: (see data in bucket section)	kg	lb	kg	lb	kg	lb
<b>Booms:*</b>						
Boom HD	1720	<b>3790</b>	1720	<b>3790</b>	1740	<b>3240</b>
Boom ES	2010	<b>4430</b>	2010	<b>4430</b>	—	—
Boom HD for CGC	1730	<b>3810</b>	1730	<b>3810</b>	—	—
Boom ES for CGC	2020	<b>4450</b>	2020	<b>4450</b>	—	—
Super Long Reach	2400	<b>5290</b>	—	—	—	—
<b>Sticks:**</b>						
Medium Stick HD	680	<b>1510</b>	680	<b>1510</b>	680	<b>1500</b>
Medium Stick ES	840	<b>1850</b>	840	<b>1850</b>	—	—
Medium Stick HD for CGC	690	<b>1530</b>	690	<b>1530</b>	—	—
Medium Stick ES for CGC	850	<b>1870</b>	850	<b>1880</b>	—	—
Super Long Reach Stick	1240	<b>2740</b>	—	—	—	—
<b>Other:</b>						
Upperstructure (complete w/o ctwt)	11 300	<b>24,920</b>	6500	<b>14,330</b>	7000	<b>15,440</b>
Standard Undercarriage (std shoe)	6620	<b>14,590</b>	—	—	—	—
Long Undercarriage (std shoe)	7850	<b>17,300</b>	7850	<b>17,300</b>	7830	<b>17,270</b>
Counterweight — Standard	3550	<b>7830</b>	6200	<b>13,670</b>	3700	<b>8160</b>
— Super Long Reach	4600	<b>10,140</b>	—	—	—	—
— Heavy	5400	<b>11,910</b>	6900	<b>15,210</b>	—	—

\*Boom weights include boom, boom lines, boom cylinders and rod end pins, stick cylinder and head end pin.

\*\*Stick weights include stick and stick lines.

- 320E
- 320E L
- 320E RR
- 320E LRR
- 320F L
- 323D2 L
- 320D2
- 320D2 L
- 320D2 GC



### One-Piece Boom Digging Envelope

- Standard shoes and undercarriage

#### KEY:

- A** Maximum loading height of bucket with teeth
- B** Maximum reach at ground level
- C** Maximum digging depth
- D** Maximum vertical wall
- E** Maximum depth of cut for 2.44 m (8'0") level bottom (straight clean up)
- F** Maximum bucket hinge pin height
- G** Maximum height, to bucket teeth at highest arc

Stick	320D2, 320D2 L with Reach Boom				320D2 GC with Reach Boom		320E, 320E L, 320E RR, 320E LRR with Reach Boom			
	2.5 m	8'2"	2.9 m	9'6"	2.9 m	9'6"	2.9 m	9'6"	2.5 m	7'6"
	m	ft	m	ft	m	ft	mm	ft	mm	ft
<b>A</b>	6.36	20'10"	6.56	21'6"	6.57	21'7"	6490	21'4"	6300	20'8"
<b>B</b>	9.40	30'1"	9.79	32'1"	9.78	32'1"	9860	30'9"	9450	31'0"
<b>C</b>	6.24	20'6"	6.66	21'1"	6.64	21'9"	6720	22'1"	6290	20'8"
<b>D</b>	5.60	18'4"	6.01	19'7"	6.01	19'9"	5060	16'7"	5210	17'1"
<b>E</b>	6.04	19'1"	6.48	21'3"	6.47	21'3"	6550	21'6"	6100	20'0"
<b>F</b>	7.87	25'9"	8.06	26'5"	—	—	—	—	—	—
<b>G</b>	9.24	30'4"	9.45	31'0"	9.44	31'0"	9370	30'7"	9240	30'4"

Stick	320E L with Super Long Reach		320F L with Reach Boom		323D2 L with Reach Boom		323D2 L with Mass Boom	
	6.28 m	20'6"	2.9 m	9'6"	2.5 m	8'2"	2.9 m	9'6"
	mm	ft	m	ft	m	ft	m	ft
<b>A</b>	11 290	37'0"	6.49	21'4"	6.29	20'8"	6.49	21'4"
<b>B</b>	15 720	51'6"	9.86	32'4"	9.63	31'7"	9.86	32'4"
<b>C</b>	11 690	38'4"	6.72	22'1"	6.30	20'8"	6.72	22'1"
<b>D</b>	10 670	35'0"	5.06	16'7"	5.65	18'6"	5.69	18'8"
<b>E</b>	11 590	38'0"	6.55	21'6"	5.96	19'7"	6.38	20'11"
<b>F</b>	—	—	—	—	—	—	—	—
<b>G</b>	13 590	44'6"	9.37	30'9"	9.29	30'6"	9.49	31'0"

**Asia Pacific, China, Latin America**

**320D2 ● Reach Boom ● 600 mm (24") Track Shoes**

Stick	Bucket		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
			Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2500 mm	0.9 m <sup>3</sup>	kg	5850*	5850*	8800	5350	5600	3500	3950	2500	—	—	3050*	1900
8'2"	1.18 yd <sup>3</sup>	lb	13,450*	13,450	18,850	11,450	11,950	7500	8450	5300	—	—	6700*	4150
2900 mm	0.8 m <sup>3</sup>	kg	6600*	6600*	8900	5400	5600	3550	3950	2500	—	—	2650*	1800
9'6"	1.05 yd <sup>3</sup>	lb	15,050*	15,050*	19,050	11,600	12,050	7600	8500	5350	—	—	5750*	3900

**Africa, Middle East, CIS Asia Pacific, China, Latin America**

**320D2 GC ● 600 mm (24") Track Shoes ● Reach Boom ● No Bucket**

Stick			3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
			Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2900 mm		kg	6200*	6200*	8900	5550	5800	3750	4150	2750	—	—	3700	2450
9'6"		lb	14,300*	14,300*	19,150	11,950	12,400	8050	9000	5900	—	—	8100	5350

**320D2 GC ● 790 mm (31") Track Shoes ● Reach Boom ● No Bucket**

Stick			3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
			Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2900 mm		kg	6200*	6200*	9200	5700	5950	3850	4350	2850	—	—	3800	2500
9'6"		lb	14,300*	14,300*	19,700	12,300	12,800	8350	9300	6150	—	—	8350	5500

**Africa, Middle East, CIS, Asia Pacific, China, Latin America**

**320D2 L ● Reach Boom ● 600 mm (24") Track Shoes**

Stick	Bucket		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
			Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2500 mm	0.9 m <sup>3</sup>	kg	—	—	10,700*	6700	7350	4500	5300	3300	—	—	5000	3100
8'2"	1.2 yd <sup>3</sup>	lb	—	—	23,150*	14,350	15,800	9650	11,450	7150	—	—	10,950	6850
2900 mm	0.9 m <sup>3</sup>	kg	6350*	6350*	10,550	6700	7400	4500	5300	3300	—	—	4350*	2900
9'6"	1.2 yd <sup>3</sup>	lb	14,600*	14,600*	22,850*	14,450	15,850	9700	11,400	7100	—	—	9550*	6350

**320D2 L ● Reach Boom ● 790 mm (31") Track Shoes**

Stick	Bucket		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
			Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2500 mm	B1-1280X	kg	—	—	10,700*	6850	7550	4600	5450	3400	—	—	5100	3200
8'2"	4'2"	lb	—	—	23,150*	14,800	16,250	9950	11,750	7350	—	—	11,250	7050
2900 mm	B1-1220X	kg	6350*	6350*	10,550	6900	7600	4650	5450	3400	—	—	4350*	3000
9'6"	4'0"	lb	14,600*	14,600*	22,850*	14,850	16,300	9950	11,750	7300	—	—	9550*	6550

\*Load limited by hydraulic capacity rather than tipping.

**North America**

**320E LRR ● 790 mm (31") Track Shoes ● HD Boom ● No Bucket  
 ● Heavy Lift Mode On ● 6.9 mt Counterweight**

Stick		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
		Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2.9 m	kg	6600*	6600*	11 650	7950	8500*	5350	6250	4000	—	—	4650*	3500
9'6"	lb	15,150	15,150	25,200	17,100	18,400	11,550	13,450	8550	—	—	10,250	7700

**North America, Europe, Australia, New Zealand**

**320F L ● Reach Boom ● 790 mm (31") Track Shoes  
 ● Heavy Lift Mode On ● No Bucket**

Stick		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
		Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2.9 m	kg	6600*	6600*	11 500*	6800	7400	4550	5350	3400	—	—	4650	2950
9'6"	lb	15,150*	15,150*	24,900*	14,600	15,900	9850	11,500	7250	—	—	10,250	6500

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**320F L ● Reach Boom ● 600 mm (24") Track Shoes  
 ● Heavy Lift Mode On ● No Bucket**

Stick		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
		Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2920 mm	kg	6600*	6600*	11 350	6600	7200	4450	5200	3300	—	—	4550	2900
9'6"	lb	15,150*	15,150*	24,300	14,200	15,450	9550	11,150	7050	—	—	9950	6300

**320F L ● VA Boom ● 600 mm (24") Track Shoes  
 ● Heavy Lift Mode On ● No Bucket**

Stick		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
		Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2920 mm	kg	6000*	6000*	9950*	6100	6850*	4100	5000	3050	—	—	4150	2500
9'6"	lb	12,950*	12,950*	21,350*	13,150	14,800*	8850	10,800	6500	—	—	9100	5500

**Africa, Middle East, China, Latin America**

**323D2 L ● Reach Boom ● 600 mm (24") Track Shoes**

Stick		3 m 9'10"		4.5 m 15'0"		6 m 20'0"		7.5 m 25'0"		9 m 30'0"		At Max. Reach	
		Front	Side	Front	Side	Front	Side	Front	Side	Front	Side	Front	Side
2.5 m	kg	—	—	10 700	6700	7350	4500	5300	3300	—	—	5000	3100
8'2"	lb	—	—	23,150	14,350	15,800	9650	11,450	7150	—	—	10,950	6850
2.9 m	kg	6350	6350	10 550	6700	7400	4500	5300	3300	—	—	4350	2900
9'6"	lb	14,600	14,600	22,850	14,450	15,850	9700	11,400	9100	—	—	9550	6350

\*Load limited by hydraulic capacity rather than tipping.



Model	Bucket Family	Interface	Bucket Type	Width Range		Capacity Range		Weight Range		GET
				mm	in	m <sup>3</sup>	yd <sup>3</sup>	kg	lb	
320F 323F 325F M322F	B	Pin-On/ Pin Grabber	General Duty	600-1350	<b>24-54</b>	0.55-1.59	<b>0.72-2.08</b>	601-963	<b>1324-2124</b>	K80
			General Duty Wide Tip	600-1350	<b>24-54</b>	0.55-1.59	<b>0.72-2.08</b>	615-1016	<b>1356-2239</b>	K80
			Heavy Duty	600-1350	<b>24-54</b>	0.46-1.38	<b>0.61-1.81</b>	629-1006	<b>1387-2217</b>	K90
			Heavy Duty Power	900-1200	<b>36-48</b>	0.79-1.14	<b>1.03-1.49</b>	808-952	<b>1781-2099</b>	K90
			Severe Duty	600-1200	<b>24-48</b>	0.46-1.19	<b>0.61-1.56</b>	674-1012	<b>1485-2231</b>	K90
			Severe Duty Power	900	<b>36</b>	0.79	<b>1.03</b>	874	<b>1926</b>	K90
			Cleanup	1800	<b>72</b>	1.60	<b>2.09</b>	979	<b>2158</b>	BOCE
			Ditch Cleaning	1500-1800	<b>60-72</b>	1.02-1.24	<b>1.33-1.63</b>	652-740	<b>1437-1631</b>	BOCE
			Ditch Cleaning Tilt	1500-1800	<b>60-72</b>	0.86-0.96	<b>1.12-1.25</b>	1032-1104	<b>2275-2433</b>	BOCE
		Center-Lock Pin Grabber Performance	Heavy Duty	600-1350	<b>24-54</b>	0.44-1.28	<b>0.57-1.67</b>	656-1056	<b>1446-2328</b>	K90
		Dedicated	General Duty	1200	<b>48</b>	1.38	<b>1.80</b>	956	<b>2107</b>	K80
Heavy Duty	675-1350	<b>27-54</b>	0.54-1.37	<b>0.71-1.80</b>	701-1036	<b>1545-2285</b>	K90			
Ditch Cleaning	1500	<b>60</b>	1.01	<b>1.32</b>	686	<b>1512</b>	BOCE			
323F LR 326F LR 330F LR	A	Pin-On/ Pin Grabber	General Purpose	900	<b>36</b>	0.53	<b>0.69</b>	403	<b>888</b>	J250
			Ditch Cleaning	1200	<b>48</b>	0.57	<b>0.75</b>	386	<b>851</b>	None/ BOCE
326F 330F 335F	CB	Pin-On/ Pin Grabber	General Duty	600-1350	<b>24-54</b>	0.63-1.83	<b>0.83-2.40</b>	704-1118	<b>1552-2464</b>	K90
			General Duty Wide Tip	600-1350	<b>24-54</b>	0.63-1.83	<b>0.83-2.40</b>	729-1176	<b>1607-2592</b>	K90
			Heavy Duty	600-1650	<b>24-66</b>	0.52-1.97	<b>0.68-2.58</b>	734-1290	<b>1619-2844</b>	K100
			Heavy Duty Power	1050-1350	<b>42-54</b>	1.12-1.53	<b>1.47-2.01</b>	1006-1176	<b>2218-2592</b>	K100
			Severe Duty	600-1200	<b>24-48</b>	0.52-1.33	<b>0.68-1.74</b>	781-1130	<b>1721-2491</b>	K100
			Cleanup	1800	<b>72</b>	1.81	<b>2.37</b>	1196	<b>2527</b>	BOCE
			Ditch Cleaning	1500-1800	<b>60-72</b>	1.25-1.53	<b>1.63-2.00</b>	793-897	<b>1627-1973</b>	BOCE
			Ditch Cleaning Tilt	1800	<b>72</b>	1.14	<b>1.50</b>	1531	<b>3374</b>	BOCE
			Center-Lock Pin Grabber Performance	Heavy Duty	750-1500	<b>30-60</b>	0.70-1.69	<b>0.91-2.21</b>	839-1311	<b>1849-2890</b>
		Severe Duty	600-1200	<b>24-48</b>	0.51-1.28	<b>0.66-1.68</b>	794-1207	<b>1750-2661</b>	K100	
		Dedicated	General Purpose	1350	<b>54</b>	1.83	<b>2.40</b>	1156	<b>2549</b>	K90
Heavy Duty	900-1350	<b>36-54</b>	0.93-1.57	<b>1.22-2.05</b>	924-1161	<b>2037-2560</b>	K100			
Ditch Cleaning	1800	<b>72</b>	1.53	<b>2.00</b>	897	<b>1978</b>	BOCE			
336E 336F	DB	Pin-On/ Pin Grabber	General Duty	750-1650	<b>30-66</b>	0.94-2.55	<b>1.23-3.33</b>	924-1470	<b>2037-3240</b>	K100
			General Duty Wide Tip	800-1550	<b>32-62</b>	1.18-2.27	<b>1.54-2.98</b>	1042-1463	<b>2298-3225</b>	K100
			Heavy Duty	750-1800	<b>30-72</b>	0.73-2.36	<b>0.95-3.08</b>	995-1767	<b>2194-3896</b>	K110
			Heavy Duty Power	900-1500	<b>36-60</b>	0.95-1.86	<b>1.24-2.43</b>	1123-1561	<b>2476-3441</b>	K110
			Severe Duty	750-1350	<b>30-54</b>	0.73-1.64	<b>0.95-2.14</b>	1060-1539	<b>2336-3393</b>	K110
			Extreme Duty	1200	<b>48</b>	1.40	<b>1.84</b>	1596	<b>3519</b>	K110
			Cleanup	1800	<b>72</b>	2.48	<b>3.24</b>	1444	<b>3184</b>	BOCE
			Ditch Cleaning	1500-1800	<b>60-72</b>	1.63-1.91	<b>2.13-2.50</b>	1088-1216	<b>2394-2677</b>	BOCE
			Center-Lock Pin Grabber Performance	Heavy Duty	900-1650	<b>36-66</b>	0.87-1.93	<b>1.14-2.52</b>	1158-1728	<b>2553-3809</b>
		Severe Duty	750-1350	<b>30-54</b>	0.68-1.50	<b>0.88-1.97</b>	1063-1588	<b>2344-3501</b>	K110	
		Dedicated	General Purpose	1500	<b>60</b>	2.27	<b>2.98</b>	1394	<b>3073</b>	K100
Heavy Duty	750-1500	<b>30-60</b>	0.74-1.87	<b>0.96-2.45</b>	965-1538	<b>2128-3391</b>	K110			
Cleanup	1800-2100	<b>72-83</b>	2.48-2.91	<b>3.24-3.81</b>	1416-1567	<b>3122-3455</b>	BOCE			
Ditch Cleaning	1800	<b>72</b>	1.91	<b>2.50</b>	1175	<b>2590</b>	BOCE			

7

Model	Shoe Type	Shoe Width		Pressure	
		mm	in	kPa	psi
<b>318D2 L</b>	Triple	500	20	48.3	7.01
	Triple	600	24	40.8	5.92
	Triple	700	28	35.8	5.19
<b>318E L</b>	Triple	500	20	52.0	7.54
	Triple	600	24	43.0	6.24
	Triple	700	28	38.0	5.51
<b>320D2</b>	Triple	600	24	46.8	6.80
	Triple	700	28	40.8	5.90
	Triple	790	31	36.2	5.30
<b>320D2 GC</b>	Triple	600	24	47.5	6.90
	Triple	790	31	37.1	5.40
<b>320D2 L</b>	Triple	600	24	43.5	6.30
	Triple	700	28	38.0	5.50
	Triple	790	31	33.6	4.90
<b>320E</b>	Triple	600	24	47.9	6.95
	Triple	700	28	41.8	6.06
	Triple	790	31	37.5	5.44
<b>320E L</b>	Triple	600	24	44.9	6.51
	Triple	700	28	39.1	5.67
	Triple	790	31	35.1	5.09
<b>320E RR</b>	Triple	600	24	53.0	7.69
	Triple	700	28	46.1	6.68
	Triple	790	31	41.3	5.99
<b>320E LRR</b>	Triple	600	24	59.9	8.69
	Triple	700	28	52.1	7.55
	Triple	790	31	46.6	6.76
<b>320F L</b>	Triple	600	24	45.0	6.53
	Triple	700	28	39.3	5.70
	Triple	790	31	35.2	5.10
<b>323F L</b>	Single	600	24	47.2	6.85
	Triple	790	31	36.3	5.27
<b>323F LN</b>	Triple	500	20	55.6	8.06

NOTE: Belgium sourced excavators have different ground pressures. See Technical Data Sheets.

**Cycle Time Estimating Chart**

Model		308E2 CR SB	311D LRR	312D, 312D L	315D L	319D L, 319D LN	M314F, M315D2	M316F, M317D2, M318F	M320F, M320D2	M322F, M322D2
Bucket Size	L	220	450	520	520	800	610	750	900	1050
	yd <sup>3</sup>	0.30	0.59	0.68	0.68	1.05	0.80	0.98	1.18	1.37
Soil Type		← Packed Earth				→ Sand/Gravel →				
Digging Depth	m	1.8	1.5	1.8	3.0	3.0	3.0	3.0	3.0	3.0
	ft	6'0"	5'0"	6'0"	10'0"	10'0"	10'0"	10'0"	10'0"	10'0"
Load Bucket	min	0.08	0.07	0.07	0.07	0.09	0.05	0.06	0.06	0.08
Swing Loaded	min	0.03	0.06	0.06	0.08	0.09	0.05	0.05	0.06	0.06
Dump Bucket	min	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Swing Empty	min	0.08	0.05	0.05	0.06	0.07	0.04	0.04	0.05	0.05
Total Cycle Time	min	0.22	0.21	0.21	0.24	0.28	0.17	0.18	0.20	0.23

7

**Cycle Time Estimating Chart**

Model		320D2	320D RR, 321D CR, 323D2	324D	328D LCR	329D	336D	349D2, 349E, 349F	365C L	385C
Bucket Size	L	800	800	1000	N/A	1100	1400	2400	1900	3760
	yd <sup>3</sup>	1.05	1.05	1.31		1.44	1.83	3.0	2.5	5.0
Soil Type		← Hard Clay				→				
Digging Depth	m	2.3	2.3	3.2	N/A	3.2	3.4	4.0	4.2	5.6
	ft	8	8	10		10	11	13	14	18
Load Bucket	min	0.09	0.09	0.09	N/A	0.09	0.09	0.13	0.10	0.19
Swing Loaded	min	0.06	0.06	0.06	N/A	0.06	0.07	0.07	0.09	0.06
Dump Bucket	min	0.03	0.03	0.04	N/A	0.04	0.04	0.02	0.04	0.03
Swing Empty	min	0.05	0.05	0.06	N/A	0.06	0.07	0.06	0.07	0.07
Total Cycle Time	min	0.23	0.23	0.25	N/A	0.25	0.27	0.28	0.30	0.35

N/A = Not Applicable

MODEL	770G		770G		770G	
Body Type	Flat Floor		Quarry Body		Dual Slope	
Emission Standards	Tier 4 Final****		Tier 4 Final****		Tier 4 Final****	
Gross Machine Weight	71 214 kg	<b>157,000 lb</b>	71 214 kg	<b>157,000 lb</b>	71 214 kg	<b>157,000 lb</b>
Chassis Weight*	25 466 kg	<b>56,144 lb</b>	25 466 kg	<b>56,144 lb</b>	25 466 kg	<b>56,144 lb</b>
Body Weight	7953 kg	<b>17,533 lb</b>	10 095 kg	<b>22,256 lb</b>	7758 kg	<b>17,103 lb</b>
Payload Without Liner	37 795 kg	<b>83,323 lb</b>	35 652 kg	<b>78,600 lb</b>	37 990 kg	<b>83,753 lb</b>
Standard Liner Weight	2943 kg	<b>6488 lb</b>	—		2810 kg	<b>6195 lb</b>
Target Payload**	34 852 kg	<b>76,835 lb</b>	—		35 180 kg	<b>77,558 lb</b>
Capacity:						
Struck (SAE)	17.2 m <sup>3</sup>	<b>22.52 yd<sup>3</sup></b>	17.2 m <sup>3</sup>	<b>22.52 yd<sup>3</sup></b>	18 m <sup>3</sup>	<b>23.5 yd<sup>3</sup></b>
Heaped (2:1) (SAE)	25.1 m <sup>3</sup>	<b>32.8 yd<sup>3</sup></b>	25.1 m <sup>3</sup>	<b>32.8 yd<sup>3</sup></b>	25.9 m <sup>3</sup>	<b>33.9 yd<sup>3</sup></b>
Distribution Empty:						
Front		<b>51%</b>		<b>51%</b>		<b>51%</b>
Rear		<b>49%</b>		<b>49%</b>		<b>49%</b>
Distribution Loaded:						
Front		<b>34%</b>		<b>34%</b>		<b>34%</b>
Rear		<b>66%</b>		<b>66%</b>		<b>66%</b>
Engine Model	<b>C15 ACERT™</b>		<b>C15 ACERT</b>		<b>C15 ACERT</b>	
Number of Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Bore	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>
Stroke	171 mm	<b>6.7"</b>	171 mm	<b>6.7"</b>	171 mm	<b>6.7"</b>
Displacement	15 L	<b>928 in<sup>3</sup></b>	15 L	<b>928 in<sup>3</sup></b>	15 L	<b>928 in<sup>3</sup></b>
Net Power	356 kW	<b>477 hp</b>	356 kW	<b>477 hp</b>	356 kW	<b>477 hp</b>
Gross Power	384 kW	<b>515 hp</b>	384 kW	<b>515 hp</b>	384 kW	<b>515 hp</b>
Standard Tires	<b>18.00R33 (E4)</b>		<b>18.00R33 (E4)</b>		<b>18.00R33 (E4)</b>	
Machine Clearance Turning Circle	20.30 m	<b>66'6"</b>	20.30 m	<b>66'6"</b>	20.30 m	<b>66'6"</b>
Fuel Tank Refill Capacity	529 L	<b>140 U.S. gal</b>	529 L	<b>140 U.S. gal</b>	529 L	<b>140 U.S. gal</b>
Diesel Exhaust Fluid Refill Capacity	21 L	<b>6 U.S. gal</b>	21 L	<b>6 U.S. gal</b>	21 L	<b>6 U.S. gal</b>
Top Speed (Loaded)	73.5 km/h	<b>45.7 mph</b>	73.5 km/h	<b>45.7 mph</b>	73.5 km/h	<b>45.7 mph</b>
<b>GENERAL DIMENSIONS (Empty):</b>						
Height to Canopy Rock Guard Rail	4.21 m	<b>13'10"</b>	4.21 m	<b>13'10"</b>	4.21 m	<b>13'10"</b>
Wheelbase	3.96 m	<b>13'0"</b>	3.96 m	<b>13'0"</b>	3.96 m	<b>13'0"</b>
Overall Length (Operating)	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>
Overall Length (Shipping)	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>
Loading Height (Empty)	3.23 m	<b>10'7"</b>	3.23 m	<b>10'7"</b>	3.23 m	<b>10'7"</b>
Height at Full Dump	8.28 m	<b>27'2"</b>	8.28 m	<b>27'2"</b>	8.28 m	<b>27'2"</b>
Body Length (Target Length)	5.64 m	<b>18'6"</b>	5.64 m	<b>18'6"</b>	5.65 m	<b>18'6"</b>
Width (Operating)	4.78 m	<b>15'8"</b>	4.78 m	<b>15'8"</b>	4.78 m	<b>15'8"</b>
Width (Shipping)***	3.95 m	<b>13'0"</b>	3.95 m	<b>13'0"</b>	3.95 m	<b>13'0"</b>
Front Tire Tread	3.11 m	<b>10'3"</b>	3.11 m	<b>10'3"</b>	3.11 m	<b>10'3"</b>

\*Weights include lubricants, coolants and 100% fuel.

\*\*Refer to Caterpillar's 10/10/20 Payload Policy for Off-Highway Trucks.

\*\*\*Disassembled.

\*\*\*\*Meets U.S. EPA Tier 4 Final, EU Stage IV, and Japan 2014 (Tier 4 Final) emission standards.

MODEL	770G		770G		770G	
Body Type	Flat Floor		Quarry Body		Dual Slope	
Emission Standards	Tier 3 Equivalent and Tier 2 Equivalent****		Tier 3 Equivalent and Tier 2 Equivalent****		Tier 3 Equivalent and Tier 2 Equivalent****	
Gross Machine Weight	71 214 kg	<b>157,000 lb</b>	71 214 kg	<b>157,000 lb</b>	71 214 kg	<b>157,000 lb</b>
Chassis Weight*	24 900 kg	<b>54,895 lb</b>	24 900 kg	<b>54,895 lb</b>	24 900 kg	<b>54,895 lb</b>
Body Weight	7850 kg	<b>17,306 lb</b>	10 095 kg	<b>22,255 lb</b>	7665 kg	<b>16,898 lb</b>
Payload Without Liner	38 464 kg	<b>84,799 lb</b>	36 219 kg	<b>79,850 lb</b>	38 649 kg	<b>85,207 lb</b>
Standard Liner Weight	2940 kg	<b>6482 lb</b>	—		2895 kg	<b>6382 lb</b>
Target Payload**	35 524 kg	<b>78,318 lb</b>	—		35 754 kg	<b>78,825 lb</b>
Capacity:						
Struck (SAE)	17.6 m <sup>3</sup>	<b>23.0 yd<sup>3</sup></b>	17.5 m <sup>3</sup>	<b>22.9 yd<sup>3</sup></b>	17.6 m <sup>3</sup>	<b>23.0 yd<sup>3</sup></b>
Heaped (2:1) (SAE)	25.2 m <sup>3</sup>	<b>33.0 yd<sup>3</sup></b>	24.9 m <sup>3</sup>	<b>32.5 yd<sup>3</sup></b>	25.2 m <sup>3</sup>	<b>32.9 yd<sup>3</sup></b>
Distribution Empty:						
Front		<b>51%</b>		<b>51%</b>		<b>51%</b>
Rear		<b>49%</b>		<b>49%</b>		<b>49%</b>
Distribution Loaded:						
Front		<b>34%</b>		<b>34%</b>		<b>34%</b>
Rear		<b>66%</b>		<b>66%</b>		<b>66%</b>
Engine Model	<b>C15 ACERT</b>		<b>C15 ACERT</b>		<b>C15 ACERT</b>	
Number of Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Bore	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>
Stroke	171 mm	<b>6.7"</b>	171 mm	<b>6.7"</b>	171 mm	<b>6.7"</b>
Displacement	15 L	<b>928 in<sup>3</sup></b>	15 L	<b>928 in<sup>3</sup></b>	15 L	<b>928 in<sup>3</sup></b>
Net Power	360 kW	<b>483 hp</b>	360 kW	<b>483 hp</b>	360 kW	<b>483 hp</b>
Gross Power	381 kW	<b>511 hp</b>	381 kW	<b>511 hp</b>	381 kW	<b>511 hp</b>
Standard Tires	<b>18.00R33 (E4)</b>		<b>18.00R33 (E4)</b>		<b>18.00R33 (E4)</b>	
Machine Clearance Turning Circle	20.30 m	<b>66'6"</b>	20.30 m	<b>66'6"</b>	20.30 m	<b>66'6"</b>
Fuel Tank Refill Capacity	529 L	<b>140 U.S. gal</b>	529 L	<b>140 U.S. gal</b>	529 L	<b>140 U.S. gal</b>
Top Speed (Loaded)	73.5 km/h	<b>45.7 mph</b>	73.5 km/h	<b>45.7 mph</b>	73.5 km/h	<b>45.7 mph</b>
<b>GENERAL DIMENSIONS (Empty):</b>						
Height to Canopy Rock Guard Rail	4.21 m	<b>13'10"</b>	4.21 m	<b>13'10"</b>	4.21 m	<b>13'10"</b>
Wheelbase	3.96 m	<b>13'0"</b>	3.96 m	<b>13'0"</b>	3.96 m	<b>13'0"</b>
Overall Length (Operating)	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>
Overall Length (Shipping)	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>	8.80 m	<b>28'10"</b>
Loading Height (Empty)	3.23 m	<b>10'7"</b>	3.23 m	<b>10'7"</b>	3.23 m	<b>10'7"</b>
Height at Full Dump	8.28 m	<b>27'2"</b>	8.28 m	<b>27'2"</b>	8.28 m	<b>27'2"</b>
Body Length (Target Length)	5.64 m	<b>18'6"</b>	5.64 m	<b>18'6"</b>	5.65 m	<b>18'6"</b>
Width (Operating)	4.78 m	<b>15'8"</b>	4.78 m	<b>15'8"</b>	4.78 m	<b>15'8"</b>
Width (Shipping)***	3.95 m	<b>13'0"</b>	3.95 m	<b>13'0"</b>	3.95 m	<b>13'0"</b>
Front Tire Tread	3.11 m	<b>10'3"</b>	3.11 m	<b>10'3"</b>	3.11 m	<b>10'3"</b>

\*Weights include lubricants, coolants and 100% fuel.

\*\*Refer to Caterpillar's 10/10/20 Payload Policy for Off-Highway Trucks.

\*\*\*Disassembled.

\*\*\*\*Meets Tier 3, Stage IIIA, Japan 2006 (Tier 3) equivalent emission standards and Tier 2, Stage II, Japan 2001 (Tier 2) equivalent emission standards.

**USE OF BRAKE PERFORMANCE CURVES**

The speed that can be maintained when the machine is descending a grade with retarder applied can be determined from the retarder curves in this section when gross machine weight and total effective grade are known.

Select appropriate grade distance chart that covers total downhill haul; don't break haul into individual segments.

To determine brake performance: Read from gross weight down to the percent effective grade. (Effective grade equals actual % grade *minus* 1% for each 10 kg/metric ton (20 lb/U.S. ton) of rolling resistance.) From this weight-effective grade point, read horizontally to the curve with the highest obtainable speed range, then down to maximum descent speed brakes can safely handle without exceeding cooling capacity. When braking, engine RPM should be maintained at the highest possible level without overspeeding. If cooling oil overheats, reduce ground speed to allow transmission to shift to next lower speed range.

Brake Performance Curves are made in compliance with ISO 10268 and applicable to Sea Level and 32° C (90° F) temperature. Contact Factory for Application Specific Performance.

**USE OF RIMPULL-SPEED-  
GRADEABILITY CURVES**

For best results, use Caterpillar Fleet Production and Cost Analysis (FPC) to simulate cycle time, fuel burn, and production for Application Specific Performance inquiries. Contact Factory Representative or visit [catminer.cat.com/stb](http://catminer.cat.com/stb) for more information.

(See Wheel Tractor Scraper Section)

**Total Effective Grade** (or Total Resistance) is grade assistance *minus* rolling resistance.

10 kg/metric ton (20 lb/U.S. ton) = 1% adverse grade.

*Example —*

With a favorable grade of 20% and rolling resistance of 50 kg/metric ton (100 lb/U.S. ton), find Total Effective Grade.

$$\begin{aligned}
 (50 \text{ kg/metric ton}) &= 50 \div 10 = 5\% \text{ Effective Grade} \\
 &\text{(from Rolling Resistance)} \\
 100 \text{ lb/ton} &= 100 \div 20 = 5\% \text{ Effective Grade} \\
 20\% \text{ (grade)} - 5\% \text{ (resistance)} &= \\
 15\% \text{ Total Effective Grade} &
 \end{aligned}$$

**TYPICAL FIXED TIMES FOR HAULING UNITS**

Wait time, delays and operator efficiency all impact cycle time. Minimizing truck exchange time can have a significant effect on productivity.

Fixed time for hauling units include:

1. Truck load time (various with loading tool)
2. Truck maneuver in load area (Truck exchange) (Typically 0.6-0.8 min.)
3. Maneuver and dump time at dump point (Typically 1.0-1.2 min.)

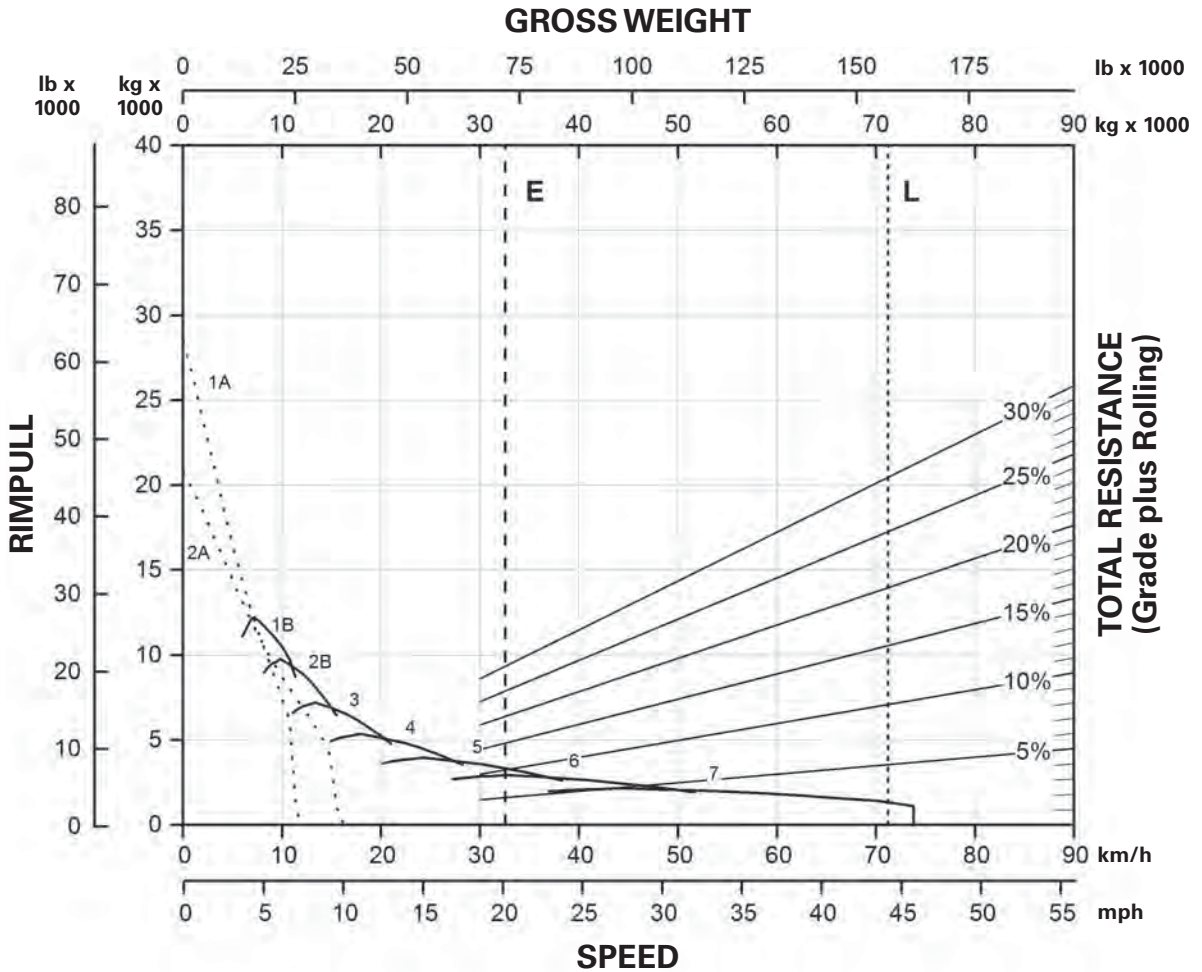
Total cycle time is the combination of:

1. The above fixed time
2. Hauling time (Loaded)
3. Return time (Empty)

*Example — assume load tool spots hauler with full bucket*

	<b>988F</b>	<b>5130B</b>
cycle times	.60	.45
First pass (dump time)	.10 min.	.05 min.
2 passes (full cycle)	.70	.50
3 passes "	1.30	.95
4 passes "	1.90	1.40
5 passes "	2.50	1.85
6 passes "	3.10	2.30
7 passes "	3.70	2.75
8 passes "	4.30	3.20
9 passes "	4.90	3.65
10 passes "	5.40	4.10

**NOTE:** Other sizes of loading tools will have different cycle times. See Wheel Loader section for **average** cycle times for truck loading.



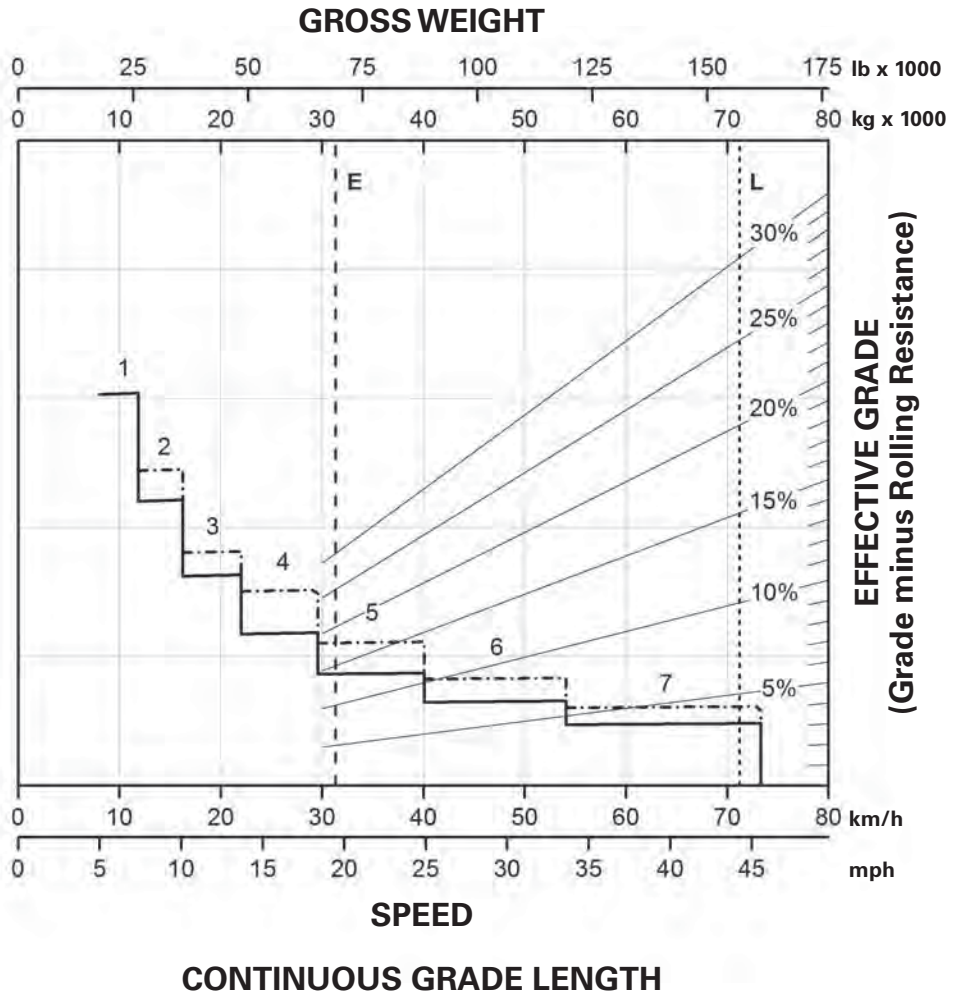
**KEY**

- 1A – 1st Gear (Torque Converter)
- 1B – 1st Gear
- 2 – 2nd Gear
- 3 – 3rd Gear
- 4 – 4th Gear
- 5 – 5th Gear
- 6 – 6th Gear
- 7 – 7th Gear

**KEY**

- E – Empty 33 224 kg (73,247 lb)
- L – Target GMW 71 214 kg (157,000 lb)

\*Meets Tier 4 Final, Stage IV, and Japan 2014 (Tier 4 Final) emission standards.



KEY

- 1 — 1st Gear
- 2 — 2nd Gear
- 3 — 3rd Gear
- 4 — 4th Gear
- 5 — 5th Gear
- 6 — 6th Gear
- 7 — 7th Gear

KEY

- E — Empty 33 224 kg (73,247 lb)
- L — Target GMW 71 214 kg (157,000 lb)
- With ARC Only
- - - - - ARC and Engine Brake

\*Meets Tier 4 Final, Stage IV, and Japan 2014 (Tier 4 Final) emission standards.



MODEL	14M3		16M3	
Base Power — Net	178 kW	<b>238 hp</b>	216 kW	<b>290 hp</b>
VHP Range — Net	178-213 kW	<b>238-285 hp</b>	216-259 kW	<b>290-348 hp</b>
VHP Plus Range — Net	180-215 kW	<b>241-289 hp</b>	—	
Operating Weight*	25 968 kg	<b>57,250 lb</b>	32 411 kg	<b>71,454 lb</b>
Engine Model	<b>C13 ACERT</b>		<b>C13 ACERT</b>	
Rated Engine RPM	<b>1850</b>		<b>2000</b>	
No. of Cylinders	<b>6</b>		<b>6</b>	
Displacement	12.5 L	<b>763 in<sup>3</sup></b>	12.5 L	<b>763 in<sup>3</sup></b>
Max. Torque:				
Tier 4 Final <sup>1</sup>	1542 N·m	<b>1137 lb-ft</b>	1771 N·m	<b>1306 lb-ft</b>
Tier 2 and Tier 3 Equivalent <sup>2</sup>	1542 N·m	<b>1137 lb-ft</b>	1721 N·m	<b>1270 lb-ft</b>
No. of Speeds Forward/Reverse	<b>8/6</b>		<b>8/6</b>	
Top Speed: Forward	50.5 km/h	<b>31.4 mph</b>	51.7 km/h	<b>32.1 mph</b>
Reverse	39.9 km/h	<b>24.8 mph</b>	40.8 km/h	<b>25.3 mph</b>
Std. Tires — Front and Rear	<b>20.5R25</b>		<b>23.5R25</b>	
Front Axle/Steering:				
Oscillation Angle	<b>32°</b>		<b>35°</b>	
Wheel Lean Angle — Left/Right	<b>17.1°/17.1°</b>		<b>18°/17°</b>	
Steering Angle	<b>50°</b>		<b>47.5°</b>	
Articulation Angle	<b>20°</b>		<b>20°</b>	
Minimum Turning Radius**	7.9 m	<b>25'11"</b>	9.3 m	<b>30'6"</b>
No. Circle Support Shoes	<b>6</b>		<b>6</b>	
Hydraulics:				
Pump Type	<b>Variable Piston</b>		<b>Variable Piston</b>	
Max. Pump Flow	257 L/min	<b>68 gpm</b>	280 L/min	<b>74 gpm</b>
Tank Capacity	64 L	<b>16.9 U.S. gal</b>	70 L	<b>18.5 U.S. gal</b>
Implement Pressure: Max.	24 100 kPa	<b>3495 psi</b>	24 750 kPa	<b>3590 psi</b>
Min.	3400 kPa	<b>493 psi</b>	3400 kPa	<b>493 psi</b>
Interior Sound Level/SAE J919:				
Tier 4 Final/EU Certified <sup>1</sup>	<b>73 dB(A)</b>		<b>71 dB(A)</b>	
Tier 2 and Tier 3 Equivalent <sup>2</sup>	<b>73 dB(A)</b>		<b>72 dB(A)</b>	
Electrical:				
System Size	<b>24V</b>		<b>24V</b>	
Std. Battery CCA @ 0° F	<b>1125</b>		<b>1400</b>	
Std. Alternator	<b>150</b>		<b>150</b>	
GENERAL DIMENSIONS:				
Height (to top of ROPS)	3566 mm	<b>140.4"</b>	3719 mm	<b>146.4"</b>
Overall Length	9677 mm	<b>381"</b>	10 593 mm	<b>417"</b>
With Ripper and Pushplate	10 899 mm	<b>429.1"</b>	12 051 mm	<b>474.4"</b>
Wheelbase	6616 mm	<b>260.5"</b>	7365 mm	<b>290"</b>
Blade Base	2880 mm	<b>113.4"</b>	3066 mm	<b>120.7"</b>
Overall Width (at top of front tires)	3050 mm	<b>120.1"</b>	3411 mm	<b>134.3"</b>
Standard Blade: Length	4267 mm	<b>14'0"</b>	4877 mm	<b>16'0"</b>
Height	585 mm	<b>23.0"</b>	787 mm	<b>31.0"</b>
Thickness	25.4 mm	<b>1.0"</b>	25 mm	<b>1.0"</b>
Lift Above Ground	438 mm	<b>17.2"</b>	400 mm	<b>15.7"</b>
Max. Shoulder Reach:***				
Frame Straight — Left	3460 mm	<b>136.2"</b>	2311 mm	<b>91"</b>
Frame Straight — Right	3350 mm	<b>131.9"</b>	2311 mm	<b>91"</b>
Fuel Tank Capacity	416 L	<b>109.9 U.S. gal</b>	496 L	<b>131 U.S. gal</b>

\***Operating Weight** — based on standard machine configuration with full fuel tank, coolant, lubricants and operator.

\*\***Minimum Turning Radius** — combining the use of articulated frame steering, front wheel steer and unlocked differential.

\*\*\*Applicable for the standard blade with hydraulic sideshift and tip control. Maximum shoulder reach is obtainable to the right.

<sup>1</sup> Meets Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final) emission standards.

<sup>2</sup> Meets Tier 2/Stage II/Japan 2001 (Tier 2) equivalent and Tier 3/Stage IIIA/Japan 2006 (Tier 3) equivalent emission standards.

**TRAVEL SPEEDS @ MAXIMUM RPM WITH STD. TIRES (M/M2/M3 SERIES)**

Gear		1		2		3		4		5		6		7		8	
		km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph
120M	Forward	4.1	2.6	5.6	3.5	8.2	5.1	11.2	7.0	17.5	10.8	23.7	14.8	32.7	20.3	47.5	29.5
	Reverse	3.3	2.0	6.1	3.8	8.9	5.5	13.8	8.6	25.8	16.0	37.5	23.3	—	—	—	—
120M2	Forward	4.0	2.5	5.4	3.4	7.8	4.8	10.8	6.7	16.8	10.4	22.8	14.2	31.4	19.5	45.7	28.4
	Reverse	3.1	1.9	5.9	3.9	8.5	5.3	13.2	8.2	24.8	15.4	36.1	22.4	—	—	—	—
12M	Forward	4.0	2.5	5.5	3.4	8.0	5.0	11.0	6.8	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	22.9	—	—	—	—
12M2	Forward	4.1	2.5	5.5	3.4	8.0	5.0	11.0	6.9	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	22.9	—	—	—	—
12M3	Forward	4.1	2.5	5.5	3.4	8.0	5.0	11.0	6.9	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	23.0	—	—	—	—
140M	Forward	4.0	2.5	5.5	3.4	8.0	5.0	11.0	6.9	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	22.9	—	—	—	—
140M2	Forward	4.1	2.5	5.5	3.4	8.0	5.0	11.0	6.9	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	22.9	—	—	—	—
140M3	Forward	4.1	2.5	5.5	3.4	8.0	5.0	11.0	6.9	17.1	10.6	23.3	14.5	32.0	19.9	46.6	29.0
	Reverse	3.2	2.0	6.0	3.7	8.7	5.4	13.5	8.4	25.3	15.7	36.8	23.0	—	—	—	—
160M	Forward	4.1	2.5	5.6	3.5	8.1	5.0	11.2	7.0	17.4	10.8	23.7	14.7	32.6	20.3	47.4	29.5
	Reverse	3.3	2.0	6.1	3.8	8.8	5.5	13.7	8.5	25.7	16.0	37.4	23.3	—	—	—	—
160M2	Forward	4.1	2.6	5.6	3.5	8.1	5.1	11.2	7.0	17.4	10.8	23.7	14.7	32.6	20.3	47.4	29.5
	Reverse	3.3	2.0	6.1	3.8	8.9	5.5	13.7	8.5	25.7	16.0	37.4	23.3	—	—	—	—
160M3	Forward	4.1	2.6	5.6	3.5	8.1	5.1	11.2	7.0	17.4	10.8	23.7	14.7	32.6	20.3	47.4	29.5
	Reverse	3.3	2.0	6.1	3.8	8.8	5.5	13.7	8.5	25.7	16.0	37.4	23.3	—	—	—	—
14M3	Forward	4.4	2.7	5.9	3.7	8.6	5.3	11.8	7.4	18.4	11.4	24.9	15.5	34.3	21.3	49.9	31.0
	Reverse	3.4	2.1	6.4	4.0	9.4	5.8	14.5	9.0	27.0	16.8	39.4	24.5	—	—	—	—
16M3	Forward	4.5	2.8	6.1	3.8	8.9	5.5	12.3	7.6	19.0	11.8	25.8	16.0	35.5	22.0	51.7	32.1
	Reverse	3.6	2.2	6.6	4.1	9.7	6.0	15.0	9.3	28.0	17.4	40.8	25.3	—	—	—	—
18M3	Forward	4.5	2.8	6.1	3.8	8.9	5.5	12.3	7.6	19.0	11.8	25.8	16.0	35.5	22.0	51.7	32.1
	Reverse	3.6	2.2	6.6	4.1	9.7	6.0	15.0	9.3	28.0	17.4	40.8	25.3	—	—	—	—
24M	Forward	3.7	2.3	5.7	3.6	9.7	6.0	15.1	9.4	28.0	17.4	43.4	27.0	—	—	—	—
	Reverse	5.5	3.4	14.5	9.0	41.6	25.8	—	—	—	—	—	—	—	—	—	—

**NOTE:** 120M speeds were calculated with a 628 mm (24.7") tire at 2000 rpm rated speed.  
 120M2 speeds were calculated with a 620 mm (24.4") tire at high idle, 2150 rpm.  
 12M2-160M2 speeds were calculated with a 655 mm (25.8") tire at high idle, 2150 rpm.  
 12M3-160M3 speeds were calculated with a 655 mm (25.8") tire at 2000 rpm rated speed.

<b>MOTOR GRADER/RIPPER</b>	<b>14M3</b>		<b>16M3</b>	
<b>Parallelogram — Rear Mounted</b>	<b>Ripper</b>		<b>Ripper</b>	
<b>Tire Size (Std.)</b>	<b>20.5R25</b>		<b>23.5-25</b>	
<b>Front and Rear</b>	<b>—</b>		<b>12PR (G-2)</b>	
<b>Ripper Shank</b>				
Maximum Digging Depth	404 mm	<b>15.9"</b>	452 mm	<b>17.8"</b>
Maximum Reach at Ground Line	1062 mm	<b>41.8"</b>	1500 mm	<b>4'11"</b>
Maximum Ground Clearance under Tip (shank pinned in bottom hole)	617.7 mm	<b>24.3"</b>	673 mm	<b>2'2.5"</b>
Maximum Ramp Angle, Ripper Up, Shanks in Working Position (shank pinned in bottom hole)	<b>14.5°</b>		<b>14.3°</b>	
Shank Section	59 × 138 mm <b>2.3" × 5.4"</b>		76 × 178 mm <b>3" × 7"</b>	
<b>Ripper Beam</b>				
Overall Width	2595 mm	<b>102.2"</b>	2.98 m	<b>9'9"</b>
Height	165 mm	<b>6.5"</b>	214 mm	<b>8.4"</b>
Length	211 mm	<b>8.3"</b>	254 mm	<b>10"</b>
Number of Pockets	<b>7</b>		<b>7</b>	
Pocket Spacing:				
Inside	472 mm	<b>18.6"</b>	500 mm	<b>1'8"</b>
Middle	373 mm	<b>14.7"</b>	445 mm	<b>17.5"</b>
Outside	373 mm	<b>14.7"</b>	445 mm	<b>17.5"</b>
Installed Weights:				
Ripper with Standard Shank	1643 kg	<b>3622 lb</b>	2198 kg	<b>4836 lb</b>
Each Additional Shank	31 kg	<b>68 lb</b>	68 kg	<b>150 lb</b>
Ripper Forces:				
Penetration Force	13 116 kg	<b>28,916 lb</b>	13 749 kg	<b>30,311 lb</b>
Pryout Force	21 228 kg	<b>46,800 lb</b>	19 822 kg	<b>43,700 lb</b>

**PRODUCTION**

The motor grader is used in a variety of applications in a variety of industries. Therefore, there are many ways to measure its operating capacity, or production. One method expresses a motor grader's production in relation to the area covered by the moldboard.

**Formula:**

$$A = S \times (L_e - L_o) \times 1000 \times E \text{ (Metric)}$$

$$A = S \times (L_e - L_o) \times 5280 \times E \text{ (English)}$$

where A: Hourly operating area (m<sup>2</sup>/h or ft<sup>2</sup>/h)

S: Operating speed (km/h or mph)

L<sub>e</sub>: Effective blade length (m or ft)

L<sub>o</sub>: Width of overlap (m or ft)

E: Job efficiency

**Operating Speeds:**

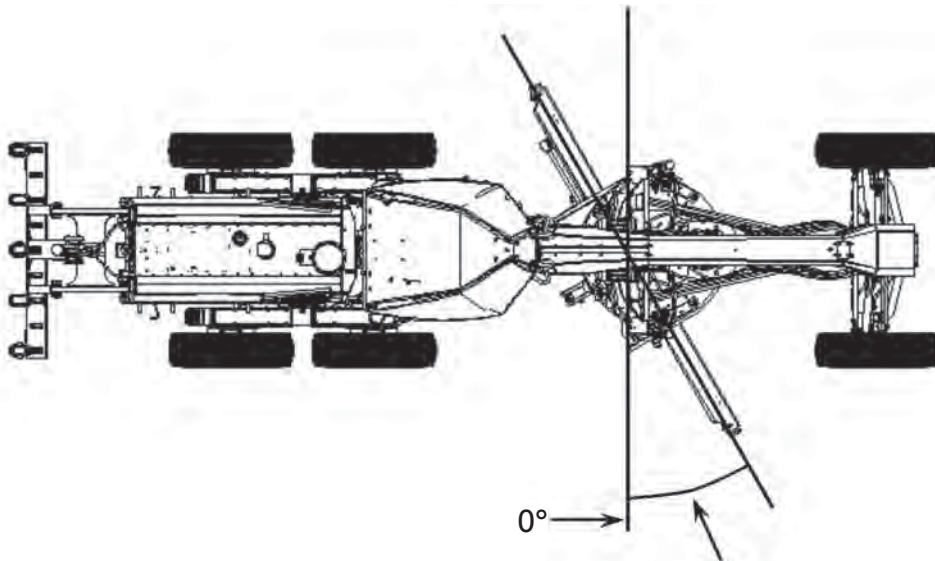
Typical operating speeds by application

Finish Grading:	0-4 km/h	(0-2.5 mph)
Heavy Blading:	0-9 km/h	(0-6 mph)
Ditch Repair:	0-5 km/h	(0-3 mph)
Ripping:	0-5 km/h	(0-3 mph)
Road Maintenance:	5-16 km/h	(3-9.5 mph)
Haul Road Maintenance:	5-16 km/h	(3-9.5 mph)
Snow Plowing:	7-21 km/h	(4-13 mph)
Snow Winging:	15-28 km/h	(9-17 mph)

**Effective Blade Length:**

Since the moldboard is usually angled when moving material, an effective blade length must be computed to account for this angle. This is the actual width of material swept by the moldboard.

**NOTE:** Angles are measured as shown below. The effective length becomes shorter as the angle increases.



Moldboard Angle

Moldboard Length, m (ft)	Effective Length, m (ft) 30 degree blade angle	Effective Length, m (ft) 45 degree blade angle
3.658 (12)	3.17 (10.4)	2.59 (8.5)
4.267 (14)	3.70 (12.1)	3.02 (9.9)
4.877 (16)	4.22 (13.9)	3.45 (11.3)
7.315 (24)	6.33 (20.8)	5.17 (17.0)

For other blade lengths and carry angles:  
 Effective length = COS [Radians (Blade L)] 3 Blade Length

**Width of Overlap:**

The width of overlap is generally 0.6 m (2.0 ft). This overlap accounts for the need to keep the tires out of the windrow on the return pass.

**Job Efficiency:**

Job efficiencies vary based on job conditions, operator skill, etc.

A good estimation for efficiency is approximately 0.70 to 0.85, but actual operating conditions should be used to determine the best value.

Example problem:

A Cat motor grader with a 3.66 m (12 ft) moldboard is performing road maintenance on a township road. The machine is working at an average speed of 13 km/h (8 mph) with a moldboard carry angle of 30 degrees. What is the motor grader’s production based on coverage area?

**Note:** Due to the long passes involved in road maintenance — fewer turnarounds — a higher job efficiency of 0.90 is chosen.

**Solution:**

From the table, the effective blade length is 3.17 m (10.4 ft).

*Metric*

$$\text{Production, A} = 13 \text{ km/h} \times (3.17 \text{ m} - 0.6 \text{ m}) \times 1000 \times 0.90 = 30\,069 \text{ m}^2/\text{hr} \text{ (3.07 hectares/hr)}$$

*English*

$$\text{Production, A} = 8 \text{ mph} \times (10.4 \text{ ft} - 2.0 \text{ ft}) \times 5280 \times 0.90 = 319,334 \text{ ft}^2/\text{hr} \text{ (7.33 acres/hr)}$$

To pinpoint the theoretical number of motor graders required to properly maintain your haul roads, based on your specific mining applications, please download the haul road maintenance calculator on <https://catminer.cat.com>.

Haul road maintenance impacts cycle time, tire, frame and drive train components, safety and ultimately your cost per ton. To achieve optimal truck productivity, your haul roads must be properly maintained.

- Moderate: ● Road Maintenance  
 ● Pad Cleaning  
 ● Rock Clearing  
 ● Shoulder Sweeping

- Difficult: ● Ripping  
 ● Spreading Dump Material  
 ● Road Profiling/Reshaping

**BLADE PULL**

This specification is also known as drawbar pull. This spec can be calculated as follows:

Variables:

Rear weight of machine = Wr

Tire traction coefficient = T (Look up the table entitled “Coefficient of Traction Factors”)

$$Wr \times T = \text{Blade Pull}$$

Example problem:

Calculate the blade pull for a 140M Global Version machine operating in a quarry pit...

*Metric*

RW = 10 501 kg

T = 0.65

$$10\,501 \times 0.65 = 6825.65$$

*English*

RW = 23,151 lb

T = 0.65

$$23,151 \times 0.65 = 15,048.15$$

**BLADE DOWN PRESSURE**

This spec can be calculated as follows:

Variables:

Blade to front axle length = BA

Wheel base length = WB

Weight on front wheels = FW

Blade down pressure = BD

$$\frac{WB}{(WB - BA)} \times FW = BD$$

Example problem:

Calculate the blade down pressure for a 140M Global Version machine...

*Metric*

BA = 2565 mm                      FW = 4223 kg

WB = 6086 mm                    BD = ?

$$\frac{6086}{(6086 - 2565)} \times 4223 = 7299 \text{ kg}$$

*English*

BA = 101 in

FW = 9310 lb

WB = 240 in

BD = ?

$$\frac{240}{(240 - 101)} \times 9310 = 16,075 \text{ lb}$$

This specification is only a minor indicator of a motor grader’s productivity. It alone gives no measure of overall machine productivity. When considering motor grader production you need an optimum balance between the machine’s front and rear weights. If a machine has too much weight on the front axle, it might have a high blade down pressure spec. It will, however, lack the essential rear weight and traction needed to push through the load. Too much weight in the rear and it will not have the necessary weight in the front during heavy cuts to maintain proper steering control.

Cat machines are built with this optimum balance in mind. A Cat motor grader is engineered with the proper weight distribution necessary for maximum productivity.

**Effective Blade Length\***

		Moldboard							
		3.66 m (12')		4.27 m (14')		4.88 m (16')		7.32 m (24')	
Angle°		m	ft	m	ft	m	ft	m	ft
	0°	3.66	12.00	4.27	14.00	4.88	16.00	7.32	24.00
	5°	3.64	11.95	4.25	13.95	4.86	15.94	7.29	23.91
	10°	3.60	11.82	4.20	13.79	4.80	15.76	7.21	23.64
	15°	3.53	11.59	4.12	13.52	4.71	15.45	7.07	23.18
	20°	3.44	11.28	4.01	13.16	4.58	15.04	6.87	22.55
	25°	3.32	10.88	3.87	12.69	4.42	14.50	6.63	21.75
	30°	3.17	10.39	3.69	12.12	4.22	13.86	6.33	20.78
	35°	3.00	9.83	3.50	11.47	4.00	13.11	5.99	19.66
	40°	2.80	9.19	3.27	10.72	3.74	12.26	5.61	18.39
45°	2.59	8.49	3.02	9.90	3.45	11.31	5.17	16.97	

\*Effective blade length is the amount of blade coverage the machine is capable of when the blade is at a given angle.

MODEL	D6T		D6T XL	
	Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent		Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent	
Emission Standards				
Flywheel Power	149 kW	200 hp	149 kW	200 hp
Operating Weight: <sup>1</sup>				
Power Shift Differential Steer				
SU Blade	20 580 kg	45,370 lb	21 600 kg	47,620 lb
Engine Model	C9 ACERT		C9 ACERT	
Rated Engine RPM: Power Shift	1850		1850	
No. of Cylinders	6		6	
Bore	112 mm	4.4"	112 mm	4.4"
Stroke	149 mm	5.9"	149 mm	5.9"
Displacement	8.8 L	537 in <sup>3</sup>	8.8 L	537 in <sup>3</sup>
Track Rollers (Each Side)	6		7	
Width of Standard Track Shoe	560 mm	22"	560 mm	22"
Length of Track on Ground	2.61 m	8'7"	2.81 m	9'3"
Ground Contact Area (w/Std. Shoe)	2.92 m <sup>2</sup>	4531 in <sup>2</sup>	3.15 m <sup>2</sup>	4878 in <sup>2</sup>
Track Gauge	1.88 m	74"	1.88 m	74"
GENERAL DIMENSIONS:				
Height <sup>2</sup> (Stripped Top) <sup>3</sup>	2.40 m	7'11"	2.40 m	7'11"
Height <sup>2</sup> (To Top of ROPS Canopy)	3.11 m	10'2"	3.11 m	10'2"
Height <sup>2</sup> (To Top of ROPS Cab)	3.11 m	10'2"	3.11 m	10'2"
Overall Length (without Blade)	3.85 m	12'7"	3.85 m	12'7"
with SU Blade	5.08 m	16'8"	5.33 m	17'6"
with Angle Blade	5.00 m	16'5"	5.21 m	17'1"
Width (over Trunnion)	2.64 m	8'8"	2.64 m	8'8"
Width (w/o Trunnion — Std. Track)	2.44 m	8'0"	2.44 m	8'0"
Ground Clearance <sup>2</sup>	384 mm	1'3"	384 mm	1'3"
Blade Types and Widths:				
Angle Straight	4.16 m	13'8"	4.16 m	13'8"
Full 25° Angle	3.77 m	12'5"	3.77 m	12'5"
Semi-U	3.26 m	10'8"	3.26 m	10'8"
Fuel Tank Refill Capacity	425 L	112 U.S. gal	425 L	112 U.S. gal

<sup>1</sup> Operating weight includes cab, operator, lubricants, coolant, full fuel tank, standard track, hydraulic controls and fluid, SU blade, drawbar and counterweight.

<sup>2</sup> Dimensions measured from ground line. Add grouser height for total dimension on hard surfaces.

<sup>3</sup> Height (Stripped Top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

### Track-Type Tractor Sustainability

Well matched engine and power train systems enhance productivity and fuel efficiency.

MODEL	D6T XL		D6T XW		D6T LGP	
Emission Standards	Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)		Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)		Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)	
Flywheel Power	151 kW	202 hp	151 kW	202 hp	151 kW	202 hp
Operating Weight: <sup>1</sup>						
Power Shift Differential Steer	20 985 kg	46,263 lb	21 788 kg	48,034 lb	22 902 kg	50,490 lb
VPAT	23 663 kg	52,167 lb	24 118 kg	53,170 lb	24 336 kg	53,651 lb
Engine Model	C9.3 ACERT		C9.3 ACERT		C9.3 ACERT	
Advertised Engine RPM	2000		2000		2000	
No. of Cylinders	6		6		6	
Bore	115 mm	4.5"	115 mm	4.5"	115 mm	4.5"
Stroke	149 mm	5.9"	149 mm	5.9"	149 mm	5.9"
Displacement	9.3 L	567 in <sup>3</sup>	9.3 L	567 in <sup>3</sup>	9.3 L	567 in <sup>3</sup>
Track Rollers (Each Side)	7		7		8	
VPAT	7		8		8	
Width of Standard Track Shoe	560 mm	22"	760 mm	30"	915 mm	36"
VPAT	560 mm	22"	710 mm	28"	785 mm	31"
Length of Track on Ground	2.84 m	9'5"	2.84 m	9'5"	3.25 m	10'9"
VPAT	2.84 m	9'5"	3.25 m	10'9"	3.25 m	10'9"
Ground Contact Area (w/Std. Shoe)	3.54 m <sup>2</sup>	5489 in <sup>2</sup>	4.81 m <sup>2</sup>	7449 in <sup>2</sup>	6.53 m <sup>2</sup>	10,122 in <sup>2</sup>
VPAT	3.54 m <sup>2</sup>	5489 in <sup>2</sup>	5.10 m <sup>2</sup>	7909 in <sup>2</sup>	5.60 m <sup>2</sup>	8684 in <sup>2</sup>
Track Gauge	1.88 m	74"	2.03 m	80"	2.29 m	90"
VPAT	2.13 m	84"	2.29 m	90"	2.29 m	90"
GENERAL DIMENSIONS:						
Height <sup>2</sup> (Stripped Top <sup>3</sup> )	2.46 m	8'1"	2.46 m	8'1"	2.51 m	8'3"
VPAT	2.46 m	8'1"	2.51 m	8'3"	2.51 m	8'3"
Height <sup>2</sup> (To Top of ROPS Canopy)	3.11 m	10'2"	3.11 m	10'2"	3.16 m	10'4"
VPAT	3.11 m	10'2"	3.16 m	10'4"	3.16 m	10'4"
Height <sup>2</sup> (To Top of ROPS Cab)	3.15 m	10'4"	3.15 m	10'4"	3.20 m	10'6"
VPAT	3.15 m	10'4"	3.20 m	10'6"	3.20 m	10'6"
Overall Length (without Blade)	3.89 m	12'9"	3.89 m	12'9"	4.25 m	13'11"
VPAT	3.89 m	12'9"	4.25 m	13'11"	4.25 m	13'11"
with S Blade	—	—	—	—	5.50 m	18'1"
with SU Blade	5.33 m	17'6"	5.33 m	17'6"	—	—
with VPAT Blade	5.39 m	17'8"	5.53 m	18'2"	5.53 m	18'2"
with Angle Blade	5.21 m	17'1"	5.29 m	17'4"	5.81 m	19'1"
Width (over Trunnion)	2.69 m	8'10"	2.94 m	9'8"	3.48 m	11'5"
Width (w/o Trunnion — Std. Track)	2.59 m	8'6"	2.79 m	9'2"	3.20 m	10'6"
VPAT	2.72 m	8'11"	3.00 m	9'10"	3.14 m	10'4"
Ground Clearance <sup>2</sup>	372 mm	1'3"	372 mm	1'3"	406 mm	1'4"
VPAT	372 mm	1'3"	406 mm	1'4"	406 mm	1'4"
Blade Types and Widths:						
Straight	—	—	—	—	4.06 m	13'4"
Angle Straight	4.16 m	13'8"	4.52 m	14'10"	5.07 m	16'8"
Full 25° Angle	3.77 m	12'5"	4.11 m	13'6"	4.63 m	15'2"
Semi-U	3.26 m	12'8"	3.56 m	11'8"	—	—
VPAT						
Straight	3.88 m	12'9"	4.16 m	13'8"	4.16 m	13'8"
Full 24° Angle	3.54 m	11'7"	3.79 m	12'5"	3.79 m	12'5"
Fuel Tank Refill Capacity	411 L	109 U.S. gal	411 L	109 U.S. gal	411 L	109 U.S. gal
DEF Tank Refill Capacity	17.1 L	4.5 U.S. gal	17.1 L	4.5 U.S. gal	17.1 L	4.5 U.S. gal

<sup>1</sup> Operating weight includes cab, operator, lubricants, coolant, full fuel tank, standard track, hydraulic controls and fluid, SU blade and drawbar.

<sup>2</sup> Dimensions measured from ground line. Add grouser height for total dimension on hard surfaces.

<sup>3</sup> Height (Stripped Top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.



**BLADE PULL**

This specification is also known as drawbar pull. This spec can be calculated as follows:

Variables:

Rear weight of machine = Wr

Tire traction coefficient = T (Look up the table entitled “Coefficient of Traction Factors”)

$$Wr \times T = \text{Blade Pull}$$

Example problem:

Calculate the blade pull for a 140M Global Version machine operating in a quarry pit...

*Metric*

RW = 10 501 kg

T = 0.65

$$10\,501 \times 0.65 = 6825.65$$

*English*

RW = 23,151 lb

T = 0.65

$$23,151 \times 0.65 = 15,048.15$$

**BLADE DOWN PRESSURE**

This spec can be calculated as follows:

Variables:

Blade to front axle length = BA

Wheel base length = WB

Weight on front wheels = FW

Blade down pressure = BD

$$\frac{WB}{(WB - BA)} \times FW = BD$$

Example problem:

Calculate the blade down pressure for a 140M Global Version machine...

*Metric*

BA = 2565 mm                      FW = 4223 kg

WB = 6086 mm                    BD = ?

$$\frac{6086}{(6086 - 2565)} \times 4223 = 7299 \text{ kg}$$

*English*

BA = 101 in

FW = 9310 lb

WB = 240 in

BD = ?

$$\frac{240}{(240 - 101)} \times 9310 = 16,075 \text{ lb}$$

This specification is only a minor indicator of a motor grader’s productivity. It alone gives no measure of overall machine productivity. When considering motor grader production you need an optimum balance between the machine’s front and rear weights. If a machine has too much weight on the front axle, it might have a high blade down pressure spec. It will, however, lack the essential rear weight and traction needed to push through the load. Too much weight in the rear and it will not have the necessary weight in the front during heavy cuts to maintain proper steering control.

Cat machines are built with this optimum balance in mind. A Cat motor grader is engineered with the proper weight distribution necessary for maximum productivity.

**Effective Blade Length\***

		Moldboard							
		3.66 m (12')		4.27 m (14')		4.88 m (16')		7.32 m (24')	
Angle°		m	ft	m	ft	m	ft	m	ft
	0°	3.66	<b>12.00</b>	4.27	<b>14.00</b>	4.88	<b>16.00</b>	7.32	<b>24.00</b>
	5°	3.64	<b>11.95</b>	4.25	<b>13.95</b>	4.86	<b>15.94</b>	7.29	<b>23.91</b>
	10°	3.60	<b>11.82</b>	4.20	<b>13.79</b>	4.80	<b>15.76</b>	7.21	<b>23.64</b>
	15°	3.53	<b>11.59</b>	4.12	<b>13.52</b>	4.71	<b>15.45</b>	7.07	<b>23.18</b>
	20°	3.44	<b>11.28</b>	4.01	<b>13.16</b>	4.58	<b>15.04</b>	6.87	<b>22.55</b>
	25°	3.32	<b>10.88</b>	3.87	<b>12.69</b>	4.42	<b>14.50</b>	6.63	<b>21.75</b>
	30°	3.17	<b>10.39</b>	3.69	<b>12.12</b>	4.22	<b>13.86</b>	6.33	<b>20.78</b>
	35°	3.00	<b>9.83</b>	3.50	<b>11.47</b>	4.00	<b>13.11</b>	5.99	<b>19.66</b>
	40°	2.80	<b>9.19</b>	3.27	<b>10.72</b>	3.74	<b>12.26</b>	5.61	<b>18.39</b>
45°	2.59	<b>8.49</b>	3.02	<b>9.90</b>	3.45	<b>11.31</b>	5.17	<b>16.97</b>	

\*Effective blade length is the amount of blade coverage the machine is capable of when the blade is at a given angle.

MODEL	D6T		D6T XL	
	Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent		Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent	
Emission Standards				
Flywheel Power	149 kW	200 hp	149 kW	200 hp
Operating Weight: <sup>1</sup>				
Power Shift Differential Steer				
SU Blade	20 580 kg	45,370 lb	21 600 kg	47,620 lb
Engine Model	C9 ACERT		C9 ACERT	
Rated Engine RPM: Power Shift	1850		1850	
No. of Cylinders	6		6	
Bore	112 mm	4.4"	112 mm	4.4"
Stroke	149 mm	5.9"	149 mm	5.9"
Displacement	8.8 L	537 in <sup>3</sup>	8.8 L	537 in <sup>3</sup>
Track Rollers (Each Side)	6		7	
Width of Standard Track Shoe	560 mm	22"	560 mm	22"
Length of Track on Ground	2.61 m	8'7"	2.81 m	9'3"
Ground Contact Area (w/Std. Shoe)	2.92 m <sup>2</sup>	4531 in <sup>2</sup>	3.15 m <sup>2</sup>	4878 in <sup>2</sup>
Track Gauge	1.88 m	74"	1.88 m	74"
GENERAL DIMENSIONS:				
Height <sup>2</sup> (Stripped Top) <sup>3</sup>	2.40 m	7'11"	2.40 m	7'11"
Height <sup>2</sup> (To Top of ROPS Canopy)	3.11 m	10'2"	3.11 m	10'2"
Height <sup>2</sup> (To Top of ROPS Cab)	3.11 m	10'2"	3.11 m	10'2"
Overall Length (without Blade)	3.85 m	12'7"	3.85 m	12'7"
with SU Blade	5.08 m	16'8"	5.33 m	17'6"
with Angle Blade	5.00 m	16'5"	5.21 m	17'1"
Width (over Trunnion)	2.64 m	8'8"	2.64 m	8'8"
Width (w/o Trunnion — Std. Track)	2.44 m	8'0"	2.44 m	8'0"
Ground Clearance <sup>2</sup>	384 mm	1'3"	384 mm	1'3"
Blade Types and Widths:				
Angle Straight	4.16 m	13'8"	4.16 m	13'8"
Full 25° Angle	3.77 m	12'5"	3.77 m	12'5"
Semi-U	3.26 m	10'8"	3.26 m	10'8"
Fuel Tank Refill Capacity	425 L	112 U.S. gal	425 L	112 U.S. gal

<sup>1</sup> Operating weight includes cab, operator, lubricants, coolant, full fuel tank, standard track, hydraulic controls and fluid, SU blade, drawbar and counterweight.

<sup>2</sup> Dimensions measured from ground line. Add grouser height for total dimension on hard surfaces.

<sup>3</sup> Height (Stripped Top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

### Track-Type Tractor Sustainability

Well matched engine and power train systems enhance productivity and fuel efficiency.

MODEL	D6T XL		D6T XW		D6T LGP	
Emission Standards	Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)		Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)		Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)	
Flywheel Power	151 kW	202 hp	151 kW	202 hp	151 kW	202 hp
Operating Weight: <sup>1</sup>						
Power Shift Differential Steer	20 985 kg	46,263 lb	21 788 kg	48,034 lb	22 902 kg	50,490 lb
VPAT	23 663 kg	52,167 lb	24 118 kg	53,170 lb	24 336 kg	53,651 lb
Engine Model	C9.3 ACERT		C9.3 ACERT		C9.3 ACERT	
Advertised Engine RPM	2000		2000		2000	
No. of Cylinders	6		6		6	
Bore	115 mm	4.5"	115 mm	4.5"	115 mm	4.5"
Stroke	149 mm	5.9"	149 mm	5.9"	149 mm	5.9"
Displacement	9.3 L	567 in <sup>3</sup>	9.3 L	567 in <sup>3</sup>	9.3 L	567 in <sup>3</sup>
Track Rollers (Each Side)	7		7		8	
VPAT	7		8		8	
Width of Standard Track Shoe	560 mm	22"	760 mm	30"	915 mm	36"
VPAT	560 mm	22"	710 mm	28"	785 mm	31"
Length of Track on Ground	2.84 m	9'5"	2.84 m	9'5"	3.25 m	10'9"
VPAT	2.84 m	9'5"	3.25 m	10'9"	3.25 m	10'9"
Ground Contact Area (w/Std. Shoe)	3.54 m <sup>2</sup>	5489 in <sup>2</sup>	4.81 m <sup>2</sup>	7449 in <sup>2</sup>	6.53 m <sup>2</sup>	10,122 in <sup>2</sup>
VPAT	3.54 m <sup>2</sup>	5489 in <sup>2</sup>	5.10 m <sup>2</sup>	7909 in <sup>2</sup>	5.60 m <sup>2</sup>	8684 in <sup>2</sup>
Track Gauge	1.88 m	74"	2.03 m	80"	2.29 m	90"
VPAT	2.13 m	84"	2.29 m	90"	2.29 m	90"
GENERAL DIMENSIONS:						
Height <sup>2</sup> (Stripped Top <sup>3</sup> )	2.46 m	8'1"	2.46 m	8'1"	2.51 m	8'3"
VPAT	2.46 m	8'1"	2.51 m	8'3"	2.51 m	8'3"
Height <sup>2</sup> (To Top of ROPS Canopy)	3.11 m	10'2"	3.11 m	10'2"	3.16 m	10'4"
VPAT	3.11 m	10'2"	3.16 m	10'4"	3.16 m	10'4"
Height <sup>2</sup> (To Top of ROPS Cab)	3.15 m	10'4"	3.15 m	10'4"	3.20 m	10'6"
VPAT	3.15 m	10'4"	3.20 m	10'6"	3.20 m	10'6"
Overall Length (without Blade)	3.89 m	12'9"	3.89 m	12'9"	4.25 m	13'11"
VPAT	3.89 m	12'9"	4.25 m	13'11"	4.25 m	13'11"
with S Blade	—	—	—	—	5.50 m	18'1"
with SU Blade	5.33 m	17'6"	5.33 m	17'6"	—	—
with VPAT Blade	5.39 m	17'8"	5.53 m	18'2"	5.53 m	18'2"
with Angle Blade	5.21 m	17'1"	5.29 m	17'4"	5.81 m	19'1"
Width (over Trunnion)	2.69 m	8'10"	2.94 m	9'8"	3.48 m	11'5"
Width (w/o Trunnion — Std. Track)	2.59 m	8'6"	2.79 m	9'2"	3.20 m	10'6"
VPAT	2.72 m	8'11"	3.00 m	9'10"	3.14 m	10'4"
Ground Clearance <sup>2</sup>	372 mm	1'3"	372 mm	1'3"	406 mm	1'4"
VPAT	372 mm	1'3"	406 mm	1'4"	406 mm	1'4"
Blade Types and Widths:						
Straight	—	—	—	—	4.06 m	13'4"
Angle Straight	4.16 m	13'8"	4.52 m	14'10"	5.07 m	16'8"
Full 25° Angle	3.77 m	12'5"	4.11 m	13'6"	4.63 m	15'2"
Semi-U	3.26 m	12'8"	3.56 m	11'8"	—	—
VPAT						
Straight	3.88 m	12'9"	4.16 m	13'8"	4.16 m	13'8"
Full 24° Angle	3.54 m	11'7"	3.79 m	12'5"	3.79 m	12'5"
Fuel Tank Refill Capacity	411 L	109 U.S. gal	411 L	109 U.S. gal	411 L	109 U.S. gal
DEF Tank Refill Capacity	17.1 L	4.5 U.S. gal	17.1 L	4.5 U.S. gal	17.1 L	4.5 U.S. gal

<sup>1</sup> Operating weight includes cab, operator, lubricants, coolant, full fuel tank, standard track, hydraulic controls and fluid, SU blade and drawbar.

<sup>2</sup> Dimensions measured from ground line. Add grouser height for total dimension on hard surfaces.

<sup>3</sup> Height (Stripped Top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

MODEL	D9R		D9T		D9T	
Emission Standards	—		Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent <sup>1</sup>		Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)	
Flywheel Power	302 kW	<b>405 hp</b>	306 kW	<b>410 hp</b>	325 kW	<b>436 hp</b>
Operating Weight: <sup>2</sup>	48 784 kg <b>107,548 lb</b>		—		—	
Power Shift Clutch Brake	—		47 872 kg <b>105,539 lb</b>		48 361 kg <b>106,618 lb</b>	
Power Shift Differential Steer	—		—		—	
Engine Model	<b>3408C SCAC</b>		<b>C18 ACERT</b>		<b>C18 ACERT</b>	
Rated Engine RPM	<b>1900</b>		<b>1833</b>		<b>1800</b>	
No. of Cylinders	<b>8</b>		<b>6</b>		<b>6</b>	
Bore	137 mm	<b>5.4"</b>	145 mm	<b>5.7"</b>	145 mm	<b>5.7"</b>
Stroke	152 mm	<b>6"</b>	183 mm	<b>7.2"</b>	183 mm	<b>7.2"</b>
Displacement	18 L	<b>1099 in<sup>3</sup></b>	18.1 L	<b>1106 in<sup>3</sup></b>	18.1 L	<b>1106 in<sup>3</sup></b>
Track Rollers (Each Side)	<b>8</b>		<b>8</b>		<b>8</b>	
Width of Standard Track Shoe	610 mm	<b>24"</b>	610 mm	<b>24"</b>	610 mm	<b>24"</b>
Length of Track on Ground	3.47 m	<b>11'5"</b>	3.47 m	<b>11'5"</b>	3.47 m	<b>11'5"</b>
Ground Contact Area (w/Std. Shoe)	4.24 m <sup>2</sup>	<b>6569 in<sup>2</sup></b>	4.24 m <sup>2</sup>	<b>6569 in<sup>2</sup></b>	4.24 m <sup>2</sup>	<b>6569 in<sup>2</sup></b>
Track Gauge	2.25 m	<b>7'5"</b>	2.25 m	<b>7'5"</b>	2.25 m	<b>7'5"</b>
GENERAL DIMENSIONS:						
Height <sup>3</sup> (Stripped Top) <sup>4</sup>	3.69 m	<b>12'1"</b>	3.69 m	<b>12'1"</b>	3.69 m	<b>12'1"</b>
Height <sup>3</sup> (To Top of ROPS Canopy)	4.00 m	<b>13'1"</b>	4.00 m	<b>13'1"</b>	4.00 m	<b>13'1"</b>
Height <sup>3</sup> (To Top of FOPS Cab)	3.82 m	<b>12'6"</b>	3.82 m	<b>12'6"</b>	3.82 m	<b>12'6"</b>
Overall Length (with SU Blade) <sup>5</sup>	6.88 m	<b>22'6"</b>	6.88 m	<b>22'6"</b>	6.88 m	<b>22'6"</b>
(without Blade)	5.18 m	<b>17'0"</b>	5.18 m	<b>17'0"</b>	5.18 m	<b>17'0"</b>
(with SU Blade and Ripper) <sup>5</sup>	8.23 m	<b>27'0"</b>	8.23 m	<b>27'0"</b>	8.23 m	<b>27'0"</b>
(without Blade and Ripper)	4.91 m	<b>16'1"</b>	4.91 m	<b>16'1"</b>	4.91 m	<b>16'1"</b>
Width (over Trunnion)	3.30 m	<b>10'8"</b>	3.30 m	<b>10'8"</b>	3.30 m	<b>10'8"</b>
Width (w/o Trunnion — Std. Shoe)	2.88 m	<b>9'5"</b>	2.88 m	<b>9'5"</b>	2.88 m	<b>9'5"</b>
Ground Clearance <sup>6</sup>	496 mm	<b>1'7"</b>	496 mm	<b>1'7"</b>	496 mm	<b>1'7"</b>
Blade Types and Widths:						
Universal	4.65 m	<b>15'3"</b>	4.65 m	<b>15'3"</b>	4.65 m	<b>15'3"</b>
Semi-U	4.31 m	<b>14'2"</b>	4.31 m	<b>14'2"</b>	4.31 m	<b>14'2"</b>
Fuel Tank Refill Capacity	818 L	<b>216 U.S. gal</b>	889 L	<b>235 U.S. gal</b>	821 L	<b>217 U.S. gal</b>
DEF Tank Refill Capacity	—		—		36 L	<b>9.5 U.S. gal</b>

<sup>1</sup> Product available to meet Tier 2/Stage II/Japan 2001 (Tier 2) equivalent OR Tier 3/Stage IIIA/Japan 2006 (Tier 3) equivalent emission standards.

<sup>2</sup> Operating weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluids, semi universal blade with tilt, back-up alarm, seat belts, lights, and single shank ripper.

— D9R equipped with track guides, ROPS/FOPS cab, single shank ripper and SU blade.

<sup>3</sup> Dimensions measured from ground line. Add grouser height for total dimension on hard surfaces.

<sup>4</sup> Height (Stripped Top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.

<sup>5</sup> Includes drawbar.

<sup>6</sup> Per ISO 6746 — Must add grouser height for total dimension on hard surfaces.

MODEL	D10T2		D11		D11 CD	
Emission Standards	Tier 4 Final/Stage IV <sup>1</sup>		Tier 4 Final/Stage V <sup>2</sup>		Tier 4 Final/Stage V <sup>2</sup>	
Flywheel Power	447 kW	600 hp	634 kW	850 hp	634 kW	850 hp
Reverse Gears	538 kW	722 hp	712 kW	955 hp	712 kW	955 hp
Operating Weight: <sup>3</sup>						
Power Shift Clutch Brake	70 171 kg	154,700 lb	104 236 kg	229,800 lb	113 700 kg	250,665 lb
Engine Model	C27 ACERT		C32 ACERT		C32 ACERT	
Rated Engine RPM	1800		1800		1800	
No. of Cylinders	12		12		12	
Bore	137 mm	5.4"	145 mm	5.71"	145 mm	5.71"
Stroke	152 mm	6"	162 mm	6.38"	162 mm	6.38"
Displacement	27 L	1648 in <sup>3</sup>	32.1 L	1959 in <sup>3</sup>	32.1 L	1959 in <sup>3</sup>
Track Rollers (Each Side)	8		8		8	
Width of Standard Track Shoe	610 mm	24"	710 mm	28"	915 mm	36"
Length of Track on Ground (Idler to Idler)	3.88 m	12'9"	4.44 m	14'7"	4.44 m	14'7"
Ground Contact Area (w/Std. Shoe)	4.74 m <sup>2</sup>	7347 in <sup>2</sup>	6.31 m <sup>2</sup>	9781 in <sup>2</sup>	8.13 m <sup>2</sup>	12,605 in <sup>2</sup>
Track Gauge	2.55 m	8'4"	2.89 m	9'6"	2.89 m	9'6"
GENERAL DIMENSIONS:						
Height (Stripped Top) <sup>4,5</sup>	3.22 m	10'7"	3.80 m	12'6"	3.80 m	12'6"
Height (To Top of ROPS Canopy)	4.41 m	14'5"	4.73 m	15'6"	4.73 m	15'6"
Height (To Top of FOPS Cab)	4.10 m	13'5"	4.41 m	14'6"	4.41 m	14'6"
Overall Length:						
(with SU Blade and SS Ripper) <sup>6</sup>	9.16 m	30'1"	10.53 m	34'7"	10.71 m	35'2"
(without Blade and Ripper) <sup>7</sup>	5.32 m	17'5"	6.16 m	20'3"	6.16 m	20'3"
Width (over Trunnion)	3.74 m	12'3"	4.38 m	14'4"	4.38 m	14'4"
Width (w/o Trunnion — Std. Shoe)	3.30 m	10'10"	3.78 m	12'5"	3.81 m	12'6"
Ground Clearance <sup>8</sup>	632 mm	2'1"	798 mm	2'7"	798 mm	2'7"
Blade Types and Widths:						
CarryDozer		—		—	6.71 m	22'0"
Universal	5.26 m	17'3"	6.36 m	20'10"		—
Semi-U	4.94 m	16'3"	5.60 m	18'4"		—
Fuel Tank Refill Capacity	1204 L	314 U.S. gal	1895 L	500 U.S. gal	1895 L	500 U.S. gal

<sup>1</sup> Product available to meet China Nonroad Stage III emission standards, equivalent to Tier 2/Stage II.

<sup>2</sup> Meets Tier 4 Final/Stage V emission standards. Product also available to meet Tier 2/Stage II emission standards.

<sup>3</sup> Operating weight includes coolant, lubricants, full fuel tank, ROPS, FOPS cab, SU ABR bulldozer (D10T2) or U ABR bulldozer (D11), dual tilt, single-shank ripper with pin-puller, fast fuel, standard ES shoes, and operator.

D11 CD has 11 Carrydozer and single-shank Carrydozer ripper.

<sup>4</sup> Height (Stripped Top) — for D10T2, without ROPS canopy, cab, exhaust, lift cylinders, seat back or other easily removed encumbrances.

<sup>5</sup> Height (Stripped Top) — for D11, the dimension is to top of precleaners from bottom of tracks on hard ground.

<sup>6</sup> Overall length of D11 CD includes Straight (CarryDozer) Blade and SS Ripper.

<sup>7</sup> Overall length of machine from front tag link trunnion to rigid drawbar and excludes track grouser height.

<sup>8</sup> Per ISO 6746 — Must add grouser height for total dimension on hard surfaces.

All dimensions are approximate.

**TRAVEL SPEED**

POWER SHIFT MODEL	Differential Steer D8R		D8T		D9R		D9T		D10T2		D11/D11 CD	
	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph
FORWARD												
1	3.5	2.2	3.4	2.1	3.8	2.4	3.9	2.4	4.0	2.5	4.0	2.5
2	6.2	3.9	6.0	3.7	6.8	4.2	6.8	4.2	7.2	4.5	7.0	4.4
3	10.8	6.7	10.6	6.6	11.9	7.4	11.7	7.3	12.7	7.9	12.2	7.6
REVERSE												
1	4.7	2.9	4.5	2.8	4.7	2.9	4.7	2.9	5.2	3.2	4.8	3.0
2	8.1	5.0	7.9	4.9	8.4	5.2	8.4	5.2	9.0	5.6	8.5	5.3
3	13.9	8.6	14.2	8.8	14.7	9.1	14.3	8.9	15.8	9.8	14.7	9.1

GEAR	D6T Powershift with AutoShift		D6T Powershift with AutoShift – Sound Suppressed		D6T		D6		D6 XE	
	km/h	mph	km/h	mph	km/h	mph	km/h	mph	km/h	mph
FORWARD										
0.5	2.7	1.7	2.7	1.7						
0.7	3.3	2.0	3.2	2.0						
1.0	3.7	2.3	3.2	2.0	3.6	2.2	3.6	2.2	3.6	2.2
1.5	4.7	2.9	4.7	2.9	4.9	3.0	4.9	3	4.9	3.0
1.7	5.7	3.6	5.7	3.6						
2.0	6.5	4.0	6.3	3.9	6.5	4.1	6.5	4	6.5	4.0
2.5	8.2	5.1	8.2	5.1	9.2	5.7	9.2	5.7	9.2	5.7
2.7	10.0	6.2	10.0	6.2						
3.0	11.3	7.0	10.9	6.8	11.6	7.2	11.7	7.2	11.7	7.2
REVERSE										
0.5	3.5	2.2	3.5	2.2						
0.7	4.2	2.6	3.9	2.4						
1.0	4.7	2.9	3.9	2.4	3.6	2.2	3.6	2.2	3.6	2.2
1.5	6.0	3.7	6.0	3.7	4.9	3.0	4.9	3	4.9	3.0
1.7	7.3	4.5	7.3	4.5						
2.0	8.3	5.1	8.0	5.0	6.5	4.0	6.5	4	6.5	4.0
2.5	10.4	6.5	10.4	6.5	8.7	5.4	8.7	5.4	9.2	5.7
2.7	12.7	7.9	12.7	7.9						
3.0	14.4	9.0	13.8	8.6	11.7	7.2	11.7	7.2	11.7	7.2

# Bulldozers

## Blade Specifications

- D6T (90")
- D6/D6 XE (76")

MODEL	D6T (90")					
	6VPAT XW/LGP		6A LGP		6S LGP	
Type	Variable Pitch Power Angle and Tilt		Angle Blade		Straight Blade	
Blade Capacities*	5.02 m <sup>3</sup>	6.57 yd <sup>3</sup>	4.94 m <sup>3</sup>	6.46 yd <sup>3</sup>	3.79 m <sup>3</sup>	4.96 yd <sup>3</sup>
Weight, Shipping** (Dozer)	1764 kg	3888 lb	1457 kg	3211 lb	1189 kg	2622 lb
Tractor and Dozer Dimensions:						
A Length (Blade Straight)	5.53 m	18'2"	5.81 m	19'1"	5.50 m	18'1"
Length (Blade Angled)	—	—	6.81 m	22'4"	—	—
Width (Blade Angled)	3.72 m	12'2"	4.63 m	15'2"	—	—
Width (with C-Frame only)	—	—	3.77 m	15'5"	—	—
Blade Dimensions:						
B Width (including std. end bits)	4.16 m	13'8"	5.07 m	16'8"	4.06 m	13'3"
C Height	1294 mm	4'3"	1150 mm	3'9"	1108 mm	3'8"
D Max. Digging Depth	743 mm	2'5"	853 mm	2'10"	590 mm	1'11"
E Ground Clearance @ Full Lift	1102 mm	3'7"	1004 mm	3'3"	1094 mm	3'7"
G Max. Pitch Adjustment	+0.5° to -3.1°		—	—	+4.4° to -4.4°	
H Max. Hydraulic Tilt	435 mm	1'5"	618 mm	2'0"	747 mm	2'5"
Blade Angle	24°		24.2°		—	
J Hydraulic Tilt (Manual Brace Centered)	—		—		399 mm	1'4"
K Push Arm Trunnion Width (to Ball Centers)	—		3.42 m	11'5"	3.42 m	11'5"

MODEL	D6/D6 XE (76")					
	6A		6 SU		6 SU Landfill	
Type	Angle Blade		Semi-Universal		Semi-Universal Landfill	
Blade Capacities*	4.2 m <sup>3</sup>	5.5 yd <sup>3</sup>	5.7 m <sup>3</sup>	7.5 yd <sup>3</sup>	11.2 m <sup>3</sup>	14.6 yd <sup>3</sup>
Weight, Shipping** (Dozer)	3394 kg	7842 lb	2608 kg	5750 lb	2827 kg	6232 lb
Tractor and Dozer Dimensions:						
A Length (Blade Straight)	5.377 m	211.7 in	5.436 m	214.0 in	5.436 m	214.0 in
Width (Blade Angled/Folded)	6.418 m	252.7 in	—	—	—	—
Length (Blade Angled)	3.982 m	156.8 in	—	—	—	—
Blade Dimensions:						
B Width (including std. end bits)	4.389 m	172.8 in	3.312 m	130.4 in	3.312 m	130.4 in
C Height	1.150 m	45.3 in	1.408 m	55.4 in	2.027 m	79.4 in
D Max. Digging Depth	0.595 m	23.4 in	0.502 m	19.8 in	0.502 m	19.8 in
E Ground Clearance @ Full Lift	1.084 m	42.7 in	0.564 m	22.2 in	0.564 m	22.2 in
G Max. Pitch Adjustment	—		±4.2 degrees		±4.2 degrees	
Blade Angle	25°		—		—	
J Hydraulic Tilt	599 mm	23.6 in	564 mm	22.2 in	564 mm	22.2 in

\*Blade capacities as determined by SAE J1265.

Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

Notice that the capacity of the SU-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the SU-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\*Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D6/D6 XE (82")							
	6A LGP (30")		6 SU LGP (30")		6 VPAT (24")		6 SU LGP (30") Landfill	
Type	Angle Blade		Semi-Universal		Variable Pitch Power Angle and Tilt		Semi-Universal Landfill	
Blade Capacities*	4.6 m <sup>3</sup>	6.0 yd <sup>3</sup>	5.8 m <sup>3</sup>	7.6 yd <sup>3</sup>	4.1 m <sup>3</sup>	5.4 yd <sup>3</sup>	12.3 m <sup>3</sup>	16.1 yd <sup>3</sup>
Weight, Shipping** (Dozer)	3414 kg	7527 lb	2827 kg	6232 lb	1414 kg	3117 lb	2973 kg	6554 lb
Tractor and Dozer Dimensions:								
<b>A</b> Length (Blade Straight)	5.448 m	214.5 in	5.436 m	214.0 in	5.662 m	222.9 in	5.436 m	214.0 in
Length (Blade Angled)	6.561 m	258.3 in	—	—	6.365 m	250.6 in	—	—
Width (Blade Angled/Folded)	4.295 m	169.1 in	—	—	3.363 m	132.4 in	—	—
Blade Dimensions:								
<b>B</b> Width (including std. end bits)	4.735 m	186.4 in	3.613 m	142.2 in	3.680 m	144.9 in	3.613 m	142.2 in
<b>C</b> Height	1.150 m	45.3 in	1.408 m	55.4 in	1.312 m	51.7 in	2.027 m	79.8 in
<b>D</b> Max. Digging Depth	0.568 m	22.4 in	0.502 m	19.8 in	0.698 m	27.5 in	0.502 m	19.8 in
<b>E</b> Ground Clearance @ Full Lift	1.125 m	44.3 in	1.180 m	46.5 in	1.131 m	44.5 in	1.180 m	46.5 in
<b>G</b> Max. Pitch Adjustment	—	—	±4.2 degrees	—	+3.1/-2.9 degrees	—	±4.2 degrees	—
Blade Angle	25°	—	—	—	24.1°	—	—	—
<b>J</b> Hydraulic Tilt	0.640 m	25.2 in	0.551 m	21.7 in	0.576 m	22.7 in	0.551 m	21.7 in

MODEL	D6/D6 XE (90")							
	6A LGP (36")		6S LGP (36")		6 VPAT LGP (30")		6S LGP (36") Landfill	
Type	Angle Blade		Straight Blade		Variable Pitch Power Angle and Tilt		Straight Blade	
Blade Capacities*	5.0 m <sup>3</sup>	6.5 yd <sup>3</sup>	3.8 m <sup>3</sup>	5.0 yd <sup>3</sup>	4.5 m <sup>3</sup>	5.9 yd <sup>3</sup>	9.40 m <sup>3</sup>	12.3 yd <sup>3</sup>
Weight, Shipping** (Dozer)	3618 kg	7976 lb	2370 kg	5225 lb	1516 kg	3342 lb	2581 kg	5692 lb
Tractor and Dozer Dimensions:								
<b>A</b> Length (Blade Straight)	5.960 m	234.6 in	5.483 m	215.9 in	5.662 m	222.9 in	5.483 m	215.9 in
Length (Blade Angled)	6.996 m	275.4 in	—	—	6.430 m	253.1 in	—	—
Width (Blade Angled/Folded)	4.626 m	182.1 in	—	—	3.655 m	143.9 in	—	—
Blade Dimensions:								
<b>B</b> Width (including std. end bits)	5.100 m	200.8 in	4.063 m	160.0 in	4.000 m	157.5 in	4.063 m	160.0 in
<b>C</b> Height	1.150 m	45.3 in	1.108 m	43.6 in	1.312 m	51.7 in	1.767 m	69.6 in
<b>D</b> Max. Digging Depth	0.719 m	28.3 in	0.600 m	23.6 in	0.698 m	27.5 in	0.600 m	23.6 in
<b>E</b> Ground Clearance @ Full Lift	1.173 m	46.2 in	1.080 m	42.5 in	1.131 m	44.5 in	1.080 m	42.5 in
<b>G</b> Max. Pitch Adjustment	—	—	±4.2 degrees	—	+3.1/-2.9 degrees	—	±4.2 degrees	—
Blade Angle	25°	—	—	—	24.1°	—	—	—
<b>J</b> Hydraulic Tilt	0.689 m	27.1 in	0.500 m	19.7 in	0.625 m	24.6 in	0.500 m	19.7 in

\*Blade capacities as determined by SAE J1265.  
 Notice that the capacity of the U-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the U-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.  
 Notice that the capacity of the SU-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the SU-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.  
 \*\*Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.



MODEL	D9R/D9T			
	9SU		9U	
Type	Semi-U		Universal	
Blade Capacities*	13.5 m <sup>3</sup>	17.7 yd <sup>3</sup>	16.4 m <sup>3</sup>	21.4 yd <sup>3</sup>
Weight, Shipping** (Dozer)	6863 kg	15,130 lb	7388 kg	16,288 lb
Tractor and Dozer Dimensions:				
<b>A</b> Length (Blade Straight)	6.60 m	21'6"	6.96 m	22'8"
Blade Dimensions:				
<b>B</b> Width (including std. end bits)	4.31 m	14'1"	4.65 m	15'2"
<b>C</b> Height	1934 mm	6'4.1"	1934 mm	6'4.1"
<b>D</b> Max. Digging Depth	606 mm	1'11.9"	606 mm	1'11.9"
<b>E</b> Ground Clearance @ Full Lift	1422 mm	4'8"	1422 mm	4'8"
<b>G</b> Max. Pitch Adjustment	+3.4° to 2.9°		+3.4° to 2.9°	
<b>H</b> Max. Hydraulic Tilt	940 mm	3'1"	1014 mm	3'3.9"
<b>J</b> Hydraulic Tilt (Manual Brace Centered)	570 mm	1'10.4"	616 mm	2'0.3"
<b>K</b> Push Arm Trunnion Width (to Ball Centers)	3.30 m	10'8"	3.30 m	10'8"
Maximum Track Width Permitted	762 mm	2'6"	762 mm	2'6"
Dual Tilt Option				
<b>G</b> Dual Pitch Adj.	+4.8° to 5.2°		+4.8° to 4.9°	
<b>H</b> Dual Max. Hyd. Tilt	1139 mm	3'8.8"	1231 mm	4'0.5"

\*Blade capacities as determined by SAE J1265.

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Notice that the capacity of the SU-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the SU-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\*Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

MODEL	D11					
	11SU		11U		11 CD	
Type	Semi-U		Universal		CarryDozer	
Blade Capacities*	27.2 m <sup>3</sup>	35.5 yd <sup>3</sup>	34.4 m <sup>3</sup>	45.0 yd <sup>3</sup>	43.6 m <sup>3</sup>	57.0 yd <sup>3</sup>
Weight, Shipping**						
Standard Dozer	14 813 kg	32,658 lb	17 296 kg	38,131 lb	24 085 kg	53,099 lb
Abrasion Dozer	16 192 kg	35,698 lb	18 823 kg	41,498 lb	—	—
Tractor and Dozer Dimensions:						
A Length	8.58 m	28'2"	8.64 m	28'4"	8.77 m	28'9"
Width	5.50 m	18'1"	6.26 m	20'7"	6.43 m	21'1"
Blade Dimensions:						
B Width (including std. end bits)	5.58 m	18'4"	6.35 m	20'10"	6.71 m	22'0"
C Height	2.75 m	9'0"	2.83 m	9'3"	2.96 m***	9'8"***
D Max. Digging Depth	766 mm	2'6.2"	766 mm	2'6.2"	688 mm	2'3"
E Ground Clearance @ Full Lift	1533 mm	5'0.4"	1533 mm	5'0.4"	1850 mm	6'1"
G Max. Pitch Adjustment	+2.1° to 2.2°		+2.1° to 2.2°		—	
H Max. Hydraulic Tilt	1184 mm	3'10.6"	1344 mm	4'4.9"	1800 mm	5'11"
J Hydraulic Tilt (Manual Brace Centered)	886 mm	2'10.9"	1006 mm	3'3.6"	—	
K Push Arm Trunnion Width (to Ball Centers)	4.18 m	13'9"	4.18 m	13'9"	4.18 m	13'9"
Maximum Track Width Permitted	914 mm	3'0"	914 mm	3'0"	914 mm	3'0"
Dual Tilt Option	+7.5° to 7.6° or +0° to 13°		+7.5° to 7.6° or +0° to 13°		+47.8° to 10.4°	
G Dual Pitch Adjustment	+0° to 13°		+0° to 13°		+47.8° to 10.4°	
H Dual Max. Hyd. Tilt	1706 mm	5'7.2"	1938 mm	6'4.3"	—	

\*Blade capacities as determined by SAE J1265.

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Notice that the capacity of the SU-blade is the volume carried by a straight blade of the same dimensions plus the volume included in the "cup" of the SU-blade. It is intended for **relative comparisons of dozer sizes**, and not for predicting capacities or productivities in actual field conditions.

\*\*Shipping Weight — Total Bulldozer Arrangement includes: Blade, push arms or C-frame, braces, cylinders, lines, trunnions and lift cylinder mountings.

\*\*\*Blade height with cutting edge at 53°.

All dimensions are approximate.

## TRACTOR/RIPPER

## D11

Ripper Type	Adjustable Parallelogram			
	Multi-shank		CD Multi-shank	
Dimensions:				
<b>Ripper to Track</b>				
Ripper length behind track, shank vertical, ripper up (A)				
<b>A</b> With Pushblock		N/A		N/A
<b>B</b> Without Pushblock	1.69 m	5'6"	1.71 m	5'8"
Ripper length behind track, shank vertical, ripper down (A)				
<b>C</b> With Pushblock		N/A		N/A
<b>D</b> Without Pushblock	2.16 m	7'1"	2.16 m	7'1"
Tip to track distance, shank vertical (A)				
<b>E</b> Ripper Up	0.78 m	2'7"	0.78 m	2'7"
<b>F</b> Ripper Down	1.95 m	6'5"	1.96 m	6'5"
<b>Shank*</b>				
<b>G</b> Maximum digging depth	1100 mm	3'7.3"	1100 mm	3'7.3"
<b>H</b> Dig adjustment per hole	280 mm	11"	280 mm	11"
<b>I</b> Total dig adjustment	280 mm	11"	280 mm	11"
Pitch Adjustment, ripper down:				
<b>J</b> Forward		12.2°		12.2°
<b>K</b> Backward		31.8°		31.8°
<b>L</b> Maximum reach at ground line	1.71 m	5'7"	1.71 m	5'7"
<b>M</b> Maximum ground clearance under tooth (shank pinned in bottom hole)				
	1090 mm	3'6.9"	1090 mm	3'6.9"
<b>N</b> Maximum ramp angle, ripper up (shank pinned in bottom hole)				
		36.4°		36.4°
Shank Section				
	100 × 400 mm	3.9" × 15.7"	100 × 400 mm	3.9" × 15.7"
<b>Ripper Beam</b>				
<b>O</b> Overall width	3.33 m	10'11"	3.34 m	10'11.5"
<b>P</b> Height	560 mm	22"	595 mm	23.4"
<b>Q</b> Length	560 mm	22"	595 mm	23.4"
Clearance under beam, shank vertical				
<b>R</b> Ripper Up	2.06 m	6'9"	2.03 m	6'8"
<b>S</b> Ripper Down	282 mm	11.1"	247 mm	9.7"
Number of Pockets				
		3		3
<b>T</b> Pocket Spacing	1.5 m	4'11"	1.5 m	4'11"
<b>U</b> Shank Gauge	3.0 m	9'10"	3.0 m	9'10"
<b>V</b> Track Clearance with standard shoe	166 mm	5.6"	166 mm	5.6"
<b>W</b> Width across widest part of lift cylinders	1.9 m	6'3"	1.9 m	6'3"
Installed Weights:				
Ripper with standard shank				
	8674 kg	19,123 lb	11 790 kg	25,993 lb
Each additional tooth group				
	689 kg	1519 lb	689 kg	1519 lb
<b>Ripper Forces:**</b>				
Penetration Force, shank vertical				
	335 kN	75,311 lb	365 kN	82,055 lb
Pryout Force, shank vertical				
	632 kN	142,079 lb	636 kN	142,978 lb

\*Hydraulic pin puller is standard with deep ripping shank. Deep Ripping Arrangement maximum digging depth is 2.18 m (7'2").

\*\*Forces are for a ripper on a tractor equipped with an EROPS, U-Dozer and performance track. Forces will vary slightly with other vehicle configurations.

**TIP SELECTION FOR THE D8R/D8T, D9R/D9T, D10T2 AND D11 RIPPERS**

Three tip configurations (short, intermediate and long) in two styles (centerline and penetration) are available for economical operation in a variety of conditions.

**RECOMMENDED TIP USAGE**

*Short* — Use in high impact conditions where breakage problems occur. The shorter the tip, the more it resists breakage.

*Intermediate* — Most effective in moderate impact conditions where abrasion is not excessive.

*Long* — Use in loose, abrasive materials where breakage is not a problem. Generally offers the most wear material.

**Centerline vs Penetration**

The materials being ripped and the tractor doing the ripping will both have an effect on which tip will do the best job. High density material requires a “penetration” tip. High impact material requires a “centerline” tip. The following is a general guide to tip application.

Ripping Condition	Tips to use		
	D8R/D8T	D9R/D9T	D10T2 D11
Tandem Tractors . . . . .	Short	Short	Short
Single Shank and Multi-shank			
Extreme Duty . . . . .	Int.	Short	Short
Medium Duty . . . . .	Long	Int.	Int.
Abrasive Duty . . . . .	Long	Long	Long

Always use the longest tip that will wear without excessive breakage. Different tips should be tried to determine the most economical.

**ESTIMATING RIPPING PRODUCTION**

Ripping costs must be compared to other methods of loosening the material — usually drilling and blasting — on a cost per ton or bank cubic yard basis. Thus, an accurate estimation of ripper production is needed to determine unit ripping costs.

There are three general methods of estimating ripping production:

1. The best method is to record the time spent ripping, then remove (using scrapers or loaders and trucks) and weigh the ripped material. The total weight divided by the time spent will give hourly production. If the contractor is paid by volume, then a density must be used and the accuracy is only as good as the density used. For payment by volume removed, method 2 may be desirable. Some care will be needed to assure that only ripped material is removed.
2. Another method is to cross-section the area and then record the time spent ripping. After the material has been removed, cross-section the area again to determine the volume of rock removed. The volume divided by the time spent ripping gives the ripping rate per minute or hour.
3. Timing the ripper over a measured distance is the least accurate method, but valuable for quick estimating on the job. An average cycle time should be determined from a number of timed cycles. Turn-around or back-up time must be included. Measure the average rip distance, rip spacing and depth of penetration. This data will give the volume per cycle from which the production in bank cubic yards can be calculated. Experience has shown results obtained from this method are about 10 to 20% higher than the more accurate method of cross-sectioning.

An example of the measured distance method for calculating ripper production is:

*Data* — D10T2 — No. 10 with one shank.

910 mm (36 in) between passes.

1.6 km/h (1 mph) average speed (including slippage and stalls).

Every 91 m (300 ft) requires 0.25 min to raise, pivot, turn, and lower again: 91 m (300 ft) = 1 pass.

610 mm (24 in) penetration.

Full time ripping (no pushing or dozing assignment).

<b>MODEL</b>	<b>950H</b>		<b>962H</b>		<b>966H</b>	
Emission Standards	<b>Tier 3 equivalent*</b>		<b>Tier 3 equivalent*</b>		<b>Tier 3 equivalent*</b>	
Maximum Engine: Net	147 kW	<b>197 hp</b>	156 kW	<b>209 hp</b>	195 kW	<b>262 hp</b>
Gross	162 kW	<b>217 hp</b>	172 kW	<b>231 hp</b>	211 kW	<b>283 hp</b>
Engine Model	<b>C7 ACERT</b>		<b>C7 ACERT</b>		<b>C11 ACERT</b>	
Maximum Net Power Engine RPM	<b>1800</b>		<b>1800</b>		<b>1800</b>	
Bore	110 mm	<b>4.3"</b>	110 mm	<b>4.3"</b>	130 mm	<b>5.1"</b>
Stroke	127 mm	<b>5"</b>	127 mm	<b>5"</b>	140 mm	<b>5.5"</b>
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>	
Displacement	7.2 L	<b>439 in<sup>3</sup></b>	7.2 L	<b>439 in<sup>3</sup></b>	11.1 L	<b>677 in<sup>3</sup></b>
Speeds Forward:	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	6.9	<b>4.3</b>	7.0	<b>4.4</b>	6.7	<b>4.2</b>
2nd	12.7	<b>7.9</b>	13.0	<b>8.1</b>	12.6	<b>7.8</b>
3rd	22.3	<b>13.9</b>	22.6	<b>14.0</b>	22.1	<b>13.7</b>
4th	37.0	<b>23.0</b>	38.0	<b>23.6</b>	37.4	<b>23.2</b>
Speeds Reverse:	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	7.6	<b>4.7</b>	7.6	<b>4.7</b>	7.4	<b>4.6</b>
2nd	13.9	<b>8.6</b>	13.9	<b>8.6</b>	13.9	<b>8.6</b>
3rd	24.5	<b>15.2</b>	24.5	<b>15.2</b>	24.3	<b>15.1</b>
4th	40.0	<b>24.9</b>	40.0	<b>24.9</b>	37.4	<b>23.2</b>
Hydraulic Cycle Time, Rated Load in Bucket:	<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>	
Raise (from Carry Position)	<b>6.2</b>		<b>6.2</b>		<b>5.9</b>	
Dump (at Maximum Raise)	<b>2.0</b>		<b>2.0</b>		<b>1.6</b>	
Lower (Empty, Float Down)	<b>2.5</b>		<b>2.5</b>		<b>2.4</b>	
Total	<b>10.7</b>		<b>10.7</b>		<b>9.9</b>	
Tread Width	2.14 m	<b>7'0"</b>	2.14 m	<b>7'0"</b>	2.23 m	<b>7'4"</b>
Width Over Tires	2.79 m	<b>9'2"</b>	2.79 m	<b>9'2"</b>	3.06 m	<b>9'10"</b>
Ground Clearance	412 mm	<b>16"</b>	412 mm	<b>16"</b>	434 mm	<b>17"</b>
Fuel Tank Capacity	264 L	<b>70 U.S. gal</b>	264 L	<b>70 U.S. gal</b>	380 L	<b>100 U.S. gal</b>
Hydraulic Tank Capacity	110 L	<b>29 U.S. gal</b>	110 L	<b>29 U.S. gal</b>	110 L	<b>29 U.S. gal</b>
Hydraulic System Capacity (includes tank)	186 L	<b>48.4 U.S. gal</b>	186 L	<b>48.4 U.S. gal</b>	200 L	<b>52 U.S. gal</b>

\*Meets Tier 3, Stage IIIA, Japan 2006 (Tier 3) equivalent emission standards.

**NOTE:** Net Engine Power is provided according to SAE J1349 and ISO 9249. Gross Engine Power is provided according to SAE J1995. Machines may only be available in certain regions. Contact your local Cat dealer for product availability.

MODEL	972H		980H		986H		990K	
Emission Standards	Tier 3 equivalent*		Tier 3 equivalent*		Tier 2 equivalent or Tier 3 equivalent**		Tier 2 equivalent or Tier 4 Final***	
Maximum Engine: Net	214 kW	<b>287 hp</b>	260 kW	<b>349 hp</b>	305 kW	<b>409 hp</b>	521 kW	<b>699 hp</b>
Gross	232 kW	<b>311 hp</b>	293 kW	<b>392 hp</b>	335 kW	<b>449 hp</b>	561 kW	<b>752 hp</b>
Rated Payload†	—		—		10 tonnes	<b>11 tons</b>	15.9 tonnes	<b>17.5 tons</b>
Gross Rated Bucket Payload†	—		—		—		24 249 kg	<b>53,460 lb</b>
Engine Model	<b>C13 ACERT</b>		<b>C15 ACERT</b>		<b>C15 ACERT</b>		<b>C27 ACERT</b>	
Maximum Net Power Engine RPM	<b>1800</b>		<b>1800</b>		<b>1800</b>		<b>1800</b>	
Bore	130 mm	<b>5.1"</b>	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>	137 mm	<b>5.4"</b>
Stroke	157 mm	<b>6.2"</b>	171 mm	<b>6.75"</b>	171 mm	<b>6.75"</b>	152 mm	<b>6"</b>
No. Cylinders	<b>6</b>		<b>6</b>		<b>6</b>		<b>12</b>	
Displacement	12.5 L	<b>763 in<sup>3</sup></b>	15.2 L	<b>928 in<sup>3</sup></b>	15.2 L	<b>928 in<sup>3</sup></b>	27.0 L	<b>1650 in<sup>3</sup></b>
Speeds Forward:	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	7.2	<b>4.5</b>	6.6	<b>4.1</b>	7.3	<b>5</b>	7.3	<b>4.5</b>
2nd	12.6	<b>7.8</b>	11.8	<b>7.3</b>	12.7	<b>8</b>	13.3	<b>8.3</b>
3rd	21.4	<b>13.3</b>	20.7	<b>12.9</b>	22	<b>14</b>	22.9	<b>14.2</b>
4th	36.9	<b>22.9</b>	36.3	<b>22.6</b>	39	<b>24</b>	—	—
Speeds Reverse:	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>	<b>km/h</b>	<b>mph</b>
1st	8.2	<b>5.1</b>	7.6	<b>4.7</b>	7.6	<b>5</b>	7.9	<b>4.9</b>
2nd	14.2	<b>8.8</b>	13.5	<b>8.4</b>	14.1	<b>9</b>	14.7	<b>9.1</b>
3rd	24.3	<b>15.1</b>	23.6	<b>14.7</b>	25	<b>12</b>	24.9	<b>15.5</b>
4th	38.8	<b>24.0</b>	41.5	<b>25.8</b>	—	—	—	—
Hydraulic Cycle Time, Rated Load in Bucket:	<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>		<b>Seconds</b>	
Raise††	<b>5.9</b>		<b>6.0</b>		<b>8.5</b>		<b>8.2</b>	
Dump (at Maximum Raise)	<b>2.1</b>		<b>2.1</b>		<b>3</b>		<b>2.9</b>	
Lower (Empty, Float Down)	<b>2.4</b>		<b>3.4</b>		<b>4.3</b>		<b>3.6</b>	
Total	<b>10.4</b>		<b>11.5</b>		<b>15.8</b>		<b>13.8</b>	
Tread Width	2.23 m	<b>7'4"</b>	2.43 m	<b>8'0"</b>	2.59 m	<b>8'6"</b>	3.1 m	<b>10'2"</b>
Width Over Tires	3.00 m	<b>9'10"</b>	3.18 m	<b>10'5"</b>	3.54 m	<b>11'7"</b>	4.1 m	<b>13'5"</b>
Ground Clearance	434 mm	<b>17"</b>	430 mm	<b>16.9"</b>	459 mm	<b>18"</b>	596 mm	<b>23.5"</b>
Fuel Tank Capacity	380 L	<b>100 U.S. gal</b>	453 L	<b>120 U.S. gal</b>	600 L	<b>159 U.S. gal</b>	1114 L	<b>294 U.S. gal</b>
Hydraulic Tank Capacity	110 L	<b>29 U.S. gal</b>	125 L	<b>33 U.S. gal</b>	130 L	<b>34 U.S. gal</b>	—	—
Implement and Fan	—	—	—	—	—	—	261 L	<b>68.9 U.S. gal</b>
Steering and Braking	—	—	—	—	—	—	132 L	<b>34.9 U.S. gal</b>
Hydraulic System Capacity (includes tank)	200 L	<b>52 U.S. gal</b>	250 L	<b>66 U.S. gal</b>	330 L	<b>87 U.S. gal</b>	795 L	<b>210 U.S. gal</b>

\*Meets Tier 3, Stage IIIA, Japan 2006 (Tier 3) equivalent emission standards.

\*\*Meets Tier 2/Stage II/Japan 2001 (Tier 2) equivalent OR Tier 3/Stage IIIA/Japan 2006 (Tier 3) equivalent emission standards.

\*\*\*Meets Tier 2/Stage II/Japan 2001 (Tier 2) equivalent OR Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final) emission standards.

†Changes in bucket weight, including field installed wear iron, can impact rated payload. Consult your Cat dealer for assistance in selecting and configuring the proper bucket for the application. The Cat Large Wheel Loader Payload Policy is a guideline intended to maximize wheel loader structural and component life. The Cat Payload Policy is that the "Gross Bucket plus Payload Capacity" is the MAXIMUM weight that should be carried on the end of the Lift Arm/Boom.

††Raise is from carry position for the 972H and 980H.

NOTE: 972H and 980H Net Engine Power is provided according to SAE J1349 and ISO 9249. Gross Engine Power is provided according to SAE J1995. The 972H and 980H are not available in all regions. Contact your local Cat dealer for product availability.

Bucket Type		General Purpose — Pin On								
		Bolt-on Cutting Edges	Teeth & Segments	Teeth	Bolt-on Cutting Edges	Teeth & Segments	Teeth	Bolt-on Cutting Edges	Teeth & Segments	Teeth
Edge Type										
	Capacity — rated (§)	m <sup>3</sup>	3.80	3.80	3.60	4.00	4.00	3.80	4.20	4.00
		yd <sup>3</sup>	<b>4.97</b>	<b>4.97</b>	<b>4.71</b>	<b>5.23</b>	<b>5.23</b>	<b>4.97</b>	<b>5.49</b>	<b>5.23</b>
Capacity — struck (§)		m <sup>3</sup>	3.24	3.24	3.09	3.50	3.50	3.34	3.80	3.60
		yd <sup>3</sup>	<b>4.24</b>	<b>4.24</b>	<b>4.04</b>	<b>4.58</b>	<b>4.58</b>	<b>4.37</b>	<b>4.97</b>	<b>4.71</b>
Width (§)		mm	3220	3271	3271	3220	3271	3271	3220	3271
		ft/in	<b>10'6"</b>	<b>10'8"</b>	<b>10'8"</b>	<b>10'6"</b>	<b>10'8"</b>	<b>10'8"</b>	<b>10'6"</b>	<b>10'8"</b>
Dump clearance at maximum lift and 45° discharge (§)		mm	3067	2915	2915	3058	2905	2905	2991	2837
		ft/in	<b>10'0"</b>	<b>9'6"</b>	<b>9'6"</b>	<b>10'0"</b>	<b>9'6"</b>	<b>9'6"</b>	<b>9'9"</b>	<b>9'3"</b>
Reach at maximum lift and 45° discharge (§)		mm	1327	1467	1467	1334	1473	1473	1388	1525
		ft/in	<b>4'4"</b>	<b>4'9"</b>	<b>4'9"</b>	<b>4'4"</b>	<b>4'10"</b>	<b>4'10"</b>	<b>4'6"</b>	<b>5'0"</b>
Reach at level lift arm and bucket level (§)		mm	2739	2943	2943	2750	2955	2955	2838	3043
		ft/in	<b>8'11"</b>	<b>9'7"</b>	<b>9'7"</b>	<b>9'0"</b>	<b>9'8"</b>	<b>9'8"</b>	<b>9'3"</b>	<b>9'11"</b>
Digging depth (§)		mm	124	124	94	124	124	94	124	94
		in	<b>4.9</b>	<b>4.9</b>	<b>3.7</b>	<b>4.9</b>	<b>4.9</b>	<b>3.7</b>	<b>4.9</b>	<b>3.7</b>
Overall length		mm	8592	8817	8817	8604	8829	8829	8691	8916
		ft/in	<b>28'3"</b>	<b>29'0"</b>	<b>29'0"</b>	<b>28'3"</b>	<b>29'0"</b>	<b>29'0"</b>	<b>28'7"</b>	<b>29'4"</b>
Overall height with bucket at maximum lift		mm	5788	5788	5788	5902	5902	5902	5902	5902
		ft/in	<b>19'0"</b>	<b>19'0"</b>	<b>19'0"</b>	<b>19'5"</b>	<b>19'5"</b>	<b>19'5"</b>	<b>19'5"</b>	<b>19'5"</b>
Loader clearance circle with bucket at carry position (§)		mm	14 727	14 899	14 899	14 733	14 905	14 905	14 778	14 951
		ft/in	<b>48'4"</b>	<b>48'11"</b>	<b>48'11"</b>	<b>48'5"</b>	<b>48'11"</b>	<b>48'11"</b>	<b>48'6"</b>	<b>49'1"</b>
Static tipping load, straight (ISO)*		kg	16 852	16 671	16 870	16 833	16 652	16 885	16 635	16 453
		lb	<b>37,142</b>	<b>36,743</b>	<b>37,182</b>	<b>37,101</b>	<b>36,701</b>	<b>37,215</b>	<b>36,664</b>	<b>36,262</b>
Static tipping load, straight (rigid tire)*		kg	18 071	17 886	18 074	18 062	17 877	18 113	17 855	17 669
		lb	<b>39,829</b>	<b>39,422</b>	<b>39,835</b>	<b>39,809</b>	<b>39,401</b>	<b>39,922</b>	<b>39,353</b>	<b>38,943</b>
Static tipping load, articulated (ISO)*		kg	14 843	14 661	14 851	14 821	14 638	14 856	14 636	14 452
		lb	<b>32,715</b>	<b>32,312</b>	<b>32,733</b>	<b>32,666</b>	<b>32,262</b>	<b>32,743</b>	<b>32,259</b>	<b>31,853</b>
Static tipping load, articulated (rigid tire)*		kg	16 034	15 849	16 028	16 021	15 836	16 056	15 828	15 869
		lb	<b>35,339</b>	<b>34,932</b>	<b>35,326</b>	<b>35,311</b>	<b>34,903</b>	<b>35,388</b>	<b>34,886</b>	<b>34,476</b>
Breakout force** (§)		kN	187	185	199	185	183	197	173	171
		lbf	<b>42,151</b>	<b>41,781</b>	<b>44,901</b>	<b>41,695</b>	<b>41,326</b>	<b>44,390</b>	<b>38,984</b>	<b>38,618</b>
Operating weight*		kg	24 081	24 218	24 055	24 133	24 270	24 107	24 189	24 163
		lb	<b>53,073</b>	<b>53,377</b>	<b>53,017</b>	<b>53,188</b>	<b>53,492</b>	<b>53,132</b>	<b>53,311</b>	<b>53,615</b>

\*Static tipping loads and operating weights shown are based on a machine configuration with Michelin 26.5R25 XHA2 L3 Radial tires, full fluids, operator, standard counterweight, cold start, roading fenders, Product Link, open differential axles (front/rear), power train guard, secondary steering, and sound suppression.

\*\*Measured 102 mm (4") behind tip of cutting edge with bucket hinge pin as pivot point in accordance with SAE J732C.

(§) Specifications and ratings conform to all applicable standards recommended by the Society of Automotive Engineers, including SAE Standard J732C governing loader ratings.

(ISO) Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculations and testing.

(Rigid Tire) Compliance to ISO 14397-1 (2007) Sections 1 thru 5.

**NOTE:** Bucket availability varies by region. Consult your local dealer for availability.

Bucket Type	General Purpose — Pin On			General Purpose — Fusion QC						
	Edge Type	Bolt-on Cutting Edges	Teeth & Segments	Teeth	Bolt-on Cutting Edges	Teeth & Segments	Teeth	Bolt-on Cutting Edges	Teeth & Segments	Teeth
Capacity — rated (§)	m <sup>3</sup>	4.60	4.60	4.40	3.80	3.80	3.60	4.20	4.20	4.00
	yd <sup>3</sup>	<b>6.02</b>	<b>6.02</b>	<b>5.75</b>	<b>4.97</b>	<b>4.97</b>	<b>4.71</b>	<b>5.49</b>	<b>5.49</b>	<b>5.23</b>
Capacity — struck (§)	m <sup>3</sup>	4.05	4.05	3.90	3.24	3.24	3.09	3.80	3.80	3.60
	yd <sup>3</sup>	<b>5.30</b>	<b>5.30</b>	<b>5.10</b>	<b>4.24</b>	<b>4.24</b>	<b>4.04</b>	<b>4.97</b>	<b>4.97</b>	<b>4.71</b>
Width (§)	mm	3220	3271	3271	3220	3271	3271	3220	3271	3271
	ft/in	<b>10'6"</b>	<b>10'8"</b>	<b>10'8"</b>	<b>10'6"</b>	<b>10'8"</b>	<b>10'8"</b>	<b>10'6"</b>	<b>10'8"</b>	<b>10'8"</b>
Dump clearance at maximum lift and 45° discharge (§)	mm	2977	2823	2823	3038	2886	2886	2960	2806	2806
	ft/in	<b>9'9"</b>	<b>9'3"</b>	<b>9'3"</b>	<b>9'11"</b>	<b>9'5"</b>	<b>9'5"</b>	<b>9'8"</b>	<b>9'2"</b>	<b>9'2"</b>
Reach at maximum lift and 45° discharge (§)	mm	1400	1537	1537	1362	1501	1501	1433	1571	1571
	ft/in	<b>4'7"</b>	<b>5'0"</b>	<b>5'0"</b>	<b>4'5"</b>	<b>4'11"</b>	<b>4'11"</b>	<b>4'8"</b>	<b>5'1"</b>	<b>5'1"</b>
Reach at level lift arm and bucket level (§)	mm	2857	3062	3062	2783	2988	2988	2893	3097	3097
	ft/in	<b>9'4"</b>	<b>10'0"</b>	<b>10'0"</b>	<b>9'1"</b>	<b>9'9"</b>	<b>9'9"</b>	<b>9'5"</b>	<b>10'1"</b>	<b>10'1"</b>
Digging depth (§)	mm	124	124	94	124	124	94	116	116	86
	in	<b>4.9</b>	<b>4.9</b>	<b>3.7</b>	<b>4.9</b>	<b>4.9</b>	<b>3.7</b>	<b>4.5</b>	<b>4.5</b>	<b>3.4</b>
Overall length	mm	8710	8935	8935	8637	8862	8862	8739	8965	8965
	ft/in	<b>28'7"</b>	<b>29'4"</b>	<b>29'4"</b>	<b>28'5"</b>	<b>29'1"</b>	<b>29'1"</b>	<b>28'9"</b>	<b>29'5"</b>	<b>29'5"</b>
Overall height with bucket at maximum lift	mm	5874	5874	5874	5803	5803	5803	5960	5960	5960
	ft/in	<b>19'4"</b>	<b>19'4"</b>	<b>19'4"</b>	<b>19'1"</b>	<b>19'1"</b>	<b>19'1"</b>	<b>19'7"</b>	<b>19'7"</b>	<b>19'7"</b>
Loader clearance circle with bucket at carry position (§)	mm	14 787	14 961	14 961	14 743	14 917	14 917	14 794	14 970	14 970
	ft/in	<b>48'7"</b>	<b>49'1"</b>	<b>49'1"</b>	<b>48'5"</b>	<b>49'0"</b>	<b>49'0"</b>	<b>48'7"</b>	<b>49'2"</b>	<b>49'2"</b>
Static tipping load, straight (ISO)*	kg	16 631	16 447	16 792	16 279	16 099	16 440	16 015	15 834	16 167
	lb	<b>36,655</b>	<b>36,249</b>	<b>37,010</b>	<b>35,880</b>	<b>35,483</b>	<b>36,233</b>	<b>35,297</b>	<b>34,898</b>	<b>35,634</b>
Static tipping load, straight (rigid tire)*	kg	17 875	17 687	18 047	17 471	17 287	17 643	17 204	17 020	17 368
	lb	<b>39,397</b>	<b>38,983</b>	<b>39,777</b>	<b>38,506</b>	<b>38,101</b>	<b>38,885</b>	<b>37,918</b>	<b>37,512</b>	<b>38,280</b>
Static tipping load, articulated (ISO)*	kg	14 622	14 436	14 771	14 292	14 111	14 438	14 047	13 865	14 186
	lb	<b>32,227</b>	<b>31,817</b>	<b>32,556</b>	<b>31,501</b>	<b>31,100</b>	<b>31,821</b>	<b>30,961</b>	<b>30,558</b>	<b>31,266</b>
Static tipping load, articulated (rigid tire)*	kg	15 837	15 649	15 997	15 460	15 276	15 616	15 214	15 029	15 363
	lb	<b>34,906</b>	<b>34,492</b>	<b>35,257</b>	<b>34,074</b>	<b>33,670</b>	<b>34,418</b>	<b>33,531</b>	<b>33,125</b>	<b>33,860</b>
Breakout force** (§)	kN	170	168	180	180	179	192	166	164	176
	lbf	<b>38,277</b>	<b>37,912</b>	<b>40,561</b>	<b>40,632</b>	<b>40,264</b>	<b>43,192</b>	<b>37,382</b>	<b>37,023</b>	<b>39,561</b>
Operating weight*	kg	24 229	24 366	24 203	24 498	24 636	24 472	24 561	24 699	24 536
	lb	<b>53,399</b>	<b>53,703</b>	<b>53,343</b>	<b>53,992</b>	<b>54,296</b>	<b>53,936</b>	<b>54,132</b>	<b>54,436</b>	<b>54,076</b>

\*Static tipping loads and operating weights shown are based on a machine configuration with Michelin 26.5R25 XHA2 L3 Radial tires, full fluids, operator, standard counterweight, cold start, roading fenders, Product Link, open differential axles (front/rear), power train guard, secondary steering, and sound suppression.

\*\*Measured 102 mm (4") behind tip of cutting edge with bucket hinge pin as pivot point in accordance with SAE J732C.

(§) Specifications and ratings conform to all applicable standards recommended by the Society of Automotive Engineers, including SAE Standard J732C governing loader ratings.

(ISO) Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculations and testing.

(Rigid Tire) Compliance to ISO 14397-1 (2007) Sections 1 thru 5.

**NOTE:** Bucket availability varies by region. Consult your local dealer for availability.



Bucket Type			Standard Lift			High Lift		
			Rock Teeth & Segments	Rock Teeth & Segments	Rock Teeth & Segments	Rock Teeth & Segments	Rock Teeth & Segments	Rock Teeth & Segments
Cutting Edge Type			Spade	Spade	Spade	Spade	Spade	
Bucket Part Number			369-2020	369-2030	369-2040	369-2020	369-2030	369-2040
Capacity — struck	m <sup>3</sup>		4.4	4.8	5.1	4.4	4.8	5.1
	yd <sup>3</sup>		<b>5.8</b>	<b>6.2</b>	<b>6.7</b>	<b>5.8</b>	<b>6.2</b>	<b>6.7</b>
Heaped capacity — rated	m <sup>3</sup>		5.4	5.7	6.1	5.4	5.7	6.1
	yd <sup>3</sup>		<b>7.0</b>	<b>7.5</b>	<b>8.0</b>	<b>7.0</b>	<b>7.5</b>	<b>8.0</b>
Width	mm		3772	3772	3772	3772	3772	3772
	ft		<b>12.4</b>	<b>12.4</b>	<b>12.4</b>	<b>12.4</b>	<b>12.4</b>	<b>12.4</b>
Dump clearance at full lift and 45° discharge	Edge	mm	3420	3374	3328	3879	3833	3787
		ft	<b>11.2</b>	<b>11.1</b>	<b>10.9</b>	<b>12.7</b>	<b>12.6</b>	<b>12.4</b>
	With Teeth	mm	3280	3234	3188	3739	3693	3647
		ft	<b>10.8</b>	<b>10.6</b>	<b>10.5</b>	<b>12.3</b>	<b>12.1</b>	<b>12.0</b>
Reach at lift and 45° discharge	Edge	mm	1858	1904	1950	1798	1840	1882
		ft	<b>6.1</b>	<b>6.2</b>	<b>6.4</b>	<b>5.9</b>	<b>6.0</b>	<b>6.2</b>
	With Teeth	mm	1976	2022	2068	1904	1946	1988
		ft	<b>6.5</b>	<b>6.6</b>	<b>6.8</b>	<b>6.2</b>	<b>6.4</b>	<b>6.5</b>
Reach with lift arms horizontal and bucket level	mm		3657	3722	3787	4021	4086	4151
	ft		<b>12.0</b>	<b>12.2</b>	<b>12.4</b>	<b>13.2</b>	<b>13.4</b>	<b>13.6</b>
Digging depth	mm		160	160	160	208	208	208
	in		<b>6.3</b>	<b>6.3</b>	<b>6.3</b>	<b>8.2</b>	<b>8.2</b>	<b>8.2</b>
Overall length	mm		10 842	10 907	10 972	11 290	11 355	11 420
	ft		<b>35.6</b>	<b>35.8</b>	<b>36.0</b>	<b>37.0</b>	<b>37.3</b>	<b>37.5</b>
Overall height with bucket at full raise	mm		6609	6671	6734	7067	7130	7193
	ft		<b>21.7</b>	<b>21.9</b>	<b>22.1</b>	<b>23.2</b>	<b>23.4</b>	<b>23.6</b>
Loader clearance turning radius — SAE carry with teeth	mm		8607.5	8624	8640.5	8806	8824	8842
	ft		<b>28.3</b>	<b>28.3</b>	<b>28.4</b>	<b>28.9</b>	<b>29.0</b>	<b>29.0</b>
Full dump angle	degrees		-50	-50	-50	-50	-50	-50
Static tipping load — straight**	kg		29 147	28 969	28 791	24 759	24 595	24 431
	lb		<b>64,259</b>	<b>63,867</b>	<b>63,472</b>	<b>54,584</b>	<b>54,224</b>	<b>53,862</b>
Static tipping load — straight*	kg		27 698	27 509	27 319	23 632	23 458	23 284
	lb		<b>61,064</b>	<b>60,647</b>	<b>60,228</b>	<b>52,100</b>	<b>51,716</b>	<b>51,332</b>
Static tipping load — full turn (articulated 35°)**	kg		25 845	25 673	25 501	21 845	21 686	21 527
	lb		<b>56,979</b>	<b>56,600</b>	<b>56,220</b>	<b>48,159</b>	<b>47,809</b>	<b>47,458</b>
Static tipping load — full turn (articulated 35°)*	kg		23 846	23 661	23 476	20 251	20 081	19 911
	lb		<b>52,571</b>	<b>52,164</b>	<b>51,756</b>	<b>44,646</b>	<b>44,271</b>	<b>43,896</b>
Breakout force	kN		356	341	328	355	341	328
	lbf		<b>79,945</b>	<b>76,722</b>	<b>73,722</b>	<b>79,869</b>	<b>76,650</b>	<b>73,652</b>
Operating weight	kg		42 011	42 118	42 225	42 836	42 943	43 050
	lb		<b>92,618</b>	<b>92,855</b>	<b>93,090</b>	<b>94,437</b>	<b>94,673</b>	<b>94,909</b>
Weight distribution at SAE carry — unloaded	Front	kg	20 493	20 689	20 885	22 262	22 472	22 680
		lb	<b>45,178</b>	<b>45,612</b>	<b>46,044</b>	<b>49,079</b>	<b>49,541</b>	<b>50,002</b>
	Rear	kg	21 518	21 429	21 340	20 574	20 472	20 370
		lb	<b>47,439</b>	<b>47,242</b>	<b>47,046</b>	<b>45,358</b>	<b>45,132</b>	<b>44,907</b>
Weight distribution at SAE carry — loaded	Front	kg	37 109	37 340	37 571	38 451	38 691	38 931
		lb	<b>81,811</b>	<b>82,320</b>	<b>82,830</b>	<b>84,769</b>	<b>85,299</b>	<b>85,828</b>
	Rear	kg	14 902	14 778	14 654	13 457	13 324	13 191
		lb	<b>32,853</b>	<b>32,580</b>	<b>32,307</b>	<b>29,668</b>	<b>29,375</b>	<b>29,081</b>

\*Tipping Load is calculated with tire squash.

\*\*Tipping Load is calculated without tire squash.

		Standard Lift Aggregate Package					
		General Purpose	General Purpose	General Purpose	General Purpose	Coal	
Bucket Type		Segments	Segments	Segments	Segments	Segments	
Ground Engaging Tools		Straight	Straight	Straight	Straight	Straight	
Cutting Edge Type		436-8310	436-8320	436-8330	477-1900	436-8340	
Bucket Part Number		436-8310	436-8320	436-8330	477-1900	436-8340	
Capacity — struck	m <sup>3</sup>	5.2	5.9	6.6	7.3	9.0	
	yd <sup>3</sup>	<b>6.8</b>	<b>7.7</b>	<b>8.6</b>	<b>9.6</b>	<b>11.8</b>	
Heaped capacity — rated	m <sup>3</sup>	6.1	6.9	7.7	8.4	10.3	
	yd <sup>3</sup>	<b>8.0</b>	<b>9.0</b>	<b>10.0</b>	<b>11.0</b>	<b>13.5</b>	
Width	mm	3687	3687	3687	3729	3729	
	ft	<b>12.1</b>	<b>12.1</b>	<b>12.1</b>	<b>12.2</b>	<b>12.2</b>	
Dump clearance at full lift and 45° discharge (edge)	mm	3560	3471	3386	3222	3266	
	ft	<b>11.7</b>	<b>11.4</b>	<b>11.1</b>	<b>10.6</b>	<b>10.7</b>	
Reach at lift and 45° discharge (edge)	mm	1743	1831	1917	2081	2012	
	ft	<b>5.7</b>	<b>6.0</b>	<b>6.3</b>	<b>6.8</b>	<b>6.6</b>	
Reach with lift arms horizontal and bucket level	mm	3294	3419	3540	3772	3692	
	ft	<b>10.8</b>	<b>11.2</b>	<b>11.6</b>	<b>12.4</b>	<b>12.1</b>	
Digging depth	mm	143	143	143	143	160	
	in	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	
Overall length	mm	10 487	10 612	10 733	10 965	10 899	
	ft	<b>34.4</b>	<b>34.8</b>	<b>35.2</b>	<b>36.0</b>	<b>35.8</b>	
Overall height with bucket at full raise	mm	6844	6965	7063	7000	7394	
	ft	<b>22.5</b>	<b>22.9</b>	<b>23.2</b>	<b>23.0</b>	<b>24.3</b>	
Loader clearance turning radius — SAE carry with teeth	mm	8636.5	8668	8699	8760.5	8771	
	ft	<b>28.4</b>	<b>28.5</b>	<b>28.6</b>	<b>28.8</b>	<b>28.8</b>	
Full dump angle	degrees	-50	-50	-50	-50	-50	
Static tipping load — straight**	kg	34 164	33 787	33 420	32 625	33 128	
	lb	<b>75,318</b>	<b>74,488</b>	<b>73,677</b>	<b>71,926</b>	<b>73,036</b>	
Static tipping load — straight*	kg	32 318	31 919	31 531	30 751	31 068	
	lb	<b>71,249</b>	<b>70,369</b>	<b>69,514</b>	<b>67,794</b>	<b>68,493</b>	
Static tipping load — full turn (articulated 35°)**	kg	30 271	29 910	29 558	28 808	29 245	
	lb	<b>66,737</b>	<b>65,940</b>	<b>65,164</b>	<b>63,510</b>	<b>64,473</b>	
Static tipping load — full turn (articulated 35°)*	kg	27 633	27 244	26 866	26 134	26 341	
	lb	<b>60,920</b>	<b>60,063</b>	<b>59,229</b>	<b>57,616</b>	<b>58,072</b>	
Breakout force	kN	400	367	340	297	307	
	lbf	<b>89,924</b>	<b>82,515</b>	<b>76,334</b>	<b>66,675</b>	<b>69,100</b>	
Operating weight	kg	45 665	45 877	46 084	46 376	46 606	
	lb	<b>100,675</b>	<b>101,142</b>	<b>101,597</b>	<b>102,242</b>	<b>102,749</b>	
Weight distribution at SAE carry — unloaded	Front	kg	20 525	20 909	21 283	21 875	22 219
	Rear	kg	25 141	24 969	24 801	24 501	24 388
	Front	lb	<b>45,249</b>	<b>46,096</b>	<b>46,921</b>	<b>48,226</b>	<b>48,984</b>
	Rear	lb	<b>55,425</b>	<b>55,046</b>	<b>54,676</b>	<b>54,015</b>	<b>53,765</b>
Weight distribution at SAE carry — loaded	Front	kg	41 648	42 118	42 577	43 323	37 678
	Rear	kg	16 719	16 461	16 208	15 755	18 000
	Front	lb	<b>91,817</b>	<b>92,853</b>	<b>93,865</b>	<b>95,510</b>	<b>83,065</b>
	Rear	lb	<b>36,858</b>	<b>36,290</b>	<b>35,733</b>	<b>34,733</b>	<b>39,684</b>

\*Tipping Load is calculated with tire squash.  
\*\*Tipping Load is calculated without tire squash.

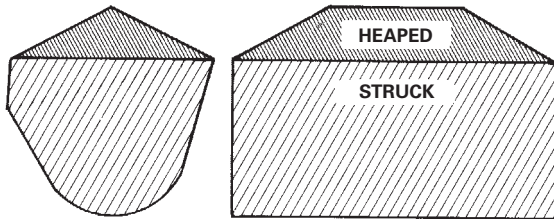
			990K STD Tires: 45/65R39 VSDL SLR: 1203 mm			
			Standard Lift			
Bucket Type			Rock		Heavy Duty	
Ground Engaging Tools			Teeth & Segments	Teeth & Segments	Teeth & Segments	Teeth & Segments
Cutting Edge Type			Spade	Spade	Spade	Spade
Bucket Part Number			361-6110	361-6120	361-6140	361-6150
Struck capacity		m <sup>3</sup>	7.0	7.5	8.0	7.0
		yd <sup>3</sup>	9.1	9.9	10.5	9.1
Heaped capacity — rated		m <sup>3</sup>	8.6	9.2	10.0	8.6
		yd <sup>3</sup>	11.25	12.0	13.0	11.25
Bucket width		mm	4610	4610	4610	4610
		ft	15.1	15.1	15.1	15.1
Dump clearance at full lift and 45° discharge	Bare	mm	4234	4186	4106	4217
		ft	13.9	13.7	13.5	13.8
	With teeth	mm	4060	4012	3932	4014
		ft	13.3	13.2	12.9	13.2
Reach at lift and 45° discharge	Bare	mm	2027	2074	2138	2027
		ft	6.6	6.8	7.0	6.6
	With teeth	mm	2194	2241	2305	2188
		ft	7.2	7.4	7.6	7.2
Reach with lift arms horizontal and bucket level — teeth		mm	4331	4398	4488	4347
		ft	14.2	14.4	14.7	14.3
Digging depth — segment		mm	113	113	113	113
		in	4.5	4.5	4.5	4.5
Overall length — bucket level ground		mm	13 072	13 139	13 229	13 088
		ft	42.9	43.1	43.4	42.9
Overall height with bucket at full raise		mm	8293	8359	8359	8293
		ft	27.2	27.4	27.4	27.2
Loader clearance turning radius — SAE carry with teeth		mm	10 431.5	10 449	10 473	10 348
		ft	34.2	34.3	34.4	34.4
Full dump angle		degrees	-45	-45	-45	-45
Static tipping load — straight*		kg	49 513	49 233	49 280	47 872
		lb	109,158	108,540	108,644	105,540
Static tipping load — full turn (articulated 35°)*		kg	44 180	43 908	43 934	42 537
		lb	94,401	96,801	96,858	93,778
Breakout force		kN	590	570	546	584
		lbf	132,617	128,103	122,733	131,034
Operating weight		kg	80 974	81 147	81 299	82 511
		lb	178,517	178,899	179,233	181,906
Weight distribution at SAE carry — unloaded	Front	kg	44 827	45 142	45 396	47 414
		lb	98,827	99,522	100,080	104,529
	Rear	kg	36 147	36 005	35 903	35 097
		lb	79,690	79,377	79,153	77,377
Weight distribution at SAE carry — loaded	Front	kg	70 939	71 103	71 536	73 510
		lb	156,395	157,197	157,710	162,062
	Rear	kg	25 909	25 719	25 638	24 876
		lb	57,120	56,700	56,521	54,842

\*Tipping Load is calculated without tire squash.

			990K STD Tires: 45/65R39 VSDL SLR: 1203 mm			
			High Lift			
Bucket Type			Rock		Heavy Duty	
Ground Engaging Tools			Teeth & Segments	Teeth & Segments	Teeth & Segments	Teeth & Segments
Cutting Edge Type			Spade	Spade	Spade	Spade
Bucket Part Number			361-6110	361-6120	361-6140	361-6150
Struck capacity		m <sup>3</sup>	7.0	7.5	8.0	7.0
		yd <sup>3</sup>	<b>9.1</b>	<b>9.9</b>	<b>10.5</b>	<b>9.1</b>
Heaped capacity — rated		m <sup>3</sup>	8.6	9.2	10	8.6
		yd <sup>3</sup>	<b>11.25</b>	<b>12</b>	<b>13</b>	<b>11.25</b>
Bucket width		mm	4610	4610	4610	4610
		ft	<b>15.1</b>	<b>15.1</b>	<b>15.1</b>	<b>15.1</b>
Dump clearance at full lift and 45° discharge	Bare	mm	4895	4647	4585	4695
		ft	<b>15.4</b>	<b>15.2</b>	<b>15.0</b>	<b>15.4</b>
	With teeth	mm	4521	4473	4410	4492
		ft	<b>14.8</b>	<b>14.7</b>	<b>14.5</b>	<b>14.7</b>
Reach at lift and 45° discharge	Bare	mm	2416	2463	2527	2416
		ft	<b>7.9</b>	<b>8.1</b>	<b>8.3</b>	<b>7.9</b>
	With teeth	mm	2583	2630	2694	2578
		ft	<b>8.5</b>	<b>8.6</b>	<b>8.8</b>	<b>8.5</b>
Reach with lift arms horizontal and bucket level — teeth		mm	4931	4998	5088	4947
		ft	<b>16.2</b>	<b>16.4</b>	<b>16.7</b>	<b>16.2</b>
Digging depth		mm	155	155	155	155
		in	<b>6.1</b>	<b>6.1</b>	<b>6.1</b>	<b>6.1</b>
Overall length		mm	13 811	13 878	13 968	13 827
		ft	<b>45.3</b>	<b>45.5</b>	<b>45.8</b>	<b>45.4</b>
Overall height with bucket at full raise		mm	8754	8820	8820	8754
		ft	<b>28.7</b>	<b>28.9</b>	<b>28.9</b>	<b>28.7</b>
Loader clearance turning radius — SAE carry with teeth		mm	10 742	10 945	10 973.5	10 811
		ft	<b>35.6</b>	<b>35.9</b>	<b>36.0</b>	<b>35.5</b>
Full dump angle		degrees	-51	-51	-51	-51
Static tipping load — straight*		kg	45 117	44 834	44 814	43 510
		lb	<b>99,465</b>	<b>98,842</b>	<b>98,798</b>	<b>95,924</b>
Static tipping load — full turn (articulated 35°)*		kg	39 904	39 631	39 596	38 295
		lb	<b>87,974</b>	<b>87,372</b>	<b>87,294</b>	<b>84,426</b>
Breakout force		kN	556	537	514	550
		lbf	<b>124,982</b>	<b>120,704</b>	<b>115,628</b>	<b>123,669</b>
Operating weight		kg	85 599	85 772	85 924	87 136
		lb	<b>188,713</b>	<b>189,094</b>	<b>189,429</b>	<b>192,102</b>
Weight distribution at SAE carry — unloaded	Front	kg	46 516	46 860	47 139	49 363
		lb	<b>102,551</b>	<b>103,309</b>	<b>103,923</b>	<b>108,826</b>
	Rear	kg	39 082	38 912	38 785	37 773
		lb	<b>86,162</b>	<b>85,786</b>	<b>85,506</b>	<b>83,275</b>
Weight distribution at SAE carry — loaded	Front	kg	75 305	75 696	75 953	78 137
		lb	<b>166,019</b>	<b>166,882</b>	<b>167,449</b>	<b>172,263</b>
	Rear	kg	26 169	25 950	25 845	24 874
		lb	<b>57,692</b>	<b>57,211</b>	<b>56,979</b>	<b>54,837</b>

\*Tipping Load is calculated without tire squash.

## SAE BUCKET RATING



### SAE Bucket Capacities

*Struck capacity* is that volume contained in a bucket after a load is leveled by drawing a straight edge resting on the cutting edge and the back of the bucket.

*Heaped capacity* is a struck capacity plus that additional material that would heap on the struck load at a 2:1 angle of repose with the struck line parallel to the ground.

SAE J742 (FEB85) specifies that the addition of any auxiliary spill guard to protect against spillage which might injure the operator will not be included in bucket capacity ratings. Buckets with irregular shaped cutting edges (vee edge) the strike plane should be drawn at one-third the distance of the protruding portion of the cutting edge. Cat rock buckets are built with integral see-through rock guards. Cat light material buckets come standard with bolt-on edges. These features which add to actual bucket capacity are included in published ratings.

### Dump Height

SAE J732 JUN92 specifies that dump height is the vertical distance from the ground to the lowest point of the cutting edge with the bucket hinge pin at maximum height and the bucket at a 45° dump angle. Dump angle is the angle in degrees that the longest flat section of the inside bottom of the bucket will rotate below horizontal.

## SELECTING A MACHINE

### Steps in selecting the proper size loader:

1. Determine production required or desired.
2. Determine loader cycle time and cycles per hour. A machine size must be assumed to select a basic cycle time.

3. Determine required payload per cycle in loose cubic yards and pounds (meters and kilograms).
4. Determine bucket size needed.
5. Make machine selection using bucket size and payload as criteria to meet production requirements.
6. Compare the loader cycle time used in calculations to the cycle time of the machine selected. If there is a difference, rework the process beginning at step 2.

### 1. Production Required

The production required of a wheel or track loader should be slightly greater than the production capability of the other critical units in the earth or material moving system. For example, if a hopper can handle 300 tons per hour, a loader capable of slightly more than 300 tons should be used. Required production should be carefully calculated so the proper machine and bucket selections are made.

### 2. Loader Cycle Times

When hauling loose granular material on a hard smooth operating surface, a .45-.55 minute basic cycle time is considered reasonable for Cat articulated loaders with a competent operator. This includes load, dump, four reversals of direction, full cycle of hydraulics and minimum travel.

Material type, pile height, and other factors may improve or reduce production, and should be added to or subtracted from the basic cycle time when applicable.

When hauls are involved, obtain the haul and return portion of the cycle from the estimated travel chart (this section). Add the haul and return times to the estimated basic cycle time to obtain total cycle time.

### CYCLE TIME FACTORS

A basic cycle time (Load, Dump, Maneuver) of .45-.55 minutes is average for an articulated loader [the basic cycle for large loaders, 3 m<sup>3</sup> (4 yd<sup>3</sup>) and up, can be slightly longer], but variations can be anticipated in the field. The following values for many variable elements are based on normal operations. Adding or subtracting any of the variable times will give the total basic cycle time.

Minutes added (+)  
 or Subtracted (-)  
 From Basic Cycle

<i>Machine</i>	
— Material handler . . . . .	-.05
<i>Materials</i>	
— Mixed . . . . .	+.02
— Up to 3 mm (1/8 in) . . . . .	+.02
— 3 mm (1/8 in) to 20 mm (3/4 in) . . . . .	-.02
— 20 mm (3/4 in) to 150 mm (6 in) . . . . .	.00
— 150 mm (6 in) and over . . . . .	+.03 and Up
— Bank or broken . . . . .	+.04 and Up
<i>Pile</i>	
— Conveyor or Dozer piled 3 m (10 ft) and up . . . . .	.00
— Conveyor or Dozer piled 3 m (10 ft) or less . . . . .	+.01
— Dumped by truck . . . . .	+.02
<i>Miscellaneous</i>	
— Common ownership of trucks and loaders . . . . .	Up to -.04
— Independently owned trucks . . . . .	Up to +.04
— Constant operation . . . . .	Up to -.04
— Inconsistent operation . . . . .	Up to +.04
— Small target . . . . .	Up to +.04
— Fragile target . . . . .	Up to +.05

Using actual job conditions and the above factors, total cycle time can be estimated. Convert total cycle time to cycles per hour.

$$\frac{\text{Cycles per hour at 100\% Efficiency}}{100\% \text{ Efficiency}} = \frac{60 \text{ min}}{\text{Total Cycle Time in Minutes}}$$

Job efficiency is an important factor in machine selection. Efficiency is the actual number of minutes worked during an hour. Job efficiency accounts for bathroom breaks and other work interruptions.

$$\frac{\text{Cycles per hour at 50 minutes per hour (83\% efficiency)}}{\text{Cycles per hour at 100\% efficiency}} = \frac{50 \text{ min} \times \text{actual work time}}{60 \text{ min hour}}$$

**TRUCK LOADING**

Average loader cycle times

910K-962H . . . . .	0.45-0.50 min
966H-980H . . . . .	0.50-0.55 min
986H-990K . . . . .	0.55-0.60 min
992K-994K . . . . .	0.60-0.70 min

**3. Required Payload Per Cycle**

Required payload per cycle is determined by dividing required hourly production by the number of cycles per hour.

**4. Bucket Selection**

After required payload per cycle has been calculated, the payload should be divided by the loose cubic yard (meter) material weight to determine number of loose cubic yards (meters) required per cycle.

The bulk of material handled does not weigh 1800 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>), so a reasonable knowledge of material weight is necessary for accurate production estimates. The Tables Section has average weight for certain materials when actual weights are not known.

The percentage of rated capacity a bucket carries in various materials is estimated below. The bucket size required to handle the required volume per cycle is found with the aid of the percentage of rated bucket capacity called "Bucket Fill Factor."

The bucket size needed is determined by dividing loose cubic meters (or yards) required per cycle by the bucket fill factor.

$$\text{Bucket size} = \frac{\text{Volume Required/Cycle}}{\text{Bucket Fill Factor}}$$

**BUCKET FILL FACTORS**

The following indicates the approximate amounts of material as a percent of rated bucket capacity which will actually be delivered per bucket per cycle. This is known as "Bucket Fill Factor."

Loose Material	Fill factor
Mixed moist aggregates . . . . .	95-100%
Uniform aggregates up to 3 mm (1/8 in) . . . . .	95-100
3 mm (1/8 in) to 9 mm (3/8 in) . . . . .	90-95
12 mm (1/2 in) to 20 mm (3/4 in) . . . . .	85-90
24 mm (1.0 in) and over . . . . .	85-90

## Wheel Loaders Integrated Toolcarriers

## Machine Selection

- Bucket Fill Factors
- Example Problem

### Blasted Rock

Well blasted . . . . .	80-95%
Average . . . . .	75-90
Poor . . . . .	60-75

### Other

Rock dirt mixtures . . . . .	100-120%
Moist loam . . . . .	100-110
Soil, boulders, roots . . . . .	80-100
Cemented materials . . . . .	85-95

**NOTE:** Fill factors on wheel loaders are affected by bucket penetration, breakout force, rack back angle, bucket profile and ground engaging tools such as bucket teeth or bolt-on replaceable cutting edges.

### Example:

12 mm (1/2 in) material and 3 m<sup>3</sup> (4 yd<sup>3</sup>) bucket.  
 $0.90 \times 3 \text{ m}^3 = 2.75 \text{ Loose m}^3 \text{ delivered per cycle.}$   
 $0.90 \times 4 \text{ yd}^3 = 3.6 \text{ Loose yd}^3 \text{ delivered per cycle.}$

**NOTE:** Check the static tipping load on the specific machine to determine if bucket load is in fact a safe operating load.

### Bucket Selection

$$\text{Tons Required/Cycle} = \frac{\text{Tons Required/Hour}}{\text{Cycles/Hour}}$$

$$\frac{\text{Kg (Pounds) Required/Cycle}}{\text{kg (2000 lb)}} = \frac{\text{Tons Required/Cycle}}{\text{kg (2000 lb)}}$$

$$\text{Volume Required/Cycle} = \frac{\text{kg (Pounds) Cycle}}{\text{Material Weight kg/m}^3 \text{ (lb/yd}^3)}$$

Always select a machine with a greater capacity than the calculated required operating capacity. For most applications, payload above recommended and excessive counterweight can hinder machine performance and reduce dynamic stability and machine life.

For optimum performance in fast cycling situations such as truck loading, operating loads should not exceed the recommended capacity. To provide extra stability, calcium chloride (CaCl<sub>2</sub>) ballast may be desired when operating at recommended operating load, see SAE Loader rating pages in this section. For specific stability data and optional tire sizes, see the "Performance Data" pages in this section.

When selecting special application buckets, such as multi-purpose and side dump the additional bucket weight must be deducted from recommended capacity.

Specific circumstances may involve other conditions which would also affect loader capacity. Because of the greatly varied applications and conditions, your Cat dealer should be contacted for guidance.

### Example problem:

#### JOB CONDITIONS

Application	Truck loading
Production Required	450 metric ton (496 Tons) per hour
Material	9 mm (3/8") gravel in 6 m (20 ft) high stockpile
Density	1660 kg/m <sup>3</sup> (2800 lb/yd <sup>3</sup> )

Trucks are 6-9 m<sup>3</sup> (8-12 yd<sup>3</sup>) capacity and are owned by three contractors. Loading is constant. Hard level surface for loader maneuvering.

1. **PRODUCTION REQUIRED:** Given
2. **CYCLE TIME:** Assume loader size between 910K and 962H for initial choice of basic cycle.

(Refer to Cycle Time Factors in this section)

Independent trucks	.04 min
Basic Cycle	.50 min
Material	-.02 min
Independent trucks	+.04 min
Constant operation	-.02 min
Total Cycle	.50 min

**NOTE:** Load and carry times not required in total cycle.

$$\begin{aligned} \text{Cycles/hr at 83\% efficiency} &= \frac{120 \text{ cycles/hr} \times \frac{50 \text{ min actual work time}}{60 \text{ min per hr}}}{100} \\ &= 100 \text{ cycles/hr} \end{aligned}$$

3. **VOLUME REQUIRED PER CYCLE**

(Density in tons)

Density in this example was given. When not given, refer to Tables Section to obtain an estimated density for the material being handled.

$$\text{Metric: } \frac{1660 \text{ kg/m}^3}{1000 \text{ kg/ton}} = 1.66 \text{ ton/m}^3$$

$$\text{English: } \frac{2800 \text{ lb/yd}^3}{2000 \text{ lb/ton}} = 1.4 \text{ tons/yd}^3$$

**Production Rate Required**

$$\text{Metric: } \frac{450 \text{ tons/hr}}{1.66 \text{ tons/m}^3} = 271 \text{ m}^3/\text{hr}$$

$$\text{English: } \frac{496 \text{ tons/hr}}{1.4 \text{ tons/yd}^3} = 354 \text{ yd}^3/\text{hr}$$

**Volume Required per Cycle**

$$\text{Metric: } \frac{271 \text{ m}^3/\text{hr}}{100 \text{ cycles/hr}} = 2.71 \text{ m}^3/\text{cycle}$$

$$\text{English: } \frac{354 \text{ yd}^3/\text{hr}}{100 \text{ cycles/hr}} = 3.54 \text{ yd}^3/\text{cycle}$$

4. *DETERMINE BUCKET SIZE*

*BUCKET FILL FACTOR*

The volume of material required per cycle has been determined. Because of varying material fill factors, buckets do not always carry their rated load, a larger capacity bucket may be needed to carry the volume required. For fill factors, refer to Bucket Fill Factor Chart in this section.

Rated Bucket Capacity Required (Heaped)

$$\frac{2.71 \text{ m}^3/\text{cycle}}{0.95 \text{ fill factor}} = 2.85 \text{ m}^3$$

$$\frac{3.54 \text{ yd}^3/\text{cycle}}{0.95 \text{ fill factor}} = 3.73 \text{ yd}^3$$

A 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) bucket would provide the required capacity.

5. *MACHINE SELECTION*

The bucket size required and material density lead to the choice of a 950H with a 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) General Purpose Bucket (see bucket selection guide pages which follow.)

Finally, SAE payload criteria must be satisfied as follows:

The required operating capacity must not exceed one-half of the full turn static tipping load of the loader as equipped with a specific bucket.

The required operating capacity of the machine is determined by the volume the machine will carry per load times the density.

$$2.9 \text{ m}^3 \times 1660 \text{ kg/m}^3 = 4814 \text{ kg}$$

$$(3.75 \text{ yd}^3 \times 2800 \text{ lb/yd}^3 = 10,500 \text{ lb})$$

One half of full turn static tipping load for the 950H with a 2.9 m<sup>3</sup> (3.75 yd<sup>3</sup>) General Purpose Bucket is 5410 kg (11,925 lb). SAE criteria is satisfied.



**An Alternative Method of Machine Selection**

Another method of selecting the right Wheel Loader and bucket to meet production requirements is by use of the nomographs on the following pages. The method is quicker and easier than the preceding example because it does not require as many calculations, yet the accuracy is about the same within the normal limits of input data.

Be careful when entering and reading data from the nomographs because some scales increase from bottom to top, while others are the reverse. Do not be overly concerned with the precision as affected by pencil line width or reading to the hundredth of a m<sup>3</sup> (yd<sup>3</sup>). Remember that bucket fill factor, material density and cycle time are at best close estimates.

Example problem:

A Wheel Loader must produce 230 m<sup>3</sup> (300 yd<sup>3</sup>) per hour in a truck loading application. Estimated cycle time is .6 minutes, working 45 minutes per hour. Bucket fill factor is 95% and material density is 1780 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>).

Determine bucket size and machine model.

Solution:

At full efficiency, the Wheel Loader will cycle 100 times per hour. Since only an average of 45 minutes are available, only 75 cycles will be completed.

Starting on Scale A at 75 cycles per hour draw a straight line intersecting 230 m<sup>3</sup>/hr (300 yd<sup>3</sup>/hr) on Scale B and extending it on to Scale C giving 3 m<sup>3</sup>/cycle (4 yd<sup>3</sup>/cycle) required payload. Follow solution steps 1-10.

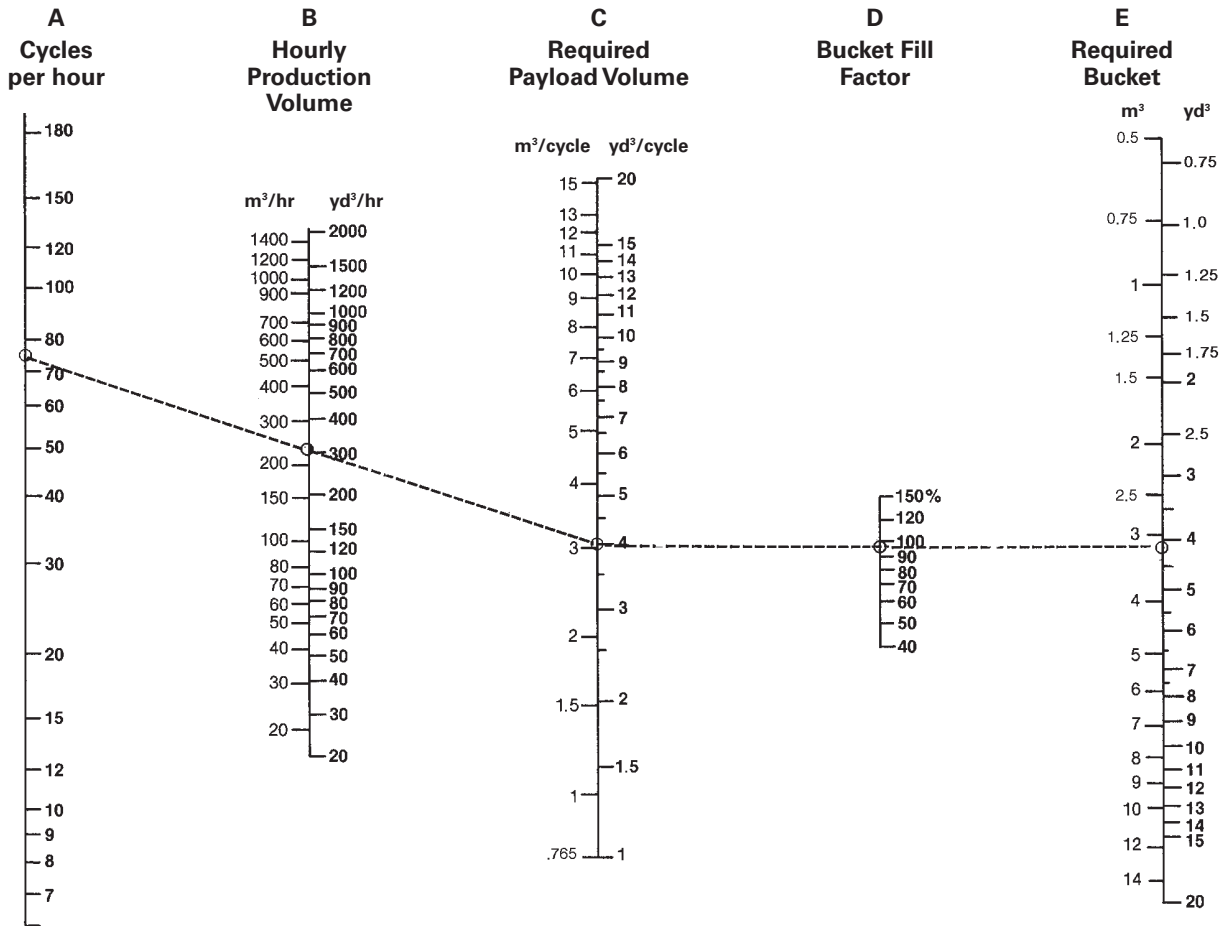


# Wheel Loaders Integrated Toolcarriers

## Production and Machine Selection Nomograph

- To find required bucket payload and bucket size

1. Enter required hourly production on Scale B 230 m<sup>3</sup>/hr (300 yd<sup>3</sup>/hr).
2. Enter cycles per hour on Scale A (60 ÷ .6 = 100 × .75 = 75 cycles/hr).
3. Connect A through B to C. This shows a required payload of 3 m<sup>3</sup> (4 yd<sup>3</sup>) per cycle.
4. Enter estimated bucket fill factor on Scale D (0.95).
5. Connect C through Scale D to E for required bucket size 3 m<sup>3</sup> (4 yd<sup>3</sup>).
6. Transfer cycles per hour Scale A and required payload Scale C to the following page.



# Production and Machine Selection Nomograph

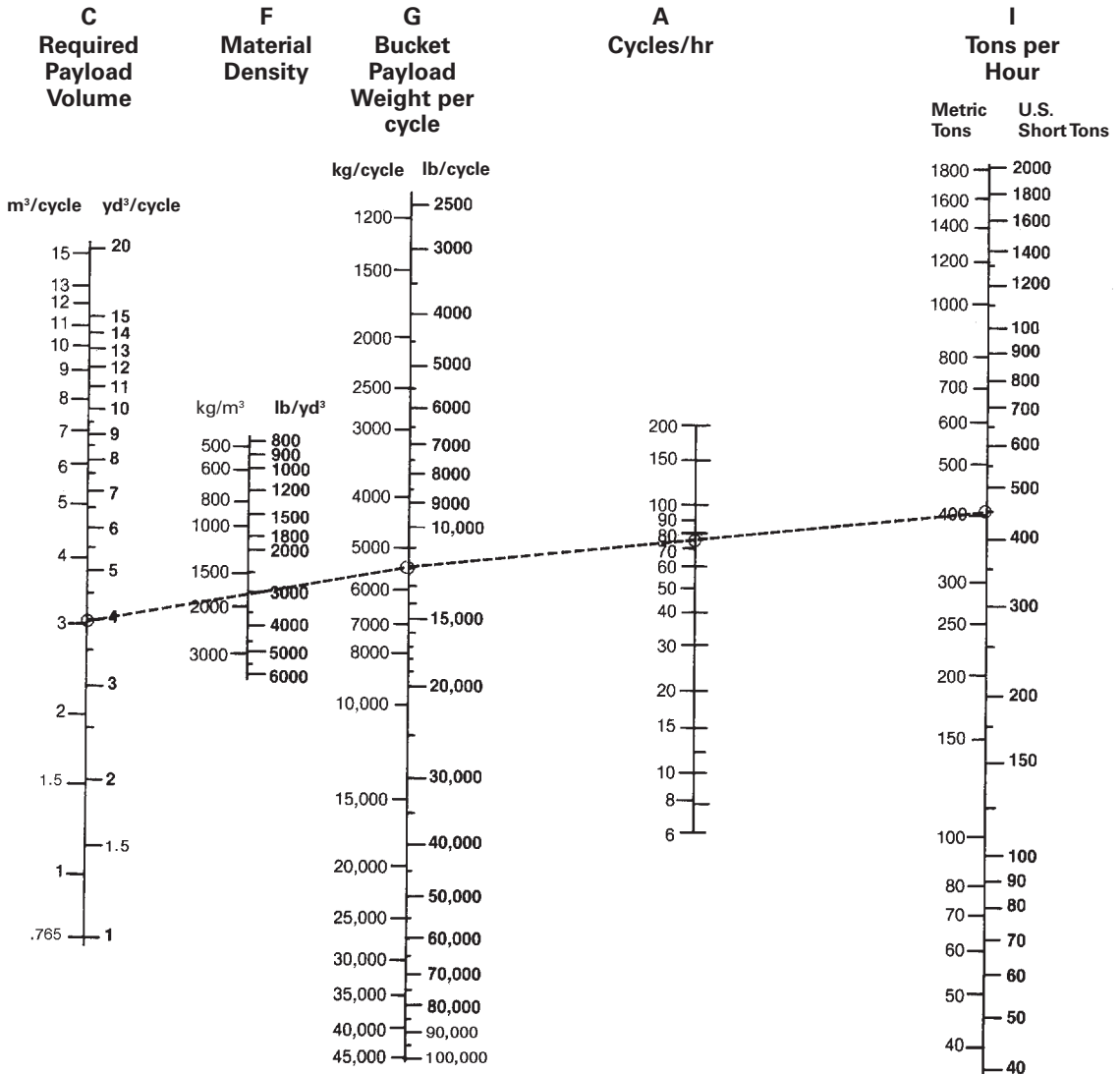
- To find payload weight and tons per hour

# Wheel Loaders Integrated Toolcarriers

- Enter material density on Scale F 1780 kg/m<sup>3</sup> (3000 lb/yd<sup>3</sup>).
- Connect C through Scale F to Scale G to give payload weight per cycle 5300 kg (11,500 lb).
- Compare Scale G quantity 5300 kg (11,500 lb) with recommended machine working range listed on the following bucket selection pages.

Operating capacity for the 950H with 3.1 m<sup>3</sup> (4 yd<sup>3</sup>) bucket is dependent on material density and bucket capacity (see bucket selection pages that follow).

- For hourly tonnage, draw a straight line from Scale G through Scale A to Scale I metric tons (450 U.S. tons).



Model	Interface	Bucket Type	Width Range		Capacity Range		Weight Range		GET
			mm	in	m <sup>3</sup>	yd <sup>3</sup>	kg	lb	
966M 966L 966K	Fusion	General Purpose Performance Series	3201	126	3.8-4.6	5.0-6.0	1965-2143	4332-4721	K90/BOCE
		Material Handling Performance Series	3201	126	4.0-4.8	5.2-6.3	2068-2254	4559-4969	K90/BOCE
		Coal Performance Series	3447	136	7.1	9.25	2865	6316	BOCE Included
		Rock Performance Series	3255	128	3.4	4.5	2084	4595	K90
		Multi-Purpose	3220	127	3.1	4.0	2785	6140	BOCE Included
		Side Dump	3677	145	3.6	4.75	2832	6243	BOCE Included
		High Dump	3059	120	5.4	7.0	2862	6310	BOCE Included
		Grapple	3048	120	3.8	5.0	4380	9656	K90
		Waste	3323	131	6.5	8.5	2569	5664	BOCE Included
		Woodchip	3943	155	9.9	13.0	2543	5606	BOCE Included
	Pin On	General Purpose Performance Series	3201	126	3.8-4.6	5.0-6.0	2112-2260	4656-4982	K90/BOCE
		Material Handling Performance Series	3201	126	4.0-4.8	5.25-6.25	2173-2350	4791-5181	K90/BOCE
		Coal Performance Series	3447	136	7.1	9.25	2795	6162	BOCE Included
		Rock Performance Series	3255	128	3.4	4.5	2362	5207	K90
		Heavy Duty Rock	3251	128	3.6-4.0	4.75-5.25	2371-2751	5227-6065	J350/K90
		Multi-Purpose	3226	127	3.1	4.0	2721	5999	K90
		Side Dump	3677	145	3.6	4.75	2858	6301	BOCE Included
		Waste	3357	132	6.5	8.5	2925	6449	BOCE Included
		Woodchip	3327-3937	131-155	8.0-9.9	10.5-13.0	2474-2543	5455-5542	BOCE Included
Doze	3357	132	6.5	8.5	3104	6844	BOCE Included		
Load & Carry	3357	132	7.5	9.75	3311	7301	BOCE Included		

**Wheel Loaders  
Integrated Toolcarriers**

**Buckets  
● Americas North**

Model	Interface	Bucket Type	Width Range		Capacity Range		Weight Range		GET
			mm	in	m <sup>3</sup>	yd <sup>3</sup>	kg	lb	
986H	Pin On	General Purpose Performance Series	3695	145	6.1-7.7	8.0-10.0	3648-4065	8042-8962	K110
		Rock Performance Series	3772	149	5.4-6.1	7.0-8.0	3726-3941	8214-8688	K110
		Heavy Duty Rock Performance Series	4014	158	5.4	7.0	5061	11,158	K130
		Extreme Duty Rock	4146	163	5.0	6.5	5195	12,050	K130
		Serrated Edge Rock	3812	150	6.1	8.0	4232	9330	N/A
		Coal	3692	145	10.0	13.5	5195	11,453	BOCE Included
988K	Pin On	General Purpose Performance Series	3855	152	6.9-8.4	9.0-11.0	4539-4994	10,007-11,010	K110
		Rock Performance Series	4020	158	6.4-7.7	8.3-10.0	4880-5263	10,759-11,603	K130
		Heavy Duty Rock Performance Series	4080	161	6.4	8.3	6360	14,021	K130
		Heavy Duty Granite Performance Series	3986	157	6.4	8.3	7433	16,385	K130
		Serrated Edge Rock	3968	156	6.4-6.9	8.3-9.0	5455-5634	12,026-12,421	N/A
		Iron Ore	3922	154	4.7	6.2	5771	12,723	K130
		Coal	4120	162	11.5-13.0	15.0-17.0	6023-6435	13,278-14,186	BOCE Included
		Slag	3900-4032	154-159	5.4-6.4	7.0-8.3	7633-8454	16,828-18,638	J600/Serrated Edge

N/A = Not Applicable

Model	Interface	Bucket Type	Width Range		Capacity Range		Weight Range		GET
			mm	in	m <sup>3</sup>	yd <sup>3</sup>	kg	lb	
990K	Pin On	Rock Performance Series	4610	182	8.6-10.0	11.25-13.0	7247-7497	15,977-16,528	K130
		Heavy Duty Rock Performance Series	4670	184	8.6	11.25	8980	19,798	K130
		Heavy Duty Granite Performance Series	4634	182	8.6	11.25	12 055	26,520	K150
		Slag	4450-4500	175-177	8.5-9.2	11.2-12.0	9149-9613	20,127-21,149	Weld-on edge included
		Coal	4370	172	13.4	17.5	7460	16,410	BOCE Included
		Iron Ore	4450	175	7.0	9.2	8525	18,750	K150
		Serrated Edge Rock	4610	182	9.5	12.4	8140	17,910	N/A
992K	Pin On	Rock	4824-4884	190-192	10.7-12.2	14.0-16.0	9382-10 574	20,684-23,262	K150/K170
		Heavy Duty Rock	5068	200	10.7	14.0	11 560	25,485	K170
		High Abrasion Rock	5068	200	10.7	14.0	11 927	26,295	K150
		Heavy Duty Granite	5165	203	10.7	14.0	13 720	30,247	K150
		Coal	6170	243	19.0	25.0	12 504	27,506	BOCE Included
		Iron Ore	4900	193	9.0	11.8	11 172	24,577	K150
		Serrated Edge Rock	4824	190	12.3	16.0	10 282	22,620	N/A
993K	Pin On	Rock	5068	200	12.2-14.5	16.0-19.0	12 864-14 209	28,301-31,260	K170
		High Abrasion Rock	5160	203	12.2-13.0	16.0-17.0	15 205-15 456	33,451-34,004	K170
		Heavy Duty Granite	5160	203	13.0	17.0	17 418	38,320	K170
		Coal	6300	248	23.0	31.0	17 673	38,880	K170
		Iron Ore	5160	203	10.0	13.0	14 063	30,940	K170
		Serrated Edge Rock	5080	200	15.0	19.5	13 915	30,615	N/A
994K	Pin On	Rock	6223	245	19.1-24.5	25-32	19 205-21 293	42,340-46,942	Spade edge*
		Heavy Duty Rock	6240	246	19.1-21.4	25-28	20 699-21 303	45,633-46,966	Spade edge*
		Coal	6964	274	32.1-39.8	42-52	20 862-22 773	45,992-50,206	Straight edge*
		Iron Ore	6240	246	17.2	22.5	19 518	43,029	Spade edge*

\*With teeth and segments.  
N/A = Not Applicable

# Wheel Tractor-Scrapers

## Specifications

- Twin Engine Open Bowl
- Optional Push-Pull

MODEL	627K		637K		657G	
Flywheel Power: Tractor	304 kW	<b>407 hp</b>	425 kW	<b>570 hp</b>	421/447 kW	<b>564/600 hp</b>
Scraper	216 kW	<b>290 hp</b>	216 kW	<b>290 hp</b>	306/337 kW	<b>410/451 hp</b>
Approx. Operating Weight (Empty)◀	40 811 kg	<b>89,973 lb</b>	52 140 kg	<b>114,950 lb</b>	68 384 kg	<b>150,760 lb</b>
Scraper Capacity: Struck	13 m <sup>3</sup>	<b>17.1 yd<sup>3</sup></b>	18.3 m <sup>3</sup>	<b>24 yd<sup>3</sup></b>	24.5 m <sup>3</sup>	<b>32 yd<sup>3</sup></b>
Heaped	18.4 m <sup>3</sup>	<b>24 yd<sup>3</sup></b>	26 m <sup>3</sup>	<b>34 yd<sup>3</sup></b>	33.6 m <sup>3</sup>	<b>44 yd<sup>3</sup></b>
Rated Load	26 127 kg	<b>57,610 lb</b>	37 285 kg	<b>82,200 lb</b>	47 174 kg	<b>104,000 lb</b>
Weight Distribution — Empty: Front		<b>59%</b>		<b>59%</b>		<b>58%</b>
Rear		<b>41%</b>		<b>41%</b>		<b>42%</b>
Weight Distribution — Loaded: Front		<b>50%</b>		<b>50%</b>		<b>50%</b>
Rear		<b>50%</b>		<b>50%</b>		<b>50%</b>
Engine Model: Tractor	<b>C13 ACERT</b>		<b>C18 ACERT</b>		<b>C18 ACERT</b>	
Scraper	<b>C9.3 ACERT</b>		<b>C9 ACERT</b>		<b>C15 ACERT</b>	
Emission Standards	<b>Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)</b>		<b>Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)</b>		<b>Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent</b>	
Rated Engine RPM: Tractor	<b>2000</b>		<b>1900</b>		<b>1800</b>	
Scraper	<b>2150</b>		<b>2150</b>		<b>1800</b>	
Displacement: Tractor	12.5 L	<b>763 in<sup>3</sup></b>	18.1 L	<b>1105 in<sup>3</sup></b>	18.1 L	<b>1105 in<sup>3</sup></b>
Scraper	9.3 L	<b>567 in<sup>3</sup></b>	9.3 L	<b>567 in<sup>3</sup></b>	15.2 L	<b>928 in<sup>3</sup></b>
Top Speed (Loaded)	53.9 km/h	<b>33.5 mph</b>	55.8 km/h	<b>34.7 mph</b>	53 km/h	<b>33 mph</b>
180° Curb-to-Curb Turning Width	18.25 m	<b>59'11"</b>	19.94 m	<b>65'5"</b>	22.33 m	<b>73'3"</b>
Tires — Tractor/Scraper	<b>33.25R29**E3</b>		<b>37.25R35**E3</b>		<b>40.5/75R39**E3</b>	
Width of Cut	3.14 m	<b>10'4"</b>	3.51 m	<b>11'6"</b>	3.85 m	<b>12'8"</b>
Maximum Depth of Cut	315 mm	<b>12.4"</b>	475 mm	<b>18.7"</b>	440 mm	<b>17.3"</b>
Maximum Depth of Spread	540 mm	<b>21.3"</b>	451 mm	<b>17.8"</b>	660 mm	<b>26"</b>
Fuel Tank Refill Capacity	1272 L	<b>336 U.S. gal</b>	1400 L	<b>370 U.S. gal</b>	1597 L	<b>424 U.S. gal</b>
Tractor DEF Tank	31.5 L	<b>8.3 U.S. gal</b>	31.5 L	<b>8.3 U.S. gal</b>		—
Scraper DEF Tank	23.1 L	<b>6.1 U.S. gal</b>	22.9 L	<b>6.0 U.S. gal</b>		—
<b>GENERAL DIMENSIONS:</b>						
Non Push-Pull						
Height — Overall Shipping	4.03 m	<b>13'2"</b>	4.15 m	<b>13'7"</b>	4.62 m	<b>15'2"</b>
Wheelbase	7.99 m	<b>26'2"</b>	8.81 m	<b>28'11"</b>	9.96 m	<b>32'8"</b>
Overall Length	14.02 m	<b>45'10"</b>	15.04 m	<b>49'4"</b>	16.2 m	<b>53'1"</b>
Overall Width	3.57 m	<b>11'7"</b>	3.94 m	<b>12'11"</b>	4.35 m	<b>14'4"</b>
Shipping Width (Draft Arm on Inside of Bowl)		—		—	3.91 m	<b>* 12'10"</b>
Center Line of Scraper Tread	2.29 m	<b>7'5"</b>	2.46 m	<b>8'1"</b>	2.81 m	<b>9'3"</b>
Center Line of Tractor Tread	2.28 m	<b>7'4"</b>	2.46 m	<b>8'1"</b>	2.63 m	<b>8'8"</b>
<b>GENERAL DIMENSIONS: Push-Pull</b>						
Operating Weight (Empty)◀	42 158 kg	<b>92,942 lb</b>	54 005 kg	<b>119,060 lb</b>	72 804 kg	<b>160,505 lb</b>
Overall Length	15.58 m	<b>51'1"</b>	16.64 m	<b>54'7"</b>	18.01 m	<b>59'1"</b>
Weight Distribution — Empty:						
Front		<b>59%</b>		<b>61%</b>		<b>58%</b>
Rear		<b>41%</b>		<b>39%</b>		<b>42%</b>
Weight Distribution — Loaded:						
Front		<b>50%</b>		<b>51%</b>		<b>51%</b>
Rear		<b>50%</b>		<b>49%</b>		<b>49%</b>

\*Standard Shipping Configuration.

◀ Operating weight includes standard machine, coolant, lubricants, full fuel tank, and operator. Operating weights for the 627K and 637K are based on Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final) platform machines. Deduct 569 kg (**1254 lb**) for the operating weight for the 627K Tier 2/Stage II/Japan 2001 (Tier 2) equivalent. Deduct 650 kg (**1433 lb**) for the operating weight for the 637K Tier 2/Stage II/Japan 2001 (Tier 2) equivalent. 657G is not available in Tier 2/Stage II/Japan 2001 (Tier 2) equivalent.

**NOTE:** Wheel Tractor-Scrapers are not emission certified in Japan market.

MODEL	637K		657G	
Flywheel Power: Tractor	425 kW	<b>570 hp</b>	421/447 kW	<b>564/600 hp</b>
Scraper	216 kW	<b>290 hp</b>	306/337 kW	<b>410/451 hp</b>
Approx. Operating Weight (Empty)	53 425 kg	<b>117,782 lb</b>	72 190 kg	<b>158,817 lb</b>
Scraper Capacity: Struck	31 m <sup>3</sup>	<b>41 yd<sup>3</sup></b>	45 m <sup>3</sup>	<b>59 yd<sup>3</sup></b>
Heaped	38 m <sup>3</sup>	<b>50 yd<sup>3</sup></b>	56 m <sup>3</sup>	<b>73 yd<sup>3</sup></b>
Emission Standards	<b>Tier 4 Final/Stage IV/ Japan 2014 (Tier 4 Final)</b>		<b>Tier 3/Stage IIIA/ Japan 2006 (Tier 3) equivalent</b>	
Rated Load	37 285 kg	<b>82,200 lb</b>	49 895 kg	<b>110,000 lb</b>
Approx. Operating Weight (Loaded)	90 710 kg	<b>199,982 lb</b>	121 933 kg	<b>268,817 lb</b>
Top Speed (Loaded)	55.8 km/h	<b>34.7 mph</b>	53 km/h	<b>33 mph</b>
180° Curb-to-Curb Turning Width	21.46 m	<b>70'5"</b>	24.43 m	<b>80'2"</b>
GENERAL DIMENSIONS:				
Height — Overall Shipping	4.15 m	<b>13'7"</b>	4.62 m	<b>15'2"</b>
Wheelbase	9.57 m	<b>31'5"</b>	11.01 m	<b>36'1"</b>
Overall Length	15.48 m	<b>50'10"</b>	17.21 m	<b>56'5"</b>
Overall Width	3.94 m	<b>12'11"</b>	4.35 m	<b>14'4"</b>
Shipping Width (Draft Arm on Inside of Bowl)		—	3.91 m	* <b>12'10"</b>
Center Line of Scraper Tread	2.46 m	<b>8'1"</b>	2.81 m	<b>9'3"</b>
Center Line of Tractor Tread	2.46 m	<b>8'1"</b>	2.63 m	<b>8'8"</b>

\*Standard Shipping Configuration.

◀ Operating weight includes standard machine, coolant, lubricants, full fuel tank, and operator. Operating weights for the 637K are based on Tier 4 Final/Stage IV/Japan 2014 (Tier 4 Final) and operating weights for the 657G are based on Tier 3/Stage IIIA/Japan 2006 (Tier 3) equivalent platform machines. Deduct 650 kg (**1433 lb**) for the operating weight for the 637K Tier 2/Stage II/Japan 2001 (Tier 2) equivalent.

**NOTE:** Wheel Tractor-Scrapers are not emission certified in Japan market.

### Coal Bowl

Coal Bowl Wheel Tractor-Scrapers are typically used for building and maintaining coal stockpiles and hauling coal to the supply system at coal power plants. The self-loading capability, large capacity, coal pile compaction, and high speed of Coal Bowl Wheel Tractor-Scrapers make them the tool of choice for moving coal both short and long distances. Coal Bowl Wheel Tractor-Scrapers are available in the 637K and 657G tandem engine models.

### Coal Bowl Advantages:

- Load hoppers
- Manage coal stockpiles
- Compaction reduces risk of spontaneous combustion in coal stockpile
- Exclusively designed large capacity coal bowls

### Notes:

- The 637K Coal Scraper is 736 mm (**29.0"**) longer, the bowl sides are 476 mm (**18.7"**) taller, and the apron is 499 mm (**19.6"**) taller than its earthmoving counterpart.
- The 657G Coal Scraper is 1072 mm (**42.2"**) longer, the bowl sides are 1010 mm (**39.8"**) taller, the apron is 677 mm (**26.7"**) taller, and the ejector is 944 mm (**37.2"**) taller than its earthmoving counterpart.

**TYPICAL FIXED TIMES FOR SCRAPERS**

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (Min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613G	Self	0.9	0.7
623K	Self	0.9	0.7
621K	One D8	0.5	0.7
627K	One D8	0.5	0.6
621K	One D9	0.4	0.7
627K	One D9	0.4	0.6
627K/PP	Self	0.9*	0.6
631K	One D9	0.6	0.7
637K	One D9	0.6	0.6
631K	One D10	0.5	0.7
637K	One D10	0.5	0.6
637K/PP	Self	1.0*	0.6
657G	One D11	0.6	0.6
657G	Push Pull Self	1.1*	0.6
637K	Coal	0.8	0.7
657G	Coal	0.8	0.6

\*Load time per pair, including transfer time.

**NOTE:** Empty Weights shown on the Wheel Tractor-Scraper charts includes ROPS Canopy. When calculating TMPH loadings any additional weight must be considered in establishing mean tire loads.

**USE OF RETARDER CURVES**

*The following explanation applies to retarder curves for Wheel Tractor-Scrapers and Articulated Trucks.*

The speed that can be maintained (without use of service brake) when the machine is descending a grade with retarder fully on can be determined from the retarder curves in this section if gross machine weight and total effective grade are known.

**Total Effective Grade (or Total Resistance)** is grade assistance *minus* rolling resistance.

10 kg/metric ton (20 lb/U.S. ton) = 1% adverse grade.

Example

15% favorable grade with 5% rolling resistance. Find Total Effective Grade.

$$\text{Total Effective Grade} = 15\% \text{ Grade Assistance} - 5\%$$

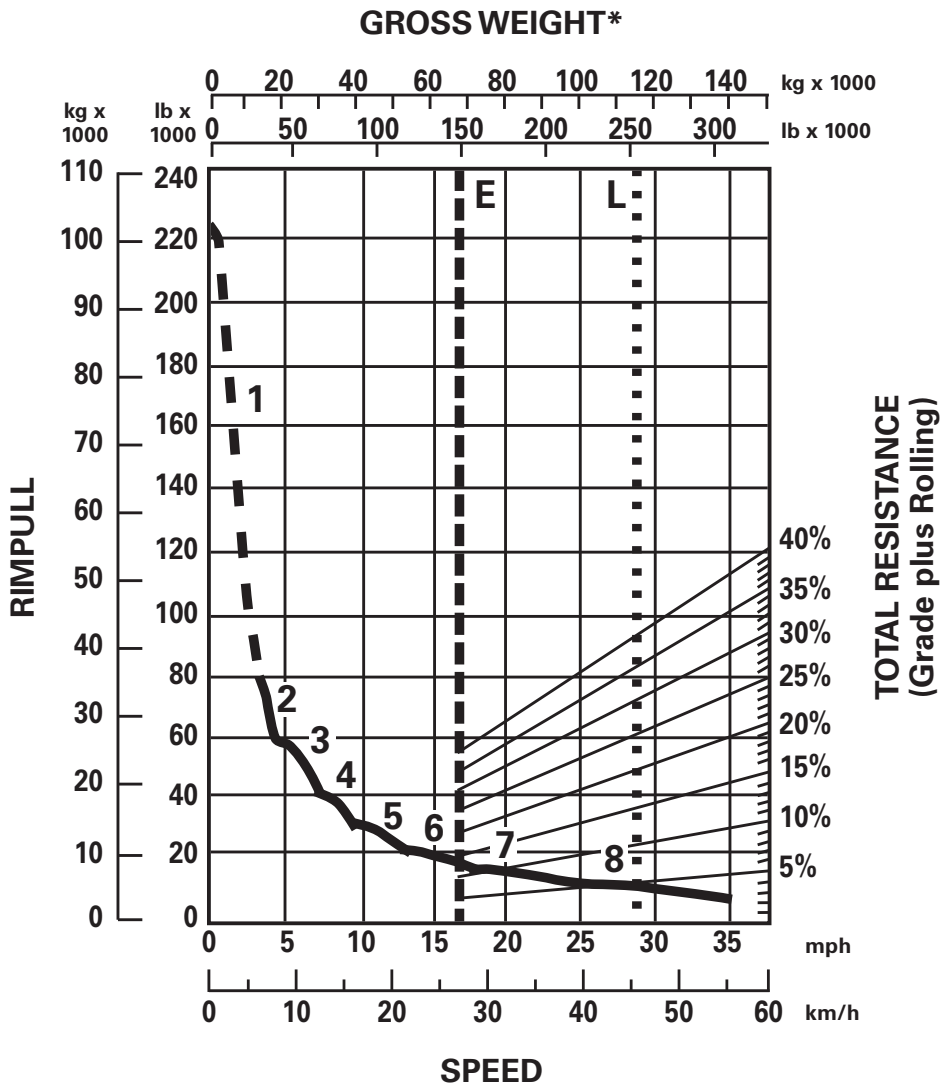
$$\text{Rolling Resistance} = 10\% \text{ Total Effective Grade Assistance.}$$

Example problem:

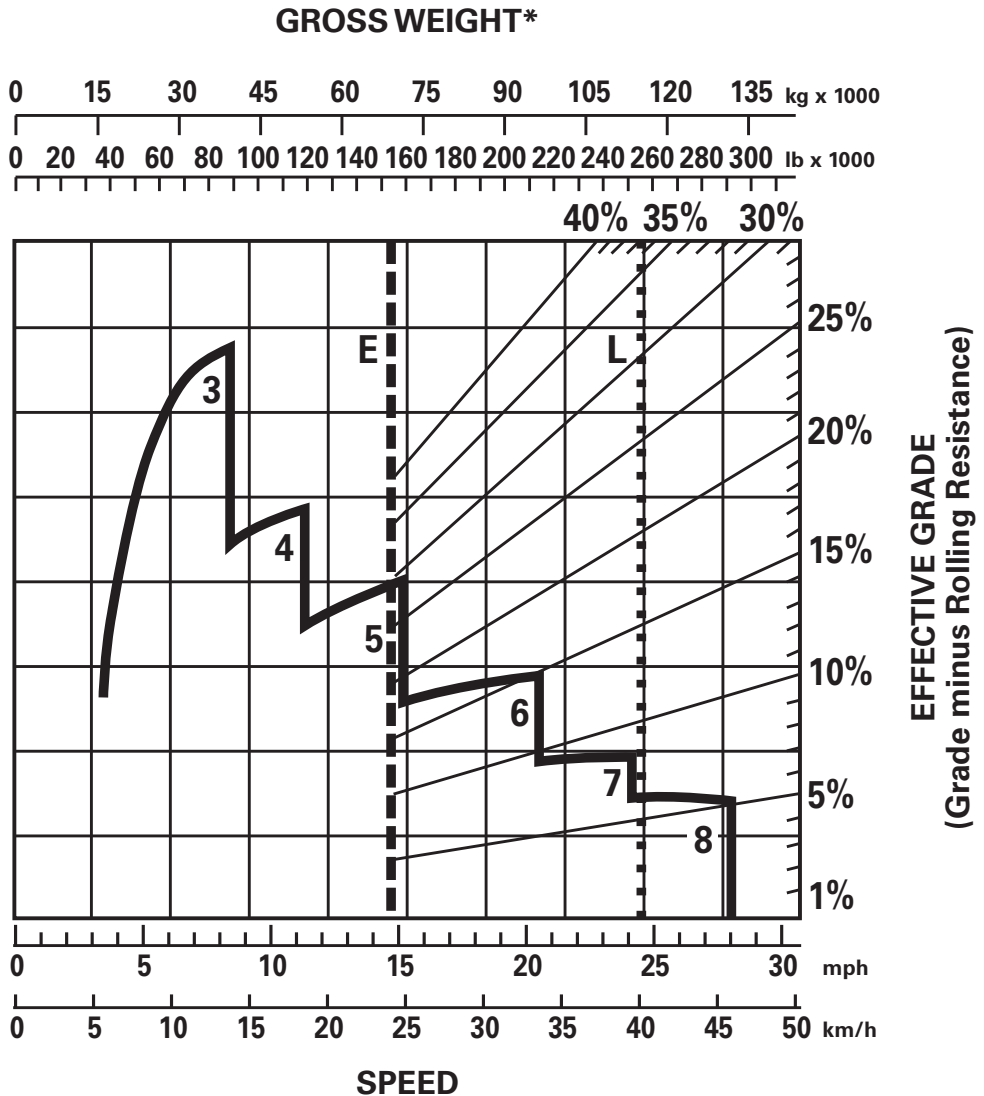
A 651E with an estimated payload of 47 175 kg (104,000 lb) descends a 10% total effective grade. Find constant speed and gear range with maximum retarder effort. Find travel time if the slope is 610 m (2000 ft) long.

$$\begin{aligned} \text{Empty Weight} + \text{Payload} &= \text{Gross Weight} \\ &= 60\,950 \text{ kg} + 47\,175 \text{ kg} = 108\,125 \text{ kg} \\ &= (134,370 \text{ lb} + 104,000 \text{ lb} = 238,370 \text{ lb}) \end{aligned}$$





\*at sea level



\*at sea level

**KEY**

- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

**KEY**

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)

# Tables

## BUCKET FILL FACTORS

Loose Material	Fill Factor
Mixed Moist Aggregates	95-100%
Uniform Aggregates up to 3 mm (1/8")	95-100
3 mm-9 mm (1/8"-3/8")	90-95
12 mm-20 mm (1/2"-3/4")	85-90
24 mm (1") and over	85-90
<b>Blasted Rock</b>	
Well Blasted	80-95%
Average Blasted	75-90
Poorly Blasted	60-75
<b>Other</b>	
Rock Dirt Mixtures	100-120%
Moist Loam	100-110
Soil, Boulders, Roots	80-100
Cemented Materials	85-95

**NOTE:** Loader bucket fill factors are affected by bucket penetration, breakout force, rack back angle, bucket profile and ground engaging tools such as bucket teeth or bolt-on replaceable cutting edges.

**NOTE:** For bucket fill factors for hydraulic excavators, see bucket payloads in the hydraulic excavator section.

**NOTE:** Above values are not valid for Hydraulic Mining Shovels.

## ANGLE OF REPOSE OF VARIOUS MATERIALS

MATERIAL	ANGLE BETWEEN HORIZONTAL AND SLOPE OF HEAPED PILE	
	Ratio	Degrees
Coal, industrial . . . . .	1.4:1—1.3:1	35-38
Common earth, Dry . . . . .	2.8:1—1.0:1	20-45
Moist . . . . .	2.1:1—1.0:1	25-45
Wet . . . . .	2.1:1—1.7:1	25-30
Gravel, Round to angular . . . . .	1.7:1—0.9:1	30-50
Sand & clay . . . . .	2.8:1—1.4:1	20-35
Sand, Dry . . . . .	2.8:1—1.7:1	20-30
Moist . . . . .	1.8:1—1.0:1	30-45
Wet . . . . .	2.8:1—1.0:1	20-45

## TYPICAL ROLLING RESISTANCE FACTORS

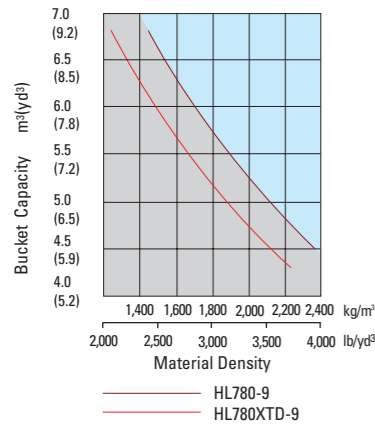
Various tire sizes and inflation pressures will greatly reduce or increase the rolling resistance. The values in this table are approximate, particularly for the track and track + tire machines. These values can be used for estimating purposes when specific performance information on particular equipment and given soil conditions is not available. See Mining and Earthmoving Section for more detail.

UNDERFOOTING	ROLLING RESISTANCE, PERCENT*			
	Tires		Track	Track
	Bias	Radial	**	+Tires
A very hard, smooth roadway, concrete, cold asphalt or dirt surface, no penetration or flexing . . . . .	1.5%*	1.2%	0%	1.0%
A hard, smooth, stabilized surfaced roadway without penetration under load, watered, maintained . . . . .	2.0%	1.7%	0%	1.2%
A firm, smooth, rolling roadway with dirt or light surfacing, flexing slightly under load or undulating, maintained fairly regularly, watered . . . . .	3.0%	2.5%	0%	1.8%
A dirt roadway, rutted or flexing under load, little maintenance, no water, 25 mm (1") tire penetration or flexing . . . . .	4.0%	4.0%	0%	2.4%
A dirt roadway, rutted or flexing under load, little maintenance, no water, 50 mm (2") tire penetration or flexing . . . . .	5.0%	5.0%	0%	3.0%
Rutted dirt roadway, soft under travel, no maintenance, no stabilization, 100 mm (4") tire penetration or flexing . . . . .	8.0%	8.0%	0%	4.8%
Loose sand or gravel . . . . .	10.0%	10.0%	2%	7.0%
Rutted dirt roadway, soft under travel, no maintenance, no stabilization, 200 mm (8") tire penetration and flexing . . . . .	14.0%	14.0%	5%	10.0%
Very soft, muddy, rutted roadway, 300 mm (12") tire penetration, no flexing . . . . .	20.0%	20.0%	8%	15.0%

\*Percent of combined machine weight.

\*\*Assumes drag load has been subtracted to give Drawbar Pull for good to moderate conditions. Some resistance added for very soft conditions.

## BUCKET SELECTION GUIDE



## SUPPLEMENTAL SPECIFICATIONS

Description	Change in operating weight kg(lb)	Change in static tipping load-straight kg(lb)	Change in static tipping load-40° turn kg(lb)
26.5-25 32PR L3	-112 (-247)	-90 (-200)	-80 (-175)
29.5-25 28PR L3	+352 (+776)	+270 (+595)	+240 (+530)
29.5-25 28PR L5	+1,240 (+2,734)	+960 (+2,160)	+850 (+1,870)
29.5 R25 XHA*	+500 (+1,102)	+390 (+860)	+340 (+750)

## STANDARD EQUIPMENT

<b>Electrical system</b> Alternator, 70A Alarms, audible and visual - air filter clogging - transmission error - alternator voltage - brake oil pressure - engine oil pressure - parking brake - fuel level - hydraulic oil temperature - coolant temperature - service brake oil pressure Alarm, back-up Batteries, 1,315 CCA, 12V, (2) Gauges - engine coolant temperature - fuel level - hydraulic oil temperature - speedometer - transmission oil temperature - voltmeter Horn, electric Indicator lights - clutch cut-off - high beam - turn signal LCD Display - clock and fault code - operating hour counter - engine rpm - transmission gear range indicator	- job time and distance - temperature (coolant, hydraulic oil, t/m oil) Lighting system - 1 LED dome lights - 2 stop and tail lights - 4 turn signals - brake lights(counterweight) - 2 head lights on front tower - 2 working lights on front roof - 2 working lights on grill Switches - clutch cut-off - hazard - Ignition key, start/stop switch - main light(illumination and head light) - parking - rear wiper & washer - work light - battery master switch - pilot cut-off Starter, electric Starting and charging system(24-volt) <b>Cab</b> Cab, ROPS/FOPS (sound suppressed and pressurized) with : - cigar lighter & ashtray - coat hook	Automatic climate control - air conditioner & heater - defroster - intermittent wiper and washer, front and rear - personal storage space: Console box Holder, can and cup Rear view mirrors (1 inside) Rear view mirrors (2 outside) 2" retractable seat belt & adjustable suspension seat with armrests Steering column, tilt and telescopic Steering wheel with knob Roller type sunshade (front window) Tinted safety glass Two door cab Magazine pocket Pedals - one accelerator pedal - one brake pedal Radio/USB player Rubber floor mat Wrist rest <b>Engine</b> Antifreeze Engine, Cummins QSM11 - Low Emission Diesel, Tier3 Engine enclosure, lockable	3 operating mode (power / standard / econo) Fan guard Fuel/water separator Fuel warmer Muffler, under hood with large exhaust stack Rain cap, engine air intake Radiator Starting aid (air intake heater) <b>Power Train</b> Brakes : Service, enclosed wet-disc Differentials, Hydraulic lock - front, conventional - rear Parking brake Torque converter Transmission, computer-controlled, electronic soft shift, auto-shift and kick down-shift features included Transmission oil cooler <b>Hydraulics</b> Boom kickout, automatic Bucket positioner, automatic Diagnostic pressure taps Hydraulic oil cooler Hydraulic system, - 2 spool, single lever, pilot control for boom and bucket actuation Steering, load-sensing	Remote cooling fan, hydraulically-driven, temperature sensing type <b>Others</b> Articulation locking bar Coolant level sight gauge Counterweight Door and cab locks, one key Doors, service access(locking) Drawbar with pin Engine oil level dipstick gauge Ergonomically located and slip resistant, left & right - handrails - ladders - platforms - steps Fenders (front / rear) Guard, bucket cylinder rod Hydraulic oil level sight gauge License plate bracket Lift and tie-down hooks Loader linkage, sealed Z-Bar design Steering stops, cushioned Tires(29.5-25, 22PR,L3) Transmission oil sight level Vandalism protection caplocks
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## OPTIONAL EQUIPMENT

24-volt to 12-volt DC converter 3 Spool Climate control - air conditioner only - heater only Beacon light, rotating Auxiliary, 2 working lights on front roof (Xenon working lights) Auxiliary, 2 working lights on rear roof Cutting edge, bolt-on type Dual brake pedal	Secondary steering system Mudguard Fire extinguisher High lift arrangement with additional counterweight, 552kg (1,210lb) Hydraulic control, 2 lever Hydraulic control, 3 lever 3rd spool for auxiliary function Joystick with travel switch (FNR) Operator suit	Pallet forks Heated rear view mirrors (2 outside) Reversible cooling fan Ride control system Seat - 2" static seat belt & adjustable mechanical suspension (vinyl) - 3" static seat belt & adjustable mechanical suspension - 2" retractable seat belt & adjustable air suspension (heated)	Roller type sunshade (rear window) License plate & lamp HI-Mate(Remote Management System) Rearview camera Marble application kit Heavy duty type axle (front / rear) Axle cooling system
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Standard and optional equipment may vary. Contact your Hyundai dealer for more information. The machine may vary according to International standards. All imperial measurements rounded off to the nearest pound or inch.

PLEASE CONTACT

**HYUNDAI CONSTRUCTION EQUIPMENT**

Head Office (Sales office)

First tower, 55, Bundang-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

MOVING YOU FURTHER

# HL780-9

With Tier 3 Engine installed



\*Photo may include optional equipment.

# Pride at Work

Hyundai Construction Equipment strives to build state-of-the-art earthmoving equipment to give every operator maximum performance, more precision, versatile machine preferences, and proven quality. Take pride in your work with Hyundai!



\*Photo may include optional equipment.

# HL780-9

## Machine Walk-Around

### Reliable Main Components

#### Engine Technology

Proven, reliable, fuel efficient, low noise Cummins Tier-III QSM11 engine.

Electronically controlled for optimum fuel to air ratio and clean, efficient combustion.

Self-diagnostic system.

3 engine modes, P (Power), S (Standard), E (Economy) for full power or reduced fuel consumption according to operator preference.

#### Fully Automatic Transmission

4 step(Manual / Light / Normal / Heavy) shift mode by working condition

Protective transmission at low temperature(Automatic warm-up system)

Self-diagnostic & Memory of malfunction history

Minimum travel shift shock by applying proportional controlling modulation valve / Self adjusting Clutch gap

Kick-down button & FNR switch for operating comfort

#### Axle

Hydraulically lockable front differential front for easy driving on variable ground condition self-adjusting & wheel speed brake.

### Improved Durability

Load sensing hydraulic system with variable displacement piston pump and closed-center MCV (main control valve).

Long-life cooling system, designed for additional durability, resistant to thermal shock, impulse and vibration.

Redesigned steering cylinder lug and bucket link, now cast steel for additional strength and reliability.

### Enhanced Operator Comfort

#### Improved Visibility

Larger operator's cab for additional comfort.

Redesigned cab with rounded front glass and larger door glass for a larger field of view.

#### Improved Convenience

Increased cooling & heating capacity with fully automatic climate control system.

Tilting & telescopic steering column.

Adjustable wrist rest for reduced operating stress.

Multiple storage compartments.

AM/FM Radio with MP3 interface and USB input and bluetooth hands-free.

Improved ladder with 20 Degree incline and large, deep tread, aluminum cast steps for safer access and exit from the cab.

#### Advanced 5.7" Color Monitor

Easy-to-read new color LCD display.

Auto boom kick out and bucket positioner - fully adjustable from within the cab.

Integrated load weighing system, viewable through the monitor, for improved work efficiency and overload prevention.

Self diagnostic & monitoring system with active display of engine, hydraulic system, transmission and electrical component information.

Color, rear-view, back-up camera for improved safety and convenience.

### Serviceability

Reversible, swing-out, cooling fan for easy service and improved cooler maintenance.

Ground level access to critical service points, filters and sight gauges for easy maintenance.

Long life hydraulic filter and oil for reduced operating costs.

# Operator Comfort

Operating a 9 series wheel loader is unique to every operator. Operators can fully customize their work environment and operating preferences to fit their individual needs.



\*Photo may include optional equipment.

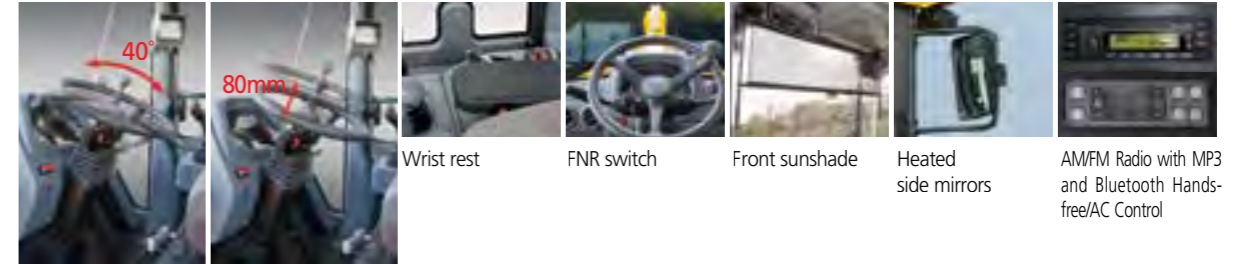


## Wide and Convenient Cab

The newly designed cabin was conceived for more space, a wider field of view and operator comfort. The front windshield is rounded and 17% wider than the previous 7A series. Special attention was given to a clean, open and convenient interior with plenty of visibility on the machine surroundings and the job at hand. This well balanced combination of cab ergonomics puts the operator in the perfect position to work safely and securely. The 9 series cab's fully automatic climate control system features 11 air vents and increased cooling and heating capacity for optimum temperature control. The defroster vents located on the front and rear windows and a PTC (electric pre-heater) make working in cold weather more hospitable.

## Operator Comfort

In the 9 series cabin you can easily adjust the steering column and wrist rest to best suit your preferred comfort level. Pilot-operated joystick controls are easy and comfortable to operate. An FNR (Forward/Neutral/Reverse) switch on the control lever facilitates easy selection of travel direction. Roller type sunshades on the front window and rear window allow the operator to reduce glare and improve visibility. Heated side mirrors feature built-in hot wires for quick defrosting during cold weather conditions.



Tilting / telescopic steering column

## Reduced Stress

Work is stressful enough. Your work environment should be stress free. Hyundai's 9 series cabin offers lots of amenities, additional space and a comfortable seat to minimize stress to the operator. A powerful climate control system provides the operator with optimum air temperature. An advanced audio system with AM/FM stereo with MP3 interface and USB input, plus remotely located controls is perfect for listening to music favorites.

## Advanced Color Monitor



The advanced new monitor with 5.7 inch wide color LCD screen allows the operator to easily and efficiently control the machine. The operator can adjust boom kick-out and bucket position via switches overhead while monitoring the adjustment settings through the monitor. An integrated load weighing system that contributes to improved work efficiency, can also be viewed through the monitor. Self diagnostics, color rear-view camera maintenance check lists and start-up machine security, were integrated into the monitor to make the machine more versatile and the operator more productive. The new monitor display unit is mounted on an adjustable swivel mount to reduce glare and position according to operator preference.

## Monitor Tilt Range



# Precision & Performance

Innovative hydraulic system technologies make the 9 series wheel loaders fast, smooth and easy to control. 9 series is designed for maximum performance to keep the operator working productively.



## Improved Durability & Reliability



An enhanced axle improves driving over variable ground conditions. Self adjusting brakes that automatically regulate disc clearance, reduce service time and improve brake reliability and performance. The new load sensing hydraulic system with a variable volume piston pump and closed center main control valve, provide efficient hydraulic power and additional energy savings. Service and clean-out are easier on the 9 series, now equipped with a completely redesigned, parallel-mounted, cooler configuration and non louvered fins to prevent clogging. All coolers are designed with aluminum bar plate configuration and undergo strict factory tests for thermal shock, impulse and vibration to assure long term durability. Top mounted non-louvered aluminum air condenser and variable displacement A/C compressor are designed for maximum cooling capacity, energy savings and easy clean-out. Additionally, the redesigned steering cylinder lug and bucket link, are now cast steel for additional strength and reliability.

## Variable Operating Modes



9 series wheel loaders are designed to allow the operator to customize the machine's engine power, automatic transmission shift timing and clutch cut-off activation based on the job condition and personal operator preference. Convenient rotary type switches allow for easy adjustment of engine power mode, transmission power shift mode, and clutch cut-off mode. Additionally, if equipped with the optional ride control system, the operator has the option to turn the system on or off with an overhead switch. The ride control system has a shock absorbing accumulator that cushions the boom, improves operator comfort and reduces material loss. The versatility of the 9 series operating modes contributes to improved productivity, enhanced operator comfort and reduced fuel consumption.



**3 Mode Engine Power Selection**  
 P(Power) Mode : Heavy duty work  
 S(Standard) Mode : General work  
 E(Economy) Mode : Light duty work

**4 Mode Transmission Power Shift System**  
 M(Manual) Mode  
 Auto L(Light) Mode : Light duty & long distance carry  
 Auto N(Normal) Mode : General excavating & loading  
 Auto H(Heavy) Mode : Heavy duty excavating & loading

**3 Mode Clutch Cut-Off System**  
 L(Low) Mode : Short distance & faster loading  
 M(Medium) Mode : General loading  
 H(High) Mode : Slope ground & inching



Eco-friendly  
Cummins QSM11 Engine

The CUMMINS QSM11 electronic control engine combines full-authority electronic controls with the reliable performance. The combination of improved airflow and evenly dispersed fuel results in increased power, improved transient response and reduced fuel consumption. And the QSM11 uses advanced electronic controls to meet the emission standards. (EPA Tier-3, EU StagIII-A)



Fully Automatic  
Transmission

Fully automatic transmission designed for maximum durability, Minimum power loss, improved travel speed and low noise. Improved clutch control and minimized shifting shock when traveling, contribute to a smoother ride. Error messages and transmission fault history are recorded and accessible through the monitor.

\*Photo may include optional equipment.

# Profitability

9 series is designed to maximize profitability through improved efficiencies, enhanced service features and longer life components.



## Hi-MATE (Remote Management System)

Hi-MATE, Hyundai's proprietary remote management system, provides operators and dealer service personnel access to vital service and diagnostic information on the machine from any computer with internet access. Users can pinpoint machine location using digital mapping and set machine work boundaries, reducing the need for multiple service calls. Hi-MATE saves time and money for the owner and dealer by promoting preventative maintenance and reducing machine downtime.



## Remote-mounted Cooling Fan

The remote mounted, hydraulically powered cooling fan regulates fan speed according to working temperatures for coolant, intake air, transmission oil and hydraulic oil. This new fan design contributes to reduced fuel consumption and machine noise. The fan is designed to auto reverse periodically or manually reverse to keep debris from accumulating on the coolers.



## Swing Out Cooling Fan

The engine fan is integrated into the rear door which swings open to over 45 degrees for easy access and regular maintenance.

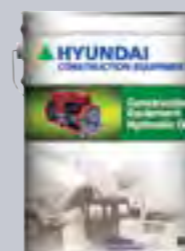


## Wide Open Access

Conveniently located coolant and transmission oil site gauges make checking fluid levels fast and efficient. Ground-line access to fuel and oil filters grease fittings, fuses, machine computer components and wide open compartments makes service more convenient on the 9 series.



Hydraulic filter  
(1,000 hr)



Hydraulic Oil  
(5,000 hr)

## Extended Life Components

The 9 series is designed for longer lubrication intervals and extended component life. Long life hydraulic filters now have 1,000 hours service intervals and Hyundai certified hydraulic oil can last up to 5,000 hours before changing. Also, a new center pivot roller bearing design, now double tapered, requires less maintenance as well. Long life and extended wear components save the operator time and money.

\*Photo may include optional equipment.



# Specifications & Dimensions

## ENGINE

<b>Maker/Model</b>	CUMMINS QSM11
<b>Type</b>	Watercooled, 4-cycle, turbocharged, charge aircooled direct injection, electronic controlled diesel engine
<b>Gross power</b>	348HP(260 kW) / 2,000rpm
<b>Net power</b>	344HP(257 kW) / 2,000rpm
<b>Max. power</b>	365HP(272 kW) / 1,800rpm
<b>Maximum torque</b>	171kg.m(1,235 lb.ft) / 1,400rpm
<b>No. of cylinders</b>	6
<b>Bore x Stroke</b>	125 mm (4.9") x 147 mm (5.8")
<b>Displacement</b>	10.8 l (660 cu in)
<b>Compression ratio</b>	16.3 : 1
<b>Air cleaner</b>	Dry, Two stages dual elements
<b>Alternator</b>	24V, 70 Amp
<b>Battery</b>	2 x 12V, 220 Ah.
<b>Starting motor</b>	24V, 7.5 kW

※ No derating for continuous operating required up to 2,438m (8,000ft). This engine meets the EPA(Tier III) / EU(Stage III-A) Emission regulation.

## TRANSMISSION

<b>Torque converter type</b>	3-elements, single-stage Double-phase
<b>Tire</b>	29.5-25, L3

※ Full automatic power shift, countershaft type with soft-shift in range and direction. Properly matched torque converter to engine and transmission for excellent working ability

Travel speed		km/h (mph)
<b>Forward</b>	1st	6.1(3.8)
	2nd	11.5(7.1)
	3rd	18.0(11.2)
	4th	36.5(22.7)
<b>Reverse</b>	1st	6.1(3.8)
	2nd	11.5(7.1)
	3rd	25.0(15.5)

## AXLES

<b>Drive system</b>	Four-wheel drive system
<b>Mount</b>	Rigid front axle and oscillating rear axle
<b>Rear axle oscillation</b>	± 13° (total 26°)
<b>Hub reduction</b>	Planetary reduction at wheel end
<b>Differential</b>	Front hyd. lock, rear conventional
<b>Reduction ratio</b>	27.0

## HYDRAULIC SYSTEM

<b>Type</b>	Load sensing hydraulic system	
<b>Pump</b>	Variable axial piston pump, 441 liters/min 116.5 gal/min	
<b>Control valve</b>	2 Spool (Bucket, Boom) 3 Spool (Bucket, Boom, Aux) Pilot pressure controlled type	
<b>System pressure</b>	280 kgf/cm <sup>2</sup> (3,982 psi)	
<b>Bucket Controls</b>	Type	Pilot operated lift and tilt circuit, single-lever(joystick) control standard.
	Lift Circuit	The valve has four functions ; raise, hold, lower and float. Can adjust automatic kickout from horizontal to full lift.
	Tilt Circuit	The valve has three functions ; tilt back, hold and dump. Can adjust automatic bucket positioner to desired load angle.
<b>Cylinder</b>	Type	Type : Double acting Lift, bore x stroke 2-180 mm(7.0") x 863 mm(34.0") Tilt, bore x stroke 2-140 mm(5.5") x 575 mm(22.6")
	HL780-9 HL780XTD-9	2-140 mm(5.5") x 570 mm(25.4")
<b>Cycle Time</b>	Raise : 6.1 sec (with load)	
	Dump : 1.4 sec	
	Lower : 4.1 sec (empty)	
	Total : 11.6 sec	

## AIR CONDITIONING SYSTEM

The air condition system for the machine contains the fluorinated greenhouse gas with global warming potential of R134a. (Global Warming Potential : 1430)  
The system hold 0.85kg refrigerant consisting of a CO<sub>2</sub> equivalent 1.22kg metric tonne. For more information, Please refer to the manual

## BRAKES

<b>Service Brakes</b>	Hydraulically actuated, wet disc brakes actuate all 4 wheels independent axle-by-axle system. wheel speed brake.
<b>Parking Brake</b>	Spring-applied, hydraulically released disc brake
<b>Emergency Brake</b>	When brake oil pressure drops, indicator light alerts operator and parking brake automatically applies.

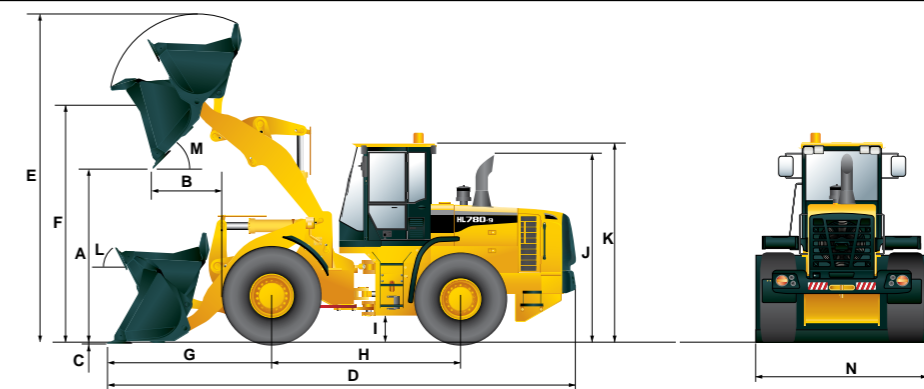
## SERVICE REFILL CAPACITIES

<b>Fuel tank</b>	450 liters (118.8 USgal)
<b>Cooling system</b>	65 liters (17.2 USgal)
<b>Crankcase</b>	38 liters (10.0 USgal)
<b>Transmission</b>	43 liters (11.4 USgal)

## OVERVIEW

Description	UNIT	HL780-9	HL780XTD-9
Operating weight	kg (lb)	30,000 (66,100)	30,800 (67,900)
Bucket capacity	Heaped	m <sup>3</sup> (yd <sup>3</sup> )	5.4 (7.1)
	Struck	m <sup>3</sup> (yd <sup>3</sup> )	4.6 (6.0)
Breakout force-bucket	kg (lb)	23,750 (52,360)	23,130 (50,990)
Tipping load	Straight	kg (lb)	24,200 (53,350)
	Full turn	kg (lb)	21,000 (46,300)

## DIMENSIONS



Description	UNIT	HL780-9	HL780XTD-9
Bucket Type	General purpose bolt-on cutting edge		
A. Dumping clearance at max. height and 45° dump angle.	mm (ft-in)	3,300 (10' 10")	3,670 (12')
B. Reach	Full lift	mm (ft-in)	1,430 (4' 8")
	7ft height	mm (ft-in)	2,150 (7' 1")
C. Digging depth	mm (in)	105 (4.1")	115 (4.5")
	on ground	mm (ft-in)	9,630 (31' 7")
D. Overall length	at carry	mm (ft-in)	10,060 (33')
	mm (ft-in)	9,545 (31' 4")	9,990 (32' 9")
E. Overall height (fully raised)	mm (ft-in)	6,295 (20' 8")	6,670 (21' 11")
	mm (ft-in)	4,560 (15')	4,935 (16' 2")

## STEERING SYSTEM

<b>Type</b>	Load sensing hydrostatic articulated steering	
<b>Pump</b>	Piston, 231 liters/min (61.0 gal/min)	
<b>Relief Valve Setting</b>	210 kg/cm <sup>2</sup> (2,990 psi)	
<b>Cylinder</b>	Type	Double acting
	Bore x Stroke	105mm(4.1") x 480mm(18.9")
<b>Steering Angle</b>	40°(each direction)	

Features  
- Center-point frame articulation. - Load-sensing, pressure-compensated system.  
- Steering-wheel operated metering pump controls flow to steering cylinders.  
- Tilt and telescopic steering column.

<b>Front axle</b>	58 liters (15.3 USgal)
<b>Rear axle</b>	58 liters (15.3 USgal)
<b>Hydraulic tank</b>	234 liters (62 USgal)
<b>Hydraulic system (including tank)</b>	344 liters (90.8 USgal)

## TIRES

<b>Type</b>	Tubeless, loader design tires
<b>Standard</b>	29.5-25, 22 PR, L3
<b>Options include</b>	26.5-25, 32 PR, L3
	29.5-25, 28 PR, L3
	29.5-25, 28 PR, L5 29.5 R25 XHA*

# KOMATSU®

## 730E-8 Electric Drive Truck

730E

**GROSS HORSEPOWER**  
2,000 HP 1492 kW

**NET HORSEPOWER**  
1,884 HP 1405 kW

**NOMINAL GVW**  
724,000 lb 328401 kg



PHOTOS MAY INCLUDE OPTIONAL EQUIPMENT

730E

# WALK-AROUND

730E-8



Photos may include optional equipment

# 730E-8

## Electric Drive Truck

**GROSS HORSEPOWER**  
**2,000 HP** 1492 kW  
 @ 1900 rpm

**NET HORSEPOWER**  
**1,884 HP** 1405 kW  
 @ 1900 rpm

**NOMINAL GVW**  
**724,000 lb**  
 328401 kg

### GEB35 WHEEL MOTOR

The collaboratively designed GEB35 wheel motor features a completely redesigned gear face to achieve a longer time between rebuilds compared to its predecessors. With a standard gear ratio of 30.8:1 the GEB35 wheel motor

provides the torque needed to navigate the tough underfoot conditions found in mines around the world today.



#### Productivity Features

- High performance Komatsu SSDA16V159E-2 engine
- Gross horsepower 1492 kW **2,000 HP**
- 2387 kW **3,200 HP** continuous retarding capability
- Automatic speed control (retard & propel) with automotive style cruise control
- Traction (spin-slide) control
- Komatsu designed application specific bodies
- Tight turning radius 13.6 m **44' 6"**
- Payload Meter III®

#### Reliability Features

- Ultra class frame design for 181 metric ton **200 short ton** payload
- Wheel motor design based on proven GEB25 and 788
- Simple and reliable hydraulic system
- Steering and brake accumulators
- Hydraulically actuated dry disc brakes
- Compact inverter
- Solid-state retarding with quad choppers

#### Environmentally Friendly

- Komatsu SSDA16V159E-2 fuel efficient engine is compliant with U.S. E.P.A. Tier 4 emissions regulations

#### Operator Environment

- Ergonomically designed spacious cab with excellent visibility
- Fully adjustable driving position settings
- Four post ROPS/FOPS Level 2 Cab
- User friendly display with payload information
- AM/FM/CD/MP3/USB/Weatherband radio
- Isolated cab mounts

#### Easy Maintenance

- KOMTRAX Plus allows immediate diagnostics of key engine, chassis, and drive system components
- Automatic lubrication system
- In-tank fast fuel system
- Flange type rims
- Optional smart (speed) rims

### KOMTRAX Plus

KOMTRAX Plus equipped machines can send SMR and trend information to a secure website utilizing wireless technology. Machines also relay error codes, cautions, maintenance items, fuel burn, and much more.

### Komatsu SSDA16V159E-2 Engine

The 1492 kW **2,000 hp** Komatsu SSDA16V159E-2 engine builds on the success of the SSA16V159 by incorporating the latest engine technology with more robust features. An enhanced fuel system coupled with upgraded components lowers noise and vibration for better reliability and performance.

#### New Features:

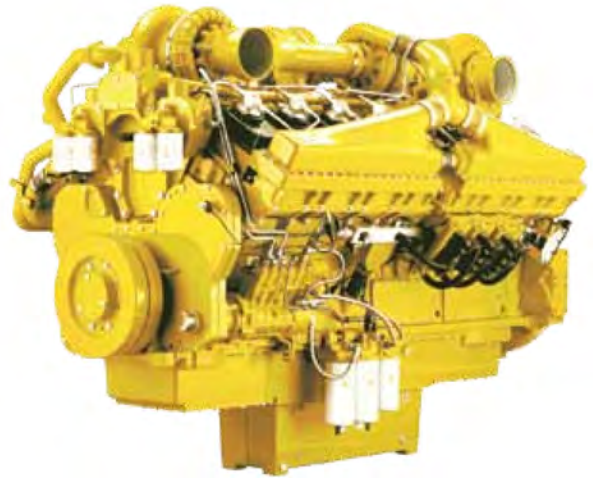
- High-pressure Modular Common Rail Fuel System (MCRS)
- Improved cold start capabilities over the SSA16V159
- Prelube prestart system pressurization to reduce friction and extend engine life
- Low noise and low vibration
- U.S. E.P.A. Tier 4 compliant

#### Optional Equipment:

- CENTINEL continuous oil replacement system

### Electric Dynamic Retarder

The 2760 kW **3,700 HP** retarding system provides advanced braking capacity for navigating today's mining applications which contain steep continuous descents and sharp switchbacks. Electric dynamic retarding enhances productivity and operator confidence, while eliminating the need for excessive mechanical braking effort.



### IGBT AC Drive System

The GTA49 traction alternator coupled with GEB35 wheel motors and Invertex II control system provides reliable performance and easy maintenance. Invertex II® AC control system offers independent control of the rear wheel motors, which in turn provides outstanding traction-ability during wet and slippery conditions, thus improving tire wear and operator confidence.

The air cooled Insulated Gate Bipolar Transistor (IGBT) inverter system technology provides the highest available reliability. The IGBT inverter is more compact and much simpler than the design of its predecessor, the Gate Turn Off (GTO) inverter, which improves serviceability and routine maintenance.



### Traction (Spin-Slide) Control

During slippery conditions, the 730E-8 wheel traction control technology detects and corrects wheel spin or slide events. Traction control operates automatically and independently of the service brakes. During propulsion, “wheel spin control” reduces non-productive wheel spin in low traction conditions. During retarding, “wheel slide control” prevents wheel lockup and subsequent sliding.

### Automatic Speed Control

While in retard or propel, the operator has the ability to select a comfortable travel speed. Automatic Speed Control simultaneously manages the speed of each wheel independently to allow for any immediate adjustments needed during slippery underfoot conditions.

### Komatsu Designed Application Specific Body

Utilizing the required body worksheet (BW) process, Komatsu ensures that each body is designed to meet the requirements for each specific application while carrying its rated payload. Komatsu works with each customer to understand all of the material properties at a mine site and to identify the appropriate liner package.

Komatsu offers a standard all-welded steel, flat floor body with an over the cab canopy and horizontal bolster.

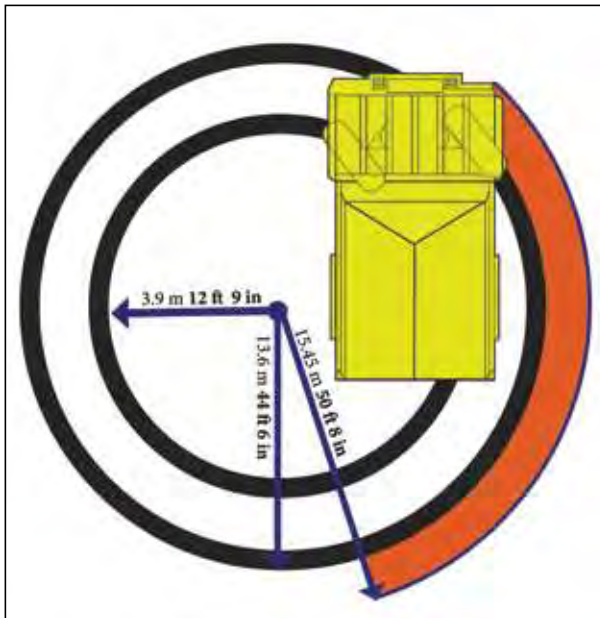
- Standard Body SAE Heaped 2:1: 111 m<sup>3</sup> **145 yd<sup>3</sup>**
- Standard Komatsu Body Weight: 28169 kg **62,100 lbs**



Photos may include optional equipment

### Tight Turning Radius

By using double acting hydraulic steering cylinders with a six-point articulation linkage, the power steering system provides steering control with minimal operator effort. The turning radius is 13.6 m **44' 6"**, which provides excellent maneuverability for tight loading and dumping conditions. The steering accumulators comply with ISO-5010 standards.



### Payload Meter III® (PLM III)

PLM III is an electronic system that monitors and records payload information for Komatsu's off-highway mining trucks. The accurate and reliable payload measurement system is designed to help optimize payload, maximize productivity and reduce the life cycle cost of the machine. PLM III tracks and records the following key production parameters:

- Payload
- Empty Carry-Back
- Operator Identification
- Haul Cycle, Loading, Dumping Time and Date
- Distance Traveled (Loaded and Empty)
- Cycle Time Information
- Maximum Speeds (Loaded and Empty)
- TMPH Estimate for Front and Rear Tires
- Average Speed (Loaded and Empty)

### Example of Payload Summary



### Hydropneumatic Suspension

Hydrair II® is a suspension system that utilizes four nitrogen-over-oil cylinders. This suspension system is designed to maximize machine productivity by providing the operator with a smooth and comfortable ride. By absorbing shocks to the chassis during operation, Hydrair II® contributes to the durability of the machine's frame and components.



## OPERATOR ENVIRONMENT

### Ergonomically Designed Cab

The Komatsu 730E-8 cab design provides operators a comfortable and productive environment to meet today's mining demands. The cab features tinted safety glass windows, heating and air conditioning, acoustical insulation, double sealed doors, and filtered - pressurized air to reduce dust.

### Operator Seat

Komatsu recognizes that operator comfort is a key to productivity in today's mining environment. The five-way adjustable operator seat and the tilt-telescopic steering column provide an optimum driving posture for increased operator comfort and control over the machine. The air suspension seat absorbs vibrations transmitted from the machine, reducing operator fatigue. A blaze orange 76 mm **3"** wide three-point seat belt is provided as standard equipment.

### Built-in ROPS and FOPS Structure

Integral ROPS/FOPS Level 2 cab. These structures conform to ISO standards 3471 and 3449.



Photos may include optional equipment



### Structurally Enhanced Frame Design

By using advanced computer-aided design, finite element analysis, and full-scale dynamic and static testing, the frame design has been structurally enhanced to carry 181 tonne **200 short tons** and provides the highest reliability in the industry.



### Castings Used in High Stress Areas

To increase frame reliability, steel castings have been incorporated at key frame pivot points and critical load bearing critical portions of the frame. This includes the rear body pivot and horseshollar sections.

### Simple and Reliable Hydraulic System

The hydraulic system is a proven and reliable design with fewer parts than other OEMs. The system utilizes a single tank, providing one common source of fluid for steering, braking, and hoist actuation. In-line, replaceable filtration elements provide protection from hydraulic system contamination, making the system easier to service.

To keep downtime to a minimum, Komatsu developed a sub-frame pump module that can be removed and replaced as a single unit. This reduces change-out time and allows easy access to the hydraulic pump module.



### Steering and Brake Accumulators

In the event that the hydraulic pressure in the steering or braking system drops below an acceptable level, nitrogen-charged accumulators will automatically apply the brakes so that the truck may be stopped. There are separate accumulators for the braking and steering systems.



### GEB35 AC Wheel Motor

The GEB35 wheel motor is designed after the proven GEB25 and 788. It has a standard gear ratio of 30.8:1 and is designed for 12% equivalent grades.

## Fully Hydraulic Dry Disc Brakes

The 730E-8 comes standard with hydraulically actuated dry front wheel speed disc brakes and rear dual armature speed brakes.

- Front service apply pressure: 17237 kPa **2,500 psi**
- Rear service apply pressure: 7722 kPa **1,120 psi**

By using a fully hydraulic braking system, the formation of water and sediments - typical in air actuated braking systems - is no longer present. This prevents contamination, freezing and corrosion from affecting service brake component life.



**\*Stops in 81% of ISO 3450 allowable distance.**



Photos may include optional equipment

### Advanced Monitoring System – On-board Diagnostics

The Komatsu advanced monitoring system identifies maintenance items to the operator, reduces diagnostic times, indicates oil filter replacement hours, and displays fault codes to maximize machine availability and productivity.

### Automatic Lubrication System

The automatic lubrication system is designed to reduce downtime for lubrication by having a centralized location that automatically distributes grease to all lubrication points.

### Battery Isolation Station

This box contains shutdown, lockout and light switches making it easier to perform basic maintenance functions at ground level. Component switches include:

- Engine shutdown
- Access ladder light switch
- Master disconnect switch
- Starter disconnect switch
- Propel lockout lever
- LED indicator lights (on/off)



### Komatsu Smart Rim Technology

Komatsu Smart Rims allow easy removal and installation of the tires and minimize the overall impact on downtime.



\* Rim and tire maintenance can be hazardous unless the correct procedures are followed by trained personnel.

### KOMTRAX Plus

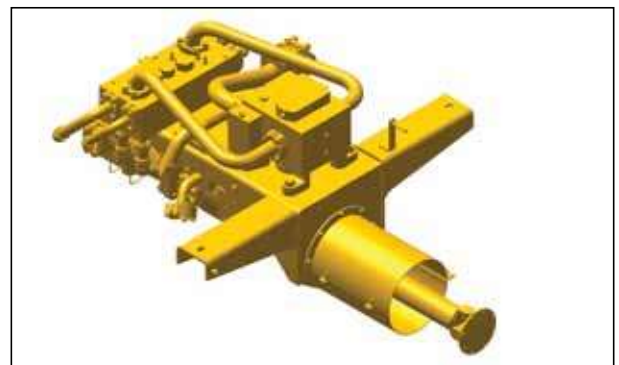
As part of a complete service and support program, Komatsu equips every mining and quarry sized machine with KOMTRAX Plus. By using a satellite-based communication system, KOMTRAX Plus offers a new vision of monitoring your valuable assets by providing insight to critical operating metrics and information that can be used to increase availability, lower owning and operating costs and maximize fuel efficiency.

The KOMTRAX Plus information available on MyKomatsu.com allows service personnel and asset owners to review cautions, operational data, fuel consumption, payloads and key component measurements provided in forms of trends. With KOMTRAX Plus, knowledge becomes the power to fuel your productivity.



### Quick Change Pump Module

To keep pump change-out time to a minimum, Komatsu has developed a sub-frame module which contains both the steering / brake and hoist pumps. This module can be removed and replaced as a single unit, helping limit potential downtime and allowing easy access to the hydraulic pumping system.



## ADDITIONAL FEATURES

### Environmentally Friendly

#### Komatsu SSDA16V159E-2 Engine

The Komatsu SSDA16V159E-2 engine is U.S. E.P.A Tier 4 compliant.

#### Less Hydraulic Fluid Than Mechanical Drives

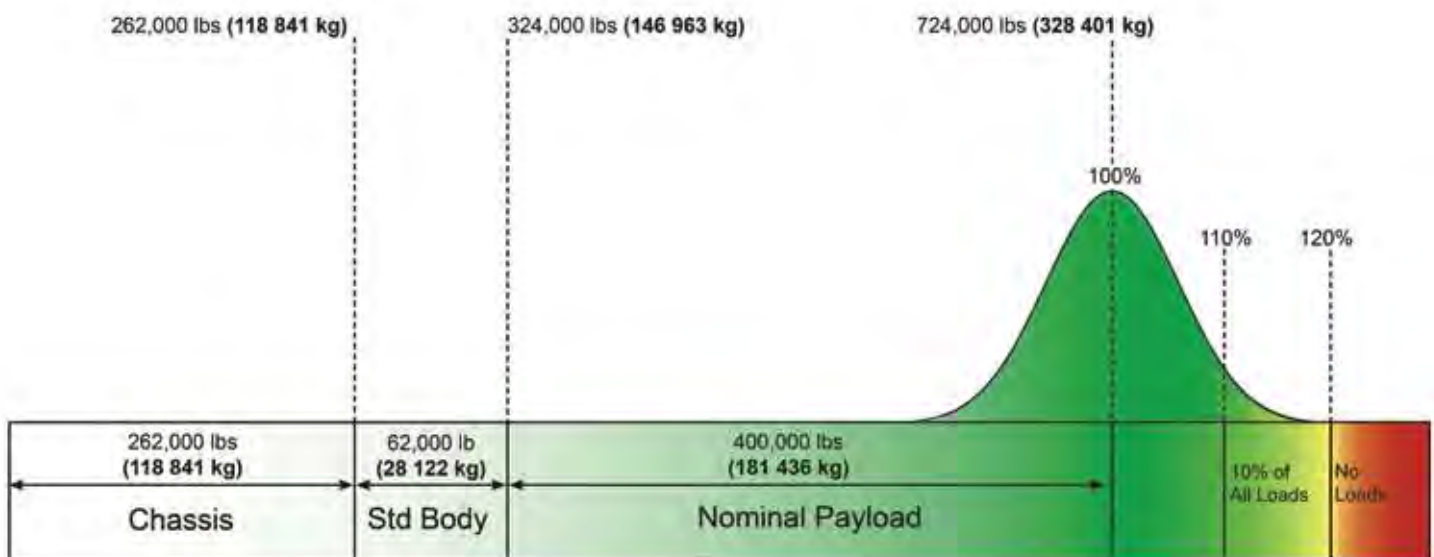
The Komatsu 730E-8 contains 53% less hydraulic fluid compared to similar class mechanical drive trucks, creating a lower environmental impact and makes fluid replacement simpler, quicker, and more economical.

### Payload Policy

#### 10-10-20 Load Policy Criteria

Recognizing that variation occurs naturally in material density, fill factors, and loading equipment, Komatsu America Corp. deems it necessary to establish a consistent payload policy. This payload policy is intended to identify the guidelines and limitations for the loading of Komatsu mining trucks, and is valid for approved applications and haul profiles only.

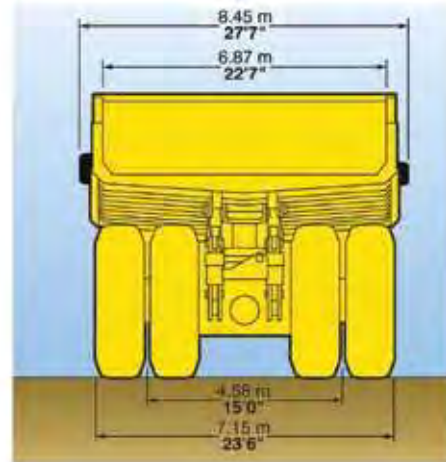
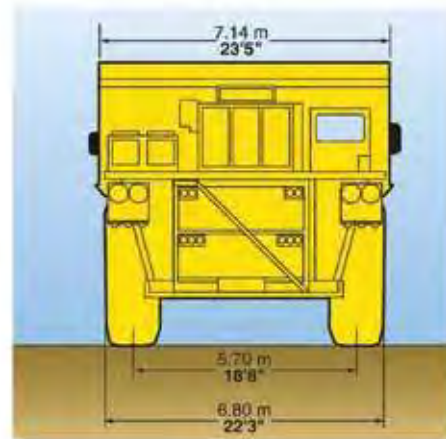
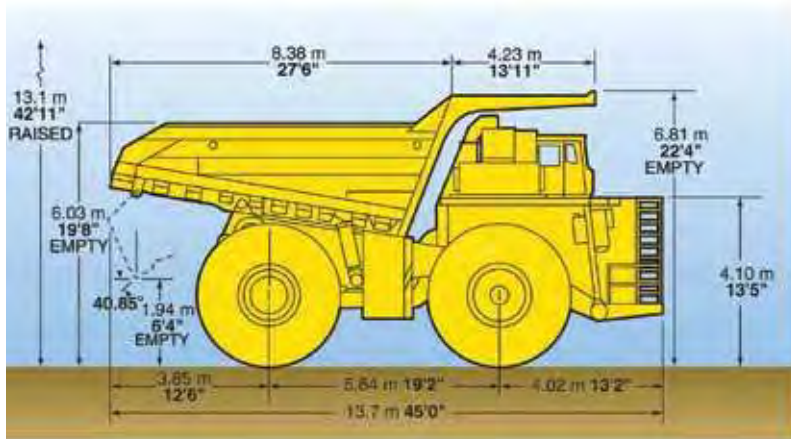
- 1) The average monthly payload must not exceed the rated payload of the truck
- 2) 90% of all loads must be below 110% of the rated payload of the truck
- 3) 10% of all loads may be between 110% and 120% of the rated payload of the truck
- 4) No single payload may exceed 120% of the rated payload of the truck







## DIMENSIONS



All dimensions are with standard body and tires.

Body	Capacity 2:1 Heap	Loading Height*
Standard	111 m <sup>3</sup> 145 yd <sup>3</sup>	6.03 m 19'8"

\*Exact load height may vary due to tire make, type, and inflation pressure.



## HYDRAULIC SYSTEM

- Steering ..... Accumulator assisted with twin double acting cylinders provide constant rate steering. Secondary steering automatically supplied by accumulator.
- Turning circle diameter (SAE) ..... 27.2 m **89'**
- Reservoir ..... 511 L **135 U.S. gal**
- Filtration ..... In-line replaceable elements
  - Suction ..... Single, full flow, 100 mesh
  - Hoist and steering ..... Dual, in-line, high pressure
- Brake component cabinet ..... Above deck, easily accessible with diagnostic test connections
- Hoist ..... Two 3-stage dual-acting outboard cylinders, internal cushion valve, over-center dampening
- Hoist times
  - Power-up loaded ..... 19 sec
  - Power-down ..... 10.5 sec
  - Float-down empty ..... 12 sec
- Pumps ..... Two pumps, single package, end of alternator
- Hoist ..... Tandem gear pump with output of 666 lpm **176 gpm** at 1900 rpm and 17236 kPa **2,500 psi**
- Steering and brake ..... Pressure-compensating piston pump with output of 254 lpm **67 gpm** at 1900 rpm and 19132 kPa **2,775 psi**
- System relief pressures
  - Hoist ..... 17237 kPa **2,500 psi**
  - Steering and brake ..... 27580 kPa **4,000 psi**



## ELECTRICAL SYSTEM

- 4 x 8D 1450 CCA, 12 volt, in series/parallel, 220-ampere-hour batteries, bumper-mounted with disconnect switch.
- Alternator ..... 24 volt, 250 amp
- Lighting ..... 24 volt
- Cranking motors ..... Two/24 volt

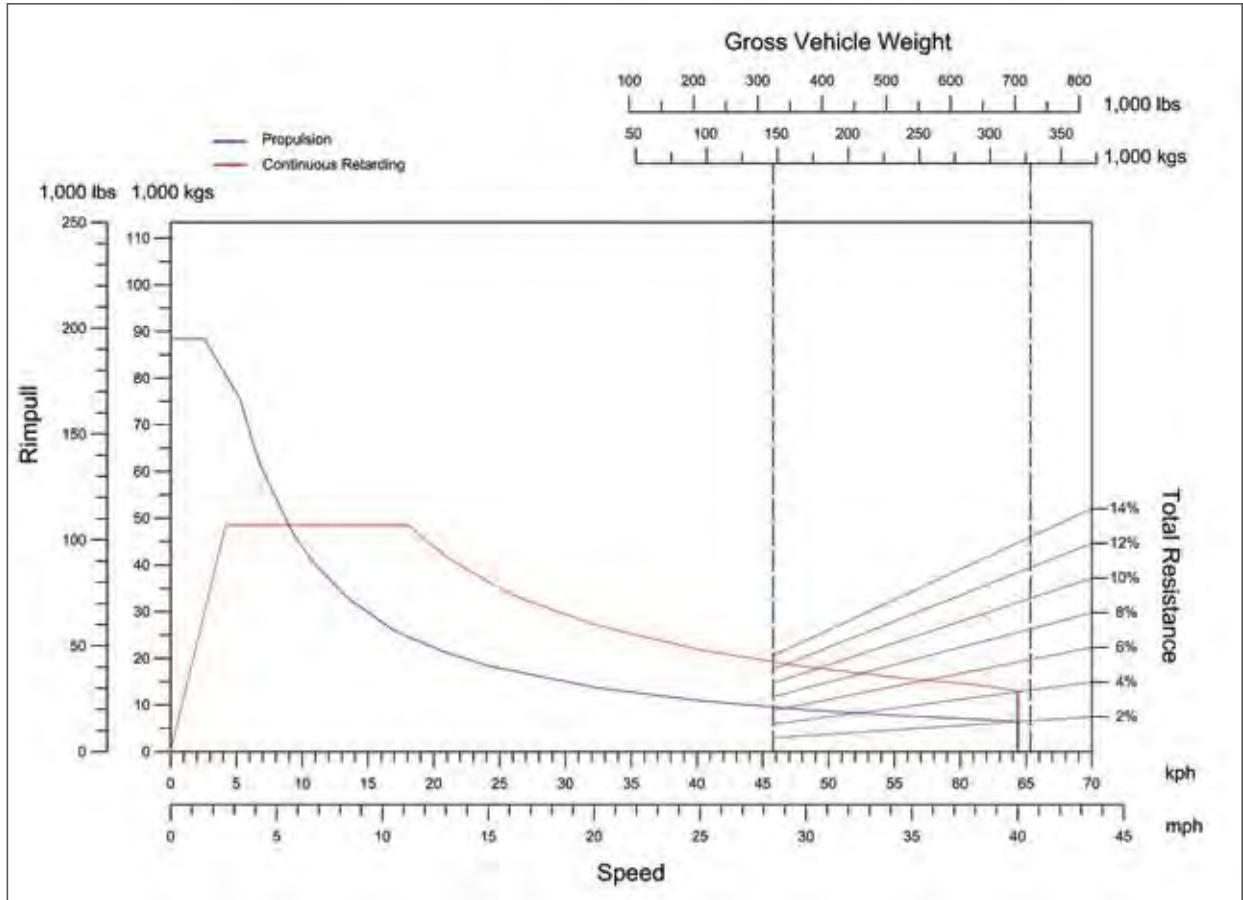


## SERVICE REFILL CAPACITIES

- Cooling System ..... 441 L **117 U.S. gal**
- Crankcase\* ..... 223 L **59 U.S. gal**
- Hydraulic system ..... 795 L **210 U.S. gal**
- Motor gear box (each) ..... 38 L **10 U.S. gal**
- Fuel ..... 3146 L **831 U.S. gal**

\* Includes lube oil filters

## Performance Chart



730E-8

## Komatsu Product Line Loader/Truck Matching

Typical Number of Passes to Load

		Komatsu Trucks							
		HD785 100 ton	HD1500 159 ton	730E 200 ton	830E-AC 244 ton	860E-1K 280 ton	930E-4 320 ton	930E-4SE 320 ton	960E 360 ton
KOMATSU EXCAVATORS	PC2000 15.7 yd <sup>3</sup>	4	7						
	PC3000 19.5 yd <sup>3</sup>	4	6	7					
	PC4000 29 yd <sup>3</sup>	3	4	5	6	6			
	PC5500 37 yd <sup>3</sup>		3	4	5	5	6	6	7
	PC8000 55 yd <sup>3</sup>				3	3	4	4	5

Nominal truck payload rating (short tons)  
 Bucket ratings are based on 1780 kg/lcm **3,000 lbs/lcy** material density.

**Empty Vehicle Weight**

Front Axle Distribution	73482 kg	<b>162,000 lbs</b>	50.0%
Rear Axle Distribution	73482 kg	<b>162,000 lbs</b>	50.0%
Total EVW	146963 kg	<b>324,000 lbs</b>	

**Gross Vehicle Weight**

Front Axle Distribution	110342 kg	<b>243,264 lbs</b>	33.6%
Rear Axle Distribution	218058 kg	<b>480,736 lbs</b>	66.4%
Nominal GVW	328401 kg	<b>724,000 lbs</b>	

**Payload**

Nominal Payload	181436 kg	<b>400,000 lbs</b>
	181 metric tons	<b>200 short tons</b>

Nominal payload is defined by Komatsu America Corp's payload policy documentation. In general, the nominal payload must be adjusted for the specific vehicle configuration and site application. The figures above are provided for basic product description purposes. Please contact your Komatsu distributor for specific application requirements.







## STANDARD EQUIPMENT

- Air cleaners, Donaldson® w/evacuators
- Alternator (24 volt/250A)
- Auto lubrication system w/ground level fill & level indicator
- Back up alarm
- Batteries—4 x 8D (1450 CCA's)
- Battery charging cable and socket
- Body impact plate
- Brakes: dry front & rear
  - Front - wheel speed disc
  - Rear - dual disc armature speed
- Cruise speed control
- Deck guard rails
- Electric start
- Fast-fill fuel system (in tank and left side remote)
- Filters, high pressure hydraulic
- Fuel tank sight gauge (3)
- Ground level radiator fill
- L&M Radiator
- Mud flaps
- Muffled exhaust—deck-mounted
- Power supply, 24 volt and 12 volt DC
- Quick disconnects (hoist and steering)
- Radiator sight gauge
- Removable power module unit (radiator, engine, alternator, blower)
- Reverse retarding
- Service center—LH
- Thermostatic fan clutch

### OPERATOR ENVIRONMENT & CONTROL

- All hydraulic service brakes w/auto apply
- Auxiliary hydraulic system
- Battery disconnect switch
- Brake lock and drive system interlock
- Circuit breakers, 24 volt
- Dedicated auxiliary circuits in operator cab (ladder lights, 2-way radios, fire suppression power)
- Diagonal staircase across grille (L to R) w/ tread
- Dimpled surface on walkways

- Dynamic retarding with continuous rated element grids
- Engine access guard rail
- Engine shutdown at ground level
- Hoist propulsion interlock
- Horns (electric—front and back-up)
- Hydraulic tank ladder
- Integral ROPS/FOPS Level 2 cab
- Isolation mounted cab
- Maintenance and power lockout
- Parking brakes with warning light & speed application protection
- Power steering w/auto secondary steering
- Radiator fan guard
- RH & LH multi-cambered convex mirrors
- Seat belts
  - Operator 3-point blaze orange 76 mm **3"** retractable
  - Passenger lap 76 mm **3"** retractable

### STANDARD HIGH VISIBILITY DELUXE CAB

- AC drive interface display
- Advanced monitoring system
- Air cleaner vacuum gauges
- Air conditioner HFC-134A
- AM/FM radio with CD, USB, MP3 & weatherband
- Column mounted speed control
- Digital tachometer
- Dome light
- Engine hourmeter, oil pressure gauge, coolant temperature gauge, hydraulic oil temperature gauge
- Engine shutdown w/ "Smart Timer" delay
- Floor mat (double barrier)
- Fuel gauge in cab
- Fuel low level light and buzzer
- Gauges (w/backlight)
- Headlight switch
- Heater and defroster (heavy-duty)
- Heater switch
- High beam selector and indicator

- Horn (center of steering wheel)
- Indicator lights (blue)
  - Engine service
  - KOMTRAX Plus snapshot (IM)
- Insulation (Max R-Value)
- Komatsu Payload Meter III®
- KOMTRAX Plus with ORBCOMM
- Operator seat, adjustable w/air suspension, lumbar support and arm rests
- Panel lighting (adjustable)
- Passenger seat, mechanical suspension
- Power windows
- Pressurized cab air system w/fan on
- Separate brake and retarder pedal
- Starter key switch
- Sunvisor (adjustable)
- Tilt & telescoping steering column
- Voltmeter (battery output)
- Windshield (tinted plate)
- Windshield wiper (dual) and washer (electric)

### LIGHTING

- Auxiliary box (LED)
- Back-up lights—R and L - deck mount (2) halogen
- Brake and retard lights on top of cab (LED)
- Brake cabinet (LED)
- Clearance lights (LED)
- Control cabinet service light (LED)
- Dynamic retarding, rear (2) (LED)
- Engine compartment service lights
- Fog lights (2) halogen
- Halogen headlights- all high & low beam positions (10)
- HID-style backup/ berm light
- Payload lights R and L (LED)
- Platform lights R, L and Center
- Recessed corner marker/ signal lighting (LED)
- Stairway lights
- Stop & tail lights (4) (LED)
- Turn signals (LED)



## OPTIONAL EQUIPMENT

Note: Optional equipment may change operating weight.

- Accumulators (cold weather)
- Body Liners\*
- Bumper mounted headlights
- Extended canopy
- Eyebrow
- Fire extinguisher 9 kg **20 lb**
- Heated body
- Hot start engine coolant (220V 2-2500W)
- Hot start engine oil (220V 2-500W)
- Hot start hydraulic oil
- SRI 3 point seat
- Komatsu Retractable Ladder System
- LED headlights
- Mudflaps on hydraulic tank & fuel tank
- Scoreboard PLM III Display
- Service center—RH
- Shutters (radiator)
- Smart (speed) rims
- Special language decals
- Suspensions, cold weather
- Wiggins Quick Fluid Fill & Engine Oil Evacuation System

\*Available factory installed or non-installed. All other options and accessories listed are available factory installed only.

# **Attachment 4.5**

## **Estimates and Quotes**

## Fred Charles

---

**From:** Fawcett, Clayton <CFawcett@conteches.com>  
**Sent:** Tuesday, February 5, 2019 9:25 AM  
**To:** Fred Charles  
**Subject:** RE: confirm or update costs for ACBs (reply requested by end of day Monday Feb 4, if possible)

Fred,

Hello and good morning. I hope this message finds you doing well. I made it back in to the office this morning and saw your e-mails.

Material and installation costs we discussed in September are still good. Please feel free to use those to complete your estimate.

Regarding your questions:

- 1 Yes, installation costs are the same for both downchutes and dissipator basins.
- 2 Yes, installation cost does include crushed stone infill (purchase and install)

Regarding your follow up e-mail with questions pertaining to cut-off walls.

- 1 Cut-off walls are not always required, however they are a good idea. The use of cut-off walls has increased in the last five years and as such, they are now recommended for inclusion at dissipator basins.
- 2 Material and installation costs for the installation of a cut-off wall are not included in the costs previously discussed and should be added.

I hope this information helps. Feel free to contact me directly with any additional questions.

Regards,

Clayton Fawcett PE (co)  
Armortec Area Manager - West

**CONTECH Engineered Solutions**  
970-290-2971 (cell)  
[cfawcett@conteches.com](mailto:cfawcett@conteches.com)

---

**From:** Fred Charles [mailto:fcharles@telesto-inc.com]  
**Sent:** Sunday, February 3, 2019 3:28 PM  
**To:** Fawcett, Clayton <CFawcett@conteches.com>  
**Subject:** confirm or update costs for ACBs (reply requested by end of day Monday Feb 4, if possible)

Hi Clayton. This email is a follow up to our email correspondence in September 2018 regarding material and installation costs for articulated concrete blocks (ACBs) used for downdrains at Chino. We've been using the cost info you passed along to me at that time. Now, I need you to confirm those costs or update them. We will use this information in a reclamation cost estimate (financial assurance for closure bonding) which we are currently finalizing for Chino and other mines in that area.

### Costs

As we had discussed, the material costs for ACBs (includes non-woven geotextile and microgrid/geogrid) are as follows:

- \$7.42/square foot (Block Class 40T, for the channel of each downdrain)

- \$10.65/square foot (Block Class 70T, for the dissipation basin at bottom of each downdrain)

Also, you quoted \$4.63/square foot for installation costs, which covers the following installation process: off-load the truck and place delivered ACBs in temporary storage area, fine grade base/subgrade soils, compact soils to 90% Standard Proctor (D698), place and secure filter fabric (non-woven geotextile), place 4-6" drainage layer overlaid by geogrid, place ACBs in final configuration, grout seams, and backfill ACBs with crushed stone.

2 questions

In addition to you confirming or updating the material and installation costs, I have two questions: (1) Is the installation cost (\$4.63/square foot) the same for both channel downdrains and dissipation basins? (2) Does the installation or material cost include the crushed stone used to backfill the ACBs?

Please create a new email to me with updated unit costs or reply to this email to confirm what I show is still correct. I will present what you provide for documentation in the cost estimate we submit to the state agencies.

Thanks,

**Fred Charles, Ph.D., P.E.** Senior Engineer  
Office: 970-484-7704, Ext 120 Cell: 720-318-5021  
3801 Automation Way, Suite 201, Fort Collins, CO 80525  
[fcharles@telesto-inc.com](mailto:fcharles@telesto-inc.com)



[www.telesto-inc.com](http://www.telesto-inc.com)

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Revegetation/Reclamation  
 Rangeland Rehabilitation  
 Landscaping / Fencing  
 Hydroseeding  
 Environmental Consulting

# ROCKY MOUNTAIN RECLAMATION

Phone (307) 745-5235  
 (307) 745-5230

[ron@reveg.us](mailto:ron@reveg.us)  
[www.reveg.us](http://www.reveg.us)

P.O. Box 1695  
 Laramie, WY 82073

## FREEPORT MCMORAN – NEW MEXICO MINING OPERATIONS

### PRICE ESTIMATES FOR REVEGETATION SERVICES FOR BUDGETING ESTIMATES

**Table 1 –Freeport McMoRan, New Mexico Mining Operations – Price Estimates for Revegetation Services for Budgeting Estimates, prepared April, 2018.**

REVEGETATION OPERATION	ESTIMATED QUANTITY	UNITS	COST/UNIT (\$)	TOTAL COST
<b>I. OPERATIONS:</b>				
1 SCARIFYING	500	Acres	\$30.00	\$15,000.00
2 DISCING	500	Acres	\$20.00	\$10,000.00
3 DRILL SEEDING (special Rangeland Drill)	500	Acres	\$80.00	\$40,000.00
4 MULCHING	500	Acres	\$148.00	\$74,000.00
5 CRIMPING	500	Acres	\$55.00	\$27,500.00
6 DAILY PER DIEM, ETC.	50	Days	\$385.00	\$19,250.00
7 MOBILIZATION	1	Each	\$13,500.00	\$13,500.00
	<b>Subtotal</b>			<b>\$199,250.00</b>
<b>II. MATERIALS:</b>				
1 SEED at 8.9 PLS/acre	500	Acres	\$210.00	\$105,000.00
2 HAY MULCH - nox. weed free, native	1000	Tons	\$245.00	\$245,000.00
	<b>Subtotal</b>			<b>\$350,000.00</b>
<b>TOTAL ESTIMATED REVEGETATION COST BEFORE TAX</b>				<b>\$549,250.00</b>
Add New Mexico Gross Receipts Tax	5.9375	%		\$32,611.72
<b>ESTIMATED REVEGETATION COST PER ACRE:</b>			<b>\$1,163.72</b>	
<b>TOTAL ESTIMATED REVEGETATION COST</b>				<b>\$581,861.72</b>

Estimate prepared by Ron Schreiber, Rocky Mountain Reclamation, for use for Budgeting Estimates.



Layne Christensen Company

12030 E. Riggs Road
Chandler, Arizona 85249
Office: 480.895.9336
Fax: 480.895.9536

Estimate

WATER - MINERAL - ENERGY

Company: Freeport McMoRan Tyrone
Contact: David Princehouse
Address: Box 571 Hwy 90 South
City: Tyrone
State: NM
Postal Code: 88065
Phone: 575 912 5752
Cell: 575 654 5246
Email: dprinceh@fmi.com

Date: July 31, 2018
Project: Tyrone Hole Abandonment
Location: Tyrone Mine
Estimated By: Joel Campbell
Proposal Number: 18-000-RC
Estimated Footage: 1,500 feet
Number of Holes: 1
Max. Depth: 1,500 feet
Average Depths: 1,500 feet

Table with columns: HAMMER DRILLING, RATE PER HOUR, FOOTAGE RANGE, Hole Size, Hourly. Row 1: 0-1,500 Feet, 5.5-inch, \$375.00

Table with columns: MOB / DEMOB, LUMP SUM, HOURLY. Rows: \*MOBILIZATION \$5,000.00, DEMOBILIZATION \$5,000.00

Table with columns: ADDITIONAL EQUIPMEN, PER MONTH, PER HOUR. Rows: FORKLIFT RENTAL N/A, AUX. AIR OP RATE N/A \$20.00

Table with columns: PER DIEM CHARGE, PER MAN/PER DAY. Row: 3 MAN CREW \$85.00

Table with columns: FUEL, RATE. Row: SUPPLIED BY TYRONE COST

Table with columns: CREW TRAVEL TIME, RATE. Row: Included in Footage Rate N/C

Table with columns: OPERATING HOURLY RIG RATE ACTIVITIES, PER HOUR. Row: DRILL HOLE ABANDONMENT \$375.00

Table with columns: STANDBY HOURLY RIG RATE ACTIVITIES, PER HOUR. Rows: CLIENT DIRECTED STANDBY WITH CREW \$300.00, WEATHER DELAY- NON OPERATING RATE \$300.00

Table with columns: SUPPLIES, RATE. Rows: CEMENT 47lb BAG EACH \$7.61, ABANTONITE 50lb BAG EACH \$16.00, LOST TOOLING / DRILL STEEL Cost, DRILLING FLUID ADDITIVES Cost plus 10%, OTHER MATERIALS / SUPPLIES AS NEEDED Cost plus 10%

PROPOSED LAYNE SUPPLIED RC DRILLING EQUIPMENT:

- One (1) Schramm 450 Track Rotary rig complete with 1,500 ft. of drill pipe, conventional downhole hammer, bit and tool subs, lubricants, wet rotary splitter, and tools necessary
One (1) 4 X 4 water truck with 1,600 gallon capacity.
One (1) 4 X 4 pipe truck
CREW: One (1) Driller; Two (2) Helpers
One (1) Ford F-250 4 x 4 Crew truck

BID CONDITIONS:

- RIG WILL WORK 1 (ONE) - 12 HOUR SHIFT PER DAY ON A 10 DAYS ON WITH 4 DAYS OFF SCHEDULE OR AS AGREED BY THE PARTIES.
- WATER SUPPLY, ACCESS, DRILL SITES, AND ALL REQUIRED PERMITS ARE THE RESPONSIBILITY OF THE



# Layne Christensen Company

12030 E. Riggs Road  
Chandler, Arizona 85249  
Office: 480.895.9336  
Fax: 480.895.9536

# Estimate

WATER · MINERAL · ENERGY

<b>Company:</b> Freeport McMoRan Tyrone	<b>Date:</b> July 31, 2018
<b>Contact:</b> David Princehouse	<b>Project:</b> Tyrone Hole Abandonment
<b>Address:</b> Box 571 Hwy 90 South	<b>Location:</b> Tyrone Mine
<b>City:</b> Tyrone	<b>Estimated By:</b> Joel Campbell
<b>State:</b> NM	<b>Proposal Number:</b> 18-000-RC
<b>Postal Code:</b> 88065	<b>Estimated Footage:</b> 1,500 feet
<b>Phone:</b> 575 912 5752	<b>Number of Holes:</b> 1
<b>Cell:</b> 575 654 5246	<b>Max. Depth:</b> 1,500 feet
<b>Email:</b> <a href="mailto:dprinceh@fmi.com">dprinceh@fmi.com</a>	<b>Average Depths:</b> 1,500 feet

Description	Quantity	Unit	Cost	Total
<b>Mobilization and Moving</b>				
Move Rig and Equipment	1	LS	\$5,000.00	\$5,000.00
De -Mobilize Rig and Equipment	1	LS	\$5,000.00	\$5,000.00
Move between holes 12hrs / move		HR	\$375.00	\$0.00
			<b>Job Total</b>	<b>\$10,000.00</b>
<b>Abandon 1 x 5.5-inch Hole to 1,500 Feet</b>				
Mix and Pump Cement Grout Whilst Pulling Rods	6	HR	\$375.00	\$2,250.00
Cement Materials	454	Bag	\$7.61	\$3,454.94
Sundry Materials Supplied - cost plus 15%				\$0.00
				\$0.00
				\$0.00
				\$0.00
			<b>Total 1 Well</b>	<b>\$5,704.94</b>

July 31, 2018

To: David Princehouse  
Tyrone Mining NM

**Re: Abandonment of Exploration Holes**

Layne intends to abandon the exploration holes drilled for Tyrone Mining for the RC Exploration program adhering to the following procedures

1. Upon reaching total depth the hole will be backfilled filling from the bottom up through the drill rods with a neat cement grout.
2. Verification of proper sealing is that the volume of sealing material placed in the hole during abandonment operations equals or exceeds the volume of the borehole to be filled and sealed

Regards



Audie Medhurst  
General Manager, Mineral Exploration  
Mineral Services Western US  
**LAYNE** | water + mineral + energy  
12030 E. Riggs Road | Chandler, AZ | 85249  
Office: 602-824-0934 | Cell: 602-359-3010  
[audie.medhurst@layne.com](mailto:audie.medhurst@layne.com) | [layne.com](http://layne.com)



August 23, 2011  
Revised August 25, 2011

Kurt Stauder  
Telesto Solutions, Inc.  
2950 E. Harmony Rd. Suite 200  
Fort Collins, CO 80528  
Phone: (970) 484-7704



CREATING INDUSTRY LEADING RESULTS

1055 S 63rd Avenue  
Phoenix, Arizona 85043  
t 602.442.0667 | f.602.442.0669

**RE: Shramrock Exploration Project  
Silver City, New Mexico  
Wilcox Proposal No.: 14.00645**

**Via Email: kstauder@telesto-inc.com**

Dear Mr. Stauder:

Wilcox Professional Services, LLC (Wilcox) is pleased to submit this proposal to provide exploratory drilling services in connection with the Shamrock Exploration Project located West of Silver City, New Mexico. Wilcox appreciates this opportunity and looks forward to working with you to make this a successful endeavor for all involved.

This proposal is based upon scope of work and bid sheets dated August 23, 2011 and are subject to negotiations between Wilcox and Hoffman Consulting & NV Gold Corp. (Client), if needed.

Drilling Scope of Work:

- Consists of 10 to 25 exploration holes to an anticipated depth of 300' each
- Reverse Circulation (RC)
- Vertical holes
- Schedule and Crew: One 12 hr. shift per day, drill till complete
- Commence October 2011

It is understood that to facilitate this drilling program the Client will provide the following at no cost to Wilcox:

- A suitable water supply (if required)
- Full time on site Geologist capable of making decisions on program to avoid delays
- Legal access to the site from public roads
- Staging area for unloading and loading equipment
- Drill pad construction and reclamation (if required)
- Road and mud pit construction and reclamation (if required)
- Any bonding and all permitting fees (if required)

The Client will be responsible for reimbursing Wilcox for the following items at suppliers' list price plus 10 percent (10%). Client may provide certain items as mutually agreed.

- Drilling mud and additives
- Cement and cementing services
- Chip boxes and lids, sample bags and marker blocks
- Special tools or drilling accessories, rig well for testing purposes or which may be a lift in the hole upon client request
- All casing shoes
- Down Hole Survey Interment (Reflex EZ-SHOT or equivalent)

*This proposal is not a binding contract. It is a submission for information purposes only and until bound by a contract, is subject to revision by either party.*

- Core drilling bits, reamers and tricones
- Casing lost/left in holes or recovered but damaged
- All materials lost in the hole
- Sump liners/tank, if required
- Sanitary facilities
- Disposal of all liquids and solid waste generated on site
- Other items as negotiated

Wilcox will provide specialized equipment and services for completion of your drilling program, including in Drilling Unit Price:

- 1 RC Drill Rig
- RC Drilling System
- MSHA Certified Drill Crews (2 man)
- Water transport (if required)
- Support equipment (welding, pickup & tools)

## **General Provisions**

### **a. Lost Materials**

In the event that drill rods, casing, or other equipment become lost, broken, or stuck in the hole while drilling at the footage rates, the Client agrees to reimburse the Contractor at field cost rates. These rates will include time and materials expended in recovery attempts. If materials are unrecoverable, the Contractor shall be reimbursed for same at replacement cost.

### **b. Unsatisfactory Progress In Hole and Hole Abandonment**

In the event that excessive water flows, cavities, loose, swelling, caving materials, or hole stability problems are encountered, and they prevent the completion or satisfactory progress of a hole the Contractor does not guarantee to drill to a predetermined depth. If it becomes necessary to abandon the hole the Contractor shall charge the Client for the holes abandoned. Such charges will include the depth of abandonment and the rates specified in our proposal. If the Client requests the Contractor to proceed in the hole, the Contractor has the option to revert to the operating field cost rates plus all materials, supplies, and equipment required at replacement cost plus ten percent (10%). These charges will be subject to the Client's approval.

### **c. Field Cost Definitions**

#### **1. Operating**

It is agreed that the operating rates shall include the labor of a regular three-man crew per shift, and drill and support equipment rental. The cost of rods, casing, below-the-head consumables, and other materials and supplies consumed onsite shall be charged to the Client at cost plus ten percent (10%).

In the event that extra labor over and above the regular two-man crew per shift is utilized, the Contractor agrees to supply such additional labor at the rates specified in Bid Prices, Section 5.

#### **2. Non-Operating (Standby)**

It is agreed that the non-operating rates shall prevail when work is interrupted due to delays not caused by the Contractor, or delays beyond his control.

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**Pricing of Services**

3000 ft Estimate

Item	Quantity	Unit	Cost	Price
<b>DRILLING COSTS</b>				
Mobilization	1	LS	5,000	\$5,000.00
Demobilization	1	LS	5,000	\$5,000.00
<b>SURFACE CASING</b>				
Vertical Casing Advancement Drilling	40	HR	150	\$6,000.00
<b>DRILLING WITH DOWN HOLE HAMMER</b>				
Vertical DHH Drilling; 5 1/2" Borehole, 0'-Up to 300'	300	FT	32	\$96,000.00
<b>RIG TIME OTHER THAN DRILLING - OPERATING</b>				
Plugging	100	HR	150	\$15,000.00
<b>RIG TIME OTHER THAN DRILLING - NON-OPERATING</b>				
Move-on, Set-up, Take-down Between Holes	50	HR	150	\$7,500.00
<b>MATERIALS</b>				
Portland Cement; 97lb. Sack	700	EA	15	\$10,500.00
Bentonite- AquaGuard or e; 50lb. Sack	90	EA	25	\$2,250.00
<b>DAILY CHARGES</b>				
Daily Crew Travel and/or Per Diem (Per Shift)	25	EA	300	\$7,500.00
Stand-by Time	25	HR	150	\$3,750.00
Contingency			10%	\$15,000.00
			<b>Total</b>	<b>\$173,500</b>

4500 ft Estimate

Item	Quantity	Unit	Cost	Price
<b>DRILLING COSTS</b>				
Mobilization	1	LS	5,000	\$5,000.00
Demobilization	1	LS	5,000	\$5,000.00
<b>SURFACE CASING</b>				
Vertical Casing Advancement Drilling	50	HR	150	\$7,500.00
<b>DRILLING WITH DOWN HOLE HAMMER</b>				
Vertical DHH Drilling; 5 1/2" Borehole, 0'-Up to 300'	4500	FT	30	\$135,000.00
<b>RIG TIME OTHER THAN DRILLING - OPERATING</b>				
Plugging	125	HR	150	\$18,750.00
<b>RIG TIME OTHER THAN DRILLING - NON-OPERATING</b>				
Move-on, Set-up, Take-down Between Holes	100	HR	150	\$15,000.00
<b>MATERIALS</b>				
Portland Cement; 97lb. Sack	1000	EA	15	\$15,000.00
Bentonite- AquaGuard or e; 50lb. Sack	100	EA	25	\$2,500.00
<b>DAILY CHARGES</b>				
Daily Crew Travel and/or Per Diem (Per Shift)	35	EA	300	\$10,500.00
Stand-by Time	35	HR	150	\$5,250.00
Contingency			10%	\$20,000.00
			<b>Total</b>	<b>\$239,500.00</b>

*This proposal is not a binding contract. It is a submission for information purposes only and until bound by a contract, is subject to revision by either party.*

ASSUMES FULL CHARGE

7500 ft Estimate

Item	Quantity	Unit	Cost	Price
<b>DRILLING COSTS</b>				
Mobilization	1	LS	5,000	\$5,000.00
Demobilization	1	LS	5,000	\$5,000.00
<b>SURFACE CASING</b>				
Vertical Casing Advancement Drilling	50	HR	125	\$6,250.00
<b>DRILLING WITH DOWN HOLE HAMMER</b>				
Vertical DHH Drilling; 5 1/2" Borehole, 0'-Up to 300'	7500	FT	27.5	\$206,250.00
<b>RIG TIME OTHER THAN DRILLING - OPERATING</b>				
Plugging	150	HR	125	\$18,750.00
<b>RIG TIME OTHER THAN DRILLING - NON-OPERATING</b>				
Move-on, Set-up, Take-down Between Holes	100	HR	125	\$12,500.00
<b>MATERIALS</b>				
Portland Cement; 97lb. Sack	1500	EA	15	\$22,500.00
Bentonite- AquaGuard or e; 50lb. Sack	125	EA	25	\$3,125.00
<b>DAILY CHARGES</b>				
Daily Crew Travel and/or Per Diem (Per Shift)	50	EA	300	\$15,000.00
Stand-by Time	50	HR	150	\$6,250.00
Contingency			10%	\$30,000.00
<b>Total</b>				<b>\$330,625.00</b>

1.5/ft

$\frac{\$18,750}{7,500 \text{ ft}} = 2.5$

$\frac{\$22,500}{7500} = 3$   
= 4.71

3.71

2.79/ft

**Wilcox Professional Services 2011 Billing Rates**

Standard Hourly Rates are set forth in this Exhibit and include salaries and wages paid to Personnel in each billing class plus the cost of customary and statutory benefits, general Administrative overhead, non-project operating costs, and operating margin or profit.

Personnel

- Project Director ..... \$190.00/per hour
- Project Manager / Sr. Professional ..... \$150.00/per hour
- Project Engineer / Surveyor ..... \$130.00/per hour
- Sr. Technician / Sr. Designer ..... \$110.00/per hour
- Technician / CAD Drafter ..... \$90.00/per hour
- Superintendent..... \$150.00/per hour
- Survey Crew..... \$150.00/per hour
- Clerical ..... \$60.00/per hour

Outside Consultants (Client Authorized)

Coordination at Personnel Hourly Rates listed above Cost + 10%

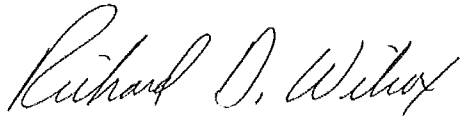
*This proposal is not a binding contract. It is a submission for information purposes only and until bound by a contract, is subject to revision by either party.*

Wilcox will require a deposit amount of \$30,000.00 be received upon authorization of the contract to hold the drilling rig, crew and equipment. The deposit will be applied towards the final invoice. A 15 days notice to prepare and transport rig to project site will also be required.

We appreciate your confidence in Wilcox and look forward to working with you on this and other projects. Thanks again for this opportunity to submit out proposal. Wilcox is ready to commence work upon receipt of authorization. If you have questions, please do not hesitate to call me at 602-442-0667.

Sincerely,

**WILCOX PROFESSIONAL SERVICES, LLC**

A handwritten signature in cursive script that reads "Richard D. Wilcox".

Richard D. Wilcox, P.E.  
President

Enclosures

CC:

# O'KEEFE DRILLING

P.O. Box 3810 - Butte, MT 59702  
 Office: (406) 494-3310 Fax: (406) 494-3301  
 Email: info@okeefedrilling.com

Item	Description	Unit	Estimated Quantity	Unit Cost	Total
<b>Drilling</b>					
1	Mobilization/ Demobilization (RC/ Dual Rotary)	LS	1	\$ 7,000.00	\$ 7,000.00
2	Mobilization-Pump Truck	LS	1	\$ 2,500.00	\$ 2,500.00
3	Set-up between holes	Each	54	\$ 1,500.00	\$ 81,000.00
4	Decontamination-Drilling	LS	54	\$ 1,000.00	\$ 54,000.00
5	Drilling (Pilot Holes-Mud Rotary)*	Ft	3600	\$ -	\$ -
6	Abandonment-Pilot Holes	Ft	3600	\$ -	\$ -
7	Drilling (Reverse Circulation) *	Ft	4650	\$ 34.00	\$ 158,100.00
8	Drilling (Dual Rotary) *	Ft	4650	\$ 40.00	\$ 186,000.00
9	4-inch SCH-40 PVC Well - Installed				\$ -
	Screen	Ft	1080	\$ 65.00	\$ 70,200.00
	Sand (5' above screen)	Ft	1350	\$ 55.00	\$ 74,250.00
	Blank Casing	Ft	8220	\$ 12.00	\$ 98,640.00
	Grout	Ft	7950	\$ 6.00	\$ 47,700.00
10	Surface Completion	Each	54	\$ 375.00	\$ 20,250.00

<b>Well Development and Sampling</b>					
11	Well Development	Hour	400	\$ 165.00	\$ 66,000.00
12	Decontamination-Development	LS	54	\$ 165.00	\$ 8,910.00
13	Stand-by Time (Pump Truck)	Hour		\$ 115.00	\$ -
14	Per diem	Day	113	\$ 275.00	\$ 31,075.00
15	Stand-by Time (Drill Rig)	Hour		\$ 220.00	\$ -
16	Interm Travel	Per Hour	96	\$ 100.00	\$ 9,600.00
<b>Total</b>					<b>\$ 915,225.00</b>

Note: The Mud Rotary Drilling will be drilled by others

\$9300

\$100/H

4/20/04

# **Attachment 4.6**

## **Fuel Cost**



## Calculation Documentation

### Problem Statement:

Freeport-McMoRan (FMI) utilizes fuel price information as part of earthwork closure cost estimation associated with the Chino Closure/Closeout Plan (CCP). A reliable estimate of the local 2024 fuel price is needed, based on local and national data for past years.

### Objective:

1. Develop an equation to predict the current estimated local fuel price for estimating earthwork closure costs at FMI's mining operations in Grant County, NM.

### Approach:

1. Identify existing data used for the calculation.
2. Correlate local and national data for fuel price, paired by year.
3. Estimate current fuel price for use in the earthwork closure costs.

### Data and Assumptions:

1. Data used for the calculations are shown below (1995-2018 as an example) and include (a) U.S. No. 2 Diesel Retail Prices (annual national) and (b) FMI quotes (for specific dates within a year) for the local Silver City area. All prices are in \$/gallon.

Fuel Price Data		FMI Fuel Quotes <sup>2</sup>			
<b>Data 1: U.S. No 2 Diesel Retail Prices (Dollars per Gallon)</b>		<b>Site</b>	<b>Date</b>	<b>Dyed, low-sulfur diesel</b>	<b>Notes</b>
<b>Date</b>	<b>U.S. No 2 Diesel Retail Prices<sup>1</sup></b>	Continental	1/21/2005	\$1.40	Tom Shelley - quote from fuel broker
1995	1.109	Chino & Tyrone	5/9/2007	\$2.41	Porter Oil Quote (7500 gal capacity)
1996	1.235	Continental	1/23/2009	\$1.80	Porter Oil Quote (7500 gal capacity)
1997	1.198	Tyrone (Little Rock)	1/14/2010	\$2.49	Porter Oil Quote (7500 gal capacity)
1998	1.044	Tyrone	7/7/2012	\$3.13	Western Refining Oil
1999	1.121	Continental	6/18/2014	\$3.22	Western Refining Oil
2000	1.491	Chino (North Lampbright)	11/5/2015	\$1.74	Western Refining Oil
2001	1.401	Chino	5/20/2016	\$1.66	Western Refining Oil
2002	1.319	Tyrone (Little Rock)	4/24/2017	\$1.90	Western Refining Oil
2003	1.509	Continental	3/12/2018	\$2.75	Griffin Propane
2004	1.81	Chino	10/10/2018	\$2.75	Griffin Propane
2005	2.402				
2006	2.705				
2007	2.885				
2008	3.803				
2009	2.467				
2010	2.992				
2011	3.84				
2012	3.968				
2013	3.922				
2014	3.825				
2015	2.707				
2016	2.304				
2017	2.65				
2018	3.178				
2019	3.056				
2020	2.551				
2021	3.125				
<b>Date</b>	<b>U.S. No 2 Diesel Retail Prices<sup>1</sup></b>				
July 2024	3.722				

1. U.S. Energy Information Administration  
[https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD\\_EPD2D\\_PTE\\_NUS\\_DPG&f=M](https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2D_PTE_NUS_DPG&f=M)  
 2. Quotes obtained from Freeport-McMoRan (FMI)

**For example use only. Values may not match the current spreadsheet.**



**Data and Assumptions (continued):**

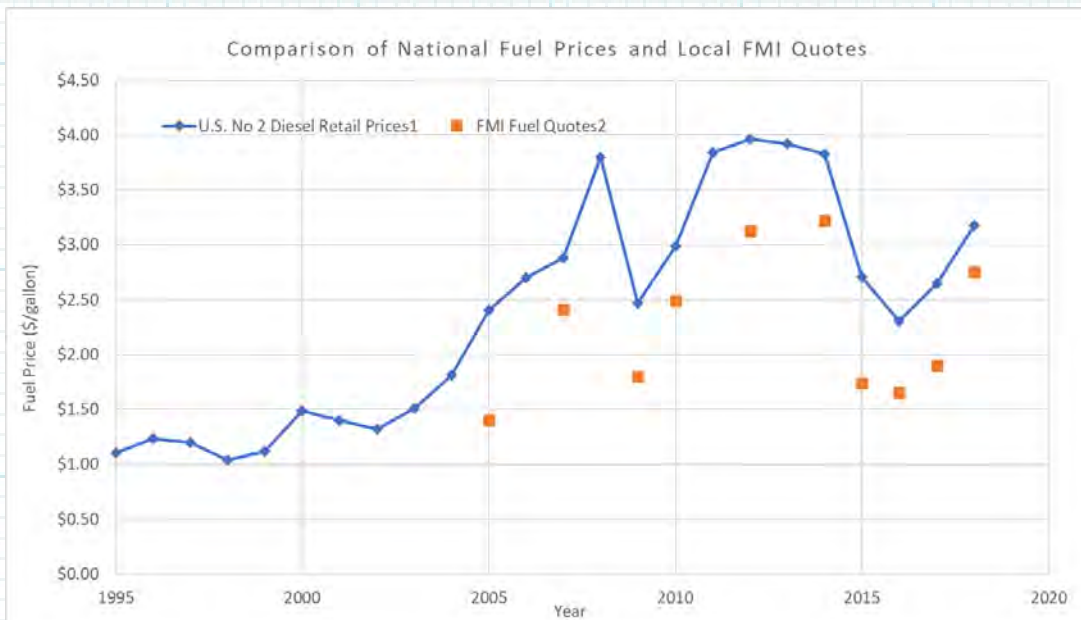
- The local FMI fuel quotes and annual national retail fuel (U.S. No. 2) prices are assumed to trend similarly – if the national prices increase, local prices also increase.
- A correlation between national and local fuel prices is assumed to reasonably predict local fuel prices for any period (e.g., annual, monthly, etc).

**Calculations and Results:**

- The annual national retail fuel prices (U.S. Energy Information Administration) dataset is tabulated and plotted for comparison with the available annual local FMI fuel quotes (note that quotes are not available for blank years).

Year	U.S. No 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>	Year	U.S. No 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>
1995	1.109		2007	2.885	\$2.41
1996	1.235		2008	3.803	
1997	1.198		2009	2.467	\$1.80
1998	1.044		2010	2.992	\$2.49
1999	1.121		2011	3.84	
2000	1.491		2012	3.968	\$3.13
2001	1.401		2013	3.922	
2002	1.319		2014	3.825	\$3.22
2003	1.509		2015	2.707	\$1.74
2004	1.81		2016	2.304	\$1.66
2005	2.402	\$1.40	2017	2.65	\$1.90
2006	2.705		2018	3.178	\$2.75

1. U.S. Energy Information Administration  
<http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD EPD2D PTE NUS DPG&f=M>  
 2. Quotes obtained from Freeport-McMoRan (FMI)



**For example use only. Values may not match the current spreadsheet.**



**Calculations and Results (continued):**

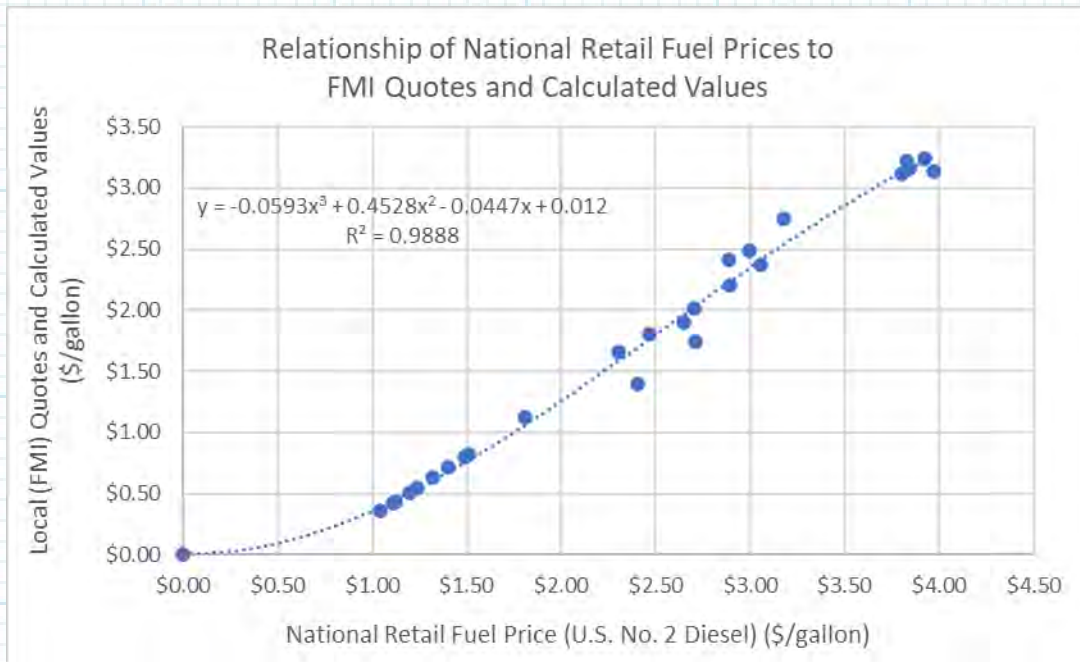
2. The annual national fuel retail prices are ranked from lowest to highest, corresponding to local FMI fuel quotes for matching years in which they are available. (see Col. A and B below)
3. The difference between the national fuel retail prices and FMI fuel quotes is calculated for each pairing. FMI fuel quotes are all lower than the corresponding national fuel retail prices. We average the differences for all pairs. (Col. C)
4. For each year without an FMI quote, the average difference of \$0.69 is subtracted from the national fuel retail prices. This results in a calculated FMI value for each unpaired data year. (Col. D)
5. We combine the available FMI fuel quotes and calculated FMI values into one column, providing a comprehensive listing of all calculated FMI values and FMI quotes. (Col. E)
6. We plot the annual national fuel retail prices (Col. A) against the FMI calculated values and quotes (Col. E) and develop a correlation. Here, national fuel prices serve as the independent variable, while FMI values and quotes act as the dependent (i.e., estimated) variable. (see Col. F and graph below)

A	B	C	D	E	F
U.S. No. 2 Diesel Retail Prices <sup>1</sup>	FMI Fuel Quotes <sup>2</sup>	Difference Between Retail Prices and FMI Quotes	Calculated FMI Values Based on Average Difference	Calculated FMI Values and Quotes	$y = -0.0617x^3 + 0.4659x^2 - 0.0611x + 0.0148$
\$0.00				\$0.00	\$0.01
\$1.11			\$0.42	\$0.42	\$0.44
\$1.24			\$0.55	\$0.55	\$0.53
\$1.20			\$0.51	\$0.51	\$0.50
\$1.04			\$0.36	\$0.36	\$0.39
\$1.12			\$0.43	\$0.43	\$0.44
\$1.49			\$0.80	\$0.80	\$0.75
\$1.40			\$0.71	\$0.71	\$0.67
\$1.32			\$0.63	\$0.63	\$0.60
\$1.51			\$0.82	\$0.82	\$0.77
\$1.81			\$1.12	\$1.12	\$1.06
\$2.40	\$1.40	\$1.00		\$1.40	\$1.70
\$2.71			\$2.02	\$2.02	\$2.04
\$2.89	\$2.41	\$0.47		\$2.41	\$2.23
\$3.80			\$3.11	\$3.11	\$3.13
\$2.47	\$1.80	\$0.67		\$1.80	\$1.77
\$2.99	\$2.49	\$0.50		\$2.49	\$2.35
\$3.84			\$3.15	\$3.15	\$3.16
\$3.97	\$3.13	\$0.84		\$3.13	\$3.25
\$3.92			\$3.23	\$3.23	\$3.22
\$3.83	\$3.22	\$0.61		\$3.22	\$3.14
\$2.71	\$1.74	\$0.97		\$1.74	\$2.04
\$2.30	\$1.66	\$0.65		\$1.66	\$1.59
\$2.65	\$1.90	\$0.75		\$1.90	\$1.98
\$3.18	\$2.75	\$0.43		\$2.75	\$2.89
	Average	\$0.69			

1. U.S. Energy Information Administration  
<http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD EPD2D PTE NUS DPG&f=M>  
 2. Quotes obtained from Freeport-McMoRan (FMI)

**For example use only. Values may not match the current spreadsheet.**

**Calculations and Results (continued):**



7. The prediction equation (and coefficient of determination,  $R^2$ ) is shown in the above graph where  $x$  = national retail fuel price (\$/gallon) and  $y$  = predicted local fuel price (\$/gallon).
8. Based on this equation and the national retail fuel price in June 2024 of \$3.72, the predicted local FMI fuel price for U.S. No. 2 diesel (June) is

$$\text{Local fuel price} = (-0.0593)(3.72)^3 + (0.4528)(3.72)^2 - (0.0447)(3.72) + 0.012 = \$3.06/\text{gallon}$$

**Summary and Conclusions:**

1. We used National and local (FMI) fuel price data to develop a strongly correlated ( $R^2 = 0.9888$ ) prediction equation by which local FMI fuel prices can be predicted from national fuel price data. Note that the relationship developed in this analysis applies only to FMI operations in the Silver City (Grant County), NM area.
2. Telesto can use the following prediction equation developed in these calculations to predict the estimated December 2020 local fuel price for use in earthwork closure costs:

$$\text{Local fuel price} = -0.0593x^3 + 0.4528x^2 - 0.0447x + 0.012$$

where  $x$  = national retail fuel price (\$/gallon) and  $y$  = predicted local fuel price (\$/gallon)

# **Attachment 5**

## **Cost Spreadsheet**

**General Information**

Applicant Chino Mines Company  
 Hurley, New Mexico 88043

Disturbed Surface Area (acres) 3,980

Type of Operation Existing/Surface/Copper

*Current value of earthwork and  
 O&M before escalation and  
 discounting* **\$233,239,163**

**Stockpiles, Tailing,  
 Reservoirs, Haul Roads  
 and Disturbed Areas**

EOY 2026 Mine Plan

**Demolition**

Building Demolition costs are calculated in "1 BuildingDemo", "2 BuildingCover", "3 BuildingVeg", and "4BuildingWaste" and summarized on the last line of this table.

Item	Material	Quantity	Unit	Unit Cost (\$/unit)	Direct Item Cost (\$)	Reference	Means Line Item	Description
NMA & SMA Reclamation	Pipelines Demolition	912,856	ft	\$4.09	\$3,733,579	Means and Other (See Pipeline Unit Cost Sheet)	02 41 13.38 1800	Water and sewer pipeline lengths from 2018 Chino Bluestake map. 50% of pipelines assumed to be reclaimed. See pipeline unit cost calculation.
NMA & SMA Reclamation	Pipeline Corridor Area Revegetation	8.2	ac	\$1,599.79	\$13,118	See Revegetation Unit Cost Sheet	N/A	See unit rates calculations. Area based on 30' corridor minus 12' for vehicles (18') multiplied by length of pipeline in Pipeline Corridor Area (length from pg. 249-250 of CCP).
NMA & SMA Utilities Reclamation	Power Poles Demolition	246	ea	\$252.03	\$61,999	Means	024113.80 0200	Number of power poles from 2018 Chino Bluestake map. Unit cost for Selective Demolition - wood utility poles 35-45 feet high.
NMA & SMA Utilities Reclamation	Power Lines Demolition	318,553	ft	\$0.94	\$299,440	Means	260505.10 0370	Wire and cable lengths from from 2018 Chino Bluestake map. Unit cost for Electrical Demolition - Nonmetallic sheathed cable 3 wire; assume similar enough in cost to overhead powerlines.
NMA & SMA Utilities Reclamation	Utility Corridors Revegetation	36.6	ac	\$1,599.79	\$58,496	See Revegetation Unit Cost Sheet	N/A	See unit rates calculations - Cost is based on a calculated unit rate that includes tractor rental and maintenance, fuel, scarifying, discing, drill seeding, mulching, crimping, seed, and mulch.
NMA Reclamation	Concrete Surface Containments	154	hr	\$208.47	\$32,105	Means	Means Crew B-12C	Standard Union Crew. 1 equipment operator (crane), 1 laborer, 1 hydraulic excavator, 2 cy, approximately 40 hrs to demo 200 ft reinforced concrete dam.
Building Demolition	See Building Demo Sheets	N/A	N/A	N/A	\$937,754	See Building Demo Sheets	N/A	Direct costs only. 20% added to buildings with extra equipment removal.

**Total Direct Cost:      \$5,136,491**

Item	Activity	Material	Eq	ID	Description	Source Location 1	Destination Location 2	Total Haul/Push Distance (ft) <sup>1</sup>	Grade (%) <sup>2,3</sup>	Equipment
1101	E	f	Rp1	1101-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	120	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
1102	E	f	Rp1	1102-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	116	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
1201	E	f	Rp1	1201-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	85	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
1202	E	f	Rp1	1202-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	249	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
1203	E	f	Rp1	1203-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	254	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
2101	E	c	Rp1	2101-E-c-Rp1	Rip-Dam 15-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2102	E	c	Rp1	2102-E-c-Rp1	Rip-Dam 16-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2103	E	c	Rp1	2103-E-c-Rp1	Rip-Dam 20-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2104	E	c	Rp1	2104-E-c-Rp1	Rip-Reservoir 18-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2105	E	c	Rp1	2105-E-c-Rp1	Rip-Fleming Pond-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2106	E	c	Rp1	2106-E-c-Rp1	Rip-Tailing Thickener 2-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2107	E	c	Rp1	2107-E-c-Rp1	Rip-PLS Pond & Launder-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2108	E	c	Rp1	2108-E-c-Rp1	Rip-Raffinate Pond-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2109	E	c	Rp1	2109-E-c-Rp1	Rip-Reservoir 2-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2110	E	c	Rp1	2110-E-c-Rp1	Rip-Reservoir 6-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2111	E	c	Rp1	2111-E-c-Rp1	Rip-Reservoir 7-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2112	E	c	Rp1	2112-E-c-Rp1	Rip-Elmo's Pond -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2113	E	c	Rp1	2113-E-c-Rp1	Rip-Lower Lined Pond -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2114	E	c	Rp1	2114-E-c-Rp1	Rip-Upper Lined Pond -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2115	E	c	Rp1	2115-E-c-Rp1	Rip-5901 PLS Sump -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2116	E	c	Rp1	2116-E-c-Rp1	Rip-6301 PLS Booster Station -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2117	E	c	Rp1	2117-E-c-Rp1	Rip-Lee Hill #2 Booster -Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2118	E	c	Rp1	2118-E-c-Rp1	Rip-Kessel Stormwater 1-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2119	E	c	Rp1	2119-E-c-Rp1	Rip-Kessel Stormwater 2-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2120	E	c	Rp1	2120-E-c-Rp1	Rip-Kessel Stormwater 3-Rough Graded Material	Dams and Reservoirs	-	100	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2203	E	c	Rp1	2203-E-c-Rp1	Rip-Chino part of Cobre Haul Road-Rough Graded Material	Miscellaneous NMA	-	-	0.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2204	E	c	Rp1	2204-E-c-Rp1	Rip-Highway to Heaven Haul Road-Rough Graded Material	Miscellaneous NMA	-	-	0.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
2300	E	a	Rp1	2300-E-a-Rp1	Rip-200-Acre Unplanned Future Disturbance-Existing Ground	Unplanned Disturbed Area	-	-	0.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
3101	E	f	Rp1	3101-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	45	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3102	E	f	Rp1	3102-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	84	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3103	E	f	Rp1	3103-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	87	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3104	E	f	Rp1	3104-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	100	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3105	E	f	Rp1	3105-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	100	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3106	E	f	Rp1	3106-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	129	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3107	E	f	Rp1	3107-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	113	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3108	E	f	Rp1	3108-E-f-Rp1	Rip-Bottom-Fill/Stockpile Material	Axiflo	X	37	-28.6% Cat D11T CD Multi-shank (w/ MSR-359H)	
3500	E	a	Rp1	3500-E-a-Rp1	Rip-Impacted Soil at TP7-Existing Ground	Impacted Soil at TP7	-	-	-1.0% Cat D11T CD Multi-shank (w/ MSR-359H)	
									0.0% Cat D11T CD Multi-shank (w/ MSR-359H)	

Earthwork Quantity Worksheet

Notes and Assumptions:

- 1 - Acres and volumes based on 3CCP drawings
- 2 - Cover Material Swell: The 'Loose Volume' is calculated based on the acreage to be covered, cover depth, and accounts for appropriate swell factor.
- 3 - Has been agreed upon with State agencies that swell occurs when cover material is moved from source to haul truck but not from the truck to placement on stockpile

ID	Description	Source Location 1	Destination Location 2	Area (ac) <sup>1</sup>	Cover Depth (in)	Bank/Stockpile Volume (bcy) <sup>1</sup>	Swell Factor % <sup>1,3</sup>	Loose/Stockpile Volume (lcy) <sup>2</sup>
1100-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	3A Stockpile	-	34.1	36.0	165,117	0%	165,117
1100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	3A Stockpile	34.1	36.0	165,117	0%	165,117
1100-C-b-Ld3	Load-Cover	Tailings Pond 6	3A Stockpile	34.1	36.0	165,117	0%	165,117
1100-D-b-Tk1	Haul-Cover	Tailings Pond 6	3A Stockpile	34.1	36.0	165,117	0%	165,117
1101-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	-	-	112,681	0%	112,681
1101-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	-	-	-	0%	-
1102-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	-	-	131,498	0%	131,498
1102-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	-	-	-	0%	-
1200-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Kessel Stockpile	-	279.8	36.0	1,354,222	0%	1,354,222
1200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Kessel Stockpile	279.8	36.0	1,354,222	0%	1,354,222
1200-C-b-Ld3	Load-Cover	Tailings Pond 6	Kessel Stockpile	279.8	36.0	1,354,222	0%	1,354,222
1200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Kessel Stockpile	279.8	36.0	1,354,222	0%	1,354,222
1201-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	-	-	661,675	0%	661,675
1201-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	-	-	-	0%	-
1202-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	-	-	1,904,218	0%	1,904,218
1202-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	-	-	-	0%	-
1203-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	-	-	1,559,361	0%	1,559,361
1203-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	-	-	-	0%	-
1300-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	South Stockpile	-	507.9	36.0	2,458,190	0%	2,458,190
1300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	South Stockpile	507.9	36.0	2,458,190	0%	2,458,190
1300-C-b-Ld3	Load-Cover	Tailings Pond 6	South Stockpile	507.9	36.0	2,458,190	0%	2,458,190
1300-D-b-Tk1	Haul-Cover	Tailings Pond 6	South Stockpile	507.9	36.0	2,458,190	0%	2,458,190
1301-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	691,900	0%	691,900
1301-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	691,900	0%	691,900
1301-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	691,900	0%	691,900
1302-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,458,555	0%	1,458,555
1302-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,458,555	0%	1,458,555
1302-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,458,555	0%	1,458,555
1303-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,323,471	0%	6,323,471
1303-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,323,471	0%	6,323,471
1303-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,323,471	0%	6,323,471
1304-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	5,921,616	0%	5,921,616
1304-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	5,921,616	0%	5,921,616
1304-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	5,921,616	0%	5,921,616
1305-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,181,885	0%	6,181,885
1305-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,181,885	0%	6,181,885
1305-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	6,181,885	0%	6,181,885
1306-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,664,045	0%	1,664,045
1306-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,664,045	0%	1,664,045
1306-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,664,045	0%	1,664,045
1307-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	3,309,770	0%	3,309,770
1307-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	3,309,770	0%	3,309,770
1307-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	3,309,770	0%	3,309,770
1308-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	224,351	0%	224,351
1308-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	224,351	0%	224,351
1308-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	224,351	0%	224,351
1309-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,205,963	0%	1,205,963
1309-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,205,963	0%	1,205,963
1309-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	1,205,963	0%	1,205,963
1310-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	704,511	0%	704,511
1310-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	704,511	0%	704,511
1310-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	704,511	0%	704,511
1311-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	212,139	0%	212,139
1311-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	212,139	0%	212,139
1311-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	212,139	0%	212,139
1312-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	104,971	0%	104,971
1312-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	104,971	0%	104,971
1312-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	104,971	0%	104,971
1313-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	208,214	0%	208,214
1313-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	208,214	0%	208,214
1313-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	-	-	208,214	0%	208,214
1400-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Stockpile 2	-	76.0	36.0	367,840	0%	367,840
1400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Stockpile 2	76.0	36.0	367,840	0%	367,840
1400-C-b-Ld3	Load-Cover	Tailings Pond 6	Stockpile 2	76.0	36.0	367,840	0%	367,840
1400-D-b-Tk1	Haul-Cover	Tailings Pond 6	Stockpile 2	76.0	36.0	367,840	0%	367,840
1402-A-f-Sc1	Grade-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	-	-	1,701,942	0%	1,701,942
1402-B-f-Dz4	Dozer Assist-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	-	-	1,701,942	0%	1,701,942
1500-A-d-Mg2	Grade-Entire Stockpile 23.5M-Placed Cover	West Stockpile	-	552.5	36.0	2,674,202	0%	2,674,202
1500-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	West Stockpile	552.5	36.0	2,674,202	0%	2,674,202
1500-C-b-Ld3	Load-Cover	Tailings Pond 6	West Stockpile	552.5	36.0	2,674,202	0%	2,674,202
1500-D-b-Tk1	Haul-Cover	Tailings Pond 6	West Stockpile	552.5	36.0	2,674,202	0%	2,674,202
1501-A-f-Sc1	Grade-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	-	-	5,107,209	0%	5,107,209
1501-B-f-Dz4	Dozer Assist-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	-	-	5,107,209	0%	5,107,209
1502-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	West Stockpile	X	-	-	11,032,629	0%	11,032,629
1502-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	West Stockpile	X	-	-	11,032,629	0%	11,032,629
1503-A-f-Sc1	Grade-West outslope-Fill/Stockpile Material	West Stockpile	X	-	-	7,499,643	0%	7,499,643
1503-B-f-Dz4	Dozer Assist-West outslope-Fill/Stockpile Material	West Stockpile	X	-	-	7,499,643	0%	7,499,643
1504-A-f-Sc1	Grade-North outslope-Fill/Stockpile Material	West Stockpile	X	-	-	679,499	0%	679,499
1504-B-f-Dz4	Dozer Assist-North outslope-Fill/Stockpile Material	West Stockpile	X	-	-	679,499	0%	679,499
1600-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Lampbright Stockpile	-	935.8	36.0	4,529,262	0%	4,529,262
1600-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Lampbright Stockpile	935.8	36.0	4,529,262	0%	4,529,262
1600-C-b-Ld3	Load-Cover	Tailings Pond 6	Lampbright Stockpile	935.8	36.0	4,529,262	0%	4,529,262
1600-D-b-Tk1	Haul-Cover	Tailings Pond 6	Lampbright Stockpile	935.8	36.0	4,529,262	0%	4,529,262
1601-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	8,702,794	0%	8,702,794
1601-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	8,702,794	0%	8,702,794
1601-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	8,702,794	0%	8,702,794
1602-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,873,128	0%	6,873,128
1602-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,873,128	0%	6,873,128
1602-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,873,128	0%	6,873,128
1603-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	5,078,469	0%	5,078,469
1603-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	5,078,469	0%	5,078,469
1603-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	5,078,469	0%	5,078,469
1604-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,819,955	0%	1,819,955
1604-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,819,955	0%	1,819,955
1604-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,819,955	0%	1,819,955
1605-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,408,766	0%	1,408,766
1605-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,408,766	0%	1,408,766
1605-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,408,766	0%	1,408,766
1606-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,482,001	0%	1,482,001
1606-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,482,001	0%	1,482,001
1606-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	1,482,001	0%	1,482,001
1607-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,088,111	0%	2,088,111
1607-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,088,111	0%	2,088,111
1607-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,088,111	0%	2,088,111
1608-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,291,599	0%	3,291,599
1608-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,291,599	0%	3,291,599
1608-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,291,599	0%	3,291,599
1609-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,567,330	0%	2,567,330
1609-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,567,330	0%	2,567,330
1609-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	2,567,330	0%	2,567,330
1610-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,363,184	0%	3,363,184
1610-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,363,184	0%	3,363,184
1610-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	3,363,184	0%	3,363,184
1611-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,656,809	0%	6,656,809
1611-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,656,809	0%	6,656,809
1611-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	-	-	6,656,809	0%	6,656,809
1612-A-f-Sc1	Grade-North East Outslope-Fill/Stockpile Material	North Lampbright	X	-	-	1,133,427	0%	1,133,427
1612-B-f-Dz4	Dozer Assist-North East Outslope-Fill/Stockpile Material	North Lampbright	X	-	-	1,133,427	0%	1,133,427
1613-A-f-Sc1	Grade-North West Outslope-Fill/Stockpile Material	North Lampbright	X	-	-	1,813,267	0%	1,813,267
1613-B-f-Dz4	Dozer Assist-North West Outslope-Fill/Stockpile Material	North Lampbright	X	-	-	1,813,267	0%	1,813,267
1614-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	-	-	870,117	0%	870,117
1614-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	-	-	870,117	0%	870,117
1615-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	-	-	365,530	0%	365,530
1615-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	-	-	365,530	0%	365,530
1700-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Northeast Stockpile	-	11.7	36.0	56,807	0%	56,807
1700-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Northeast Stockpile	11.7	36.0	56,807	0%	56,807
1700-C-b-Ld3	Load-Cover	Tailings Pond 6	Northeast Stockpile	11.7	36.0	56,807	0%	56,807
1700-D-b-Tk1	Haul-Cover	Tailings Pond 6	Northeast Stockpile	11.7	36.0	56,807	0%	56,807
1701-A-f-Sc1	Grade-Top-Fill/Stockpile Material	Northeast Stockpile	X	-	-	4,014	0%	4,014
1701-B-f-Dz4	Dozer Assist-Top-Fill/Stockpile Material	Northeast Stockpile	X	-	-	4,014	0%	4,014
1800-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Upper South	-	142.7	36.0	690,474	0%	690,474



Earthwork Quantity Worksheet

Notes and Assumptions:

- 1 - Acres and volumes based on 3CCP drawings
- 2 - Cover Material Swell: The 'Loose Volume' is calculated based on the acreage to be covered, cover depth, and accounts for appropriate swell factor.
- 3 - Has been agreed upon with State agencies that swell occurs when cover material is moved from source to haul truck but not from the truck to placement on stockpile

ID	Description	Source Location 1	Destination Location 2	Area (ac) <sup>1</sup>	Cover Depth (in)	Bank/Stockpile Volume (bcy) <sup>1</sup>	Swell Factor % <sup>1,3</sup>	Loose/Stockpile Volume (lcy) <sup>2</sup>
2102-A-a-Dz2	Grade-Dam 16-Existing Ground	Dams and Reservoirs	-	0.1	-	780	0%	780
2102-E-c-Rp1	Rip-Dam 16-Rough Graded Material	Dams and Reservoirs	-	0.1	-	-	0%	-
2103-A-a-Dz2	Grade-Dam 20-Existing Ground	Dams and Reservoirs	-	0.3	-	1,845	0%	1,845
2103-E-c-Rp1	Rip-Dam 20-Rough Graded Material	Dams and Reservoirs	-	0.3	-	-	0%	-
2104-A-a-Dz2	Grade-Reservoir 18-Existing Ground	Dams and Reservoirs	-	3.4	-	16,559	0%	16,559
2104-E-c-Rp1	Rip-Reservoir 18-Rough Graded Material	Dams and Reservoirs	-	3.4	-	-	0%	-
2104-K-a-Ex1	Perforate Liner-Reservoir 18-Existing Ground	Dams and Reservoirs	-	3.4	-	16,559	0%	16,559
2105-A-a-Dz2	Grade-Fleming Pond-Existing Ground	Dams and Reservoirs	-	0.8	-	4,071	0%	4,071
2105-E-c-Rp1	Rip-Fleming Pond-Rough Graded Material	Dams and Reservoirs	-	0.8	-	-	0%	-
2105-K-a-Ex1	Perforate Liner-Fleming Pond-Existing Ground	Dams and Reservoirs	-	0.8	-	4,071	0%	4,071
2106-A-a-Dz2	Grade-Tailing Thickener 2-Existing Ground	Dams and Reservoirs	-	2.6	-	12,880	0%	12,880
2106-E-c-Rp1	Rip-Tailing Thickener 2-Rough Graded Material	Dams and Reservoirs	-	2.6	-	-	0%	-
2106-K-a-Ex1	Perforate Liner-Tailing Thickener 2-Existing Ground	Dams and Reservoirs	-	2.6	-	12,880	0%	12,880
2107-A-a-Dz2	Grade-PLS Pond & Launder-Existing Ground	Dams and Reservoirs	-	0.3	-	1,555	0%	1,555
2107-E-c-Rp1	Rip-PLS Pond & Launder-Rough Graded Material	Dams and Reservoirs	-	0.3	-	-	0%	-
2107-K-a-Ex1	Perforate Liner-PLS Pond & Launder-Existing Ground	Dams and Reservoirs	-	0.3	-	1,555	0%	1,555
2108-A-a-Dz2	Grade-Raffinate Pond-Existing Ground	Dams and Reservoirs	-	0.1	-	829	0%	829
2108-E-c-Rp1	Rip-Raffinate Pond-Rough Graded Material	Dams and Reservoirs	-	0.1	-	-	0%	-
2108-K-a-Ex1	Perforate Liner-Raffinate Pond-Existing Ground	Dams and Reservoirs	-	0.1	-	829	0%	829
2109-A-a-Dz2	Grade-Reservoir 2-Existing Ground	Dams and Reservoirs	-	0.2	-	1,361	0%	1,361
2109-E-c-Rp1	Rip-Reservoir 2-Rough Graded Material	Dams and Reservoirs	-	0.2	-	-	0%	-
2110-A-a-Dz2	Grade-Reservoir 6-Existing Ground	Dams and Reservoirs	-	1.5	-	55,956	0%	55,956
2110-E-c-Rp1	Rip-Reservoir 6-Rough Graded Material	Dams and Reservoirs	-	1.5	-	-	0%	-
2111-A-a-Dz2	Grade-Reservoir 7-Existing Ground	Dams and Reservoirs	-	2.4	-	36,161	0%	36,161
2111-E-c-Rp1	Rip-Reservoir 7-Rough Graded Material	Dams and Reservoirs	-	2.4	-	-	0%	-
2112-A-a-Dz2	Grade-Elmo's Pond -Existing Ground	Dams and Reservoirs	-	1.2	-	6,002	0%	6,002
2112-E-c-Rp1	Rip-Elmo's Pond -Rough Graded Material	Dams and Reservoirs	-	1.2	-	-	0%	-
2113-A-a-Dz2	Grade-Lower Lined Pond -Existing Ground	Dams and Reservoirs	-	2.2	-	10,793	0%	10,793
2113-E-c-Rp1	Rip-Lower Lined Pond -Rough Graded Material	Dams and Reservoirs	-	2.2	-	-	0%	-
2113-K-a-Ex1	Perforate Liner-Lower Lined Pond -Existing Ground	Dams and Reservoirs	-	2.2	-	10,793	0%	10,793
2114-A-a-Dz2	Grade-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	0.4	-	1,984	0%	1,984
2114-E-c-Rp1	Rip-Upper Lined Pond -Rough Graded Material	Dams and Reservoirs	-	0.4	-	-	0%	-
2114-K-a-Ex1	Perforate Liner-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	0.4	-	1,984	0%	1,984
2115-A-a-Dz2	Grade-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	0.6	-	2,759	0%	2,759
2115-E-c-Rp1	Rip-5901 PLS Sump -Rough Graded Material	Dams and Reservoirs	-	0.6	-	-	0%	-
2115-K-a-Ex1	Perforate Liner-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	0.6	-	2,759	0%	2,759
2116-A-a-Dz2	Grade-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	0.0	-	145	0%	145
2116-E-c-Rp1	Rip-6301 PLS Booster Station -Rough Graded Material	Dams and Reservoirs	-	0.0	-	-	0%	-
2116-K-a-Ex1	Perforate Liner-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	0.0	-	145	0%	145
2117-A-a-Dz2	Grade-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	0.1	-	678	0%	678
2117-E-c-Rp1	Rip-Lee Hill #2 Booster -Rough Graded Material	Dams and Reservoirs	-	0.1	-	-	0%	-
2117-K-a-Ex1	Perforate Liner-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	0.1	-	678	0%	678
2118-A-a-Dz2	Grade-Kessel Stormwater 1-Existing Ground	Dams and Reservoirs	-	4.3	-	296	0%	296
2118-E-c-Rp1	Rip-Kessel Stormwater 1-Rough Graded Material	Dams and Reservoirs	-	4.3	-	-	0%	-
2119-A-a-Dz2	Grade-Kessel Stormwater 2-Existing Ground	Dams and Reservoirs	-	2.9	-	296	0%	296
2119-E-c-Rp1	Rip-Kessel Stormwater 2-Rough Graded Material	Dams and Reservoirs	-	2.9	-	-	0%	-
2120-A-a-Dz2	Grade-Kessel Stormwater 3-Existing Ground	Dams and Reservoirs	-	0.3	-	296	0%	296
2120-E-c-Rp1	Rip-Kessel Stormwater 3-Rough Graded Material	Dams and Reservoirs	-	0.3	-	-	0%	-
2200-A-d-Mg2	Grade-Miscellaneous NMA-Placed Cover	Miscellaneous NMA	-	76.6	36.0	370,904	0%	370,904
2200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous NMA	76.6	36.0	370,904	0%	370,904
2200-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous NMA	76.6	36.0	370,904	0%	370,904
2200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous NMA	76.6	36.0	370,904	0%	370,904
2203-E-c-Rp1	Rip-Chino part of Cobre Haul Road-Rough Graded Material	Miscellaneous NMA	-	3.2	-	-	0%	-
2204-A-a-Dz2	Grade-Highway to Heaven Haul Road-Existing Ground	Miscellaneous NMA	-	32.4	-	-	0%	-
2204-E-c-Rp1	Rip-Highway to Heaven Haul Road-Rough Graded Material	Miscellaneous NMA	-	32.4	-	-	0%	-
2300-A-d-Mg2	Grade-200-Acre Unplanned Future Disturbance-Placed Cover	Unplanned Disturbed Area	-	200.0	36.0	968,000	0%	968,000
2300-E-a-Rp1	Rip-200-Acre Unplanned Future Disturbance-Existing Ground	Unplanned Disturbed Area	-	200.0	-	-	0%	-
3100-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Axiflo	-	90.8	36.0	439,421	0%	439,421
3100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Axiflo	90.8	36.0	439,421	0%	439,421
3100-C-b-Ld3	Load-Cover	Tailings Pond 6	Axiflo	90.8	36.0	439,421	0%	439,421
3100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Axiflo	90.8	36.0	439,421	0%	439,421
3101-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	189	0%	189
3101-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3102-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	2,358	0%	2,358
3102-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3103-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	894	0%	894
3103-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3104-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	1,944	0%	1,944
3104-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3105-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	10,607	0%	10,607
3105-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3106-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	2,944	0%	2,944
3106-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3107-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	133	0%	133
3107-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3108-A-f-Dz4	Grade-Bottom-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3108-E-f-Rp1	Rip-Bottom-Fill/Stockpile Material	Axiflo	X	-	-	-	0%	-
3200-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Tailings Pond 6	-	261.7	36.0	1,266,425	0%	1,266,425
3200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond 6	261.7	36.0	1,266,425	0%	1,266,425
3200-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 6	261.7	36.0	1,266,425	0%	1,266,425
3200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond 6	261.7	36.0	1,266,425	0%	1,266,425
3300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond 7	1,688.4	36.0	8,171,730	0%	8,171,730
3300-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 7	1,688.4	36.0	8,171,730	0%	8,171,730
3300-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond 7	1,688.4	36.0	8,171,730	0%	8,171,730
3400-A-d-Mg2	Grade-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	60.3	36.0	291,681	0%	291,681
3400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous SMA	60.3	36.0	291,681	0%	291,681
3400-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous SMA	60.3	36.0	291,681	0%	291,681
3400-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous SMA	60.3	36.0	291,681	0%	291,681
3500-A-f-Mg2	Grade-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	565.2	-	-	0%	-
3500-B-f-Dz4	Dozer Assist-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	565.2	-	-	0%	-
3500-C-f-Ld1	Load-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	565.2	-	-	0%	-
3500-D-f-Tk3	Haul-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	565.2	-	-	0%	-
3500-E-a-Rp1	Rip-Impacted Soil at TP7-Existing Ground	Impacted Soil at TP7	-	565.2	-	-	8%	-



**Productivity and Hours Required for Water Truck Use**

**Notes and Assumptions:**

6,000 gal water truck for compaction (water truck hours tied to 1/3 of grading time for fill material)  
 May filter on equipment (D14) to show pertinent rows  
 Compaction volume assumed to 1/3 of fill material

Sheet to which to tie hrs 12 Scrapers  
 Equipment for hrs Sc2

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Operational Maintenance Time (hrs)
1100-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	3A Stockpile	-	Cat 14M3	-
1100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	3A Stockpile	Cat D6, SU Blade	-
1100-C-b-Ld3	Load-Cover	Tailings Pond 6	3A Stockpile	Hyundai HL780XTD-9	-
1100-D-b-Tk1	Haul-Cover	Tailings Pond 6	3A Stockpile	Cat 770G	-
1100-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	3A Stockpile	-	-	-
1100-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	3A Stockpile	-	-	-
1100-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	3A Stockpile	-	-	-
1100-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	3A Stockpile	-	-	-
1100-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final C	3A Stockpile	-	-	-
1100-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	3A Stockpile	-	-	-
1100-P-e-Comb1	Road Maintenance-Entire Stockpile	3A Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1101-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D6, SU Blade	-
1101-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
1102-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D6, SU Blade	-
1102-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
1200-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Kessel Stockpile	-	Cat 14M3	-
1200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Kessel Stockpile	Cat D6, SU Blade	-
1200-C-b-Ld3	Load-Cover	Tailings Pond 6	Kessel Stockpile	Hyundai HL780XTD-9	-
1200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Kessel Stockpile	Cat 770G	-
1200-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	Kessel Stockpile	-	-	-
1200-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Kessel Stockpile	-	-	-
1200-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	Kessel Stockpile	-	-	-
1200-P-e-Comb1	Road Maintenance-Entire Stockpile	Kessel Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1201-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	-
1201-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
1202-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	-
1202-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
1203-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	-
1203-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
1300-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	South Stockpile	-	Cat 14M3	-
1300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	South Stockpile	Cat D6, SU Blade	-
1300-C-b-Ld3	Load-Cover	Tailings Pond 6	South Stockpile	Hyundai HL780XTD-9	-
1300-D-b-Tk1	Haul-Cover	Tailings Pond 6	South Stockpile	Cat 770G	-
1300-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	South Stockpile	-	-	-
1300-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	South Stockpile	-	-	-
1300-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final C	South Stockpile	-	-	-
1300-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	South Stockpile	-	-	-
1300-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	South Stockpile	-	-	-
1300-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	South Stockpile	-	-	-
1300-P-e-Comb1	Road Maintenance-Entire Stockpile	South Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1301-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1301-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1301-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1302-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1302-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1302-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1303-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1303-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1303-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1304-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1304-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1304-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1305-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1305-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1305-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1306-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1306-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1306-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1307-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1307-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1307-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1308-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1308-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1308-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1309-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1309-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1309-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-

**Productivity and Hours Required for Water Truck Use**

**Notes and Assumptions:**

6,000 gal water truck for compaction (water truck hours tied to 1/3 of grading time for fill material)

1310-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1310-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1310-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1311-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1311-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1311-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1312-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1312-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1312-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1313-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	-
1313-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	-
1313-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	-
1400-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Stockpile 2	-	Cat 14M3	-
1400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Stockpile 2	Cat D6, SU Blade	-
1400-C-b-Ld3	Load-Cover	Tailings Pond 6	Stockpile 2	Hyundai HL780XTD-9	-
1400-D-b-Tk1	Haul-Cover	Tailings Pond 6	Stockpile 2	Cat 770G	-
1400-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	Stockpile 2	-	-	-
1400-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Stockpile 2	-	-	-
1400-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	Stockpile 2	-	-	-
1400-P-e-Comb1	Road Maintenance-Entire Stockpile	Stockpile 2	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1402-A-f-Sc1	Grade-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	Cat 657G	-
1402-B-f-Dz4	Dozer Assist-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	Cat D6, SU Blade	-
1500-A-d-Mg2	Grade-Entire Stockpile 23.5M-Placed Cover	West Stockpile	-	Cat 14M3	-
1500-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	West Stockpile	Cat D6, SU Blade	-
1500-C-b-Ld3	Load-Cover	Tailings Pond 6	West Stockpile	Hyundai HL780XTD-9	-
1500-D-b-Tk1	Haul-Cover	Tailings Pond 6	West Stockpile	Cat 770G	-
1500-F-d-U3	Grade Benches-Entire Stockpile 23.5M-Placed Cover	West Stockpile	-	-	-
1500-G-e-U6	Construct Downdrains-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	-	-
1500-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile 23.5M	West Stockpile	-	-	-
1500-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile 23.5M-F	West Stockpile	-	-	-
1500-J-e-U2a	Revegetate-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	-	-
1500-M-e-U9	Post-Closure O&M-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	-	-
1500-N-e-U18	Plug and Abandon Well-Entire Stockpile 23.5M-Final Gr	West Stockpile	-	-	-
1500-P-e-Comb1	Road Maintenance-Entire Stockpile 23.5M	West Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1501-A-f-Sc1	Grade-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	-
1501-B-f-Dz4	Dozer Assist-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	Cat D6, SU Blade	-
1502-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	-
1502-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	West Stockpile	X	Cat D6, SU Blade	-
1503-A-f-Sc1	Grade-West outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	-
1503-B-f-Dz4	Dozer Assist-West outslope-Fill/Stockpile Material	West Stockpile	X	Cat D6, SU Blade	-
1504-A-f-Sc1	Grade-North outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	-
1504-B-f-Dz4	Dozer Assist-North outslope-Fill/Stockpile Material	West Stockpile	X	Cat D6, SU Blade	-
1600-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Lampbright Stockpile	-	Cat 14M3	-
1600-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Lampbright Stockpile	Cat D6, SU Blade	-
1600-C-b-Ld3	Load-Cover	Tailings Pond 6	Lampbright Stockpile	Hyundai HL780XTD-9	-
1600-D-b-Tk1	Haul-Cover	Tailings Pond 6	Lampbright Stockpile	Cat 770G	-
1600-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	Lampbright Stockpile	-	-	-
1600-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	Lampbright Stockpile	-	-	-
1600-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Lampbright Stockpile	-	-	-
1600-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	Lampbright Stockpile	-	-	-
1600-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final C	Lampbright Stockpile	-	-	-
1600-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Gr	Lampbright Stockpile	-	-	-
1600-P-e-Comb1	Road Maintenance-Entire Stockpile	Lampbright Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1601-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1601-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1601-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1602-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1602-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1602-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1603-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1603-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1603-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1604-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1604-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1604-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1605-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1605-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1605-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1606-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1606-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1606-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1607-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1607-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1607-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1608-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1608-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1608-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1609-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-

**Productivity and Hours Required for Water Truck Use**

**Notes and Assumptions:**

6,000 gal water truck for compaction (water truck hours tied to 1/3 of grading time for fill material)

1609-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1609-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1610-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1610-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1610-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1611-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat D6, SU Blade	-
1611-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K	-
1611-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 770G	-
1612-A-f-Sc1	Grade-North East Outslope-Fill/Stockpile Material	North Lampbright	X	Cat 657G	-
1612-B-f-Dz4	Dozer Assist-North East Outslope-Fill/Stockpile Material	North Lampbright	X	Cat D6, SU Blade	-
1613-A-f-Sc1	Grade-North West Outslope-Fill/Stockpile Material	North Lampbright	X	Cat 657G	-
1613-B-f-Dz4	Dozer Assist-North West Outslope-Fill/Stockpile Material	North Lampbright	X	Cat D6, SU Blade	-
1614-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat 657G	-
1614-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat D6, SU Blade	-
1615-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat 657G	-
1615-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat D6, SU Blade	-
1700-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Northeast Stockpile	-	Cat 14M3	-
1700-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Northeast Stockpile	Cat D6, SU Blade	-
1700-C-b-Ld3	Load-Cover	Tailings Pond 6	Northeast Stockpile	Hyundai HL780XTD-9	-
1700-D-b-Tk1	Haul-Cover	Tailings Pond 6	Northeast Stockpile	Cat 770G	-
1700-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	Northeast Stockpile	-	-	-
1700-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Northeast Stockpile	-	-	-
1700-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	Northeast Stockpile	-	-	-
1700-P-e-Comb1	Road Maintenance-Entire Stockpile	Northeast Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1701-A-f-Sc1	Grade-Top-Fill/Stockpile Material	Northeast Stockpile	X	Cat 657G	-
1701-B-f-Dz4	Dozer Assist-Top-Fill/Stockpile Material	Northeast Stockpile	X	Cat D6, SU Blade	-
1800-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Upper South	-	Cat 14M3	-
1800-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Upper South	Cat D6, SU Blade	-
1800-C-b-Ld3	Load-Cover	Tailings Pond 6	Upper South	Hyundai HL780XTD-9	-
1800-D-b-Tk1	Haul-Cover	Tailings Pond 6	Upper South	Cat 770G	-
1800-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	Upper South	-	-	-
1800-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Upper South	-	-	-
1800-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Upper South	-	-	-
1800-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	Upper South	-	-	-
1800-P-e-Comb1	Road Maintenance-Entire Stockpile	Upper South	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
1900-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	9 Waste Rock	-	Cat 14M3	-
1900-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	9 Waste Rock	Cat D6, SU Blade	-
1900-C-b-Ld3	Load-Cover	Tailings Pond 6	9 Waste Rock	Hyundai HL780XTD-9	-
1900-D-b-Tk1	Haul-Cover	Tailings Pond 6	9 Waste Rock	Cat 770G	-
1900-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	9 Waste Rock	-	-	-
1900-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	9 Waste Rock	-	-	-
1900-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	9 Waste Rock	-	-	-
1900-M-e-U9	Post-Closure O&M-Entire Stockpile-Final Grade	9 Waste Rock	-	-	-
1900-P-e-Comb1	Road Maintenance-Entire Stockpile	9 Waste Rock	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
2100-A-d-Mg2	Grade-All-Placed Cover	Dams and Reservoirs	-	Cat 14M3	-
2100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Dams and Reservoirs	Cat D6, SU Blade	-
2100-C-b-Ld3	Load-Cover	Tailings Pond 6	Dams and Reservoirs	Hyundai HL780XTD-9	-
2100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Dams and Reservoirs	Cat 770G	-
2100-J-e-U2a	Revegetate-All-Final Grade	Dams and Reservoirs	-	-	-
2100-M-e-U9	Post-Closure O&M-All-Final Grade	Dams and Reservoirs	-	-	-
2100-P-e-Comb1	Road Maintenance-All	Dams and Reservoirs	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
2101-A-a-Dz2	Grade-Dam 15-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2101-E-c-Rp1	Rip-Dam 15-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2102-A-a-Dz2	Grade-Dam 16-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2102-E-c-Rp1	Rip-Dam 16-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2103-A-a-Dz2	Grade-Dam 20-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2103-E-c-Rp1	Rip-Dam 20-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2104-A-a-Dz2	Grade-Reservoir 18-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2104-E-c-Rp1	Rip-Reservoir 18-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2104-K-a-Ex1	Perforate Liner-Reservoir 18-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2105-A-a-Dz2	Grade-Fleming Pond-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2105-E-c-Rp1	Rip-Fleming Pond-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2105-K-a-Ex1	Perforate Liner-Fleming Pond-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2106-A-a-Dz2	Grade-Tailing Thickener 2-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2106-E-c-Rp1	Rip-Tailing Thickener 2-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2106-K-a-Ex1	Perforate Liner-Tailing Thickener 2-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2107-A-a-Dz2	Grade-PLS Pond & Launder-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2107-E-c-Rp1	Rip-PLS Pond & Launder-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2107-K-a-Ex1	Perforate Liner-PLS Pond & Launder-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2108-A-a-Dz2	Grade-Raffinate Pond-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2108-E-c-Rp1	Rip-Raffinate Pond-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2108-K-a-Ex1	Perforate Liner-Raffinate Pond-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2109-A-a-Dz2	Grade-Reservoir 2-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2109-E-c-Rp1	Rip-Reservoir 2-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2110-A-a-Dz2	Grade-Reservoir 6-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2110-E-c-Rp1	Rip-Reservoir 6-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2111-A-a-Dz2	Grade-Reservoir 7-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2111-E-c-Rp1	Rip-Reservoir 7-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-

**Productivity and Hours Required for Water Truck Use**

**Notes and Assumptions:**

6,000 gal water truck for compaction (water truck hours tied to 1/3 of grading time for fill material)

2112-A-a-Dz2	Grade-Elmo's Pond -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2112-E-c-Rp1	Rip-Elmo's Pond -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2113-A-a-Dz2	Grade-Lower Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2113-E-c-Rp1	Rip-Lower Lined Pond -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2113-K-a-Ex1	Perforate Liner-Lower Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2114-A-a-Dz2	Grade-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2114-E-c-Rp1	Rip-Upper Lined Pond -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2114-K-a-Ex1	Perforate Liner-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2115-A-a-Dz2	Grade-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2115-E-c-Rp1	Rip-5901 PLS Sump -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2115-K-a-Ex1	Perforate Liner-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2116-A-a-Dz2	Grade-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2116-E-c-Rp1	Rip-6301 PLS Booster Station -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2116-K-a-Ex1	Perforate Liner-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2117-A-a-Dz2	Grade-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2117-E-c-Rp1	Rip-Lee Hill #2 Booster -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2117-K-a-Ex1	Perforate Liner-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	-
2118-A-a-Dz2	Grade-Kessel Stormwater 1-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2118-E-c-Rp1	Rip-Kessel Stormwater 1-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2119-A-a-Dz2	Grade-Kessel Stormwater 2-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2119-E-c-Rp1	Rip-Kessel Stormwater 2-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2120-A-a-Dz2	Grade-Kessel Stormwater 3-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	-
2120-E-c-Rp1	Rip-Kessel Stormwater 3-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2200-A-d-Mg2	Grade-Miscellaneous NMA-Placed Cover	Miscellaneous NMA	-	Cat 14M3	-
2200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous NMA	Cat D6, SU Blade	-
2200-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous NMA	Hyundai HL780XTD-9	-
2200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous NMA	Cat 770G	-
2200-J-e-U2a	Revegetate-Miscellaneous NMA-Final Grade	Miscellaneous NMA	-	-	-
2200-M-e-U9	Post-Closure O&M-Miscellaneous NMA-Final Grade	Miscellaneous NMA	-	-	-
2200-P-e-Comb1	Road Maintenance-Miscellaneous NMA	Miscellaneous NMA	-	-	-
2203-E-c-Rp1	Rip-Chino part of Cobre Haul Road-Rough Graded Mate	Miscellaneous NMA	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
2204-A-a-Dz2	Grade-Highway to Heaven Haul Road-Existing Ground	Miscellaneous NMA	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2204-E-c-Rp1	Rip-Highway to Heaven Haul Road-Rough Graded Mate	Miscellaneous NMA	-	Cat D11T CD	-
2204-Hb-e-U8b	Construct Channels w/o Riprap-Highway to Heaven Haul	Miscellaneous NMA	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2300-A-d-Mg2	Grade-200-Acre Unplanned Future Disturbance-Placed	Unplanned Disturbed Area	-	-	-
2300-E-a-Rp1	Rip-200-Acre Unplanned Future Disturbance-Existing Gr	Unplanned Disturbed Area	-	Cat 14M3	-
2300-J-e-U2a	Revegetate-200-Acre Unplanned Future Disturbance-Fir	Unplanned Disturbed Area	-	Cat D11T CD Multi-shank (w/ MSR-359H)	-
2300-M-e-U9	Post-Closure O&M-200-Acre Unplanned Future Disturb	Unplanned Disturbed Area	-	-	-
2300-P-e-Comb1	Road Maintenance-200-Acre Unplanned Future Disturb	Unplanned Disturbed Area	-	-	-
3100-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Axiflo	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
3100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Axiflo	Cat 14M3	-
3100-C-b-Ld3	Load-Cover	Tailings Pond 6	Axiflo	Cat D6, SU Blade	-
3100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Axiflo	Hyundai HL780XTD-9	-
3100-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Axiflo	-	Cat 770G	-
3100-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Fin	Axiflo	-	-	-
3100-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Axiflo	-	-	-
3100-M-e-U9	Post-Closure O&M-Entire Impoundment-Final Grade	Axiflo	-	-	-
3101-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3101-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3102-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3102-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3103-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3103-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3104-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3104-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3105-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3105-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3106-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3106-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3107-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3107-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3108-A-f-Dz4	Grade-Bottom-Fill/Stockpile Material	Axiflo	X	Cat D6, SU Blade	-
3108-E-f-Rp1	Rip-Bottom-Fill/Stockpile Material	Axiflo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	-
3100-P-e-Comb1	Road Maintenance-Entire Impoundment	Axiflo	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
3200-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Tailings Pond 6	-	Cat 14M3	-
3200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond 6	Cat D6, SU Blade	-
3200-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 6	Hyundai HL780XTD-9	-
3200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond 6	Cat 770G	-
3200-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Tailings Pond 6	-	-	-
3200-G-e-U6	Construct Downdrains-Entire Impoundment-Final Grade	Tailings Pond 6	-	-	-
3200-Gb-e-U7	Construct Downdrain Dissipators-Entire Impoundment-F	Tailings Pond 6	-	-	-
3200-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Fin	Tailings Pond 6	-	-	-
3200-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Tailings Pond 6	-	-	-
3200-M-e-U9	Post-Closure O&M-Entire Impoundment-Final Grade	Tailings Pond 6	-	-	-
3200-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 6	-	-	-
3300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond 7	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
3300-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 7	Cat D6, SU Blade	-
3300-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond 7	Hyundai HL780XTD-9	-
				Cat 770G	-

**Productivity and Hours Required for Water Truck Use**

**Notes and Assumptions:**

6,000 gal water truck for compaction (water truck hours tied to 1/3 of grading time for fill material)

3300-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Tailings Pond 7	-	-	-
3300-G-e-U6	Construct Downdrains-Entire Impoundment-Final Grade	Tailings Pond 7	-	-	-
3300-Gb-e-U7	Construct Downdrain Dissipators-Entire Impoundment-F	Tailings Pond 7	-	-	-
3300-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Fin	Tailings Pond 7	-	-	-
3300-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Tailings Pond 7	-	-	-
3300-M-e-U9	Post-Closure O&M-Entire Impoundment-Final Grade	Tailings Pond 7	-	-	-
3300-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 7	-	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.
3400-A-d-Mg2	Grade-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	-	Cat 14M3
3400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous SMA	-	Cat D6, SU Blade
3400-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous SMA	-	Hyundai HL780XTD-9
3400-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous SMA	-	Cat 770G
3400-F-d-U3	Grade Benches-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	-	-
3400-Hb-e-U8b	Construct Channels w/o Riprap-Miscellaneous SMA-Fin	Miscellaneous SMA	-	-	-
3400-J-e-U2a	Revegetate-Miscellaneous SMA-Final Grade	Miscellaneous SMA	-	-	-
3400-M-e-U9	Post-Closure O&M-Miscellaneous SMA-Final Grade	Miscellaneous SMA	-	-	-
3400-P-e-Comb1	Road Maintenance-Miscellaneous SMA	Miscellaneous SMA	-	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.
3500-A-f-Mg2	Grade-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	-	Cat 14M3
3500-B-f-Dz4	Dozer Assist-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	-	Cat D6, SU Blade
3500-C-f-Ld1	Load-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	-	Cat 990K
3500-D-f-Tk3	Haul-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	-	Komatsu 730E
3500-E-a-Rp1	Rip-Impacted Soil at TP7-Existing Ground	Impacted Soil at TP7	-	-	Cat D11T CD Multi-shank (w/ MSR-359H)
3500-J-e-U2a	Revegetate-Impacted Soil at TP7-Final Grade	Impacted Soil at TP7	-	-	-

**Productivity and Hours Required for Dust Suppression and Road Maintenance**

Continental Mine  
 Stockpile Spreadsheet Worksheet #7  
 10/15/24

**Notes and Assumptions:**

6,000 gal water truck and 14M motor grader for dust suppression and site maintenance (water truck hours and 14M hours tied to loading time for cover material)  
 May filter on equipment (D14) to show pertinent rows

Sheet to which to tie hrs 11 Loader Shovel  
 Equipment for hrs Ld3  
 Equipment for hrs Ld1

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Operational Maintenance Time (hrs)
1100-P-e-Comb1	Road Maintenance-Entire Stockpile	3A Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	244
1200-P-e-Comb1	Road Maintenance-Entire Stockpile	Kessel Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	2,004
1300-P-e-Comb1	Road Maintenance-Entire Stockpile	South Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	3,911
1400-P-e-Comb1	Road Maintenance-Entire Stockpile	Stockpile 2	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	585
1500-P-e-Comb1	Road Maintenance-Entire Stockpile 23.5M	West Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	4,078
1600-P-e-Comb1	Road Maintenance-Entire Stockpile	Lampbright Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	6,994
1700-P-e-Comb1	Road Maintenance-Entire Stockpile	Northeast Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	93
1800-P-e-Comb1	Road Maintenance-Entire Stockpile	Upper South	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	1,021
1900-P-e-Comb1	Road Maintenance-Entire Stockpile	9 Waste Rock	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	1,295
2100-P-e-Comb1	Road Maintenance-All	Dams and Reservoirs	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	174
2200-P-e-Comb1	Road Maintenance-Miscellaneous NMA	Miscellaneous NMA	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	549
2300-P-e-Comb1	Road Maintenance-200-Acre Unplanned Future Disturb	Unplanned Disturbed Area	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	-
3100-P-e-Comb1	Road Maintenance-Entire Impoundment	Axfllo	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	730
3200-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 6	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	1,873
3300-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 7	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	12,836
3400-P-e-Comb1	Road Maintenance-Miscellaneous SMA	Miscellaneous SMA	-	Cat 14M, Off-Hwy Water Tanker Truck,6,000-gal.	458





**Productivity and Hours Required for Hydraulic Excavator**

**Notes and Assumptions:**

Uses area to calculate time for perforating liners  
 3' sheepsfoot roller  
 Can be used for excavating and loading, or sheepsfoot compaction using a roller  
 May filter on equipment (D14) to show pertinent rows

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Area (ac) or Volume (cy)	Unit (ac or cy)	Sheepsfoot Roller Width (ft) or Bucket Capacity (cy)	Unit (ft or cy)	Maximum Reach at Ground Level (ft)	Cycle Time (min)	Work Hour (min/hr)	Task Time (hr)
2104-K-a-Ex1	Perforate Liner-Reservoir 18-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	3.4	ac	2.0	ft	30.1	0.11	50.00	5.35
2105-K-a-Ex1	Perforate Liner-Fleming Pond-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.8	ac	2.0	ft	30.1	0.11	50.00	1.24
2106-K-a-Ex1	Perforate Liner-Tailing Thickener 2-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	2.6	ac	2.0	ft	30.1	0.11	50.00	4.14
2107-K-a-Ex1	Perforate Liner-PLS Pond & Launder-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.3	ac	2.0	ft	30.1	0.11	50.00	0.41
2108-K-a-Ex1	Perforate Liner-Raffinate Pond-Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.1	ac	2.0	ft	30.1	0.11	50.00	0.18
2113-K-a-Ex1	Perforate Liner-Lower Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	2.2	ac	2.0	ft	30.1	0.11	50.00	3.55
2114-K-a-Ex1	Perforate Liner-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.4	ac	2.0	ft	30.1	0.11	50.00	0.65
2115-K-a-Ex1	Perforate Liner-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.6	ac	2.0	ft	30.1	0.11	50.00	0.91
2116-K-a-Ex1	Perforate Liner-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.0	ac	2.0	ft	30.1	0.11	50.00	0.05
2117-K-a-Ex1	Perforate Liner-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	0.1	ac	2.0	ft	30.1	0.11	50.00	0.22



**Productivity and Hours Required for Front End Loader Use or Hydraulic Shovel Use**

**Assumptions:**

Uses cover volume to calculate loading time of cover material

May filter on equipment (D14) to show pertinent rows

											PERFORMANCE FACTORS			
5	6	7	8	9	10	11	12	13	14	15	16	17		
ID	Task Description	Source Location 1	Destination Location 2	Equipment	Hauling Equipment ID	Loose/Stockpile Volume (cy)	Loader/ Shovel Cycle Time (min)	Per Loader/Shovel Productivity (cy/hr)	Loader/ Shovel Task Time (hrs)	Max of Loader/Shovel or Truck Task Time (hrs)	Net Bucket Capacity (cy)	Work Hour (min/hr)		
1100-C-b-Ld3	Load-Cover	Tailings Pond 6	3A Stockpile	Hyundai HL780XTD-9 Tk1		165,117	0.53	676.2	244.2	244.2	7.1	50		
1200-C-b-Ld3	Load-Cover	Tailings Pond 6	Kessel Stockpile	Hyundai HL780XTD-9 Tk1		1,354,222	0.53	676.2	2,002.7	2,004.1	7.1	50		
1300-C-b-Ld3	Load-Cover	Tailings Pond 6	South Stockpile	Hyundai HL780XTD-9 Tk1		2,458,190	0.53	676.2	3,635.4	3,910.7	7.1	50		
1301-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		691,900	0.58	695.7	994.6	1,047.7	8.0	50		
1302-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		1,458,555	0.58	695.7	2,096.7	2,096.7	8.0	50		
1303-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		6,323,471	0.58	695.7	9,090.0	9,429.5	8.0	50		
1304-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		5,921,616	0.58	695.7	8,512.3	9,112.1	8.0	50		
1305-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		6,181,885	0.58	695.7	8,886.5	9,577.2	8.0	50		
1306-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		1,664,045	0.58	695.7	2,392.1	2,440.2	8.0	50		
1307-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		3,309,770	0.58	695.7	4,757.8	5,597.6	8.0	50		
1308-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		224,351	0.58	695.7	322.5	352.8	8.0	50		
1309-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		1,205,963	0.58	695.7	1,733.6	1,795.2	8.0	50		
1310-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		704,511	0.58	695.7	1,012.7	1,012.7	8.0	50		
1311-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		212,139	0.58	695.7	305.0	362.0	8.0	50		
1312-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		104,971	0.58	695.7	150.9	167.3	8.0	50		
1313-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K Tk1		208,214	0.58	695.7	299.3	326.2	8.0	50		
1400-C-b-Ld3	Load-Cover	Tailings Pond 6	Stockpile 2	Hyundai HL780XTD-9 Tk1		367,940	0.53	676.2	544.0	585.2	7.1	50		
1500-C-b-Ld3	Load-Cover	Tailings Pond 6	West Stockpile	Hyundai HL780XTD-9 Tk1		2,674,202	0.53	676.2	3,954.8	4,077.7	7.1	50		
1600-C-b-Ld3	Load-Cover	Tailings Pond 6	Lampbright Stockpile	Hyundai HL780XTD-9 Tk1		4,529,262	0.53	676.2	6,698.2	6,994.5	7.1	50		
1601-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		8,872,794	0.58	695.7	12,510.3	12,599.1	8.0	50		
1602-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		6,873,128	0.58	695.7	9,880.1	11,578.3	8.0	50		
1603-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		5,078,469	0.58	695.7	7,300.3	8,022.0	8.0	50		
1604-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		1,819,955	0.58	695.7	2,616.2	3,023.4	8.0	50		
1605-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		1,408,766	0.58	695.7	2,025.1	2,425.6	8.0	50		
1606-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		1,482,001	0.58	695.7	2,130.4	2,469.5	8.0	50		
1607-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		2,088,111	0.58	695.7	3,001.7	3,001.7	8.0	50		
1608-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		3,291,599	0.58	695.7	4,731.7	5,012.1	8.0	50		
1609-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		2,567,330	0.58	695.7	3,690.5	4,486.9	8.0	50		
1610-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		3,363,184	0.58	695.7	4,834.6	4,834.6	8.0	50		
1611-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbright Stockpile	X	Cat 986K Tk1		6,656,809	0.58	695.7	9,569.2	9,782.4	8.0	50		
1700-C-b-Ld3	Load-Cover	Tailings Pond 6	Northeast Stockpile	Hyundai HL780XTD-9 Tk1		56,807	0.53	676.2	84.0	92.9	7.1	50		
1800-C-b-Ld3	Load-Cover	Tailings Pond 6	Upper South	Hyundai HL780XTD-9 Tk1		690,474	0.53	676.2	1,021.1	1,021.1	7.1	50		
1900-C-b-Ld3	Load-Cover	Tailings Pond 6	9 Waste Rock	Hyundai HL780XTD-9 Tk1		780,208	0.53	676.2	1,153.8	1,295.3	7.1	50		
2100-C-b-Ld3	Load-Cover	Tailings Pond 6	Dams and Reservoirs	Hyundai HL780XTD-9 Tk1		115,631	0.53	676.2	171.0	174.3	7.1	50		
2200-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous NMA	Hyundai HL780XTD-9 Tk1		370,904	0.53	676.2	548.5	548.5	7.1	50		
3100-C-b-Ld3	Load-Cover	Tailings Pond 6	Axiflo	Hyundai HL780XTD-9 Tk1		439,421	0.53	676.2	649.8	730.2	7.1	50		
3200-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 6	Hyundai HL780XTD-9 Tk1		1,266,425	0.53	676.2	1,872.9	1,872.9	7.1	50		
3300-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond 7	Hyundai HL780XTD-9 Tk1		8,171,730	0.53	676.2	12,085.0	12,836.1	7.1	50		
3400-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous SMA	Hyundai HL780XTD-9 Tk1		291,681	0.53	676.2	431.4	458.2	7.1	50		
3500-C-f-Ld1	Load-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Cat 990K Tk3		-	0.58	1,130.4	-	-	13.0	50		

**Productivity for Scrapers**

**Notes and Assumptions:**  
Uses volumes of stockpile or cover for hauling and grading times  
Haul & Scrape Grade (%) assumes positive is downhill  
May filter on equipment (D14) to show pertinent rows

Number of scrapers used for grading cover = 1  
1609.344 meters/mile

ID	Task Description	Source Location 1	Destination Location 2	Equipment	Loose/Stockpile Volume (cy)	Total Haul Distance One Way (feet)	Haul & Scrape Grade (%)	Rolling Resistance (%)	Effective Grade Uphill (%)	Effective Grade Downhill (%)	Load Time (min)	Maneuver & Spread Time (min)	Full Scraper Haul Speed (mph)	Empty Scraper Return Speed (mph)	Scraper RT Cycle Task Time (min)	Pusher Cycle Time (min/cycle)	Rated Load (lb)	Soil Weight (lbs/cy)	Heaped Capacity (cy)	Work Hour (min/hr)	Cycles per Scraper per Hr	Productivity per Heaped Scraper (cy/hr)	Total Task Time (hrs)	Number of Scrapers	Task Time w All Scrapers (hrs)
1402-A-F-Sc1	Grade-move from 2 to 1-Fill/Stockpile Material	Stockpile 2	X	Cat 657G	1,701,942	893.3	-13.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	2.29	1.44	104,000	2,900	44	50	22	753	2,260	1.0	2,260
1501-A-F-Sc1	Grade-Southeast outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	5,107,209	1,655.4	-9.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	3.02	1.44	104,000	3,300	44	50	17	504	10,128	1.0	10,128
1502-A-F-Sc1	Grade-South outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	11,032,629	2,189.8	-10.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	3.52	1.44	104,000	3,300	44	50	14	441	25,005	1.0	25,005
1503-A-F-Sc1	Grade-West outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	7,499,643	2,861.7	-10.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	4.15	1.44	104,000	3,300	44	50	12	378	19,831	1.0	19,831
1504-A-F-Sc1	Grade-North outslope-Fill/Stockpile Material	West Stockpile	X	Cat 657G	679,499	969.9	-8.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	2.37	1.44	104,000	3,300	44	50	21	662	1,027	1.0	1,027
1612-A-F-Sc1	Grade-North East Outslope-Fill/Stockpile Material	North Lampbright	X	Cat 657G	1,153,427	1,270.7	-0.76%	2.5%	3.3%	0.0%	0.9	0.6	29.0	20.7	2.65	1.44	104,000	3,300	44	50	19	567	1,996	1.0	1,996
1613-A-F-Sc1	Grade-North West Outslope-Fill/Stockpile Material	North Lampbright	X	Cat 657G	1,813,267	1,612.9	-0.67%	2.5%	3.2%	0.0%	0.9	0.6	29.1	20.7	2.96	1.44	104,000	3,300	44	50	17	504	3,596	2.0	1,798
1614-A-F-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat 657G	870,117	1,334.5	-4.00%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	2.71	1.44	104,000	3,300	44	50	18	567	1,534	1.0	1,534
1615-A-F-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbright	X	Cat 657G	365,530	861.4	-8.17%	2.5%	0.0%	0.0%	0.9	0.6	28.7	20.7	2.28	1.44	104,000	3,300	44	50	22	662	552	1.0	552
1701-A-F-Sc1	Grade-Top-Fill/Stockpile Material	Northeast Stockpile	X	Cat 657G	4,014	-	0.00%	2.5%	2.5%	0.0%	0.9	0.6	29.9	20.7	1.45	1.44	104,000	3,300	44	50	34	1,072	4	1.0	4

**Productivity and Hours Required for Motorgrader Use---Grading**

**Notes and Assumptions:**

Productivity (based on area of overall stockpile) = Sq.ft per hour = Speed x (Eff. Blade L -Blade Overlap) x Efficiency (Cat. Handbook Edition 47 pg 11-27)  
 Max. safe slope for motor graders is 2:1 (50%), proposed final grade for Tyrone cover grading on stockpiles is 33%, therefore use of graders an option (Cat. Handbook Edition 46 pg 11-30)  
 Grade Factor = -0.02(Grade %) + 1  
 May filter on equipement (D14) to show pertinent rows

ID	Task Description	Source Location 1	Destination Location 2	Grading Equipment	Area (ac)	Grading Shaping Productivity (ac/hr)	Task Time (hrs)	Grade Factor	Material Factor	Material Weight (lb/cy)	Production Method/Blade	Effective Blade Width (ft)	Pass Overlap (ft)	Speed (mph)	Work Hour (min/hr)	Operator Factor
1100-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	3A Stockpile	-	Cat 14M3	34	4	8.9	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1200-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Kessel Stockpile	-	Cat 14M3	280	4	72.8	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1300-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	South Stockpile	-	Cat 14M3	508	4	132.2	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1400-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Stockpile 2	-	Cat 14M3	76	4	19.8	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1500-A-d-Mg2	Grade-Entire Stockpile 23.5M-Placed Cover	West Stockpile	-	Cat 14M3	553	4	143.8	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1600-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Lampbright Stockpile	-	Cat 14M3	936	4	243.6	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1700-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Northeast Stockpile	-	Cat 14M3	12	4	3.1	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1800-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Upper South	-	Cat 14M3	143	4	37.1	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
1900-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	9 Waste Rock	-	Cat 14M3	161	4	42.0	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
2100-A-d-Mg2	Grade-All-Placed Cover	Dams and Reservoirs	-	Cat 14M3	24	4	6.2	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
2200-A-d-Mg2	Grade-Miscellaneous NMA-Placed Cover	Miscellaneous NMA	-	Cat 14M3	77	4	19.9	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
2300-A-d-Mg2	Grade-200-Acre Unplanned Future Disturbance-Plac	Unplanned Disturbed Area	-	Cat 14M3	200	4	52.1	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
3100-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Axiflo	-	Cat 14M3	91	4	23.6	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
3200-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Tailings Pond 6	-	Cat 14M3	262	4	68.1	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
3400-A-d-Mg2	Grade-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	Cat 14M3	60	4	15.7	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75
3500-A-f-Mg2	Grade-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Cat 14M3	565	4	147.1	1.0	1.2	2,900	1.20	14.00	2.00	3.70	50	0.75

**Summary Calculation of Earthmoving Costs**

Summarizes costs for line items involving earthworks

**Notes and Assumptions:**

Productivity (based on area of overall stockpile) = Sq.ft per hour = Speed x (Eff. Blade L - Blade Overlap) x Efficiency (Cat. Handbook Edition 47 pg 11-27)  
Max. safe slope for motor graders is 2:1 (50%), proposed final grade for cover grading on stockpiles is 33%, therefore use of graders an option (Cat. Handbook Edition 46 pg 11-30)  
Grade Factor = -0.02(Grade %) + 1  
May filter on equipment (D14) to show pertinent rows

ID	Description	Source Location 1	Destination Location 2	Equipment	Fuel Cost (\$/hr)	Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd Per Unit (hrs)	Direct Fuel Cost (\$)	Direct Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$)	Direct Labor Cost (\$)	Total Equipment Cost (\$)	Total Production Volume (CY)	Total Production Area (AC)
1100-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	3A Stockpile	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	8.9	\$207	\$673	\$292	\$1,172	-	34.1
1100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	3A Stockpile	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	244.2	\$5,172	\$21,331	\$8,029	\$34,531	165,117	-
1100-C-b-Ld3	Load-Cover	Tailings Pond 6	3A Stockpile	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	244.2	\$4,364	\$19,950	\$8,114	\$32,428	165,117	-
1100-D-b-Tk1	Haul-Cover	Tailings Pond 6	3A Stockpile	Cat 770G	\$20.90	\$55.72	\$26.79	4	244.2	\$20,414	\$54,421	\$26,167	\$101,002	165,117	-
1100-P-e-Comb1	Road Maintenance-Entire Stockpile	-	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	244.2	\$14,099	\$37,051	\$14,571	\$65,721	-	-
1101-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	350.6	\$7,426	\$30,628	\$11,528	\$49,582	112,681	-
1101-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
1102-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	399.7	\$8,465	\$34,912	\$13,141	\$56,517	131,498	-
1102-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
1200-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Kessel Stockpile	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	72.8	\$1,699	\$5,517	\$2,395	\$9,611	-	279.8
1200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Kessel Stockpile	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	2,004.1	\$42,447	\$175,067	\$65,895	\$283,409	1,354,222	-
1200-C-b-Ld3	Load-Cover	Tailings Pond 6	Kessel Stockpile	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	2,004.1	\$35,813	\$163,735	\$66,597	\$266,145	1,354,222	-
1200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Kessel Stockpile	Cat 770G	\$20.90	\$55.72	\$26.79	7	2,004.1	\$293,201	\$781,632	\$375,831	\$1,450,664	1,354,222	-
1200-P-e-Comb1	Road Maintenance-Entire Stockpile	-	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	2,004.1	\$115,717	\$304,086	\$119,585	\$539,389	-	-
1201-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,588.0	\$33,633	\$138,714	\$52,212	\$224,559	661,675	-
1201-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
1202-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	10,332.2	\$218,837	\$902,560	\$339,724	\$1,461,121	1,904,218	-
1202-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
1203-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	8,578.8	\$181,698	\$749,388	\$282,070	\$1,213,156	1,559,361	-
1203-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
1300-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	South Stockpile	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	132.2	\$3,083	\$10,015	\$4,347	\$17,445	-	507.9
1300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	South Stockpile	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	3,910.7	\$82,828	\$341,614	\$128,584	\$553,026	2,458,190	-
1300-C-b-Ld3	Load-Cover	Tailings Pond 6	South Stockpile	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	3,910.7	\$69,884	\$319,502	\$129,952	\$519,339	2,458,190	-
1300-D-b-Tk1	Haul-Cover	Tailings Pond 6	South Stockpile	Cat 770G	\$20.90	\$55.72	\$26.79	6	3,910.7	\$490,401	\$1,307,337	\$628,605	\$2,426,343	2,458,190	-
1300-P-e-Comb1	Road Maintenance-Entire Stockpile	South Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	3,910.7	\$225,803	\$593,374	\$233,351	\$1,052,529	-	-
1301-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	3,910.7	\$22,190	\$91,519	\$34,448	\$148,157	691,900	-
1301-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	1,047.7	\$23,280	\$102,281	\$34,815	\$160,376	691,900	-
1301-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	1,047.7	\$65,690	\$175,120	\$84,203	\$325,012	691,900	-
1302-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	2,096.7	\$44,408	\$183,152	\$68,939	\$296,499	1,458,555	-
1302-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	2,096.7	\$46,588	\$204,689	\$69,672	\$320,950	1,458,555	-
1302-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	2,096.7	\$175,282	\$467,276	\$224,679	\$867,237	1,458,555	-
1303-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	9,429.5	\$199,178	\$823,707	\$310,044	\$1,333,468	6,323,471	-
1303-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	9,429.5	\$209,525	\$920,568	\$313,344	\$1,443,436	6,323,471	-
1303-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	5	9,429.5	\$985,388	\$2,626,901	\$1,263,088	\$4,875,377	6,323,471	-
1304-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	9,112.1	\$192,994	\$795,977	\$299,606	\$1,288,578	5,921,616	-
1304-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	9,112.1	\$202,471	\$889,577	\$302,795	\$1,394,844	5,921,616	-
1304-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	5	9,112.1	\$952,215	\$2,538,467	\$1,220,567	\$4,711,249	5,921,616	-
1305-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	9,577.2	\$202,845	\$836,603	\$314,897	\$1,354,344	6,181,885	-
1305-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	9,577.2	\$212,805	\$934,980	\$318,249	\$1,466,034	6,181,885	-
1305-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	5	9,577.2	\$1,000,815	\$2,668,026	\$1,282,862	\$4,951,703	6,181,885	-
1306-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Dozer SU Blade	\$21.18	\$87.35	\$32.88	1	2,440.2	\$151,683	\$80,233	\$345,073	\$1,664,045	6,181,885	-
1306-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	2,440.2	\$54,220	\$238,223	\$81,087	\$373,530	1,664,045	-
1306-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	6	2,440.2	\$305,996	\$1,513,971	\$513,971	\$1,513,971	1,664,045	-
1307-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	5,597.6	\$118,557	\$488,970	\$184,049	\$791,576	3,309,770	-
1307-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	5,597.6	\$124,378	\$546,469	\$186,008	\$856,855	3,309,770	-
1307-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	5,597.6	\$467,958	\$1,247,508	\$599,837	\$2,315,303	3,309,770	-
1308-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	352.8	\$7,473	\$30,821	\$11,601	\$49,894	224,351	-
1308-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	352.8	\$7,840	\$34,445	\$11,724	\$54,009	224,351	-
1308-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	2	352.8	\$14,748	\$39,316	\$18,904	\$72,969	224,351	-
1309-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,795.2	\$38,022	\$156,815	\$59,025	\$253,862	1,205,963	-
1309-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	1,795.2	\$39,889	\$175,255	\$59,653	\$274,797	1,205,963	-
1309-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	1,795.2	\$112,557	\$300,061	\$144,278	\$556,895	1,205,963	-
1310-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,012.7	\$21,450	\$88,466	\$33,296	\$143,215	704,511	-
1310-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	1,012.7	\$22,503	\$98,869	\$33,653	\$155,025	704,511	-
1310-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	1,012.7	\$63,498	\$169,278	\$81,393	\$314,170	704,511	-
1311-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	382.0	\$8,091	\$33,369	\$12,560	\$54,020	212,139	-
1311-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	382.0	\$8,488	\$37,293	\$12,694	\$58,475	212,139	-
1311-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	2	382.0	\$15,968	\$42,567	\$20,468	\$79,003	212,139	-
1312-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	167.3	\$3,544	\$14,616	\$5,502	\$23,662	104,971	-
1312-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	167.3	\$3,718	\$16,335	\$5,560	\$25,613	104,971	-
1312-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	2	167.3	\$6,994	\$8,965	\$34,605	\$46,127	104,971	-
1313-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	326.2	\$6,909	\$28,494	\$10,725	\$46,127	208,214	-
1313-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	326.2	\$7,248	\$31,844	\$10,839	\$49,931	208,214	-
1313-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	Cat 770G	\$20.90	\$55.72									

**Summary Calculation of Earthmoving Costs**

Summarizes costs for line items involving earthworks

**Notes and Assumptions:**

Productivity (based on area of overall stockpile) = Sq.ft per hour = Speed x (Eff. Blade L - Blade Overlap) x Efficiency (Cat. Handbook Edition 47 pg 11-27)  
Max. safe slope for motor graders is 2:1 (50%), proposed final grade for cover grading on stockpiles is 33%, therefore use of graders an option (Cat. Handbook Edition 46 pg 11-30)  
Grade Factor = -0.02(Grade %) + 1  
May filter on equipment (D14) to show pertinent rows

ID	Description	Source Location 1	Destination Location 2	Equipment	Fuel Cost (\$/hr)	Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd Per Unit (hrs)	Direct Fuel Cost (\$)	Direct Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$)	Direct Labor Cost (\$)	Total Equipment Cost (\$)	Total Production Volume (CY)	Total Production Area (AC)
1602-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	11,578.3	\$245,229	\$1,011,411	\$380,696	\$1,637,336	6,873,128	-
1602-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	11,578.3	\$257,271	\$1,130,345	\$384,748	\$1,772,363	6,873,128	-
1602-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	11,578.3	\$967,949	\$2,580,410	\$1,240,734	\$4,789,093	6,873,128	-
1603-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	8,022.0	\$169,906	\$700,750	\$263,763	\$1,134,419	5,078,469	-
1603-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	8,022.0	\$178,248	\$783,152	\$266,570	\$1,227,971	5,078,469	-
1603-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	8,022.0	\$670,637	\$1,787,822	\$859,535	\$3,318,094	5,078,469	-
1604-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	3,023.4	\$64,035	\$264,104	\$99,409	\$427,549	1,819,955	-
1604-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	3,023.4	\$67,180	\$295,161	\$100,467	\$462,808	1,819,955	-
1604-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	3,023.4	\$252,755	\$673,809	\$323,986	\$1,250,550	1,819,955	-
1605-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	2,425.6	\$51,374	\$211,886	\$79,754	\$343,014	1,408,766	-
1605-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	2,425.6	\$53,897	\$236,802	\$80,603	\$371,302	1,408,766	-
1605-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	2,425.6	\$152,086	\$450,438	\$194,946	\$752,470	1,408,766	-
1606-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	2,469.5	\$52,304	\$215,720	\$81,197	\$349,221	1,482,001	-
1606-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	2,469.5	\$54,872	\$241,087	\$82,061	\$378,021	1,482,001	-
1606-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	2,469.5	\$154,838	\$412,775	\$198,474	\$766,086	1,482,001	-
1607-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	3,001.7	\$63,575	\$262,206	\$98,695	\$424,476	2,088,111	-
1607-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	3,001.7	\$66,697	\$293,040	\$99,745	\$459,482	2,088,111	-
1607-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	3,001.7	\$250,939	\$668,966	\$321,658	\$1,241,563	2,088,111	-
1608-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	5,012.1	\$106,157	\$437,828	\$164,798	\$708,783	3,291,599	-
1608-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	5,012.1	\$111,369	\$489,312	\$166,553	\$767,234	3,291,599	-
1608-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	5,012.1	\$419,013	\$1,117,028	\$537,099	\$2,073,140	3,291,599	-
1609-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	4,486.9	\$95,032	\$371,945	\$147,528	\$634,506	2,567,330	-
1609-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	4,486.9	\$99,688	\$438,035	\$149,099	\$686,832	2,567,330	-
1609-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	3	4,486.9	\$281,327	\$749,977	\$360,610	\$1,391,913	2,567,330	-
1610-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	4,834.6	\$102,396	\$422,319	\$158,961	\$683,676	3,363,184	-
1610-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	4,834.6	\$107,424	\$471,980	\$160,653	\$740,057	3,363,184	-
1610-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	4	4,834.6	\$404,171	\$1,077,460	\$518,073	\$1,989,704	3,363,184	-
1611-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	9,782.4	\$207,191	\$854,530	\$321,645	\$1,383,367	6,656,809	-
1611-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 986K	\$22.22	\$97.63	\$33.23	1	9,782.4	\$217,365	\$855,016	\$325,069	\$1,497,450	6,656,809	-
1611-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	Lampbriht Stockpile	X	Cat 770G	\$20.90	\$55.72	\$26.79	5	9,782.4	\$1,022,261	\$2,725,200	\$1,310,353	\$5,057,815	6,656,809	-
1612-A-f-Sc1	Grade-North East Outslope-Fill/Stockpile Material	North Lampbriht	X	Cat 657G	\$147.95	\$211.61	\$32.88	1	1,998.0	\$295,608	\$422,805	\$65,695	\$784,108	1,133,427	-
1612-B-f-Dz4	Dozer Assist-North East Outslope-Fill/Stockpile Material	North Lampbriht	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.4	\$9	\$38	\$14	\$61	1,133,427	-
1613-A-f-Sc1	Grade-North West Outslope-Fill/Stockpile Material	North Lampbriht	X	Cat 657G	\$147.95	\$211.61	\$32.88	2	1,798.0	\$502,032	\$760,958	\$118,237	\$1,411,227	1,813,267	-
1613-B-f-Dz4	Dozer Assist-North West Outslope-Fill/Stockpile Material	North Lampbriht	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.4	\$8	\$34	\$13	\$54	1,813,267	-
1614-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbriht	X	Cat 657G	\$147.95	\$211.61	\$32.88	1	1,533.9	\$226,935	\$324,582	\$50,433	\$601,950	870,117	-
1614-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbriht	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.4	\$9	\$38	\$14	\$61	870,117	-
1615-A-f-Sc1	Grade-South outslope-Fill/Stockpile Material	Southwest Lampbriht	X	Cat 657G	\$147.95	\$211.61	\$32.88	1	552.3	\$81,715	\$116,875	\$18,160	\$216,750	365,530	-
1615-B-f-Dz4	Dozer Assist-South outslope-Fill/Stockpile Material	Southwest Lampbriht	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.5	\$11	\$44	\$17	\$71	365,530	-
1700-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Northeast Stockpile	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	3.1	\$71	\$231	\$403	-	11.7	-
1700-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Northeast Stockpile	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	92.9	\$1,968	\$8,116	\$3,055	\$13,138	56,807	-
1700-C-b-Ld3	Load-Cover	Tailings Pond 6	Northeast Stockpile	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	92.9	\$1,660	\$7,590	\$12,338	\$56,807	56,807	-
1700-D-b-Tk1	Haul-Cover	Tailings Pond 6	Northeast Stockpile	Cat 770G	\$20.90	\$55.72	\$26.79	8	92.9	\$15,534	\$41,411	\$19,912	\$76,857	56,807	-
1700-P-e-Comb1	Road Maintenance-Entire Stockpile	Northeast Stockpile	-	Cat 14M, Off-Hwy Water Tanker Truck, 6,000-gal.	\$57.74	\$151.73	\$59.67	1	92.9	\$5,364	\$14,097	\$25,005	-	-	-
1701-A-f-Sc1	Grade-Top-Fill/Stockpile Material	Northeast Stockpile	X	Cat 657G	\$147.95	\$211.61	\$32.88	1	3.7	\$654	\$793	\$123	\$1,470	4,014	-
1701-B-f-Dz4	Dozer Assist-Top-Fill/Stockpile Material	Northeast Stockpile	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.8	\$17	\$71	\$27	\$115	4,014	-
1800-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Upper South	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	37.1	\$866	\$2,813	\$1,221	\$4,900	-	142.7
1800-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Upper South	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,021.1	\$21,627	\$89,199	\$33,575	\$144,401	690,474	-
1800-C-b-Ld3	Load-Cover	Tailings Pond 6	Upper South	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	1,021.1	\$18,247	\$83,426	\$33,932	\$135,605	690,474	-
1800-D-b-Tk1	Haul-Cover	Tailings Pond 6	Upper South	Cat 770G	\$20.90	\$55.72	\$26.79	2	1,021.1	\$42,683	\$113,787	\$54,712	\$211,181	690,474	-
1800-P-e-Comb1	Road Maintenance-Entire Stockpile	Upper South	-	Cat 14M, Off-Hwy Water Tanker Truck, 6,000-gal.	\$57.74	\$151.73	\$59.67	1	1,021.1	\$58,960	\$154,936	\$60,930	\$274,826	-	-
1900-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	9 Waste Rock	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	42.0	\$979	\$1,380	\$537	-	-	161.2
1900-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	9 Waste Rock	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,295.3	\$27,434	\$113,146	\$42,588	\$183,168	780,208	-
1900-C-b-Ld3	Load-Cover	Tailings Pond 6	9 Waste Rock	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	1,295.3	\$23,146	\$105,823	\$43,042	\$172,011	780,208	-
1900-D-b-Tk1	Haul-Cover	Tailings Pond 6	9 Waste Rock	Cat 770G	\$20.90	\$55.72	\$26.79	4	1,295.3	\$108,284	\$288,669	\$138,800	\$535,754	780,208	-
1900-P-e-Comb1	Road Maintenance-Entire Stockpile	9 Waste Rock	-	Cat 14M, Off-Hwy Water Tanker Truck, 6,000-gal.	\$57.74	\$151.73	\$59.67	1	1,295.3	\$74,788	\$196,532	\$77,288	\$348,609	-	-
2100-A-d-Mg2	Grade-All-Placed Cover	Dams and Reservoirs	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	6.2	\$145	\$471	\$821	-	-	23.9
2100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Dams and Reservoirs	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	174.3	\$3,692	\$15,228	\$5,732	\$24,653	115,631	-
2100-C-b-Ld3	Load-Cover	Tailings Pond 6	Dams and Reservoirs	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	174.3	\$3,115	\$14,243	\$5,793	\$23,151	115,631	-
2100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Dams and Reservoirs	Cat 770G	\$20.90	\$55.72	\$26.79	9	174.3	\$32,792	\$87,418	\$42,033	\$162,242	115,631	-
2100-P-e-Comb1	Road Maintenance-All	Dams and Reservoirs	-	Cat 14M, Off-Hwy Water Tanker Truck, 6,000-gal.	\$57.74	\$151.73	\$59.67	1	174.3	\$10,066	\$26,451	\$46,920	-	-	-
2101-A-a-Dz2	Grade-Dam 15-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.3	\$24	\$82	\$10	\$115	780	-
2101-E-c-Rp1	Rip-Dam 15-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.0	\$3	\$11	\$16	-	0.1	-
2102-A-a-Dz2	Grade-Dam 16-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.3	\$24	\$82	\$10	\$115	780</	



**Summary Calculation of Earthmoving Costs**

Summarizes costs for line items involving earthworks

**Notes and Assumptions:**

Productivity (based on area of overall stockpile) = Sq.ft per hour = Speed x (Eff. Blade L - Blade Overlap) x Efficiency (Cat. Handbook Edition 47 pg 11-27)  
 Max. safe slope for motor graders is 2:1 (50%), proposed final grade for cover grading on stockpiles is 33%, therefore use of graders an option (Cat. Handbook Edition 46 pg 11-30)  
 Grade Factor = -0.02(Grade %) + 1  
 May filter on equipment (D14) to show pertinent rows

ID	Description	Source Location 1	Destination Location 2	Equipment	Fuel Cost (\$/hr)	Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd Per Unit (hrs)	Direct Fuel Cost (\$)	Direct Lube, Tires, GEC, & Field Parts Adjusted Rental Cost (w/o fuel) (\$)	Direct Labor Cost (\$)	Total Equipment Cost (\$)	Total Production Volume (CY)	Total Production Area (AC)
2114-A-a-Dz2	Grade-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.7	\$61	\$208	\$25	\$293	1,984	-
2114-E-c-Rp1	Rip-Upper Lined Pond -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.2	\$14	\$47	\$6	\$66	-	0.4
2114-K-a-Ex1	Perforate Liner-Upper Lined Pond -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	\$7.04	\$50.71	\$33.23	1	0.7	\$5	\$33	\$22	\$59	-	0.4
2115-A-a-Dz2	Grade-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	1.0	\$85	\$289	\$34	\$408	2,759	-
2115-E-c-Rp1	Rip-5901 PLS Sump -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.2	\$19	\$65	\$8	\$91	-	0.6
2115-K-a-Ex1	Perforate Liner-5901 PLS Sump -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	\$7.04	\$50.71	\$33.23	1	0.9	\$6	\$46	\$30	\$83	-	0.6
2116-A-a-Dz2	Grade-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.1	\$4	\$15	\$2	\$21	145	-
2116-E-c-Rp1	Rip-6301 PLS Booster Station -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.0	\$1	\$3	\$0	\$5	-	0.0
2116-K-a-Ex1	Perforate Liner-6301 PLS Booster Station -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	\$7.04	\$50.71	\$33.23	1	0.0	\$0	\$2	\$2	\$4	-	0.0
2117-A-a-Dz2	Grade-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.3	\$21	\$71	\$8	\$100	678	-
2117-E-c-Rp1	Rip-Lee Hill #2 Booster -Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.1	\$5	\$16	\$2	\$22	-	0.1
2117-K-a-Ex1	Perforate Liner-Lee Hill #2 Booster -Existing Ground	Dams and Reservoirs	-	Cat 320 GC	\$7.04	\$50.71	\$33.23	1	0.2	\$2	\$11	\$7	\$20	-	0.1
2118-A-a-Dz2	Grade-Kessel Stormwater 1-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.1	\$9	\$31	\$4	\$44	296	-
2118-E-c-Rp1	Rip-Kessel Stormwater 1-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	1.7	\$142	\$484	\$57	\$683	-	4.3
2119-A-a-Dz2	Grade-Kessel Stormwater 2-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.1	\$9	\$31	\$4	\$44	296	-
2119-E-c-Rp1	Rip-Kessel Stormwater 2-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	1.2	\$97	\$333	\$39	\$470	-	2.9
2120-A-a-Dz2	Grade-Kessel Stormwater 3-Existing Ground	Dams and Reservoirs	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	0.1	\$9	\$31	\$4	\$44	296	-
2120-E-c-Rp1	Rip-Kessel Stormwater 3-Rough Graded Material	Dams and Reservoirs	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	0.1	\$11	\$37	\$4	\$52	-	0.3
2200-A-d-Mg2	Grade-Miscellaneous NMA-Placed Cover	Miscellaneous NMA	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	19.9	\$465	\$1,511	\$656	\$2,632	-	76.6
2200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous NMA	Dozer D6, SU Blade	\$21.18	\$87.35	\$32.88	1	548.5	\$11,618	\$47,915	\$18,035	\$77,568	370,904	-
2200-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous NMA	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	548.5	\$9,802	\$44,814	\$18,227	\$72,843	370,904	-
2200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous NMA	Cat 770G	\$20.90	\$55.72	\$26.79	2	548.5	\$22,928	\$61,123	\$29,390	\$113,441	370,904	-
2200-P-e-Comb1	Road Maintenance-Miscellaneous NMA	Miscellaneous NMA	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	548.5	\$31,672	\$83,228	\$32,730	\$147,630	-	-
2203-E-c-Rp1	Rip-Chino part of Cobre Haul Road-Rough Graded Material	Miscellaneous NMA	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	1.1	\$89	\$306	\$36	\$432	-	3.2
2204-A-a-Dz2	Grade-Highway to Heaven Haul Road-Existing Ground	Miscellaneous NMA	-	Cat D11T CD	\$81.21	\$277.90	\$32.88	1	5.8	\$473	\$1,617	\$191	\$2,281	-	32.4
2204-E-c-Rp1	Rip-Highway to Heaven Haul Road-Rough Graded Material	Miscellaneous NMA	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	11.1	\$904	\$3,092	\$366	\$4,361	-	32.4
2300-A-d-Mg2	Grade-200-Acre Unplanned Future Disturbance-Placed Cover	Unplanned Disturbed Area	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	52.1	\$1,214	\$3,944	\$1,712	\$6,870	-	200.0
2300-E-a-Rp1	Rip-200-Acre Unplanned Future Disturbance-Existing Ground	Unplanned Disturbed Area	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	68.6	\$5,571	\$19,063	\$2,255	\$26,889	-	200.0
2300-P-e-Comb1	Road Maintenance-200-Acre Unplanned Future Disturbance	Unplanned Disturbed Area	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	-	\$0	\$0	\$0	\$0	-	90.8
3100-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Axfllo	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	23.6	\$551	\$1,790	\$777	\$3,118	-	-
3100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Axfllo	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	730.2	\$15,466	\$63,787	\$24,009	\$103,262	439,421	-
3100-C-b-Ld3	Load-Cover	Tailings Pond 6	Axfllo	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	730.2	\$13,049	\$59,658	\$24,265	\$96,972	439,421	-
3100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Axfllo	Cat 770G	\$20.90	\$55.72	\$26.79	3	730.2	\$45,784	\$122,054	\$58,687	\$226,525	439,421	-
3101-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.2	\$5	\$22	\$8	\$35	189	-
3101-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3102-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	4.9	\$104	\$430	\$162	\$697	2,358	-
3102-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3103-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1.9	\$41	\$169	\$63	\$273	894	-
3103-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3104-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	4.6	\$98	\$405	\$153	\$656	1,944	-
3104-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3105-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	30.6	\$649	\$2,675	\$1,007	\$4,331	10,607	-
3105-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3106-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	7.7	\$163	\$674	\$254	\$1,091	2,944	-
3106-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3107-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	0.1	\$3	\$13	\$5	\$21	133	-
3107-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3108-A-f-Dz4	Grade-Bottom-Fill/Stockpile Material	Axfllo	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3108-E-f-Rp1	Rip-Bottom-Fill/Stockpile Material	Axfllo	X	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	-	\$0	\$0	\$0	\$0	-	-
3100-P-e-Comb1	Road Maintenance-Entire Impoundment	Axfllo	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	730.2	\$42,162	\$110,795	\$43,572	\$196,529	-	261.7
3200-A-d-Mg2	Grade-Entire Impoundment-Placed Cover	Tailings Pond 6	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	68.1	\$1,588	\$5,160	\$2,240	\$8,988	-	-
3200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	-	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	1,872.9	\$39,668	\$163,603	\$61,590	\$264,851	1,266,425	-
3200-C-b-Ld3	Load-Cover	Tailings Pond 6	-	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	1,872.9	\$33,468	\$153,014	\$62,236	\$248,718	1,266,425	-
3200-D-b-Tk1	Haul-Cover	Tailings Pond 6	-	Cat 770G	\$20.90	\$55.72	\$26.79	5	1,872.9	\$95,716	\$521,751	\$250,873	\$968,339	1,266,425	-
3200-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 6	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	1,872.9	\$108,140	\$284,175	\$111,755	\$504,070	-	-
3300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	-	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	12,836.1	\$271,869	\$1,121,285	\$422,052	\$1,815,207	8,171,730	-
3300-C-b-Ld3	Load-Cover	Tailings Pond 6	-	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	12,836.1	\$229,382	\$1,048,709	\$426,545	\$1,704,635	8,171,730	-
3300-D-b-Tk1	Haul-Cover	Tailings Pond 6	-	Cat 770G	\$20.90	\$55.72	\$26.79	4	12,836.1	\$1,073,101	\$2,860,731	\$1,375,520	\$5,309,352	8,171,730	-
3300-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 7	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	12,836.1	\$741,158	\$1,947,643	\$765,932	\$3,454,733	-	-
3400-A-d-Mg2	Grade-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	Cat 14M3	\$23.32	\$75.75	\$32.88	1	15.7	\$366	\$1,188	\$516	\$2,070	-	60.3
3400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	-	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	458.2	\$9,704	\$40,023	\$15,065	\$64,792	291,681	-
3400-C-b-Ld3	Load-Cover	Tailings Pond 6	-	Hyundai HL780XTD-9	\$17.87	\$81.70	\$33.23	1	458.2	\$8,188	\$37,433	\$15,225	\$60,845	291,681	-
3400-D-b-Tk1	Haul-Cover	Tailings Pond 6	-	Cat 770G	\$20.90	\$55.72	\$26.79	4	458.2	\$38,303	\$102,111	\$49,098	\$189,512	291,681	-
3400-P-e-Comb1	Road Maintenance-Miscellaneous SMA	Miscellaneous SMA	-	Cat 14M, Off-Hwy Water Tanker Truck 6,000-gal.	\$57.74	\$151.73	\$59.67	1	458.2	\$26,455	\$69,519	\$27,339	\$123,313	-	-
3500-A-f-Mg2	Grade-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Cat 14M3	\$23.32	\$75.75	\$32.88	1	147.1	\$3,431	\$11,145	\$4,837	\$19,413	-	565.2
3500-B-f-Dz4	Dozer Assist-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Cat D6, SU Blade	\$21.18	\$87.35	\$32.88	1	-	\$0	\$0	\$0	\$0	-	565.2
3500-C-f-Ld1	Load-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Cat 990K	\$52.05	\$266.76	\$33.23	1	-	\$0	\$0	\$0	\$0	-	-
3500-D-f-Tk3	Haul-Impacted Soil at TP7-Fill/Stockpile Material	Impacted Soil at TP7	X	Komatsu 730E	\$87.52	\$216.39	\$26.79	0	-	\$0	\$0	\$0	\$0	-	-
3500-E-a-Rp1	Rip-Impacted Soil at TP7-Existing Ground	Impacted Soil at TP7	-	Cat D11T CD Multi-shank (w/ MSR-359H)	\$81.21	\$277.90	\$32.88	1	193.8	\$15,742	\$53,869	\$6,374	\$75,985	-	565.2
<b>TOTAL</b>										<b>\$33,171,697</b>	<b>\$87,044,970</b>	<b>\$33,506,309</b>	<b>\$153,722,977</b>	<b>350,786,040</b>	<b>5,413.0</b>

**Revegetation Costs**

**Description:**  
 Includes scarifying (ripping), discing, rangeland drill seeding, mulching, crimping, and daily per diem  
 May filter on equipment (D14) to show pertinent rows

Item	Activity	Material	Eq	ID	Description	Source Location 1	Destination Location 2	Area (ac)	Fuel Unit Cost (\$/ac)	Reveg w/o Fuel Unit Cost (\$/ac)	Fuel Direct Cost (\$)	Reveg w/o Fuel Direct Cost (\$)
1100 J	e	U2a		1100-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	3A Stockpile	-	34.1	\$ 4.54	\$ 1,595.24	\$ 155	\$ 54,422
1200 J	e	U2a		1200-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Kessel Stockpile	-	279.8	\$ 4.54	\$ 1,595.24	\$ 1,271	\$ 446,346
1300 J	e	U2a		1300-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	South Stockpile	-	507.9	\$ 4.54	\$ 1,595.24	\$ 2,308	\$ 810,208
1400 J	e	U2a		1400-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Stockpile 2	-	76.0	\$ 4.54	\$ 1,595.24	\$ 345	\$ 121,238
1500 J	e	U2a		1500-J-e-U2a	Revegetate-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	552.5	\$ 4.54	\$ 1,595.24	\$ 2,511	\$ 881,405
1600 J	e	U2a		1600-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Lampbright Stockpile	-	935.8	\$ 4.54	\$ 1,595.24	\$ 4,252	\$ 1,492,824
1700 J	e	U2a		1700-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Northeast Stockpile	-	11.7	\$ 4.54	\$ 1,595.24	\$ 53	\$ 18,723
1800 J	e	U2a		1800-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Upper South	-	142.7	\$ 4.54	\$ 1,595.24	\$ 648	\$ 227,577
1900 J	e	U2a		1900-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	9 Waste Rock	-	161.2	\$ 4.54	\$ 1,595.24	\$ 733	\$ 257,153
2100 J	e	U2a		2100-J-e-U2a	Revegetate-All-Final Grade	Dams and Reservoirs	-	23.9	\$ 4.54	\$ 1,595.24	\$ 109	\$ 38,112
2200 J	e	U2a		2200-J-e-U2a	Revegetate-Miscellaneous NMA-Final Grade	Miscellaneous NMA	-	76.6	\$ 4.54	\$ 1,595.24	\$ 348	\$ 122,248
2300 J	e	U2a		2300-J-e-U2a	Revegetate-200-Acre Unplanned Future Disturbance-Final Grade	Unplanned Disturbed Area	-	200.0	\$ 4.54	\$ 1,595.24	\$ 909	\$ 319,048
3100 J	e	U2a		3100-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Axiflo	-	90.8	\$ 4.54	\$ 1,595.24	\$ 413	\$ 144,831
3200 J	e	U2a		3200-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Tailings Pond 6	-	261.7	\$ 4.54	\$ 1,595.24	\$ 1,189	\$ 417,408
3300 J	e	U2a		3300-J-e-U2a	Revegetate-Entire Impoundment-Final Grade	Tailings Pond 7	-	1688.4	\$ 4.54	\$ 1,595.24	\$ 7,672	\$ 2,693,365
3400 J	e	U2a		3400-J-e-U2a	Revegetate-Miscellaneous SMA-Final Grade	Miscellaneous SMA	-	60.3	\$ 4.54	\$ 1,595.24	\$ 274	\$ 96,137
3500 J	e	U2a		3500-J-e-U2a	Revegetate-Impacted Soil at TP7-Final Grade	Impacted Soil at TP7	-	565.2	\$ 4.54	\$ 1,595.24	\$ 2,568	\$ 901,599
<b>TOTAL</b>								5,669			\$ 25,758	\$ 9,042,643

**Other Reclamation Activity Costs**

**Assumptions:**

- 1 - Cost to construct drain or channel on re-graded stockpile
  - 2 - The downdrain, ACB, well plug & abandon, and well replacement costs include fuel
- May filter on equipment (D14) to show pertinent rows

Item	Activity	Material	Eq	ID	Description	Source Location 1	Destination Location 2	Quantity	Unit	Fuel Unit Cost (\$/unit)	Unit Cost w/o Fuel (\$/unit) <sup>1,2</sup>	Fuel Direct Cost (\$)	Direct w/o Fuel Cost (\$)		
1100 G	e	U6		1100-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	3A Stockpile	-	3,362	ft	\$	389.75	\$	1,310,355		
1100 Hb	e	U8b		1100-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	3A Stockpile	-	5,000	ft	\$	0.55	\$	2,745		
1100 Gb	e	U7		1100-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final Grade	3A Stockpile	-	1	ea	\$	16,045.45	\$	16,045		
1100 F	d	U3		1100-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	3A Stockpile	-	5,000	ft	\$	0.45	\$	8,690		
1200 Hb	e	U8b		1200-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Kessel Stockpile	-	-	ft	\$	0.14	\$	-		
1300 F	d	U3		1300-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	South Stockpile	-	113,364	ft	\$	0.45	\$	197,021		
1300 G	e	U6		1300-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	South Stockpile	-	3,550	ft	\$	389.75	\$	1,383,629		
1300 Gb	e	U7		1300-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final Grade	South Stockpile	-	3	ea	\$	16,045.45	\$	48,136		
1300 Hb	e	U8b		1300-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	South Stockpile	-	113,364	ft	\$	0.14	\$	62,246		
1400 Hb	e	U8b		1400-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Stockpile 2	-	-	ft	\$	0.14	\$	-		
1500 F	d	U3		1500-F-d-U3	Grade Benches-Entire Stockpile 23.5M-Placed Cover	West Stockpile	-	81,840	ft	\$	0.45	\$	142,234		
1500 G	e	U6		1500-G-e-U6	Construct Downdrains-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	3,680	ft	\$	389.75	\$	1,434,297		
1500 Gb	e	U7		1500-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	4	ea	\$	16,045.45	\$	64,182		
1500 Hb	e	U8b		1500-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	81,840	ft	\$	0.14	\$	44,937		
1500 N	e	U18		1500-N-e-U18	Plug and Abandon Well-Entire Stockpile 23.5M-Final Grade	West Stockpile	-	1,700	ft	\$	20.84	\$	35,431		
1600 F	d	U3		1600-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	Lampbright Stockpile	-	205,130	ft	\$	0.45	\$	356,505		
1600 Hb	e	U8b		1600-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Lampbright Stockpile	-	205,130	ft	\$	0.14	\$	112,633		
1600 Gb	e	U7		1600-Gb-e-U7	Construct Downdrain Dissipators-Entire Stockpile-Final Grade	Lampbright Stockpile	-	4	ea	\$	16,045.45	\$	64,182		
1600 Hb	e	U8b		1600-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Lampbright Stockpile	-	205,130	ft	\$	0.14	\$	112,633		
1700 G	e	U6		1700-G-e-U6	Construct Downdrains-Entire Stockpile-Final Grade	Northeast Stockpile	-	-	ft	\$	389.75	\$	-		
1800 F	d	U3		1800-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	Upper South	-	5,348	ft	\$	0.45	\$	9,295		
1800 Hb	e	U8b		1800-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	Upper South	-	5,348	ft	\$	0.14	\$	2,936		
1900 F	d	U3		1900-F-d-U3	Grade Benches-Entire Stockpile-Placed Cover	9 Waste Rock	-	14,085	ft	\$	0.45	\$	24,479		
1900 Hb	e	U8b		1900-Hb-e-U8b	Construct Channels w/o Riprap-Entire Stockpile-Final Grade	9 Waste Rock	-	14,085	ft	\$	0.14	\$	7,734		
2204 Hb	e	U8b		2204-Hb-e-U8b	Construct Channels w/o Riprap-Highway to Heaven Haul Road-Final Grade	Miscellaneous NMA	-	1,995	ft	\$	0.14	\$	1,095		
3100 F	d	U3		3100-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Axiflo	-	3,380	ft	\$	0.45	\$	5,874		
3100 Hb	e	U8b		3100-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Final Grade	Axiflo	-	3,380	ft	\$	0.14	\$	1,856		
3200 F	d	U3		3200-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Tailings Pond 6	-	6,497	ft	\$	0.45	\$	11,292		
3200 G	e	U6		3200-G-e-U6	Construct Downdrains-Entire Impoundment-Final Grade	Tailings Pond 6	-	319	ft	\$	389.75	\$	124,424		
3200 Gb	e	U7		3200-Gb-e-U7	Construct Downdrain Dissipators-Entire Impoundment-Final Grade	Tailings Pond 6	-	-	ea	\$	16,045.45	\$	-		
3200 Hb	e	U8b		3200-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Final Grade	Tailings Pond 6	-	6,497	ft	\$	0.14	\$	3,568		
3300 F	d	U3		3300-F-d-U3	Grade Benches-Entire Impoundment-Placed Cover	Tailings Pond 7	-	42,224	ft	\$	0.45	\$	73,382		
3300 G	e	U6		3300-G-e-U6	Construct Downdrains-Entire Impoundment-Final Grade	Tailings Pond 7	-	2,280	ft	\$	389.75	\$	888,770		
3300 Gb	e	U7		3300-Gb-e-U7	Construct Downdrain Dissipators-Entire Impoundment-Final Grade	Tailings Pond 7	-	-	ea	\$	16,045.45	\$	-		
3300 Hb	e	U8b		3300-Hb-e-U8b	Construct Channels w/o Riprap-Entire Impoundment-Final Grade	Tailings Pond 7	-	42,224	ft	\$	0.14	\$	23,184		
3400 F	d	U3		3400-F-d-U3	Grade Benches-Miscellaneous SMA-Placed Cover	Miscellaneous SMA	-	-	ft	\$	0.45	\$	-		
3400 Hb	e	U8b		3400-Hb-e-U8b	Construct Channels w/o Riprap-Miscellaneous SMA-Final Grade	Miscellaneous SMA	-	-	ft	\$	0.14	\$	-		
<b>TOTAL</b>												\$	312,239	\$	6,573,790

**Continental Mine**

Reclamation Summary Stockpiles, Haul Roads, Reservoirs, and Disturbed Areas

		<b>Current Value</b>
<b>DIRECT COSTS</b>	Facility and Structure Removal	\$5,136,491
	Earthmoving	\$153,722,977
	Revegetation	\$9,068,402
	Other	\$6,886,029
	<b>Subtotal, Direct Costs</b>	<b>\$174,813,898</b>
<b>INDIRECT COSTS</b>	<b>Subtotal, Indirect Costs</b>	<b>30.0% \$52,444,170</b>
<b>TOTAL COST</b>		<b>\$227,258,068</b>

Notes:

Indirect costs are based on 2019 agreement between FMI and agencies

Indirect costs include but are not limited to mobilization and demobilization, engineering redesign fee, contingencies, contractor profit and overhead, project management fee, and state procurement cost

Reclamation Summary

Notes and Assumptions

Used to summarize costs for Sheet 17b Facility Characteristics

ID	Description	Source Location 1	Destination Location 2	Area (ac)	Cover Material Excav, Haul, Grade (\$)	Cover Material Excav, Haul, Grade Fuel (\$)	Cover Material Excav, Haul, Grade Indirects (\$)	Pullback and Backfill (\$)	Pullback and Backfill Fuel (\$)	Pullback and Backfill Indirects (\$)	Top/Outslope Adjustment Grading w/o Fuel (\$)	Top/Outslope Adjustment Grading Fuel (\$)	Top/Outslope Adjustment Grading Indirects (\$)	Scarify, Seed & Mulch, Reveg w/o Fuel (\$)	Scarify, Seed & Mulch, Reveg Fuel (\$)	Scarify, Seed & Mulch, Reveg Indirects (\$)	Channels & Benches (\$)	Channels & Benches Fuel (\$)	Channels & Benches Indirects (\$)	Other (\$)	Other Fuel (\$)	Other Indirects (\$)	Capital Cost Totals (\$)	Capital Cost/Acre (\$)	
1100-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	3A Stockpile	-	34.1	\$ 965	\$ 207	\$ 352	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,172	\$ 34	
1100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	3A Stockpile	34.1	\$ 29,360	\$ 5,172	\$ 10,359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34,531	\$ 1,012	
1100-C-b-Ld3	Load-Cover	Tailings Pond 6	3A Stockpile	34.1	\$ 28,064	\$ 4,364	\$ 9,728	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,428	\$ 951	
1100-D-b-Tk1	Haul-Cover	Tailings Pond 6	3A Stockpile	34.1	\$ 80,588	\$ 20,414	\$ 30,301	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	101,002	\$ 2,961	
1100-G-e-U6	Construct Downdrains-Entire Stockpile-F	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,310,355	\$ 38,410	
1100-Hb-e-U8b	Construct Channels w/o Riprap-Entire St	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	-	-	-	1,310,355	717	393,106	-	-	-	1,310,355	\$ 38,410	
1100-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,463	\$ 102	
1100-M-e-U9	Post-Closure O&M-Entire Stockpile-Final	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	54,422	155	16,373	-	-	-	-	-	-	-	54,577	\$ 1,600
1100-Gb-e-U7	Construct Downdrain Dissipators-Entire	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,045	\$ 470	
1100-F-d-U3	Grade Benches-Entire Stockpile-Placed	3A Stockpile	-	34.1	-	-	-	-	-	-	-	-	-	-	-	-	16,045	2,245	4,814	-	-	-	10,935	\$ 321	
1100-P-e-Comb1	Road Maintenance-Entire Stockpile	3A Stockpile	-	34.1	\$ 51,622	\$ 14,099	\$ 19,716	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	65,721	\$ 1,926	
1101-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	0.0	-	-	-	42,156	7,426	14,875	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1101-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1102-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	3A Stockpile	X	0.0	-	-	-	48,053	8,465	16,955	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1102-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	3A Stockpile	X	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1200-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	Kessel Stockpile	-	279.8	\$ 7,912	\$ 1,699	\$ 2,883	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,611	\$ 34	
1200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Kessel Stockp	279.8	\$ 240,962	\$ 42,447	\$ 85,023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	283,409	\$ 1,013	
1200-C-b-Ld3	Load-Cover	Tailings Pond 6	Kessel Stockp	279.8	\$ 230,332	\$ 35,813	\$ 79,844	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	266,145	\$ 951	
1200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Kessel Stockp	279.8	\$ 1,157,463	\$ 293,201	\$ 435,199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,450,664	\$ 5,185	
1200-Hb-e-U8b	Construct Channels w/o Riprap-Entire St	Kessel Stockpile	-	279.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1200-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	Kessel Stockpile	-	279.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1200-M-e-U9	Post-Closure O&M-Entire Stockpile-Final	Kessel Stockpile	-	279.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1200-P-e-Comb1	Road Maintenance-Entire Stockpile	Kessel Stockpile	-	279.8	\$ 423,671	\$ 115,717	\$ 161,817	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	539,389	\$ 1,928	
1201-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	190,926	33,633	67,368	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1201-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1202-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	1,242,284	218,837	438,336	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1202-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1203-A-f-Dz4	Grade-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	1,031,458	181,698	363,947	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1203-E-f-Rp1	Rip-Outslope-Fill/Stockpile Material	Kessel	X	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	South Stockpile	-	507.9	\$ 14,362	\$ 3,083	\$ 5,234	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,445	\$ 34	
1300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	South Stockpil	507.9	\$ 470,197	\$ 82,828	\$ 165,908	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	553,026	\$ 1,089	
1300-C-b-Ld3	Load-Cover	Tailings Pond 6	South Stockpil	507.9	\$ 449,455	\$ 69,884	\$ 155,802	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	519,339	\$ 1,023	
1300-D-b-Tk1	Haul-Cover	Tailings Pond 6	South Stockpil	507.9	\$ 1,935,942	\$ 490,401	\$ 727,903	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,426,343	\$ 4,777	
1300-F-d-U3	Grade Benches-Entire Stockpile-Placed	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-G-e-U6	Construct Downdrains-Entire Stockpile-F	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-Gb-e-U7	Construct Downdrain Dissipators-Entire	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-Hb-e-U8b	Construct Channels w/o Riprap-Entire St	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1300-M-e-U9	Post-Closure O&M-Entire Stockpile-Final	South Stockpile	-	507.9	-	-	-	-	-	-	-	-	-	810,208	2,308	243,755	-	-	-	-	-	-	812,516	\$ 1,600	
1300-P-e-Comb1	Road Maintenance-Entire Stockpile	South Stockpile	-	507.9	\$ 826,725	\$ 225,803	\$ 315,759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,052,529	\$ 2,072	
1301-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	125,967	22,190	44,447	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1301-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	137,096	23,280	48,113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1301-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	259,323	65,690	97,504	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1302-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	252,091	44,408	88,950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1302-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	274,362	46,588	96,285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1302-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	691,955	175,282	260,171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1303-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	1,133,751	199,718	400,041	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1303-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	1,233,912	209,525	433,031	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1303-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	3,889,989	985,388	1,462,613	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1304-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	1,095,583	192,994	386,573	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1304-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	1,192,373	202,471	418,453	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1304-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	3,759,034	952,215	1,413,375	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1305-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	1,151,500	202,845	406,303	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1305-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	1,253,229	212,805	439,810	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1305-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	3,950,889	1,000,815	1,485,511	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1306-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-	-	293,390	51,683	103,522	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1306-C-f-Ld2	Load-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	319,310	54,220	112,059	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1306-D-f-Tk1	Haul-Outslope-Fill/Stockpile Material	South Stockpile	X	0.0	-	-	-	1,207,974	305,996	454,191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1307-B-f-Dz4	Dozer Assist-Outslope-Fill/Stockpile Mat	South Stockpile	X	0.0	-	-																			



Reclamation Summary

Notes and Assumptions

Used to summarize costs for Sheet 17b Facility Characteristics

ID	Description	Source Location 1	Destination Location 2	Area (ac)	Cover Material Excav, Haul, Grade (\$)	Cover Material Excav, Haul, Grade Fuel (\$)	Cover Material Excav, Haul, Grade Indirects (\$)	Pullback and Backfill (\$)	Pullback and Backfill Fuel (\$)	Pullback and Backfill Indirects (\$)	Top/Outslope Adjustment Grading w/o Fuel (\$)	Top/Outslope Adjustment Grading Fuel (\$)	Top/Outslope Adjustment Grading Indirects (\$)	Scarify, Seed & Mulch, Reveg w/o Fuel (\$)	Scarify, Seed & Mulch, Reveg Fuel (\$)	Scarify, Seed & Mulch, Reveg Indirects (\$)	Channels & Benches (\$)	Channels & Benches Fuel (\$)	Channels & Benches Indirects (\$)	Other (\$)	Other Fuel (\$)	Other Indirects (\$)	Capital Cost Totals (\$)	Capital Cost/Acre (\$)
1900-A-d-Mg2	Grade-Entire Stockpile-Placed Cover	9 Waste Rock	-	161.2	4,558	979	1,661	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,537	34
1900-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	9 Waste Rock	161.2	155,734	27,434	54,950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	183,168	1,136
1900-C-b-Ld3	Load-Cover	Tailings Pond 6	9 Waste Rock	161.2	148,864	23,146	51,603	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	172,011	1,067
1900-D-b-Tk1	Haul-Cover	Tailings Pond 6	9 Waste Rock	161.2	427,470	108,284	160,726	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	535,754	3,324
1900-F-d-U3	Grade Benches-Entire Stockpile-Placed	9 Waste Rock	-	161.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30,803	191
1900-Hb-e-U8b	Construct Channels w/o Riprap-Entire St	9 Waste Rock	-	161.2	-	-	-	-	-	-	-	-	-	-	-	-	24,479	6,324	9,241	-	-	-	9,755	61
1900-J-e-U2a	Revegetate-Entire Stockpile-Final Grade	9 Waste Rock	-	161.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	257,885	1,600
1900-M-e-U9	Post-Closure O&M-Entire Stockpile-Final	9 Waste Rock	-	161.2	-	-	-	-	-	-	-	-	-	257,153	733	77,366	7,734	2,021	2,926	-	-	-	-	-
1900-P-e-Comb1	Road Maintenance-Entire Stockpile	9 Waste Rock	-	161.2	273,820	74,788	104,583	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	348,609	2,163
2100-A-d-Mg2	Grade-All-Placed Cover	Dams and Reser-	-	23.9	676	145	246	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	821	34
2100-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Dams and Res	23.9	20,960	3,692	7,396	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,653	1,032
2100-C-b-Ld3	Load-Cover	Tailings Pond 6	Dams and Res	23.9	20,036	3,115	6,945	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23,151	969
2100-D-b-Tk1	Haul-Cover	Tailings Pond 6	Dams and Res	23.9	129,451	32,792	48,673	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	162,242	6,791
2100-J-e-U2a	Revegetate-All-Final Grade	Dams and Reser-	-	23.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38,220	1,600
2100-M-e-U9	Post-Closure O&M-All-Final Grade	Dams and Reser-	-	23.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2100-P-e-Comb1	Road Maintenance-All	Dams and Reser-	-	23.9	36,854	10,066	14,076	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46,920	1,964
2101-A-a-Dz2	Grade-Dam 15-Existing Ground	Dams and Reserv-	-	0.1	-	-	-	-	-	-	91	24	35	-	-	-	-	-	-	-	-	-	115	1,154
2101-E-c-Rp1	Rip-Dam 15-Rough Graded Material	Dams and Reserv-	-	0.1	-	-	-	-	-	-	13	3	5	-	-	-	-	-	-	-	-	-	16	160
2102-A-a-Dz2	Grade-Dam 16-Existing Ground	Dams and Reserv-	-	0.1	-	-	-	-	-	-	91	24	35	-	-	-	-	-	-	-	-	-	115	1,154
2102-E-c-Rp1	Rip-Dam 16-Rough Graded Material	Dams and Reserv-	-	0.1	-	-	-	-	-	-	13	3	5	-	-	-	-	-	-	-	-	-	16	160
2103-A-a-Dz2	Grade-Dam 20-Existing Ground	Dams and Reserv-	-	0.3	-	-	-	-	-	-	216	57	82	-	-	-	-	-	-	-	-	-	273	852
2103-E-c-Rp1	Rip-Dam 20-Rough Graded Material	Dams and Reserv-	-	0.3	-	-	-	-	-	-	41	11	15	-	-	-	-	-	-	-	-	-	51	160
2104-A-a-Dz2	Grade-Reservoir 18-Existing Ground	Dams and Reserv-	-	3.4	-	-	-	-	-	-	1,941	507	734	-	-	-	-	-	-	-	-	-	2,448	729
2104-E-c-Rp1	Rip-Reservoir 18-Rough Graded Material	Dams and Reserv-	-	3.4	-	-	-	-	-	-	428	112	162	-	-	-	-	-	-	-	-	-	539	160
2104-K-a-Ex1	Perforate Liner-Reservoir 18-Existing Gr	Dams and Reserv-	-	3.4	-	-	-	-	-	-	449	38	146	-	-	-	-	-	-	-	-	-	487	145
2105-A-a-Dz2	Grade-Fleming Pond-Existing Ground	Dams and Reserv-	-	0.8	-	-	-	-	-	-	477	125	181	-	-	-	-	-	-	-	-	-	602	772
2105-E-c-Rp1	Rip-Fleming Pond-Rough Graded Materi	Dams and Reserv-	-	0.8	-	-	-	-	-	-	99	26	38	-	-	-	-	-	-	-	-	-	125	160
2105-K-a-Ex1	Perforate Liner-Fleming Pond-Existing G	Dams and Reserv-	-	0.8	-	-	-	-	-	-	104	9	34	-	-	-	-	-	-	-	-	-	113	145
2106-A-a-Dz2	Grade-Tailing Thickener 2-Existing Grou	Dams and Reserv-	-	2.6	-	-	-	-	-	-	1,510	395	571	-	-	-	-	-	-	-	-	-	1,904	732
2106-E-c-Rp1	Rip-Tailing Thickener 2-Rough Graded M	Dams and Reserv-	-	2.6	-	-	-	-	-	-	331	86	125	-	-	-	-	-	-	-	-	-	417	160
2106-K-a-Ex1	Perforate Liner-Tailing Thickener 2-Existi	Dams and Reserv-	-	2.6	-	-	-	-	-	-	348	29	113	-	-	-	-	-	-	-	-	-	377	145
2107-A-a-Dz2	Grade-PLS Pond & Launder-Existing Grc	Dams and Reserv-	-	0.3	-	-	-	-	-	-	182	48	69	-	-	-	-	-	-	-	-	-	230	884
2107-E-c-Rp1	Rip-PLS Pond & Launder-Rough Graded	Dams and Reserv-	-	0.3	-	-	-	-	-	-	33	9	13	-	-	-	-	-	-	-	-	-	42	160
2107-K-a-Ex1	Perforate Liner-PLS Pond & Launder-Exi	Dams and Reserv-	-	0.3	-	-	-	-	-	-	35	3	11	-	-	-	-	-	-	-	-	-	38	145
2108-A-a-Dz2	Grade-Raffinate Pond-Existing Ground	Dams and Reserv-	-	0.1	-	-	-	-	-	-	97	25	37	-	-	-	-	-	-	-	-	-	123	1,114
2108-E-c-Rp1	Rip-Raffinate Pond-Rough Graded Mater	Dams and Reserv-	-	0.1	-	-	-	-	-	-	14	4	5	-	-	-	-	-	-	-	-	-	18	160
2108-K-a-Ex1	Perforate Liner-Raffinate Pond-Existing	Dams and Reserv-	-	0.1	-	-	-	-	-	-	15	1	5	-	-	-	-	-	-	-	-	-	16	145
2109-A-a-Dz2	Grade-Reservoir 2-Existing Ground	Dams and Reserv-	-	0.2	-	-	-	-	-	-	160	42	60	-	-	-	-	-	-	-	-	-	201	915
2109-E-c-Rp1	Rip-Reservoir 2-Rough Graded Material	Dams and Reserv-	-	0.2	-	-	-	-	-	-	28	7	11	-	-	-	-	-	-	-	-	-	35	160
2110-A-a-Dz2	Grade-Reservoir 6-Existing Ground	Dams and Reserv-	-	1.5	-	-	-	-	-	-	6,559	1,714	2,482	-	-	-	-	-	-	-	-	-	8,273	5,515
2110-E-c-Rp1	Rip-Reservoir 6-Rough Graded Material	Dams and Reserv-	-	1.5	-	-	-	-	-	-	191	50	72	-	-	-	-	-	-	-	-	-	241	160
2111-A-a-Dz2	Grade-Reservoir 7-Existing Ground	Dams and Reserv-	-	2.4	-	-	-	-	-	-	4,239	1,108	1,604	-	-	-	-	-	-	-	-	-	5,346	2,218
2111-E-c-Rp1	Rip-Reservoir 7-Rough Graded Material	Dams and Reserv-	-	2.4	-	-	-	-	-	-	307	80	116	-	-	-	-	-	-	-	-	-	387	160
2112-A-a-Dz2	Grade-Elmo's Pond -Existing Ground	Dams and Reserv-	-	1.2	-	-	-	-	-	-	703	184	266	-	-	-	-	-	-	-	-	-	887	716
2112-E-c-Rp1	Rip-Elmo's Pond -Rough Graded Materi	Dams and Reserv-	-	1.2	-	-	-	-	-	-	158	41	60	-	-	-	-	-	-	-	-	-	199	160
2113-A-a-Dz2	Grade-Lower Lined Pond -Existing Grou	Dams and Reserv-	-	2.2	-	-	-	-	-	-	1,265	331	479	-	-	-	-	-	-	-	-	-	1,596	716
2113-E-c-Rp1	Rip-Lower Lined Pond -Rough Graded M	Dams and Reserv-	-	2.2	-	-	-	-	-	-	284	74	107	-	-	-	-	-	-	-	-	-	358	160
2113-K-a-Ex1	Perforate Liner-Lower Lined Pond -Existi	Dams and Reserv-	-	2.2	-	-	-	-	-	-	298	25	97	-	-	-	-	-	-	-	-	-	323	145
2114-A-a-Dz2	Grade-Upper Lined Pond -Existing Grou	Dams and Reserv-	-	0.4	-	-	-	-	-	-	233	61	88	-	-	-	-	-	-	-	-	-	293	716
2114-E-c-Rp1	Rip-Upper Lined Pond -Rough Graded M	Dams and Reserv-	-	0.4	-	-	-	-	-	-	52	14	20	-	-	-	-	-	-	-	-	-	66	160
2114-K-a-Ex1	Perforate Liner-Upper Lined Pond -Existi	Dams and Reserv-	-	0.4	-	-	-	-	-	-	55	5	18	-	-	-	-	-	-	-	-	-	59	145
2115-A-a-Dz2	Grade-5901 PLS Sump -Existing Ground	Dams and Reserv-	-	0.6	-	-	-	-	-	-	323	85	122	-	-	-	-	-	-	-	-	-	408	716
2115-E-c-Rp1	Rip-5901 PLS Sump -Rough Graded Ma	Dams and Reserv-	-	0.6	-	-	-	-	-	-	73	19	27	-	-	-	-	-	-	-	-	-	91	160
2115-K-a-Ex1	Perforate Liner-5901 PLS Sump -Existi	Dams and Reserv-	-	0.6	-	-	-	-	-	-	76	6	25	-	-	-	-	-	-	-	-	-	83	145
2116-A-a-Dz2	Grade-6301 PLS Booster Station -Existi	Dams and Reserv-	-	0.0	-	-	-	-	-	-	17	4	6	-	-	-	-	-	-	-	-	-	21	716
2116-E-c-Rp1	Rip-6301 PLS Booster Station -Rough G	Dams and Reserv-	-	0.0	-	-	-	-	-	-	4	1	1	-	-	-	-	-	-	-	-	-	5	160
2116-K-a-Ex1	Perforate Liner-6301 PLS Booster Stator	Dams and Reserv-	-	0.0	-	-	-	-	-	-	4	0	1	-	-	-	-	-	-	-	-	-	4	145
2117-A-a-Dz2	Grade-Lee Hill #2 Booster -Existing Grou	Dams and Reserv-	-	0.1	-	-	-	-	-	-	79	21	30	-	-	-	-	-	-	-	-	-	100	716
2117-E-c-Rp1	Rip-Lee Hill #2 Booster -Rough Graded	Dams and Reserv-	-	0.1	-	-	-	-	-	-	18	5	7	-	-	-	-	-	-	-	-	-	22	160
2117-K-a-Ex1	Perforate Liner-Lee Hill #2 Booster -Exist	Dams and Reserv-	-	0.1	-	-																		

Reclamation Summary

Notes and Assumptions

Used to summarize costs for Sheet 17b Facility Characteristics

ID	Description	Source Location 1	Destination Location 2	Area (ac)	Cover Material Excav, Haul, Grade (\$)	Cover Material Excav, Haul, Grade Fuel (\$)	Cover Material Excav, Haul, Grade Indirects (\$)	Pullback and Backfill (\$)	Pullback and Backfill Fuel (\$)	Pullback and Backfill Indirects (\$)	Top/Outslope Adjustment Grading w/o Fuel (\$)	Top/Outslope Adjustment Grading Fuel (\$)	Top/Outslope Adjustment Grading Indirects (\$)	Scarify, Seed & Mulch, Reveg w/o Fuel (\$)	Scarify, Seed & Mulch, Reveg Fuel (\$)	Scarify, Seed & Mulch, Reveg Indirects (\$)	Channels & Benches (\$)	Channels & Benches Fuel (\$)	Channels & Benches Indirects (\$)	Other (\$)	Other Fuel (\$)	Other Indirects (\$)	Capital Cost Totals (\$)	Capital Cost/Acre (\$)
3101-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	30	\$ 5	\$ 10	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3101-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3102-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	592	\$ 104	\$ 209	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3102-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3103-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	232	\$ 41	\$ 82	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3103-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3104-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	558	\$ 98	\$ 197	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3104-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3105-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	3,682	\$ 649	\$ 1,299	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3105-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3106-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	928	\$ 163	\$ 327	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3106-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3107-A-f-Dz4	Grade-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	18	\$ 3	\$ 6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3107-E-f-Rp1	Rip-Sideslope-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3108-A-f-Dz4	Grade-Bottom-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3108-E-f-Rp1	Rip-Bottom-Fill/Stockpile Material	Axiflo	X	0.0	\$ -	\$ -	\$ -	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3100-P-e-Comb1	Road Maintenance-Entire Impoundment	Axiflo	-	90.8	\$ 154,367	\$ 42,162	\$ 58,959	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 196,529	\$ 2,165
3200-A-d-Mg2	Grade-Entire Impoundment-Placed Cove	Tailings Pond 6	-	261.7	\$ 7,399	\$ 1,588	\$ 2,696	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,988	\$ 34
3200-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond	261.7	\$ 225,184	\$ 39,668	\$ 79,455	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 264,851	\$ 1,012
3200-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond	261.7	\$ 215,250	\$ 33,468	\$ 74,615	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 248,718	\$ 951
3200-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond	261.7	\$ 772,623	\$ 195,716	\$ 290,502	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 968,339	\$ 3,701
3200-F-d-U3	Grade Benches-Entire Impoundment-Pla	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 11,292	\$ 2,917	\$ 4,263	\$ -	\$ -	\$ -	\$ 14,209	\$ 54
3200-G-e-U6	Construct Downdrains-Entire Impoundm	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 124,424	\$ -	\$ 37,327	\$ -	\$ -	\$ -	\$ 124,424	\$ 476
3200-Gb-e-U7	Construct Downdrain Dissipators-Entire I	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3200-Hb-e-U8b	Construct Channels w/o Riprap-Entire Irr	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,568	\$ 932	\$ 1,350	\$ -	\$ -	\$ -	\$ 4,500	\$ 17
3200-J-e-U2a	Revegetate-Entire Impoundment-Final G	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 417,408	\$ 1,189	\$ 125,579	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 418,597	\$ 1,600
3200-M-e-U9	Post-Closure O&M-Entire Impoundment-	Tailings Pond 6	-	261.7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3200-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 6	-	261.7	\$ 395,930	\$ 108,140	\$ 151,221	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 504,070	\$ 1,926
3300-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Tailings Pond	1688.4	\$ 1,543,337	\$ 271,869	\$ 544,562	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,815,207	\$ 1,075
3300-C-b-Ld3	Load-Cover	Tailings Pond 6	Tailings Pond	1688.4	\$ 1,475,253	\$ 229,382	\$ 511,391	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,704,635	\$ 1,010
3300-D-b-Tk1	Haul-Cover	Tailings Pond 6	Tailings Pond	1688.4	\$ 4,236,251	\$ 1,073,101	\$ 1,592,806	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,309,352	\$ 3,145
3300-F-d-U3	Grade Benches-Entire Impoundment-Pla	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 73,382	\$ 18,957	\$ 27,702	\$ -	\$ -	\$ -	\$ 92,339	\$ 55
3300-G-e-U6	Construct Downdrains-Entire Impoundm	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 888,770	\$ -	\$ 266,631	\$ -	\$ -	\$ -	\$ 888,770	\$ 526
3300-Gb-e-U7	Construct Downdrain Dissipators-Entire I	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3300-Hb-e-U8b	Construct Channels w/o Riprap-Entire Irr	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 23,184	\$ 6,058	\$ 8,773	\$ -	\$ -	\$ -	\$ 29,243	\$ 17
3300-J-e-U2a	Revegetate-Entire Impoundment-Final G	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,693,365	\$ 7,672	\$ 810,311	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,701,037	\$ 1,600
3300-M-e-U9	Post-Closure O&M-Entire Impoundment-	Tailings Pond 7	-	1688.4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3300-P-e-Comb1	Road Maintenance-Entire Impoundment	Tailings Pond 7	-	1688.4	\$ 2,713,575	\$ 741,158	\$ 1,036,420	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,454,733	\$ 2,046
3400-A-d-Mg2	Grade-Miscellaneous SMA-Placed Cove	Miscellaneous SA	-	60.3	\$ 1,704	\$ 366	\$ 621	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,070	\$ 34
3400-B-b-Dz4	Dozer Assist-Cover	Tailings Pond 6	Miscellaneous	60.3	\$ 55,088	\$ 9,704	\$ 19,438	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 64,792	\$ 1,075
3400-C-b-Ld3	Load-Cover	Tailings Pond 6	Miscellaneous	60.3	\$ 52,658	\$ 8,188	\$ 18,254	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,845	\$ 1,010
3400-D-b-Tk1	Haul-Cover	Tailings Pond 6	Miscellaneous	60.3	\$ 151,209	\$ 38,303	\$ 56,854	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 189,512	\$ 3,145
3400-F-d-U3	Grade Benches-Miscellaneous SMA-Plac	Miscellaneous SA	-	60.3	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3400-Hb-e-U8b	Construct Channels w/o Riprap-Miscellar	Miscellaneous SA	-	60.3	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3400-J-e-U2a	Revegetate-Miscellaneous SMA-Final Gr	Miscellaneous SA	-	60.3	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 96,137	\$ 274	\$ 28,923	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 96,411	\$ 1,600
3400-M-e-U9	Post-Closure O&M-Miscellaneous SMA-f	Miscellaneous SA	-	60.3	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3400-P-e-Comb1	Road Maintenance-Miscellaneous SMA	Miscellaneous SA	-	60.3	\$ 96,858	\$ 26,455	\$ 36,994	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 123,313	\$ 2,046
3500-A-f-Mg2	Grade-Impacted Soil at TP7-Fill/Stockpile	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	15,982	\$ 3,431	\$ 5,824	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3500-B-f-Dz4	Dozer Assist-Impacted Soil at TP7-Fill/Stockpile	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3500-C-f-Ld1	Load-Impacted Soil at TP7-Fill/Stockpile	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3500-D-f-Tk3	Haul-Impacted Soil at TP7-Fill/Stockpile	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
3500-E-a-Rp1	Rip-Impacted Soil at TP7-Existing Groun	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,242	\$ 15,742	\$ 22,795	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75,985	\$ 134
3500-J-e-U2a	Revegetate-Impacted Soil at TP7-Final C	Impacted Soil at T X	-	565.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 901,599	\$ 2,568	\$ 271,250	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 904,167	\$ 1,600
<b>Total:</b>					\$ 34,213,519	\$ 8,061,294	\$ 12,682,444	\$ 86,227,860	\$ 25,081,934	\$ 33,392,938	\$ 109,900	\$ 28,469	\$ 41,511	\$ 9,042,643	\$ 25,758	\$ 2,720,521	\$ 6,538,359	\$ 312,239	\$ 2,055,179	\$ 35,431	\$ -	\$ 10,629	\$ 58,367,613	\$ 226,718



**Facility Characteristics**  
Facilities are categorized in this listing to meet the MMD reporting requirement

	1100	1203	1304	1400	1504	1604	1704	1802	1902	2104	2204	2104	2204	3104	3204	3304	3404	3504	3604
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Facility	3A Stockpile	Kessel Stockpile	South Stockpile	Stockpile 2	West Stockpile	Lampright Stockpile	Northeast Stockpile	Upper South	9 Waste Rock	Dams and Reservoirs	Miscellaneous NMA	Unplanned Disturbed Area	Aesth	Tailings Pond 6	Tailings Pond 7	Miscellaneous SMA	Impacted Soil at TPT	Total
Reclaimed Acres <sup>1</sup>	34.12	279.80	507.89	76.00	552.52	935.80	11.74	142.66	161.20	23.89	76.63	200.00	90.79	261.66	1688.37	60.26	665.18	6668.51
<b>Capital Cost</b>	<b>\$234,854</b>	<b>\$2,549,218</b>	<b>\$4,569,682</b>	<b>\$683,651</b>	<b>\$6,451,262</b>	<b>\$8,618,812</b>	<b>\$127,741</b>	<b>\$770,914</b>	<b>\$1,248,078</b>	<b>\$207,787</b>	<b>\$414,115</b>	<b>\$6,870</b>	<b>\$1,964,966</b>	<b>\$12,283,927</b>	<b>\$440,532</b>	<b>\$0</b>	<b>\$0</b>	<b>\$42,274,813</b>
Cover Material Excav. Haul. Grade <sup>1</sup>	\$106,099	\$2,398,036	\$3,343,304	\$886,951	\$21,973,481	\$1,585,021	\$0	\$1,585	\$0	\$0	\$0	\$0	\$7,154	\$0	\$0	\$0	\$0	\$11,309,794
Top/Outside Adjustment Grading <sup>2</sup>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$28,422	\$7,074	\$28,889	\$0	\$0	\$0	\$0	\$0	\$0	\$75,985
Scarify, Seed & Mutch. Reveg <sup>3</sup>	\$54,577	\$447,617	\$812,616	\$121,584	\$883,916	\$1,497,076	\$18,777	\$228,225	\$297,885	\$38,220	\$122,597	\$319,957	\$145,244	\$418,597	\$2,701,037	\$96,411	\$0	\$9,068,402
Channels & Benches <sup>4</sup>	\$1,340,798	\$0	\$1,708,194	\$0	\$1,734,135	\$796,915	\$0	\$15,399	\$46,557	\$0	\$1,382	\$0	\$9,733	\$143,132	\$1,070,352	\$0	\$0	\$6,850,598
Demolition	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Other<sup>5</sup></b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$35,431</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$35,431</b>
<b>Capital Cost Totals</b>	<b>\$1,786,328</b>	<b>\$6,896,671</b>	<b>\$44,586,696</b>	<b>\$1,693,188</b>	<b>\$31,978,225</b>	<b>\$63,891,825</b>	<b>\$148,103</b>	<b>\$1,914,639</b>	<b>\$1,543,321</b>	<b>\$324,429</b>	<b>\$444,167</b>	<b>\$332,716</b>	<b>\$788,486</b>	<b>\$2,666,695</b>	<b>\$16,993,316</b>	<b>\$38,943</b>	<b>\$0</b>	<b>\$99,865</b>
<b>Capital Cost/Acre</b>	<b>\$50,896</b>	<b>\$24,871</b>	<b>\$79,912</b>	<b>\$22,266</b>	<b>\$56,248</b>	<b>\$68,265</b>	<b>\$12,619</b>	<b>\$9,576</b>	<b>\$13,860</b>	<b>\$7,114</b>	<b>\$1,769</b>	<b>\$8,685</b>	<b>\$9,771</b>	<b>\$16,132</b>	<b>\$49,474</b>	<b>\$8,910</b>	<b>\$0</b>	<b>\$38,033</b>
Cover Material Excav. Haul. Grade <sup>1</sup>	\$70,456	\$764,765	\$1,370,624	\$205,095	\$1,935,379	\$2,885,644	\$38,322	\$231,274	\$373,523	\$77,336	\$124,234	\$2,061	\$187,922	\$508,490	\$3,685,178	\$132,160	\$0	\$12,682,444
Top/Outside Adjustment Grading <sup>2</sup>	\$31,830	\$869,651	\$1,034,191	\$266,085	\$6,592,044	\$15,590,706	\$476	\$0	\$0	\$0	\$0	\$0	\$2,131	\$0	\$0	\$0	\$0	\$3,392,938
Scarify, Seed & Mutch. Reveg <sup>3</sup>	\$16,373	\$134,295	\$243,765	\$38,475	\$305,175	\$449,123	\$5,633	\$8,527	\$73,365	\$11,466	\$36,779	\$96,987	\$43,373	\$125,579	\$810,311	\$28,923	\$0	\$2,701,250
Channels & Benches <sup>4</sup>	\$402,239	\$0	\$527,458	\$0	\$520,241	\$239,075	\$0	\$4,620	\$12,167	\$0	\$414	\$0	\$2,900	\$42,940	\$303,106	\$0	\$0	\$2,056,179
Demolition	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Other<sup>5</sup></b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$10,629</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$10,629</b>
<b>Indirect Cost Totals</b>	<b>\$520,889</b>	<b>\$1,768,791</b>	<b>\$12,176,009</b>	<b>\$677,656</b>	<b>\$9,323,467</b>	<b>\$19,164,547</b>	<b>\$44,431</b>	<b>\$304,362</b>	<b>\$463,056</b>	<b>\$97,329</b>	<b>\$163,650</b>	<b>\$166,116</b>	<b>\$236,546</b>	<b>\$767,099</b>	<b>\$4,798,695</b>	<b>\$161,083</b>	<b>\$0</b>	<b>\$299,869</b>
<b>Indirect Cost/Acre</b>	<b>\$15,269</b>	<b>\$6,321</b>	<b>\$23,974</b>	<b>\$6,680</b>	<b>\$16,874</b>	<b>\$17,164,547</b>	<b>\$3,786</b>	<b>\$2,133</b>	<b>\$2,873</b>	<b>\$4,074</b>	<b>\$2,134</b>	<b>\$2,605</b>	<b>\$2,842</b>	<b>\$23,974</b>	<b>\$49,474</b>	<b>\$8,910</b>	<b>\$0</b>	<b>\$116,710</b>
<b>Total Cost</b>	<b>\$2,267,227</b>	<b>\$7,664,372</b>	<b>\$52,762,704</b>	<b>\$2,199,841</b>	<b>\$40,401,692</b>	<b>\$83,046,372</b>	<b>\$192,534</b>	<b>\$1,918,900</b>	<b>\$2,006,577</b>	<b>\$421,758</b>	<b>\$708,717</b>	<b>\$459,830</b>	<b>\$1,025,031</b>	<b>\$3,323,704</b>	<b>\$20,793,911</b>	<b>\$698,026</b>	<b>\$0</b>	<b>\$1,299,434</b>
Total Cost/Cover	\$305,311	\$3,313,983	\$5,939,286	\$888,746	\$8,386,641	\$12,504,456	\$166,064	\$1,022,188	\$1,618,601	\$335,123	\$814,327	\$68,931	\$2,593,456	\$15,969,105	\$572,692	\$0	\$0	\$24,967,257
Top/Outside Adjustment Grading	\$137,929	\$3,769,487	\$43,481,495	\$1,153,036	\$28,565,526	\$67,599,727	\$2,061	\$0	\$0	\$0	\$0	\$0	\$9,235	\$0	\$0	\$0	\$0	\$14,702,733
Total Cost Earthwork	\$443,240	\$7,082,470	\$49,420,781	\$2,041,782	\$36,952,166	\$80,064,183	\$168,125	\$1,022,188	\$1,618,601	\$372,072	\$547,545	\$43,886	\$283,562	\$15,969,105	\$572,692	\$124,017	\$0	\$199,839,869
Capital Cost Re-Veg	\$70,950	\$591,902	\$1,036,271	\$168,059	\$1,149,090	\$1,946,199	\$24,410	\$206,693	\$336,251	\$169,376	\$415,944	\$188,817	\$544,176	\$3,511,348	\$117,816	\$0	\$0	\$11,788,822
Capital Cost Other <sup>6</sup>	\$0	\$0	\$0	\$0	\$46,069	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$46,069
<b>Total Cost/Acre</b>	<b>\$66,162</b>	<b>\$27,393</b>	<b>\$100,886</b>	<b>\$28,845</b>	<b>\$71,122</b>	<b>\$88,744</b>	<b>\$16,404</b>	<b>\$9,246</b>	<b>\$12,448</b>	<b>\$17,854</b>	<b>\$9,346</b>	<b>\$11,290</b>	<b>\$12,702</b>	<b>\$19,316</b>	<b>\$11,683</b>	<b>\$0</b>	<b>\$2,299</b>	<b>\$985,743</b>
Total Cost/Cover Cover	\$6,949	\$11,844	\$11,694	\$11,694	\$15,178	\$15,362	\$14,149	\$7,025	\$10,041	\$14,027	\$7,025	\$46	\$6,969	\$9,912	\$5,458	\$9,903	\$0	\$163,877
Top/Outside Adjustment Grading	\$4,043	\$13,469	\$86,612	\$15,172	\$61,790	\$72,195	\$176	\$0	\$0	\$0	\$0	\$0	\$102	\$0	\$0	\$0	\$0	\$242,812
Total Cost/Acre Earthwork	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,547	\$1,618	\$0	\$0	\$0	\$0	\$0	\$0	\$176
Total Cost/Acre Re-Veg	\$20,892	\$26,313	\$87,206	\$26,866	\$86,679	\$86,657	\$14,324	\$7,025	\$10,041	\$15,674	\$7,146	\$9,071	\$9,912	\$9,458	\$9,683	\$0	\$0	\$219
Capital Cost/Acre Other <sup>6</sup>	\$0	\$0	\$0	\$0	\$83	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$83

1 Cover Material includes dicer assist, load, haul, grade cover, and water truck and motor grader for road maintenance and dust control during reclamation  
 2 Top/Outside Adjustment Grading includes rough grading and shaping before placing cover  
 3 Revegetation includes scarifying, discing, 9R seeding, mulching, eroding, post dem, mobilization, seeding, and mulching  
 4 Channels & Benches includes channels, ditches, dromedaries, benches  
 5 Other includes well rehabilitation/conservation, well replacement, berm construction, fencing and signage, and seepage collector/interceptor trench installation  
 6 Capital costs before O&M

**Attachment 5**  
**Cost Spreadsheet**

**Table 1 RCE Costs**