

APPENDIX B

Earthwork Cost Estimate Summary Report

Appendix B Earthwork Cost Estimate Summary Report

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December 2014



Signature Page

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December 2014



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1.0 INTRODUCTION

1.1 Purpose and Summary

As part of the 2014 Continental Mine Closure/Closeout Plan (CCP) Update, an earthwork reclamation cost estimate for financial assurance was prepared by Telesto Solutions Inc. (Telesto) for Freeport-McMoRan Cobre Mining Company (Cobre). The earthwork reclamation cost estimate is based on a template originally created by the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD, 1996). This earthwork estimate includes reclamation earthwork, demolition, and site operations and maintenance costs. Water related reclamation costs are included in a separate estimate (2014 CCP Update, Appendix C). The earthwork reclamation cost estimate is based on the configuration of facilities as described in the end-of-year (EOY) 2019 mine plan, and assumes reclamation would begin in 2020 (Reclamation year 0).

This document is organized into several major sections. Section 1 provides an introduction and a listing of assumptions that are common throughout the financial assurance cost estimate. Sections 2 through 10 describe the assumptions specific to each type of facility. Table B.1 provides a brief description of each worksheet (Sheet) used in the cost estimate. An overview of the mine facilities is included in Table B.2. A summary of the estimate is included in Table B.3. Unit cost basis for fuel, labor, and equipment costs are summarized in Table B.4, miscellaneous unit cost basis are provided in Table B.5, and equipment production factors are provided in Table B.6. Appendix B.1 contains the cost estimate calculations and an electronic copy of the cost estimate is provided in 2014 CCP Update Appendix D. The unit rates used to develop the cost estimate and other supporting documentation are provided in Appendix B.2. Engineering quantities are provided in Appendix B.3. A closeout plan was recently completed for the Cobre Haul Road and is attached in Appendix B.4, the Cobre Haul Road reclamation costs are included in Table B.3.

The cost calculations (Appendix B.1) are organized by Sheet number and/or name. Throughout this document, the items described are followed by a reference to the location of the corresponding calculation Sheet. Table B.1 provides a brief description of each sheet contained in the cost estimate. Appendix B.2.1 provides the main equations used in the cost estimate spreadsheet.

1.2 Reclamation Overview

A summary of the mine facilities is provided in Table B.2. With the exception of operation and maintenance costs, only facilities requiring reclamation as of EOY 2019 are included in this earthwork reclamation cost estimate.

1.3 Financial Assurance Cost Estimate Assumptions

Assumptions used throughout the cost estimate include:

Dozer Push Distances: Dozer push distances represent the distance from the centroid of the cut block to the centroid of the fill block.

Cover Placement: Trucks and loaders with dozer assist perform all cover loading and distribution. The economic optimum number of trucks per loader was used for each haul route.

Haul Distances: Haul distances are calculated along a preferred route and assumed to originate at the approximate centroid of the source and terminate at the approximate centroid of the reclamation area. A maximum of three segments are used for each haul route.

Borrow Areas: Overburden and topsoil stockpile material was approved for use as cover material (Condition 81; Golder, 2006). Borrow areas are left in a condition such that they can be directly ripped and revegetated (Table B.2 and B.3). The Overburden Stockpiles and Top Soil Stockpile are anticipated to be completely removed and the footprints ripped and revegetated.

Dust Suppression and Site Maintenance: A full time water truck and a motor grader are included as part of the fleet during reclamation. The water truck and grader task time is equal to loader task time (Costs located near the bottom of Magnetite Tailings Sheet 13 and Stockpile Sheet 13).

Labor Rates: With the exception of the truck driver rate all labor rates were developed based on the New Mexico Department of Labor (DOL) Type H (Heavy Engineering) labor rates effective January 1, 2014. These rates include the base, fringe benefit, and apprenticeship contribution rates. The following were added to the labor rates to obtain the total per hour labor

rate: FICA (6.2%), Medicare (1.45%), Federal un-employment (0.6% on first \$7,000), State un-employment (2% on first \$23,400), and Workman's Compensation Insurance. See Table B.4 and Appendix B.2.2, and the bottom of Magnetite Tailings Sheet 13 and Stockpile Sheet 13.

Truck Driver Labor Rate: The base truck driver labor rate for truck drivers was assumed to be 90% of the New Mexico DOL base operator labor rate. Added to the base rate were fringe benefits, apprenticeship contributions, taxes, and Workman's Compensation Insurance (Table B.4 and Appendix B.2.2).

Equipment Rates: Earth-moving equipment used in the estimate would commonly be available to a contractor. The equipment unit operating costs were taken from Equipment Watch Custom Cost Evaluator (Penton Media, Inc., 2014; Table B.4, Appendix B.2.3, and bottom of Magnetite Tailings Sheet 13 and Stockpile Sheet 13).

Equipment Production Factors: Production factors from Caterpillar (2014) for each type of equipment used is presented in Table B.6. Productivity curves were also developed from Caterpillar (2014) and are described in Appendix B.2.4 and B.2.5.

Fuel Costs: The off-road diesel fuel cost of \$3.22/gal was based on a quote obtained on June 18, 2014 from Western Refining for delivery of dyed ultra-low sulfur diesel to Hurley, NM (Table B.4, Magnetite Tailings Sheet 13 and Stockpile Sheet 13).

Capital Indirect Costs: Total indirect costs of 28.3% were applied to the capital direct costs per MMD (1996) and OSM (2000) guidance. The indirect costs are comprised of: Mobilization and Demobilization (3.8%), Contingencies (4.0%), Engineering Redesign Fee (2.5%), Contractor Profit and Overhead (15.0%), and Project Management Fee (3.0%). Indirect cost percentages are identical to the percentages presented to MMD and the New Mexico Environment Department (NMED) in meetings with Tyrone on September 20, 2012, and on November 2, 2012.

Operations and Maintenance Indirect Costs: Total indirect costs of 23.3% were applied for long term operations and maintenance per MMD (1996) and OSM (2000) guidance and comprise the same values and factors as the capital indirect costs with exception of Contractor Profit and Overhead. Contractor Profit and Overhead for long term operations and maintenance is 10.0%, to account for the long term contract and repetitive annual work. Indirect cost percentages are identical to the percentages presented to MMD and the NMED in meetings with Tyrone on September 20, 2012, and on November 2, 2012.

Revegetation Unit Costs: The revegetation unit cost was based on a quote obtained on June 18, 2014 from Rocky Mountain Reclamation of Laramie, WY, and includes: scarifying, discing, rangeland drill seeding, mulching, crimping, and daily per diem (Table B.4 Magnetite Tailings Sheet 14, and Stockpile Sheet 14, and Demolition Sheet 3).

Revegetation and Scarification: Scarifying of the final surface is performed at the same time as the revegetation and is included in the revegetation quote.

Rip Rap: The rip rap unit cost is based on a verbal quote obtained in February 2009 from Fowler Brothers Riprap. The quote was inflated to 2014 dollars and is consistent with recent riprap purchases (Magnetite Tailings Sheet 15 and Stockpile Sheet 15).

Miscellaneous Unit Costs: Miscellaneous unit costs were taken from several sources including R.S. Means Heavy Construction Cost Data Edition 26 (R.S. Means, 2014). All costs taken from R.S. Means were adjusted using the location factor for Las Cruces (84.7%). Miscellaneous unit costs are summarized on Table B.5 and used on Magnetite Tailings Sheet 15, Stockpile Sheet 15, O&M Sheet 22, and Demolition Sheets 1 and 2. Supporting documentation is included in Appendix B.2.6.

Well Abandonment: The well abandonment unit costs are based on MMD Guidance for wet drill holes (MMD, 2013; Appendix B.2.7, Table B.5, Stockpile Sheet 15).

2.0 MAIN TAILINGS IMPOUNDMENT

The Main Tailings Impoundment (MTI) reclamation cost was based on 2013 topography. The MTI is unchanged by EOY 2019. The Reclaim Pond is assumed to be reclaimed with MTI by reclamation year 5. Cost calculations are located in the Cobre_Stockpiles_Tails_Other_2014.xlsx spreadsheet, Stockpile Sheets 1 through 18, in Appendix B.1. The main activities involved in closing the tailing ponds include:

- Regrading top surface and southeast rock embankment (Stockpile Sheet 5 and 13)
- Completing surface water channels to route stormwater (Stockpile Sheet 15, Appendix B.2.8)
- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13)
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14)

The major assumptions for this cost estimate for areas to be closed include:

- **Regrading:** 200-foot maximum interbench slope length, maximum 3H:1V interbench slopes; 0.5% minimum top surface slope. Rock buttresses, constructed along the east and south portions of the embankments in 2005, are preserved at 3H:1V overall slope. The existing test plots are preserved. Dozers perform all top surface and channel regrading. Southwest rock embankment and Weber Pond area left in existing configuration.
- **Top Surface Channels:** Maximum 5% longitudinal slope, 2.5-foot of riprap over 6-inches of gravel bedding underlain by 3-feet of cover

material; constructed to convey runoff from the impoundment top surface and surrounding tributary area to the embankment toe.

- **Downdrain:** 2.5-foot of riprap over 6-inches of gravel bedding underlain by 3-feet of cover material constructed to drain the top surface and discharge on the west side of the embankment.
- **Outslope Channels:** 20-foot wide, 5.0% maximum cross-bench slope, 2.0% longitudinal bench slope, 6-inches of gravel underlain by 3-feet of cover.
- **Cover:** 36-inch cover thickness tops and outslopes. A six-inch-thick cover was placed over approximately 90 percent of the impoundment top surface in 2007. Cover criteria would be met with an additional 18 inches of cover material placed over the top surface where a six-inch thickness has already been added. Remaining areas receive a 24-inch thickness of cover material. The upper 12 inches of tailings is included as part of the cover system (DP-1403, Condition 77) for a total of 36-inches.
- **Tailings Pipelines:** Capped and buried in place with 36-inch-thick cover along a 35-foot wide strip. The 35-foot width was based on two 24-inch diameter pipelines, spaced 5 feet apart with 3 feet of cover at 3H:1V sideslopes. It was assumed pipelines on top of the impoundment were covered when the top is covered. Pipeline flushing costs are included separately in the water management portion of the reclamation cost estimate.

3.0 MAGNETITE TAILINGS IMPOUNDMENT

The Magnetite Tailings Impoundment (MGTI) reclamation cost was based on 2004 topography, prior to the sale and shipping of magnetite material. Cost calculations are located in the Cobre_Mag_Tails_2014.xlsx spreadsheet, Magnetite Tailings Sheets 1 through 18, in Appendix B.1. The main activities involved in closing the MGTI include:

- Regrading top and outslope (Magnetite Tailings Sheet 5 and 13)
- Completing a downdrain channel (Magnetite Tailings Sheet 15, Appendix B.2.8)
- Hauling and grading cover material (Magnetite Tailings Sheet 5, 6, 9, 10, 13)
- Scarifying and revegetating covered areas, includes ripping (Magnetite Tailings Sheet 14)

The major assumptions for this cost estimate for areas to be closed include:

- **Regrading:** maximum 3H:1V interbench slopes; 0.5% minimum top surface slope. Dozers perform all regrading.

- **Downdrain:** 2.5-foot of riprap over 6-inches of gravel bedding underlain by 3-feet of cover material constructed to drain the top surface and discharge on the west side of the embankment.
- **Cover:** 36-inch cover thickness – tops and outslopes.

4.0 WASTE ROCK FACILITIES

The existing Waste Rock Facilities (WRF) include five contiguous waste rock piles: the South, East, West, Buckhorn, and Union Hill. By EOY 2019 the five facilities are combined into the South Waste Rock Disposal Facility (SWRDF). The SWRDF is at less than half of its anticipated maximum capacity by EOY 2019. This reclamation cost estimate is based on the 2019 projected configuration of the SWRDF. During mining, SWRDF material is placed at a 3.5H:1V overall slope (3H:1V interbench slope). Material placed on the east side is placed at 3H:1V overall slope (2.5H:1V interbench slope) to preserve the road located at the toe of the stockpile. Cost calculations are located in the Cobre_Stockpiles_Tails_Other_2014.xlsx spreadsheet, Stockpile Sheets 1 through 18, in Appendix B.1. The main activities involved in closing the SWRDF include:

- Regrading top surfaces and outslope benches (Stockpile Sheet 5 and 13)
- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13)
- Completing surface water channels to route stormwater (Stockpile Sheet 15, Appendix B.2.8)
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14)
- Scarifying and revegetating the disturbed area adjacent and North of the SWRDF includes ripping (Stockpile Sheet 14)

Assumptions for this reclamation cost estimate include:

- **Regrading:** 200-foot maximum interbench slope length, maximum 3H:1V interbench slopes; 1% minimum top surface slope; East side 175-foot maximum interbench slope length, maximum 2.5H:1V interbench slope to preserve the road located at the toe of the stockpile.
- **Top Surface Channels:** maximum 5% longitudinal slope, 1-foot of riprap over 6-inches of gravel bedding underlain by 3-feet of cover material.
- **Benches:** 30-foot bench width, 5.0% maximum cross-bench slope, 2.0% longitudinal bench slope and 3-feet of cover.

- **Outslope Channels:** 20-foot wide, 5.0% maximum cross-bench slope, 2.0% longitudinal bench slope, 6-inches of gravel underlain by 3-feet of cover.
- **Down drains:** 2.5-foot of riprap over 6-inches of gravel bedding underlain by 3-feet of cover material.
- **Cover:** 36-inch cover thickness tops and outslopes. The upper 24 inches of waste rock are approved as part of the cover (DP-1403, Condition 77) on the east side of the East, and Union Hill WRFs unburied by the expansion.

5.0 OTHER STOCKPILES

The cost estimate includes reclamation of the Low-Grade Waste Rock Stockpiles located east of the Continental Pit. Cost calculations are located in the Cobre_Stockpiles_Tails_Other_2014.xlsx spreadsheet, Stockpile Sheets 1 through 18, in Appendix B.1. The main activities involved in closing the ore stockpiles include:

- Surface grading (Stockpile Sheet 6 and 13)
- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13)
- Completing surface water channels (Stockpile Sheet 15, Appendix B.2.8)
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14)

Assumptions for this reclamation cost estimate include:

- **Cover:** 36-inch cover thickness tops and outslopes. The upper 24 inches of material is approved as part of the cover (DP-1403, Condition 77).

6.0 HANOVER MOUNTAIN DEPOSIT

The proposed Hanover Mountain Deposit is planned to be mined from 2015 through 2020. Cost calculations are located in the Cobre_Stockpiles_Tails_Other_2014.xlsx, Stockpile Sheets 1 through 18, in Appendix B.1. The main activities involved in closing the mining of the Hanover Mountain Deposit include:

- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13)
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14)
- Safety Fencing and Berms to prevent run-on (Stockpile Sheet 15)

Assumptions for this reclamation cost estimate include:

- **Cover:** 36-inch cover thickness tops and outslopes in areas that are 50-feet from highwalls.
- **Fencing and Berms:** A combination of 6-foot chain link fencing and 2H:1V slope, 5-feet high, and 10-foot top width berms will be constructed approximately 40 feet from the highwalls for public safety (Sheet 15). Revegetation is included for an approximately 25-foot-wide disturbance area used to construct the chain link fencing, and approximately 100-foot-wide disturbance area used to construct the berm (Sheet 14).

7.0 CONTINENTAL PIT

In the MMD permit GR002RE 01-1 the Continental Pit was granted a conditional waiver from achieving a self-sustaining ecosystem. The Continental Pit extent was delineated using 2013 topography. Reclamation of the open pit consists of a combination of fencing and berms to prevent access and minimize runoff into the open pit (Stockpile Sheet 15).

Assumptions for this reclamation cost estimate include:

- **Fencing and Berms:** A combination of 6-foot chain link fencing and 2H:1V slope, 5-feet high, 10-foot top width berms will be constructed approximately 40 feet from the open pit highwalls for public safety (Sheet 15). Revegetation is included for an approximately 25-foot-wide disturbance area used to construct the chain link fencing, and approximately 100-foot-wide disturbance area used to construct the berm (Sheet 14).

8.0 BUILDING DEMOLITION/RECLAMATION

A number of facilities are used for Industrial Post Mining Land Use (PMLU). Those facilities not designated for Industrial PMLU will be demolished, removed, and/or buried or otherwise closed in accordance with an approved plan. Demolition cost calculations, to demolish buildings and other miscellaneous structures upon closure, are located in Cobre_Demolition_2014.xlsx, Demolition Sheets 1 through 4, in Appendix B.1. Appendix B.3 provides the building information for the demolition cost estimate.

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

- All equipment and above-grade structures are demolished and removed from the area or buried (Demolition Sheet 1).
- Debris is placed either into the stockpiles or other designated area.
- Demolition debris is covered with 36-inches of cover material (Demolition Sheet 2).
- Demolition areas are covered with 36-inches of cover material, scarified and revegetated (Demolition Sheets 2 and 3).
- Salvage value for all structures and equipment is zero.
- Any new buildings constructed prior to reclamation have an Industrial PMLU.

9.0 OTHER MISCELLANEOUS COSTS

This category includes miscellaneous estimated closure costs such as wells, surface impoundments, Pearson-Barnes Mine Area, and roads. Post closure capital and operation and maintenance costs associated with utilities such as tanks, ponds, pumps, pipelines, and electrical infrastructure are located in a separate water management cost estimate. Cost calculations are located in the Cobre_Stockpiles_Tails_Other_2014.xlsx spreadsheet, Stockpile Sheets 1 through 18, in Appendix B.1. Appendix B.3 and Table B.5 provide the support for the other miscellaneous costs.

9.1 Wells

Costs are included for the abandonment of post closure monitoring wells. It was assumed that 7 monitoring wells are used for post closure monitoring and are abandoned at reclamation year 99 (Appendix B.3, Stockpile Sheet 15). Well abandonment unit cost estimates are based on MMD guidance for abandoning wet drill holes (MMD, 2013; Table B.5, Appendix B.2.7).

9.2 Surface impoundments

Surface impoundments are stormwater and seepage retention structures. Existing and planned impoundments and their PMLU are listed in Appendix B.3. The operation and maintenance (O&M) costs for surface impoundments are included in a separate water management cost estimate.

Costs are included to close non-Industrial PMLU surface impoundments used during reclamation years 0 to 12. A table describing water management surface impoundments is included in Table C.1 in Appendix C of the 2014 CCP Update. The main activities involved in closing surface impoundments include:

- Ripping liners and burying in place (Stockpile Sheet 7 and 13).
- Grading to drain (Stockpile Sheet 6 and 13)
- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13).
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14).

Assumptions for this reclamation cost estimate include:

- **Cover:** 36-inch cover thickness

9.3 Pearson-Barnes Mine Area

The Pearson-Barnes Mine Area is ultimately incorporated into the SWRDF expansion. By EOY 2019 the Pearson-Barnes Mine area is unchanged. The main activities involved in closing the Pearson-Barnes Mine Area include:

- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13).
- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14).

Assumptions for this reclamation cost estimate include:

- **Cover:** 36-inch cover thickness, tapering down to existing channels. Existing channels will remain in their current configuration.

9.4 Roads

A closeout plan, including reclamation costs, was recently completed for the Cobre Haul Road and is included in Appendix B.4 and Table B.3. The main activities involved in closing other roads not needed post-closure include:

- Grading to drain (Stockpile Sheet 6 and 13)
- Hauling and grading cover material (Stockpile Sheet 5, 6, 9, 10, 13).

- Scarifying and revegetating covered areas, includes ripping (Stockpile Sheet 14).

Assumptions for this reclamation cost estimate include:

- **Exploration Roads:** Approximately 15 miles of average 20-foot wide roads located in the area to the west of the MTI, and areas on Hermosa Mountain west of the Continental Pit.
- **Haul Roads:** Roads located outside facility footprints are included as a separate line item in the reclamation cost estimate. Roads located within a facility footprint are reclaimed along with that facility.
- **Cover:** 36-inch cover thickness

10.0 OPERATIONS AND MAINTENANCE

Operations and maintenance estimated costs relate to periodic erosion control, road maintenance, and vegetation maintenance. Cost calculations are located in Cobre_O&M_2014.xlsx spreadsheet, O&M Sheet 19 through 21, in Appendix B.1. Operations and maintenance costs are assumed to diminish with time:

Erosion Control (O&M Sheet 20):

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

Road Maintenance (O&M Sheet 20):

- 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

Revegetation Maintenance (O&M Sheet 19):

- Reclamation Years 0–11 Based on observations of previously reclaimed areas, the annual vegetation failure is conservatively estimated to be 2% failure every year for a total of 12 years, starting the year reclamation is completed.

11.0 COST ESTIMATE

The total current dollar cost for reclamation is estimated to be **\$22,677,000**. A summary of the estimate is provided in Table B.3. The costs presented in this estimate are current (2014) dollar costs, a net present value calculation will be presented separately which will include water management costs.

12.0 REFERENCES

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TABLES

Table B.1 Cost Estimate Sheet Descriptions

Worksheet	Description
Cobre_Stockpiles_Tails_Other_2014.xlsx (Stockpile Sheets) and Cobre_Mag_Tails_2014.xlsx (Magnetite Tailings Sheets)	
1 General	Cover sheet
2 Demo	Building demolition is included on a separate spreadsheet. Sheet 2 is blank and remains to maintain consistency between different cost estimates
3 Material	General overview of tasks, locations, and equipment
4 Earthwork	General overview of material quantities
5 Dozer	Task time calculation for regrading and the dozer to assist the loader with loading cover material. The dozer assist is used to push-up material for ease of excavation by the loader and would maintain the working area of the loader. The dozer assist task time is equivalent to the calculated loader task time
6 Grading	Task time calculation for grading surfaces and spreading cover material
7 Ripper	Ripper task time is not calculated separately from revegetation in this earthwork cost estimate. Sheet 7 is used only for estimating the task time to rip surface impoundment liners
8 Excavator	Excavation is not utilized in this earthwork cost estimate. Sheet 8 is blank and remains to maintain consistency between different cost estimates
9 Trucks	Sheet 9 Task time calculation for hauling material
10 Loader	Sheet 10 Task time calculations for loading material onto haul trucks
11 Scraper	Sheet 11 is blank and remains to maintain consistency between different cost estimates
12 M grader	Motor graders are utilized for dust suppression and site maintenance as well as post closure road maintenance. Motor grader costs are accounted for elsewhere in the estimate (13 EarthSum). Sheet 12 is blank and remains to maintain consistency between different cost estimates.
13 EarthSum	Earthwork indirect cost calculation summary. Utilizes the task times calculated in Sheets 5, 6, 7, 9 and 10
14 Revegetation	Revegetation indirect cost calculations, which include scarifying, discing, rangeland drill seeding, mulching, crimping, and daily per diem.
15 Other	Miscellaneous indirect cost calculations, which include costs for benches, channels, downdrains, plug and abandon wells, fence, berms, and reinforced concrete wall demolition.
16 Sum	Total direct earthwork cost summation and indirect cost calculation based on the direct costs calculated on Sheets 13, 14 and 15
17 Detailed Sum	Detailed summary of direct and indirect costs for each item
18 Facility Characteristics	Capital cost per acre for each item
Cobre_Demolition_2014.xlsx (Demolition Sheets)	
1 Demo	Building demolition cost calculation
2 Cover	Building footprint cover cost calculation
3 Reveg	Building footprint revegetation cost calculation
4 Sum	Total direct demolition cost summation and indirect cost calculation based on the direct costs calculated on Demolition Sheets 1-3
Cobre_O&M_2014.xlsx (O&M Sheets)	
19 Veg Maintenance	Calculated the direct current dollar cost for maintaining vegetation on reclaimed surfaces
20 O&M	Operations and Maintenance direct cost calculations for erosion control, and road maintenance
21 Sum	Total current dollar operations and maintenance cost summation based on the costs calculated on Sheets 19 through 22

Table B.2 Facility Overview¹

Feature	Notes
Main Tailings Impoundment	Remains in existing configuration by EOY 2019
Magnetite Tailings Impoundment	Sale and shipping of magnetite material continues through mine life. Reclamation costs use pre-sales configuration.
South Waste Rock Disposal Facility	Approximately half planned SWRDF placed by EOY 2019
South, East, and Union Hill WRF	Covered by SWRDF by EOY 2019. East side is not buried by the expansion.
West and Buckhorn WRF	Covered by SWRDF by EOY 2019
Low Grade WRF	Remains in existing configuration by EOY 2019
Hanover Mountain Deposit	Mining still in progress by EOY 2019
Pearson Barnes	EOY 2019 the Pearson Barnes Mine area is unchanged
Cobre Haul Road	Constructed by EOY 2015
Haul Roads and Exploration Roads	EOY 2019 Various changes to Haul Roads accommodate SWRDF expansion, Hanover Mountain exploration roads are mined out
Overburden and Topsoil Stockpiles	
East OB Stockpile	EOY 2019 covered by SWRDF
Top Soil Stockpile (TSSP)	Remains in existing configuration by EOY 2019
NOBS	Proposed Topsoil stockpile, in place by EOY 2019
South OB Stockpile	Proposed Topsoil stockpile, in place by EOY 2019
OB Stockpile-1	Remains in existing configuration by EOY 2019
OB Stockpile -2	Remains in existing configuration by EOY 2019
OB Stockpile -3	Remains in existing configuration by EOY 2019
OB Stockpile -4	Remains in existing configuration by EOY 2019
OB Stockpile -5	Remains in existing configuration by EOY 2019
Pit	
Continental Pit	GR002RE 01-1 Pit reclamation waiver

¹See Appendix C Table C.1 for Surface Impoundments

Table B.3 Cost Estimate Summary

Item	Subtotal, Direct Costs	Subtotal, Indirect Costs	Total Estimated Cost
Capital		28.3%	
Tailing Ponds			
Magnetite Tailing Pond	\$1,015,682	\$287,438	\$1,303,120
Main Tailings Impoundment	\$2,591,919	\$733,513	\$3,325,432
Subtotal	\$3,607,601	\$1,020,951	\$4,628,552
Waste Rock and Ore Piles			
SWRDF	\$8,208,701	\$2,323,062	\$10,531,763
Hanover Mountain Deposit	\$1,458,813	\$412,844	\$1,871,657
Low Grade WRF	\$127,626	\$36,118	\$163,744
Subtotal	\$9,795,140	\$2,772,024	\$12,567,164
Continental Pit			
Total	\$84,434	\$23,895	\$108,329
Surface Impoundments			
Subtotal	\$98,017	\$27,739	\$125,756
Historic Sites			
Pearson-Barnes Mine Area	\$146,547	\$41,473	\$188,020
Other Disturbed Areas			
Haul and Exploration Roads	\$88,407	\$25,019	\$113,426
Wells	\$7,791	\$2,205	\$9,996
Subtotal	\$96,198	\$27,224	\$123,422
Demolition			
Buildings	\$575,750	\$162,937	\$738,687
Cover	\$37,473	\$10,605	\$48,078
Rip & Revegetation	\$963	\$273	\$1,236
Subtotal	\$614,186	\$173,815	\$788,001

Total Capital Cost	\$14,442,123	\$4,087,121	\$18,529,244
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O&M Overall Site		23.30%	
Revegetation Maintenance	\$206,994	\$48,230	\$255,224
Road Maintenance	\$1,657,960	\$386,305	\$2,044,264
Erosion Control	\$1,253,130	\$291,979	\$1,545,109
Total O&M	\$3,118,084	\$726,514	\$3,844,598

CHR*			
CHR Total Capital Cost	\$139,726	\$39,542	\$179,268
CHR Total Operations and Maintenance	\$100,103	\$23,324	\$123,427
Total CHR	\$239,829	\$62,866	\$302,695

Total Earthwork with O&M	\$17,800,000	\$4,877,000	\$22,677,000
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*From 2014 Cobre Haul Road Closeout Plan (Appendix B.4)

Table B.4 Fuel, Labor, and Equipment Unit Costs

Parameter	Value	Comment
Revegetation	\$899/acre	Rocky Mountain Reclamation Quote (June, 18 2014, \$1153/acre minus 28.3% indirect costs)
Fuel	\$3.215/gal	Western Refining Quote, Lordsburg NM (June 18, 2014).
Dozer Operator	\$47.58/hr	Based on New Mexico Department of Labor Rates
Mechanic	\$47.75/hr	Based on New Mexico Department of Labor Rates
Haul Truck Operator	\$42.82/hr	Base Rate 90% x Dozer Operator Base Rate
Truck Driver	\$25.34/hr	Based on New Mexico Department of Labor Rates
Loader Operator	\$47.75/hr	Based on New Mexico Department of Labor Rates
Motor Grader	\$47.58	Based on New Mexico Department of Labor Rates
Caterpillar D11T CD	\$509.12/hr	Standard Crawler Dozer, rates is for U blade assume same price for CD blade
Caterpillar D11T w/ Multishank Ripper	\$534.56/hr	Standard Crawler Dozer
Caterpillar D6T XL SU	\$102.89/hr	LGP Crawler Dozer
Caterpillar D9T SU	\$227.29/hr	Standard Crawler Dozer
Caterpillar 777F	\$294.40	Mechanical Rear Dump
Caterpillar 992K	\$369.97/hr	4-WD Articulated Loader
Caterpillar 16M	\$164.06/hr	Articulated Frame Grader
Off-Highway Water Tanker Truck	\$171.97/hr	10,000 Gallon

Equipment Unit Rate Notes: Equipment unit rates from EquipmentWatch Custom Cost Evaluator Version 6.15.0B, adjusted Sales Tax = 0%, Fuel = \$3.215/gal, mechanic wage \$47.75/hr. Annual Use Hours increased as shown to correct for 50 min work hour.

Table B.5 Miscellaneous Unit Costs

Activity	Base Unit Cost \$/unit ¹	Units	Scaled Cost Las Cruces 84.7 % ²	Means Line Item	Means Page	Reference
Erosion Control Crew	\$5,480	day	\$4,641	Modified Crew B-13A	543	1 Foreman, 2 laborers, 2 equip. operators, 2 truck drivers, 1 crawler loader (4 cy), 2 dump trucks (8 cy)
Riprap	\$32.33	cy	-	-	-	Fowler Brothers Riprap Verbal Quote February 2009 \$29.16/cy inflated to 2014 dollars
Chain link fence, open pit perimeters	\$24.02	ft	\$20.34	323113.20-0800	316	Fence, chain link industrial, schedule 40, including concrete, 6 ga. wire, 6' high, but omit barbed wire, galv. Steel
Down drain	\$5.86	ft	-	-	-	Excavate and waste 7.6 cy/lf material on slopes with D11T CD, 175-foot downslope excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 3 passes 1 mph.
Type 1 Channel	\$3.28	ft	-	-	-	Excavate and waste 2.4 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D9T SU 3 passes 1 mph.
Type 2 Channel	\$9.38	ft	-	-	-	Excavate and waste 7.6 cy/lf with D11T CD, 175-foot downslope excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 3 passes 1 mph.
Gravel	\$5.04	cy	\$4.27	321123.23-0301	302	Base Course Drainage Layers, Crushed 1 1/2 ", Compacted to 4" deep
Riprap - Haul	\$11.05	cy	\$9.36	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
Building Demolition Cover	\$8.53	cy	\$7.22	G1030140-7600	481	Load and Haul earth 5-cy loader, 12 20-cy trailers, 4-mile RT
Outslope Channel	\$0.48	ft	-	-	-	Excavate and waste 0.43 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 1 pass 1 mph.
Rip rap, backfill	\$1.07	cy	\$0.91	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
3:1 Slope Stockpile Bench Grading	\$2.12	ft	-	-	-	Excavate and waste 9.26 cy/lf on slopes with D11T CD, 87-foot push. Finish grade with D9T SU 3 passes 1 mph.
3:1 Slope Tailings Bench Grading	\$1.86	ft	-	-	-	Excavate and waste 9.26 cy/lf on slopes with D11T CD, 87-foot push. Finish grade with D9T SU 3 passes 1 mph.
2.5:1 Slope Stockpile Bench Grading	\$1.81	ft	-	-	-	Excavate and waste 9.52 cy/lf on slopes with D11T CD, 78-foot push. Finish grade with D9T SU 3 passes 1 mph.
Structure Demolition	\$0.3	cft	\$0.25	024116.13 0100	37	Structure Demolition Building demolition large urban projects includes 20 mi. haul no foundation or dump fees mixture of types
Reinforced Concrete Wall Demolition	\$198.01	hr	-	Crew B-12C	541	1 Equip. Operator (crane), 1 laborer, 1 Hyd. Excavator, 2 C.Y. Approximately 40 hrs to demo a 200' reinforced concrete dam.
Road Maintenance Crew	\$10,234	month	-	-	-	Equipment Rates - Equipment Watch / Labor Rates NM DOL: Cat 16M motor grader, 10,000-gallon off-highway water tanker truck 24 hours / month
Plug & Abandon Wells	\$11.13	ft	-	-	-	\$14.00/ft minus 28.3% indirect costs then added 2% inflation from 2013 to 2014. "Estimated costs for abandoning boreholes using bentonite cement grout ranges from approximately \$14.00 to \$25.00 per foot. For the purposes of estimating a simplified cost of abandoning boreholes the MMD cost is \$14.00/ft. The FA cost estimate could be higher or lower based on site specific characteristics". (MMD, 2013).

¹ Overhead and Profit are included in the indirect costs.
² City Cost Index Las Cruces-Total 84.7% (weighted average) R.S. Means Heavy Construction Cost Data, 28th Annual Edition, 2014, pg. 594.

Table B.6 Equipment Production Factors

Parameter	Value	Comment/Reference
Swell Factor Stockpiles and Tailings ⁽¹⁾	0% Pushdown, 0% load & haul cover 15% load & haul cover	No virgin materials are being regraded as part of closure. Thus a swell factor is not applied when regrading material. Cover material volumes are calculated based on the reclaimed area and the cover depth. Thus, a swell factor is not needed to calculate this cost. A portion of the excavation for the Reclaim Pond outlet channel is used for cover material. A cover volume was calculated based on an excavation volume; this calculation utilizes a swell factor.
Regrading Tops and Outslopes (D11T CD)		
Operator Factor ⁽¹⁾	0.75 coarse grading	Due to small job size assume average instead of excellent operator (CPH 44, 19-55, average)
Material Factor	1.2	CPH 44, 19-55, Loose stockpile
Work Hour	50 min	(CPH 44, 19-55)
Grade Factor – Tops	1.0	(CPH 44, 19-55) 1-5% Slope
Grade Factor - Outslopes ⁽¹⁾	1.6	(CPH 44, 19-55) 1.6 – 3H:1V Slopes
Soil Weight	3,300 lb/cy Stockpile 2,900 lb/cy Tailings 4,185 lb/cy Magnetite Tailings	-
Production Method/ Blade Factor	1.2	(CPH 44, 19-55, slot dozing)
Visibility Factor	1.0	(CPH 44, 19-55) Clear
Elevation Factor	1.0	(CPH 44, 30-5)
Direct Drive Transmission	1.0	-
Grading Cover, Other Surfaces, and Channels (D11T, D9T, 16M, D6T)		
Material Factor	1.2	CPH 44, 19-55, Loose stockpile
Grade Factor – Tops	1.0	(CPH 44, 19-55) 1-5% slopes
Grade Factor - Outslopes ⁽¹⁾	1.6	(CPH 44, 19-55) 1.6 – 3H:1V Slopes
Soil Weight (lb/cy)	3,300 lb/cy	-
Production Method/Blade	1.2 1.0	(CPH 44, 19-55, slot dozing) No correction applied channels/down drains/benches
Effective Blade Width (feet)	22 D11T CD Universal Blade 14.25 D9T Semi Universal Blade 16 16M 17.5 D6T XL SU	(CPH 44, 19-49) (CPH 44, 19-47) (CPH 44, 11-17) (CPH 44, 19-43)
Speed (miles/hr)	2.5 mph D11T CD and 16M 1.0 mph D9T and D6T	-
Operator	0.75	(CPH 44, 19-55, average)
Work Hour (min/hr)	50	(CPH 44, 19-55)
Visibility	1.0	(CPH 44, 19-55) Clear
Elevation	1.0	(CPH 44, 30-5)
Direct Drive Transmission	1.0	-
Ripper (D11T CD Multishank)		
Ripping Length (ft)	1000 large surface areas 100 liners	-
Penetration (in)	18	-
Pocket Spacing (in)	69	(CPH 44, 19-72)
Number of Pockets	3	(CPH 44, 19-72)
Turn Time (min/pass)	0.25	-

Table B.6 Equipment Production Factors Continued

Parameter	Value	Comment/Reference
Speed (mph)	1	-
Work Hour (min/hr)	50	(CPH 44, 19-55)
Distance between passes (in)	69	Maintain pocket spacing between passes
Loader (992K)		
Net Bucket Capacity (cy)	16.0	(CPH 44, 23-288, Standard, 3000 lb/yd3)
Loader Cycle Time (min)	0.65	(CPH 44, 23-223) Avg 0.6-0.7
Bucket Fill Factor	.875	(CPH 44, 30-1) Avg 0.85-0.90 Loose Material 1" and over
Work Hour (min/hr)	50	(CPH 44, 19-55)
Trucks (CAT 777F)		
Struck Capacity (cy)	54.8	(CPH 44, 10-12)
Heaped Capacity(cy)	78.6	(CPH 44, 10-12)
Rolling Resistance (%)	2.5%	(CPH 44, 30-1) Radial tires, dirt road maintained fairly regularly, watered, flexing slightly
Truck Exchange Time (min)	0.7	(CPH 44, 10-20) Avg. 0.6-0.8
Dump/Maneuver Time (min)	1.1	(CPH 44, 10-20) Avg 1.0-1.2
Work Hour (min/hr)	50	(CPH 44, 19-55)

CPH = Caterpillar Performance Handbook Edition 44(Caterpillar, Inc. 2014)

⁽¹⁾ 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 (Tyrone, 2012).

APPENDIX B.1

COST CALCULATIONS

General Information

Applicant	Cobre Mining Company Hanover, New Mexico 88401		
Disturbed Surface Area (acres)	85J		
Type of Operation	Existing/Surface/Copper		
Current value before escalation and discounting	\$16,438,122		
Based on Projected EOY 2019 Mine Plan		Stockpiles, Main Tailings Impoundment, Surface Impoundments, Haul Roads, Borrow Areas, Wells and Continental Pit	

Demolition

Demo cost are addressed elsewhere.

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Material Handling Plan Summary Sheet

Item	Description	Location 1	Location 2	Total Haul/Push Distance (ft)	Grade (%)	Equipment
1100	Regrade Top	SWRDF	-	540	see dozer	D11T CD
1101	Regrade Top	MTI	-	200	see dozer	D11T CD
1102	Regrade Outslope	MTI Reclaim Pond	-	200	see dozer	D11T CD
1103	Regrade Outslope	MTI	-	250	see dozer	D11T CD
1104	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	-	see dozer	D11T CD
1105	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes	-	see dozer	D11T CD
1106	Dozer Assist	NOBS	SWRDF Top	-	see dozer	D11T CD
1107	Dozer Assist	NOBS	Hanover Mountain Deposit	-	see dozer	D11T CD
1108	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	-	see dozer	D11T CD
1109	Dozer Assist	OB-4 Stockpile	Low Grade WRF	-	see dozer	D11T CD
1110	Dozer Assist	NOBS	MTI Reclaim Pond	-	see dozer	D11T CD
1111	Dozer Assist	NOBS	MTI Top	-	see dozer	D11T CD
1112	Dozer Assist	NOBS	MTI Outslope	-	see dozer	D11T CD
1113	Dozer Assist	Reclaim Pond Outlet Channel	MTI Top	-	see dozer	D11T CD
1114	Dozer Assist	NOBS	Tailing Pipeline Corridor	-	see dozer	D11T CD
1115	Dozer Assist	NOBS	Grape Gulch Pond #3	-	see dozer	D11T CD
1116	Dozer Assist	NOBS	Magnetite Seepage Pond	-	see dozer	D11T CD
1117	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	-	see dozer	D11T CD
1118	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	-	see dozer	D11T CD
1119	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	-	see dozer	D11T CD
1120	Dozer Assist	OB-4 Stockpile	North Tailings Decant Pond	-	see dozer	D11T CD
1121	Dozer Assist	OB-4 Stockpile	East WRF Containment	-	see dozer	D11T CD
1122	Dozer Assist	NOBS	Blackman's Seep (Pond #2)	-	see dozer	D11T CD
1123	Dozer Assist	OB-4 Stockpile	Decant Pond #4	-	see dozer	D11T CD
1124	Dozer Assist	NOBS	Upper Creek Containment Pond 1	-	see dozer	D11T CD
1200	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top			992K
1201	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes			992K
1202	Load cover soil	NOBS	SWRDF Top			992K
1203	Load cover soil	NOBS	Hanover Mountain Deposit			992K
1204	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area			992K
1205	Load cover soil	OB-4 Stockpile	Low Grade WRF			992K
1206	Load cover soil	NOBS	MTI Reclaim Pond			992K
1207	Load cover soil	NOBS	MTI Top			992K
1208	Load cover soil	NOBS	MTI Outslope			992K
1209	Load cover soil	Reclaim Pond Outlet Channel	MTI Top			992K
1210	Load cover soil	NOBS	Tailing Pipeline Corridor			992K
1211	Load cover soil	NOBS	Grape Gulch Pond #3			992K
1212	Load cover soil	NOBS	Magnetite Seepage Pond			992K
1213	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1			992K
1214	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2			992K
1215	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3			992K
1216	Load cover soil	OB-4 Stockpile	North Tailings Decant Pond			992K
1217	Load cover soil	OB-4 Stockpile	East WRF Containment			992K
1218	Load cover soil	NOBS	Blackman's Seep (Pond #2)			992K
1219	Load cover soil	OB-4 Stockpile	Decant Pond #4			992K
1220	Load cover soil	NOBS	Upper Creek Containment Pond 1			992K
1300	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	3,630	see Trucks	777F
1301	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes	3,630	see Trucks	777F
1302	Haul cover soil	NOBS	SWRDF Top	12,559	see Trucks	777F
1303	Haul cover soil	NOBS	Hanover Mountain Deposit	5,707	see Trucks	777F
1304	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	600	see Trucks	777F
1305	Haul cover soil	OB-4 Stockpile	Low Grade WRF	1,000	see Trucks	777F
1306	Haul cover soil	NOBS	MTI Reclaim Pond	7,193	see Trucks	777F
1307	Haul cover soil	NOBS	MTI Top	7,193	see Trucks	777F
1308	Haul cover soil	NOBS	MTI Outslope	7,193	see Trucks	777F
1309	Haul cover soil	Reclaim Pond Outlet Channel	MTI Top	1,172	see Trucks	777F
1310	Haul cover soil	NOBS	Tailing Pipeline Corridor	7,193	see Trucks	777F
1311	Haul cover soil	NOBS	Grape Gulch Pond #3	3,856	see Trucks	777F
1312	Haul cover soil	NOBS	Magnetite Seepage Pond	6,480	see Trucks	777F
1313	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	3,630	see Trucks	777F
1314	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	3,630	see Trucks	777F
1315	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	3,630	see Trucks	777F
1316	Haul cover soil	OB-4 Stockpile	North Tailings Decant Pond	1,000	see Trucks	777F
1317	Haul cover soil	OB-4 Stockpile	East WRF Containment	1,000	see Trucks	777F
1318	Haul cover soil	NOBS	Blackman's Seep (Pond #2)	3,856	see Trucks	777F
1319	Haul cover soil	OB-4 Stockpile	Decant Pond #4	1,000	see Trucks	777F
1320	Haul cover soil	NOBS	Upper Creek Containment Pond 1	3,856	see Trucks	777F
1400	Rip liners	East WRF Containment	-	1,000		D11T w/ ripper
1401	Rip liners	Decant Pond #4	-	1,000		D11T w/ ripper
1402	Rip liners	Blackman's Seep (Pond #2)	-	1,000		D11T w/ ripper
1403	Rip liners	Grape Gulch Pond #3	-	1,000		D11T w/ ripper
1404	Rip liners	Magnetite Seepage Pond	-	1,000		D11T w/ ripper
1405	Rip surface	Reclaim Pond Outlet Channel	-	1,000		D11T w/ ripper
1406	Rip liners	Upper Creek Containment Pond 1	-	1,000		D11T w/ ripper
1500	Grade surface	Haul Roads	-			16M
1501	Grade surface	Exploration Roads	-			16M
1502	Grade surface	Low Grade WRF	-			16M
1503	Grade surface	Grape Gulch Pond #3	-			16M
1504	Grade surface	Magnetite Seepage Pond	-			16M
1505	Grade surface	SWRF Dam 1	-			16M
1506	Grade surface	SWRF Dam 2	-			16M
1507	Grade surface	SWRF Dam 3	-			16M
1508	Grade surface	North Tailings Decant Pond	-			16M
1509	Grade surface	East WRF Containment	-			16M
1510	Grade surface	Blackman's Seep (Pond #2)	-			16M
1511	Grade surface	Decant Pond #4	-			16M
1512	Grade surface	Upper Creek Containment Pond 1	-			16M
1513	Grade cover soil	SWRDF Top	-			D11T CD
1514	Grade cover soil	SWRDF Outslopes	-			D11T CD
1515	Grade cover soil	SWRDF Top	-			D11T CD
1516	Grade cover soil	Hanover Mountain Deposit	-			D11T CD
1517	Grade cover soil	Pearson-Barnes Mine Area	-			D11T CD
1518	Grade cover soil	Low Grade WRF	-			D11T CD
1519	Grade cover soil	MTI Reclaim Pond	-			D11T CD
1520	Grade cover soil	MTI Top	-			D11T CD
1521	Grade cover soil	MTI Outslope	-			D11T CD
1522	Grade cover soil	MTI Top	-			D11T CD
1523	Grade cover soil	Tailing Pipeline Corridor	-			D11T CD
1524	Grade cover soil	Grape Gulch Pond #3	-			D11T CD
1525	Grade cover soil	Magnetite Seepage Pond	-			D11T CD
1526	Grade cover soil	SWRF Dam 1	-			D11T CD
1527	Grade cover soil	SWRF Dam 2	-			D11T CD
1528	Grade cover soil	SWRF Dam 3	-			D11T CD
1529	Grade cover soil	North Tailings Decant Pond	-			D11T CD
1530	Grade cover soil	East WRF Containment	-			D11T CD
1531	Grade cover soil	Blackman's Seep (Pond #2)	-			D11T CD
1532	Grade cover soil	Decant Pond #4	-			D11T CD
1533	Grade cover soil	Upper Creek Containment Pond 1	-			D11T CD
1600	Off-Hwy Water Tanker Truck					10,000 gal
1601	Motor Grader					16M

OB = Overburden
WRF= Waste Rock Facility

		Location 1	Location 2	Area (ac)	Cover Depth (in)	Bank/stockpile Volume (bcy)	Swell Factor (%)	Loose/stockpile Volume (lcy)
Item	Description							
1100	Regrade Top	SWRDF	Top			666,680	0%	666,680
1101	Regrade Top	MTI	Top			50,795	0%	50,795
1102	Regrade Outslope	MTI Reclaim Pond	Top and Outslope			67,765	0%	67,765
1103	Regrade Outslope	MTI	Outslope			170,294	0%	170,294
1104	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top			412,368	0%	412,368
1105	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes			1,237,104	0%	1,237,104
1106	Dozer Assist	NOBS	SWRDF Top			119,548	0%	119,548
1107	Dozer Assist	NOBS	Hanover Mountain Deposit			451,572	0%	451,572
1108	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area			57,596	0%	57,596
1109	Dozer Assist	OB-4 Stockpile	Low Grade WRF			44,899	0%	44,899
1110	Dozer Assist	NOBS	MTI Reclaim Pond			159,720	0%	159,720
1111	Dozer Assist	NOBS	MTI Top			190,284	0%	190,284
1112	Dozer Assist	NOBS	MTI Outslope			175,837	0%	175,837
1113	Dozer Assist	Reclaim Pond Outlet Channel	MTI Top			62,226	15%	71,560
1114	Dozer Assist	NOBS	Tailing Pipeline Corridor			6,999	0%	6,999
1115	Dozer Assist	NOBS	Grape Gulch Pond #3			1,839	0%	1,839
1116	Dozer Assist	NOBS	Magnetite Seepage Pond			968	0%	968
1117	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1			2,517	0%	2,517
1118	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2			1,646	0%	1,646
1119	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3			4,066	0%	4,066
1120	Dozer Assist	OB-4 Stockpile	North Tailings Decant Pond			2,226	0%	2,226
1121	Dozer Assist	OB-4 Stockpile	East WRF Containment			2,420	0%	2,420
1122	Dozer Assist	NOBS	Blackman's Seep (Pond #2)			48	0%	48
1123	Dozer Assist	OB-4 Stockpile	Decant Pond #4			3,001	0%	3,001
1124	Dozer Assist	NOBS	Upper Creek Containment Pond 1			5,469	0%	5,469
1200	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	85	36	412,368	0%	412,368
1201	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes	256	36	1,237,104	0%	1,237,104
1202	Load cover soil	NOBS	SWRDF Top	25	36	119,548	0%	119,548
1203	Load cover soil	NOBS	Hanover Mountain Deposit	93	36	451,572	0%	451,572
1204	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	12	36	57,596	0%	57,596
1205	Load cover soil	OB-4 Stockpile	Low Grade WRF	28	12	44,899	0%	44,899
1206	Load cover soil	NOBS	MTI Reclaim Pond	33	36	159,720	0%	159,720
1207	Load cover soil	NOBS	MTI Top	108	18	190,284	0%	190,284
1208	Load cover soil	NOBS	MTI Outslope	36	36	175,837	0%	175,837
1209	Load cover soil	Reclaim Pond Outlet Channel	MTI Top	-	-	62,226	15%	71,560
1210	Load cover soil	NOBS	Tailing Pipeline Corridor	1.4	36	6,999	0%	6,999
1211	Load cover soil	NOBS	Grape Gulch Pond #3	0.4	36	1,839	0%	1,839
1212	Load cover soil	NOBS	Magnetite Seepage Pond	0.2	36	968	0%	968
1213	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	0.5	36	2,517	0%	2,517
1214	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	0.3	36	1,646	0%	1,646
1215	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	0.8	36	4,066	0%	4,066
1216	Load cover soil	OB-4 Stockpile	North Tailings Decant Pond	0.5	36	2,226	0%	2,226
1217	Load cover soil	OB-4 Stockpile	East WRF Containment	0.5	36	2,420	0%	2,420
1218	Load cover soil	NOBS	Blackman's Seep (Pond #2)	0.0	36	48	0%	48
1219	Load cover soil	OB-4 Stockpile	Decant Pond #4	0.6	36	3,001	0%	3,001
1220	Load cover soil	NOBS	Upper Creek Containment Pond 1	1.1	36	5,469	0%	5,469
1300	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top			412,368	0%	412,368
1301	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes			1,237,104	0%	1,237,104
1302	Haul cover soil	NOBS	SWRDF Top			119,548	0%	119,548
1303	Haul cover soil	NOBS	Hanover Mountain Deposit			451,572	0%	451,572
1304	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area			57,596	0%	57,596
1305	Haul cover soil	OB-4 Stockpile	Low Grade WRF			44,899	0%	44,899
1306	Haul cover soil	NOBS	MTI Reclaim Pond			159,720	0%	159,720
1307	Haul cover soil	NOBS	MTI Top			190,284	0%	190,284
1308	Haul cover soil	NOBS	MTI Outslope			175,837	0%	175,837
1309	Haul cover soil	Reclaim Pond Outlet Channel	MTI Top			62,226	15%	71,560
1310	Haul cover soil	NOBS	Tailing Pipeline Corridor			6,999	0%	6,999
1311	Haul cover soil	NOBS	Grape Gulch Pond #3			1,839	0%	1,839
1312	Haul cover soil	NOBS	Magnetite Seepage Pond			968	0%	968
1313	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1			2,517	0%	2,517
1314	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2			1,646	0%	1,646
1315	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3			4,066	0%	4,066
1316	Haul cover soil	OB-4 Stockpile	North Tailings Decant Pond			2,226	0%	2,226
1317	Haul cover soil	OB-4 Stockpile	East WRF Containment			2,420	0%	2,420
1318	Haul cover soil	NOBS	Blackman's Seep (Pond #2)			48	0%	48
1319	Haul cover soil	OB-4 Stockpile	Decant Pond #4			3,001	0%	3,001
1320	Haul cover soil	NOBS	Upper Creek Containment Pond 1			5,469	0%	5,469
1400	Rip liners	East WRF Containment	-	0.5				
1401	Rip liners	Decant Pond #4	-	0.6				
1402	Rip liners	Blackman's Seep (Pond #2)	-	0.0				
1403	Rip liners	Grape Gulch Pond #3	-	0.4				
1404	Rip liners	Magnetite Seepage Pond	-	0.2				
1405	Rip surface	Reclaim Pond Outlet Channel	-	1.7				
1406	Rip liners	Upper Creek Containment Pond 1	-	1.1				
1500	Grade surface	Haul Roads	-	45				
1501	Grade surface	Exploration Roads	-	37				
1502	Grade surface	Low Grade WRF	-	28				
1503	Grade surface	Grape Gulch Pond #3	-	0.4				
1504	Grade surface	Magnetite Seepage Pond	-	0.2				
1505	Grade surface	SWRF Dam 1	-	0.5				
1506	Grade surface	SWRF Dam 2	-	0.3				
1507	Grade surface	SWRF Dam 3	-	0.8				
1508	Grade surface	North Tailings Decant Pond	-	0.5				
1509	Grade surface	East WRF Containment	-	0.5				
1510	Grade surface	Blackman's Seep (Pond #2)	-	0.0				
1511	Grade surface	Decant Pond #4	-	0.6				
1512	Grade surface	Upper Creek Containment Pond 1	-	1.1				
1513	Grade cover soil	SWRDF Top	-			412,368	0%	412,368
1514	Grade cover soil	SWRDF Outslopes	-			1,237,104	0%	1,237,104
1515	Grade cover soil	SWRDF Top	-			119,548	0%	119,548
1516	Grade cover soil	Hanover Mountain Deposit	-			451,572	0%	451,572
1517	Grade cover soil	Pearson-Barnes Mine Area	-			57,596	0%	57,596
1518	Grade cover soil	Low Grade WRF	-			44,899	0%	44,899
1519	Grade cover soil	MTI Reclaim Pond	-			159,720	0%	159,720
1520	Grade cover soil	MTI Top	-			190,284	0%	190,284
1521	Grade cover soil	MTI Outslope	-			175,837	0%	175,837
1522	Grade cover soil	MTI Top	-			62,226	15%	71,560
1523	Grade cover soil	Tailing Pipeline Corridor	-			6,999	0%	6,999
1524	Grade cover soil	Grape Gulch Pond #3	-			1,839	0%	1,839
1525	Grade cover soil	Magnetite Seepage Pond	-			968	0%	968
1526	Grade cover soil	SWRF Dam 1	-			2,517	0%	2,517
1527	Grade cover soil	SWRF Dam 2	-			1,646	0%	1,646
1528	Grade cover soil	SWRF Dam 3	-			4,066	0%	4,066
1529	Grade cover soil	North Tailings Decant Pond	-			2,226	0%	2,226
1530	Grade cover soil	East WRF Containment	-			2,420	0%	2,420
1531	Grade cover soil	Blackman's Seep (Pond #2)	-			48	0%	48
1532	Grade cover soil	Decant Pond #4	-			3,001	0%	3,001
1533	Grade cover soil	Upper Creek Containment Pond 1	-			5,469	0%	5,469
1600	Off-Hwy Water Tanker Truck							
1601	Motor Grader							

Productivity and Hours Required for Dozer Use—Earthmoving

Task Description	Location 1	Location 2	Equipment	Loose Volume (cy)	Productivity (cy/hr)	Total Task Time (hours)	PERFORMANCE FACTORS										Direct Drive Trans. Factor	Grade (%)
							Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor		
Regrade Top	SWRDF	Top	D11T CD	666,680	449	1,486	1.2	1.02	3,300	1.20	540	701	0.75	50	1.00	1.00	1.00	-1.0
Regrade Top	MTI	Top	D11T CD	50,795	1,197	42	1.2	1.02	2,900	1.20	200	1651	0.75	50	1.00	1.00	1.00	-0.8
Regrade Outslope	MTI Reclaim Pond	Top and Outslope	D11T CD	67,765	1,719	39	1.2	1.66	3,300	1.20	200	1651	0.75	50	1.00	1.00	1.00	-33.0
Regrade Outslope	MTI	Outslope	D11T CD	170,294	1,614	106	1.2	1.66	2,900	1.20	250	1362	0.75	50	1.00	1.00	1.00	-33.0
Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	D11T CD	N/A	N/A	383	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outsoles	D11T CD	N/A	N/A	1,149	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	SWRDF Top	D11T CD	N/A	N/A	111	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Hanover Mountain Deposit	D11T CD	N/A	N/A	419	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	D11T CD	N/A	N/A	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB-4 Stockpile	Low Grade WRF	D11T CD	N/A	N/A	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	MTI Reclaim Pond	D11T CD	N/A	N/A	148	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	MTI Top	D11T CD	N/A	N/A	177	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	MTI Outslope	D11T CD	N/A	N/A	163	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	Reclaim Pond Outlet Channel	MTI Top	D11T CD	N/A	N/A	66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Tailing Pipeline Corrido	D11T CD	N/A	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Grape Gulch Pond #3	D11T CD	N/A	N/A	1.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Magnetite Seepage Pond	D11T CD	N/A	N/A	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	D11T CD	N/A	N/A	2.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	D11T CD	N/A	N/A	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	D11T CD	N/A	N/A	3.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB-4 Stockpile	North Tailings Decant Pond	D11T CD	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB-4 Stockpile	East WRF Containment	D11T CD	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Blackman's Seep (Pond #2)	D11T CD	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	OB-4 Stockpile	Decant Pond #4	D11T CD	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer Assist	NOBS	Upper Creek Containment Pond 1	D11T CD	N/A	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Productivity and Hours Required for Dozer Use---Grading

		PERFORMANCE FACTORS																					
Task Description	Location 1	Location 2	Equipment	Volume (cy)	Area (acres)	Productivity (acres/hr)	Productivity (cy/hr)	Task Time (hours)	Material	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade	Effective Blade Width (feet)	Speed (miles/hr)	Work Hour (min/hr)	Visibility	Elevation	Direct Drive Trans.	Grade (%)	Operator	Maximum Push Distance (feet)	Normal Production (cy/hr)	
Grade surface	Haul Roads	-	16M	-	45.0	3.1		14.5	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Exploration Roads	-	16M	-	37.0	3.1		11.9	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Low Grade WRF	-	16M	-	27.8	3.1		9.0	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Grape Gulch Pond #3	-	16M	-	0.4	3.1		0.1	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Magnetite Seepage Pond	-	16M	-	0.2	3.1		0.1	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	SWRF Dam 1	-	16M	-	0.5	3.1		0.2	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	SWRF Dam 2	-	16M	-	0.3	3.1		0.1	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	SWRF Dam 3	-	16M	-	0.8	3.1		0.3	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	North Tailings Decant Pond	-	16M	-	0.5	3.1		0.1	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	East WRF Containment	-	16M	-	0.5	3.1		0.2	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Blackman's Seep (Pond #2)	-	16M	-	0.0	3.1		0.0	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Decant Pond #4	-	16M	-	0.6	3.1		0.2	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade surface	Upper Creek Containment Pond 1	-	16M	-	1	3.1		0.4	1.2	1.0	3,300	1.2	16	2.50	50	1	1	1	-1.0	0.75	-		
Grade cover soil	SWRDF Top	-	D11T CD	412,368	-	-	1,921	214.7	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	SWRDF Outslopes	-	D11T CD	1,237,104	-	-	3,032	408	1.2	1.6	3,300	1.2	-	-	50	1	1	1	-30.5	0.75	100	3002	
Grade cover soil	SWRDF Top	-	D11T CD	119,548	-	-	1,921	62	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Hanover Mountain Deposit	-	D11T CD	451,572	-	-	1,921	235.1	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Pearson-Barnes Mine Area	-	D11T CD	57,596	-	-	1,243	46.3	1.2	0.7	3,300	1.2	-	-	50	1	1	1	17	0.75	100	3002	
Grade cover soil	Low Grade WRF	-	D11T CD	44,899	-	-	3,126	14.4	1.2	1.7	3,300	1.2	-	-	50	1	1	1	-33	0.75	100	3002	
Grade cover soil	MTI Reclaim Pond	-	D11T CD	159,720	-	-	3,126	51.1	1.2	1.7	3,300	1.2	-	-	50	1	1	1	-33	0.75	100	3002	
Grade cover soil	MTI Top	-	D11T CD	190,284	-	-	1,912	99.5	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-0.8	0.75	100	3002	
Grade cover soil	MTI Outslope	-	D11T CD	175,837	-	-	3,126	56.2	1.2	1.7	3,300	1.2	-	-	50	1	1	1	-33	0.75	100	3002	
Grade cover soil	MTI Top	-	D11T CD	71,560	-	-	1,912	37.4	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-0.8	0.75	100	3002	
Grade cover soil	Tailing Pipeline Corridor	-	D11T CD	6,999	-	-	1,921	3.6	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Grape Gulch Pond #3	-	D11T CD	1,839	-	-	1,921	1.0	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Magnetite Seepage Pond	-	D11T CD	968	-	-	1,921	0.5	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	SWRF Dam 1	-	D11T CD	2,517	-	-	1,921	1.3	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	SWRF Dam 2	-	D11T CD	1,646	-	-	1,921	0.9	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	SWRF Dam 3	-	D11T CD	4,066	-	-	1,921	2.1	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	North Tailings Decant Pond	-	D11T CD	2,226	-	-	1,921	1.2	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	East WRF Containment	-	D11T CD	2,420	-	-	1,921	1.3	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Blackman's Seep (Pond #2)	-	D11T CD	48	-	-	1,921	0.0	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Decant Pond #4	-	D11T CD	3,001	-	-	1,921	1.6	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	
Grade cover soil	Upper Creek Containment Pond 1	-	D11T CD	5,469	-	-	1,921	2.8	1.2	1.0	3,300	1.2	-	-	50	1	1	1	-1.0	0.75	100	3002	

*Push distances: Assumed 100 feet.

**Productivity and Hours Required for
Ripper-Equipped Dozer Use**

Note: Scarifying/Ripping Covered Areas Currently Included in Revegetation Costs

								PERFORMANCE FACTORS:								
Task Description	Location 1	Location 2	Equipment	Area (acres)	Volume (cy)	Productivity (acres/hr)	Task Time (hours)	Ripping Length (feet)	Ripper Penetration (in)	Pocket Spacing (in)	No. of Pockets	Turn Time (min/pass)	Work Hour (min/hr)	Speed (mph)	1000 ft (passes/acre)	ripper path width (feet)
Rip liners	East WRF Containment	-	D11T w/ ripper	0.50	1,210	1.70	0.3	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip liners	Decant Pond #4	-	D11T w/ ripper	0.62	1,500	1.70	0.4	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip liners	Blackman's Seep (Pond #2)	-	D11T w/ ripper	0.01	24	1.70	0.01	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip liners	Grape Gulch Pond #3	-	D11T w/ ripper	0.38	920	1.70	0.2	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip liners	Magnetite Seepage Pond	-	D11T w/ ripper	0.20	484	1.70	0.1	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip surface	Reclaim Pond Outlet Channel	-	D11T w/ ripper	1.70	4,114	1.70	1.0	1,000	18	69	3	0.25	50	1	2.53	17.3
Rip liners	Upper Creek Containment Pond 1	-	D11T w/ ripper	1.13	2,735	1.70	0.7	1,000	18	69	3	0.25	50	1	2.53	17.3

Productivity and Hours Required for Hydraulic Excavator

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Productivity and Hours Required for Truck Use

Truck-Loader Matching
Truck Loading Height (empty), Cat 777F - 14'7"
Loader Dump Clearance, Cat 992G - 15'3"

		PERFORMANCE FACTORS																				
Task Description	Location 1*	Location 2	Equipment	Volume (cy)	Truck Cycle Time (min)	Optimum No. of Trucks	Productivity (cy/hr)	Task Time (hrs)	Struck Capacity (cy)	Heaped Capacity (cy)	Loader Cycles per Truck	Total Haul Distance (feet)	Haul Distance Segment 1 (feet)	Haul Distance Segment 2 (feet)	Haul Distance Segment 3 (feet)	Haul Grade Segment 1 (%)	Haul Grade Segment 2 (%)	Haul Grade Segment 3 (%)	Rolling Resistance (%)	Haul Distance Segment 1 (meters)	Haul Distance Segment 2 (meters)	Haul Distance Segment 3 (meters)
Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	777F	412,368	7.5	2	938	440	54.6	78.6	5	3,630	3,630	-	-	-0.3%	-	-	2.5%	1,106	0	0
Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes	777F	1,237,104	7.5	2	938	1,319	54.6	78.6	5	3,630	3,630	-	-	-0.3%	-	-	2.5%	1,106	0	0
Haul cover soil	NOBS	SWRDF Top	777F	119,548	15.3	4	913	131	54.6	78.6	5	12,559	2,310	7,312	2,937	-8.9%	-1.0%	4.1%	2.5%	704	2,229	895
Haul cover soil	NOBS	Hanover Mountain Deposit	777F	451,572	11.5	3	913	495	54.6	78.6	5	5,707	1,759	2,466	1,482	-10.0%	-8.1%	6.8%	2.5%	536	752	452
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	777F	57,596	5.8	2	1,216	53	54.6	78.6	5	600	600	-	-	4.2%	-	-	2.5%	183	0	0
Haul cover soil	OB-4 Stockpile	Low Grade WRF	777F	44,899	6.0	2	1,166	42	54.6	78.6	5	1,000	1,000	-	-	2.5%	-	-	2.5%	305	0	0
Haul cover soil	NOBS	MTI Reclaim Pond	777F	159,720	12.2	4	1,152	148	54.6	78.6	5	7,193	2,310	1,940	2,943	-8.9%	1.6%	3.6%	2.5%	704	591	897
Haul cover soil	NOBS	MTI Top	777F	190,284	12.2	4	1,152	177	54.6	78.6	5	7,193	2,310	1,940	2,943	-8.9%	1.6%	3.6%	2.5%	704	591	897
Haul cover soil	NOBS	MTI Outslope	777F	175,837	12.2	4	1,152	163	54.6	78.6	5	7,193	2,310	1,940	2,943	-8.9%	1.6%	3.6%	2.5%	704	591	897
Haul cover soil	Reclaim Pond Outlet Channel	MTI Top	777F	71,560	5.9	2	1,178	66	54.6	78.6	5	1,172	1,172	-	-	0.9%	-	-	2.5%	357	0	0
Haul cover soil	NOBS	Tailing Pipeline Corridor	777F	6,999	12.2	4	1,152	6	54.6	78.6	5	7,193	2,310	1,940	2,943	-8.9%	1.6%	3.6%	2.5%	704	591	897
Haul cover soil	NOBS	Grape Gulch Pond #3	777F	1,839	8.7	3	1,207	2	54.6	78.6	5	3,856	2,310	1,546	-	-8.9%	-7.8%	-	2.5%	704	471	0
Haul cover soil	NOBS	Magnetite Seepage Pond	777F	968	10.4	3	1,008	1	54.6	78.6	5	6,480	2,310	1,940	2,230	-8.9%	1.6%	-4.0%	2.5%	704	591	680
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	777F	2,517	7.5	2	938	3	54.6	78.6	5	3,630	3,630	-	-	-0.3%	-	-	2.5%	1,106	0	0
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	777F	1,646	7.5	2	938	2	54.6	78.6	5	3,630	3,630	-	-	-0.3%	-	-	2.5%	1,106	0	0
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	777F	4,066	7.5	2	938	4	54.6	78.6	5	3,630	3,630	-	-	-0.3%	-	-	2.5%	1,106	0	0
Haul cover soil	OB-4 Stockpile	North Tailings Decant Pond	777F	2,226	6.0	2	1,166	2	54.6	78.6	5	1,000	1000	-	-	2.5%	-	-	2.5%	305	0	0
Haul cover soil	OB-4 Stockpile	East WRF Containment	777F	2,420	6.0	2	1,166	2	54.6	78.6	5	1,000	1000	-	-	2.5%	-	-	2.5%	305	0	0
Haul cover soil	NOBS	Blackman's Seep (Pond #2)	777F	48	8.7	3	1,207	0	54.6	78.6	5	3,856	2,310	1,546	-	-8.9%	-7.8%	-	2.5%	704	471	0
Haul cover soil	OB-4 Stockpile	Decant Pond #4	777F	3,001	6.0	2	1,166	3	54.6	78.6	5	1,000	1,000	-	-	2.5%	-	-	2.5%	305	0	0
Haul cover soil	NOBS	Upper Creek Containment Pond 1	777F	5,469	8.7	3	1,207	5	54.6	78.6	5	3,856	2,310	1,546	-	-8.9%	-7.8%	-	2.5%	704	471	0

*Cover material is assumed to be obtained for each facility based on the 2014 mine expansion plan, the volume of available cover material, and proximity to the facility being covered. These haul routes are subject to change based on those factors.

Productivity and Hours Required for Truck Use

Truck-Loader Matching
Truck Loading Height (empty), Cat 777F - 14'7"
Loader Dump Clearance, Cat 992G - 15'3"

			Haul Effective Grade Segment 1 (%)	Haul Effective Grade Segment 2 (%)	Haul Effective Grade Segment 3 (%)	Return Effective Grade Segment 1 (%)	Return Effective Grade Segment 2 (%)	Return Effective Grade Segment 3 (%)	Haul Time (min)	Return Time (min)	Loading Time (min)	Load/ Maneuver Time (min)	Dump/ Maneuver Time (min)	Work Hour (min/hr)	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)
Task Description	Location 1*	Location 2																		
Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	2%	0%	0%	3%	0%	0%	1.4	1.0	3.3	0.7	1.1	50	0.00128	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outslopes	2%	0%	0%	3%	0%	0%	1.4	1.0	3.3	0.7	1.1	50	0.00128	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	NOBS	SWRDF Top	0%	2%	7%	11%	3%	0%	5.8	4.5	3.3	0.7	1.1	50	0.00090	0.00112	0.00293	0.00231	0.00093	0.00090
Haul cover soil	NOBS	Hanover Mountain Deposit	0%	0%	9%	12%	11%	0%	3.1	3.4	3.3	0.7	1.1	50	0.00090	0.00090	0.00423	0.00256	0.00213	0.00090
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	7%	0%	0%	0%	0%	0%	0.5	0.2	3.3	0.7	1.1	50	0.00297	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB-4 Stockpile	Low Grade WRF	5%	0%	0%	0%	0%	0%	0.7	0.3	3.3	0.7	1.1	50	0.00223	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	NOBS	MTI Reclaim Pond	0%	4%	6%	11%	1%	0%	4.2	3.0	3.3	0.7	1.1	50	0.00090	0.00186	0.00270	0.00231	0.00088	0.00090
Haul cover soil	NOBS	MTI Top	0%	4%	6%	11%	1%	0%	4.2	3.0	3.3	0.7	1.1	50	0.00090	0.00186	0.00270	0.00231	0.00088	0.00090
Haul cover soil	NOBS	MTI Outslope	0%	4%	6%	11%	1%	0%	4.2	3.0	3.3	0.7	1.1	50	0.00090	0.00186	0.00270	0.00231	0.00088	0.00090
Haul cover soil	Reclaim Pond Outlet Channel	MTI Top	3%	0%	0%	2%	0%	0%	0.6	0.3	3.3	0.7	1.1	50	0.00162	0.00090	0.00090	0.00087	0.00090	0.00090
Haul cover soil	NOBS	Tailing Pipeline Corridor	0%	4%	6%	11%	1%	0%	4.2	3.0	3.3	0.7	1.1	50	0.00090	0.00186	0.00270	0.00231	0.00088	0.00090
Haul cover soil	NOBS	Grape Gulch Pond #3	0%	0%	0%	11%	10%	0%	1.1	2.6	3.3	0.7	1.1	50	0.00090	0.00090	0.00090	0.00231	0.00205	0.00090
Haul cover soil	NOBS	Magnetite Seepage Pond	0%	4%	0%	11%	1%	7%	2.3	3.0	3.3	0.7	1.1	50	0.00090	0.00186	0.00090	0.00231	0.00088	0.00128
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	2%	0%	0%	3%	0%	0%	1.4	1.0	3.3	0.7	1.1	50	0.00128	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	2%	0%	0%	3%	0%	0%	1.4	1.0	3.3	0.7	1.1	50	0.00128	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	2%	0%	0%	3%	0%	0%	1.4	1.0	3.3	0.7	1.1	50	0.00128	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB-4 Stockpile	North Tailings Decant Pond	5%	0%	0%	0%	0%	0%	0.7	0.3	3.3	0.7	1.1	50	0.00223	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	OB-4 Stockpile	East WRF Containment	5%	0%	0%	0%	0%	0%	0.7	0.3	3.3	0.7	1.1	50	0.00223	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	NOBS	Blackman's Seep (Pond #2)	0%	0%	0%	11%	10%	0%	1.1	2.6	3.3	0.7	1.1	50	0.00090	0.00090	0.00090	0.00231	0.00205	0.00090
Haul cover soil	OB-4 Stockpile	Decant Pond #4	5%	0%	0%	0%	0%	0%	0.7	0.3	3.3	0.7	1.1	50	0.00223	0.00090	0.00090	0.00090	0.00090	0.00090
Haul cover soil	NOBS	Upper Creek Containment Pond 1	0%	0%	0%	11%	10%	0%	1.1	2.6	3.3	0.7	1.1	50	0.00090	0.00090	0.00090	0.00231	0.00205	0.00090

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Productivity for Front End Loader

			PERFORMANCE FACTORS								
Task Description	Location 1	Location 2	Equipment	Volume (cy)	Net Bucket Capacity (cy)	Loader Cycle Time (min)	Productivity (cy/hr)	Task Time (hours)	Rated Bucket Capacity (cy)	Bucket Fill Factor	Work Hour (min/hr)
Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	992K	412,368	14	0.65	1,077	383	16	0.875	50
Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outcrops	992K	1,237,104	14	0.65	1,077	1,149	16	0.875	50
Load cover soil	NOBS	SWRDF Top	992K	119,548	14	0.65	1,077	111	16	0.875	50
Load cover soil	NOBS	Hanover Mountain Deposit	992K	451,572	14	0.65	1,077	419	16	0.875	50
Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	992K	57,596	14	0.65	1,077	53	16	0.875	50
Load cover soil	OB-4 Stockpile	Low Grade WRF	992K	44,899	14	0.65	1,077	42	16	0.875	50
Load cover soil	NOBS	MTI Reclaim Pond	992K	159,720	14	0.65	1,077	148	16	0.875	50
Load cover soil	NOBS	MTI Top	992K	190,284	14	0.65	1,077	177	16	0.875	50
Load cover soil	NOBS	MTI Outslope	992K	175,837	14	0.65	1,077	163	16	0.875	50
Load cover soil	Reclaim Pond Outlet Channel	MTI Top	992K	71,560	14	0.65	1,077	66	16	0.875	50
Load cover soil	NOBS	Tailing Pipeline Corridor	992K	6,999	14	0.65	1,077	6	16	0.875	50
Load cover soil	NOBS	Grape Gulch Pond #3	992K	1,839	14	0.65	1,077	2	16	0.875	50
Load cover soil	NOBS	Magnetite Seepage Pond	992K	968	14	0.65	1,077	1	16	0.875	50
Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	992K	2,517	14	0.65	1,077	2	16	0.875	50
Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	992K	1,646	14	0.65	1,077	2	16	0.875	50
Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	992K	4,066	14	0.65	1,077	4	16	0.875	50
Load cover soil	OB-4 Stockpile	North Tailings Decant Pond	992K	2,226	14	0.65	1,077	2	16	0.875	50
Load cover soil	OB-4 Stockpile	East WRF Containment	992K	2,420	14	0.65	1,077	2	16	0.875	50
Load cover soil	NOBS	Blackman's Seep (Pond #2)	992K	48	14	0.65	1,077	0.0	16	0.875	50
Load cover soil	OB-4 Stockpile	Decant Pond #4	992K	3,001	14	0.65	1,077	2.8	16	0.875	50
Load cover soil	NOBS	Upper Creek Containment Pond 1	992K	5,469	14	0.65	1,077	5.1	16	0.875	50

Productivity and Hours Required for Scraper Use

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Productivity and Hours Required for Motor grader Use---Grading

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Summary Calculation of Earthmoving Costs											Stockpile Worksheet #13	Coblen
											12/05/14	
Equipment Type	Task	Location 1	Location 2	Owning and Operating Cost (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd (hrs)	Direct Cost (\$)	Total Production	Prod. Unit	Unit Cost (\$/unit)	
Dozers-Earthmoving												
D11T CD	Regrade Top	SWRDF	Top	\$509.12	\$47.58	1	1,486	\$827,385	666,680	cy	1.24	
D11T CD	Regrade Top	MTI	Top	\$509.12	\$47.58	1	42	\$23,627	50,795	cy	0.47	
D11T CD	Regrade Outslope	MTI Reclaim Pond	Top and Outslope	\$509.12	\$47.58	1	39	\$21,940	67,765	cy	0.32	
D11T CD	Regrade Outslope	MTI	Outslope	\$509.12	\$47.58	1	106	\$58,736	170,294	cy	0.34	
D11T CD	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	\$509.12	\$47.58	1	383	\$213,168	412,368	cy	0.52	
D11T CD	Dozer Assist	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outsoles	\$509.12	\$47.58	1	1,149	\$639,503	1,237,104	cy	0.52	
D11T CD	Dozer Assist	NOBS	SWRDF Top	\$509.12	\$47.58	1	111	\$61,799	119,548	cy	0.52	
D11T CD	Dozer Assist	NOBS	Hanover Mountain Deposit	\$509.12	\$47.58	1	419	\$233,434	451,572	cy	0.52	
D11T CD	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	\$509.12	\$47.58	1	53	\$29,773	57,596	cy	0.52	
D11T CD	Dozer Assist	OB-4 Stockpile	Low Grade WRF	\$509.12	\$47.58	1	42	\$23,210	44,899	cy	0.52	
D11T CD	Dozer Assist	NOBS	MTI Reclaim Pond	\$509.12	\$47.58	1	148	\$82,565	159,720	cy	0.52	
D11T CD	Dozer Assist	NOBS	MTI Top	\$509.12	\$47.58	1	177	\$98,365	190,284	cy	0.52	
D11T CD	Dozer Assist	NOBS	MTI Outslope	\$509.12	\$47.58	1	163	\$90,897	175,837	cy	0.52	
D11T CD	Dozer Assist	Reclaim Pond Outlet Channel	MTI Top	\$509.12	\$47.58	1	66	\$36,992	62,226	cy	0.59	
D11T CD	Dozer Assist	NOBS	Tailing Pipeline Corridor	\$509.12	\$47.58	1	6	\$3,618	6,999	cy	0.52	
D11T CD	Dozer Assist	NOBS	Grape Gulch Pond #3	\$509.12	\$47.58	1	2	\$951	1,839	cy	0.52	
D11T CD	Dozer Assist	NOBS	Magnetite Seepage Pond	\$509.12	\$47.58	1	1	\$500	968	cy	0.52	
D11T CD	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	\$509.12	\$47.58	1	2	\$1,301	2,517	cy	0.52	
D11T CD	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	\$509.12	\$47.58	1	2	\$851	1,646	cy	0.52	
D11T CD	Dozer Assist	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	\$509.12	\$47.58	1	4	\$2,102	4,066	cy	0.52	
D11T CD	Dozer Assist	OB-4 Stockpile	North Tailings Decant Pond	\$509.12	\$47.58	1	2	\$1,151	2,226	cy	0.52	
D11T CD	Dozer Assist	OB-4 Stockpile	East WRF Containment	\$509.12	\$47.58	1	2	\$1,251	2,420	cy	0.52	
D11T CD	Dozer Assist	NOBS	Blackman's Seep (Pond #2)	\$509.12	\$47.58	1	0	\$25	48	cy	0.52	
D11T CD	Dozer Assist	OB-4 Stockpile	Decant Pond #4	\$509.12	\$47.58	1	3	\$1,551	3,001	cy	0.52	
D11T CD	Dozer Assist	NOBS	Upper Creek Containment Pond 1	\$509.12	\$47.58	1	5	\$2,827	5,469	cy	0.52	
Dozers-Grading												
16M	Grade surface	Haul Roads	-	\$509.12	\$47.58	1	14.5	\$8,076	45.0	ac	179.46	
16M	Grade surface	Exploration Roads	-	\$509.12	\$47.58	1	11.9	\$6,640	37.0	ac	179.46	
16M	Grade surface	Low Grade WRF	-	\$509.12	\$47.58	1	9.0	\$4,994	27.8	ac	179.46	
16M	Grade surface	Grape Gulch Pond #3	-	\$509.12	\$47.58	1	0.1	\$68	0.4	ac	179.46	
16M	Grade surface	Magnetite Seepage Pond	-	\$509.12	\$47.58	1	0.1	\$36	0.2	ac	179.46	
16M	Grade surface	SWRF Dam 1	-	\$509.12	\$47.58	1	0.2	\$93	0.5	ac	179.46	
16M	Grade surface	SWRF Dam 2	-	\$509.12	\$47.58	1	0.1	\$61	0.3	ac	179.46	
16M	Grade surface	SWRF Dam 3	-	\$509.12	\$47.58	1	0.3	\$151	0.8	ac	179.46	
16M	Grade surface	North Tailings Decant Pond	-	\$509.12	\$47.58	1	0.1	\$83	0.5	ac	179.46	
16M	Grade surface	East WRF Containment	-	\$509.12	\$47.58	1	0.2	\$90	0.5	ac	179.46	
16M	Grade surface	Blackman's Seep (Pond #2)	-	\$509.12	\$47.58	1	0.0	\$2	0.0	ac	179.46	
16M	Grade surface	Decant Pond #4	-	\$509.12	\$47.58	1	0.2	\$111	0.6	ac	179.46	
16M	Grade surface	Upper Creek Containment Pond 1	-	\$509.12	\$47.58	1	0.4	\$203	1.1	ac	179.46	
D11T CD	Grade cover soil	SWRDF Top	-	\$509.12	\$47.58	1	214.7	\$119,509	412,368.0	cy	0.29	
D11T CD	Grade cover soil	SWRDF Outsoles	-	\$509.12	\$47.58	1	408.0	\$227,141	1,237,104.0	cy	0.18	
D11T CD	Grade cover soil	SWRDF Top	-	\$509.12	\$47.58	1	62.2	\$34,646	119,548.0	cy	0.29	
D11T CD	Grade cover soil	Hanover Mountain Deposit	-	\$509.12	\$47.58	1	235.1	\$130,870	451,572.0	cy	0.29	
D11T CD	Grade cover soil	Pearson-Barnes Mine Area	-	\$509.12	\$47.58	1	46.3	\$25,797	57,596.0	cy	0.45	
D11T CD	Grade cover soil	Low Grade WRF	-	\$509.12	\$47.58	1	14.4	\$7,995	44,899.1	cy	0.18	
D11T CD	Grade cover soil	MTI Reclaim Pond	-	\$509.12	\$47.58	1	51.1	\$28,442	159,720.0	cy	0.18	
D11T CD	Grade cover soil	MTI Top	-	\$509.12	\$47.58	1	99.5	\$55,396	190,284.1	cy	0.29	
D11T CD	Grade cover soil	MTI Outslope	-	\$509.12	\$47.58	1	56.2	\$31,312	175,837.2	cy	0.18	
D11T CD	Grade cover soil	MTI Top	-	\$509.12	\$47.58	1	37.4	\$20,833	71,559.9	cy	0.29	
D11T CD	Grade cover soil	Tailing Pipeline Corridor	-	\$509.12	\$47.58	1	3.6	\$2,028	6,998.6	cy	0.29	
D11T CD	Grade cover soil	Grape Gulch Pond #3	-	\$509.12	\$47.58	1	1.0	\$533	1,839.2	cy	0.29	
D11T CD	Grade cover soil	Magnetite Seepage Pond	-	\$509.12	\$47.58	1	0.5	\$281	968.0	cy	0.29	
D11T CD	Grade cover soil	SWRF Dam 1	-	\$509.12	\$47.58	1	1.3	\$729	2,516.8	cy	0.29	
D11T CD	Grade cover soil	SWRF Dam 2	-	\$509.12	\$47.58	1	0.9	\$477	1,645.6	cy	0.29	
D11T CD	Grade cover soil	SWRF Dam 3	-	\$509.12	\$47.58	1	2.1	\$1,178	4,065.6	cy	0.29	
D11T CD	Grade cover soil	North Tailings Decant Pond	-	\$509.12	\$47.58	1	1.2	\$645	2,226.4	cy	0.29	
D11T CD	Grade cover soil	East WRF Containment	-	\$509.12	\$47.58	1	1.3	\$701	2,420.0	cy	0.29	
D11T CD	Grade cover soil	Blackman's Seep (Pond #2)	-	\$509.12	\$47.58	1	0.0	\$14	48.4	cy	0.29	
D11T CD	Grade cover soil	Decant Pond #4	-	\$509.12	\$47.58	1	1.6	\$870	3,000.8	cy	0.29	
D11T CD	Grade cover soil	Upper Creek Containment Pond 1	-	\$509.12	\$47.58	1	2.8	\$1,585	5,469.2	cy	0.29	
Loaders												
992K	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	\$369.97	\$47.75	1	440	\$183,711	412,368	cy	0.45	
992K	Load cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outsoles	\$369.97	\$47.75	1	1,319	\$551,134	1,237,104	cy	0.45	
992K	Load cover soil	NOBS	SWRDF Top	\$369.97	\$47.75	1	131	\$54,693	119,548	cy	0.46	
992K	Load cover soil	NOBS	Hanover Mountain Deposit	\$369.97	\$47.75	1	495	\$206,640	451,572	cy	0.46	
992K	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	\$369.97	\$47.75	1	53	\$22,341	57,596	cy	0.39	
992K	Load cover soil	OB-4 Stockpile	Low Grade WRF	\$369.97	\$47.75	1	42	\$17,416	44,899	cy	0.39	
992K	Load cover soil	NOBS	MTI Reclaim Pond	\$369.97	\$47.75	1	148	\$61,953	159,720	cy	0.39	
992K	Load cover soil	NOBS	MTI Top	\$369.97	\$47.75	1	177	\$73,808	190,284	cy	0.39	
992K	Load cover soil	NOBS	MTI Outslope	\$369.97	\$47.75	1	163	\$68,204	175,837	cy	0.39	
992K	Load cover soil	Reclaim Pond Outlet Channel	MTI Top	\$369.97	\$47.75	1	66	\$27,757	71,560	cy	0.39	
992K	Load cover soil	NOBS	Tailing Pipeline Corridor	\$369.97	\$47.75	1	6	\$2,715	6,999	cy	0.39	
992K	Load cover soil	NOBS	Grape Gulch Pond #3	\$369.97	\$47.75	1	2	\$713	1,839	cy	0.39	
992K	Load cover soil	NOBS	Magnetite Seepage Pond	\$369.97	\$47.75	1	1	\$401	968	cy	0.41	
992K	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	\$369.97	\$47.75	1	3	\$1,121	2,517	cy	0.45	
992K	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	\$369.97	\$47.75	1	2	\$733	1,646	cy	0.45	
992K	Load cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	\$369.97	\$47.75	1	4	\$1,811	4,066	cy	0.45	
992K	Load cover soil	OB-4 Stockpile	North Tailings Decant Pond	\$369.97	\$47.75	1	2	\$864	2,226	cy	0.39	
992K	Load cover soil	OB-4 Stockpile	East WRF Containment	\$369.97	\$47.75	1	2	\$939	2,420	cy	0.39	
992K	Load cover soil	NOBS	Blackman's Seep (Pond #2)	\$369.97	\$47.75	1	0	\$19	48	cy	0.39	
992K	Load cover soil	OB-4 Stockpile	Decant Pond #4	\$369.97	\$47.75	1	3	\$1,164	3,001	cy	0.39	
992K	Load cover soil	NOBS	Upper Creek Containment Pond 1	\$369.97	\$47.75	1	5	\$2,121	5,469	cy	0.39	

Equipment Type	Task	Location 1	Location 2	Owning and Operating Cost (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd (hrs)	Direct Cost (\$)	Total Production	Prod. Unit	Unit Cost (\$/unit)
Trucks											
777F	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Top	\$294.40	\$42.82	2	440	\$296,616	412,368	cy	0.72
777F	Haul cover soil	OB Stockpile 1 through 4, Topsoil Stockpile, South OB Stockpile	SWRDF Outsoles	\$294.40	\$42.82	2	1,319	\$889,848	1,237,104	cy	0.72
777F	Haul cover soil	NOBS	SWRDF Top	\$294.40	\$42.82	4	131	\$176,613	119,548	cy	1.48
777F	Haul cover soil	NOBS	Hanover Mountain Deposit	\$294.40	\$42.82	3	495	\$500,453	451,572	cy	1.11
777F	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	Pearson-Barnes Mine Area	\$294.40	\$42.82	2	53	\$36,070	57,596	cy	0.63
777F	Haul cover soil	OB-4 Stockpile	Low Grade WRF	\$294.40	\$42.82	2	42	\$28,119	44,899	cy	0.63
777F	Haul cover soil	NOBS	MTI Reclaim Pond	\$294.40	\$42.82	4	148	\$200,054	159,720	cy	1.25
777F	Haul cover soil	NOBS	MTI Top	\$294.40	\$42.82	4	177	\$238,337	190,284	cy	1.25
777F	Haul cover soil	NOBS	MTI Outslope	\$294.40	\$42.82	4	163	\$220,242	175,837	cy	1.25
777F	Haul cover soil	Reclaim Pond Outlet Channel	MTI Top	\$294.40	\$42.82	2	66	\$44,816	71,560	cy	0.63
777F	Haul cover soil	NOBS	Tailing Pipeline Corridor	\$294.40	\$42.82	4	6	\$8,766	6,999	cy	1.25
777F	Haul cover soil	NOBS	Grape Gulch Pond #3	\$294.40	\$42.82	3	2	\$1,728	1,839	cy	0.94
777F	Haul cover soil	NOBS	Magnetite Seepage Pond	\$294.40	\$42.82	3	1	\$971	968	cy	1.00
777F	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 1	\$294.40	\$42.82	2	3	\$1,810	2,517	cy	0.72
777F	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 2	\$294.40	\$42.82	2	2	\$1,184	1,646	cy	0.72
777F	Haul cover soil	OB Stockpile 1 through 3, Topsoil Stockpile, South OB Stockpile	SWRF Dam 3	\$294.40	\$42.82	2	4	\$2,924	4,066	cy	0.72
777F	Haul cover soil	OB-4 Stockpile	North Tailings Decant Pond	\$294.40	\$42.82	2	2	\$1,394	2,226	cy	0.63
777F	Haul cover soil	OB-4 Stockpile	East WRF Containment	\$294.40	\$42.82	2	2	\$1,516	2,420	cy	0.63
777F	Haul cover soil	NOBS	Blackman's Seep (Pond #2)	\$294.40	\$42.82	3	0	\$45	48	cy	0.94
777F	Haul cover soil	OB-4 Stockpile	Decant Pond #4	\$294.40	\$42.82	2	3	\$1,879	3,001	cy	0.63
777F	Haul cover soil	NOBS	Upper Creek Containment Pond 1	\$294.40	\$42.82	3	5	\$5,138	5,469	cy	0.94
Rippers											
D11T w/ ripper	Rip liners	East WRF Containment	-	\$534.56	\$47.58	1	0.293	\$171	1,210	cy	0.14
D11T w/ ripper	Rip liners	Decant Pond #4	-	\$534.56	\$47.58	1	0.364	\$212	1,500	cy	0.14
D11T w/ ripper	Rip liners	Blackman's Seep (Pond #2)	-	\$534.56	\$47.58	1	0.006	\$3	24	cy	0.14
D11T w/ ripper	Rip liners	Grape Gulch Pond #3	-	\$534.56	\$47.58	1	0.223	\$130	920	cy	0.14
D11T w/ ripper	Rip liners	Magnetite Seepage Pond	-	\$534.56	\$47.58	1	0.117	\$68	484	cy	0.14
D11T w/ ripper	Rip surface	Reclaim Pond Outlet Channel	-	\$534.56	\$47.58	1	0.997	\$580	4,114	cy	0.14
D11T w/ ripper	Rip liners	Upper Creek Containment Pond 1	-	\$534.56	\$47.58	1	0.663	\$386	2,735	cy	0.14
Water Truck and Grader											
Off-Hwy Water Tanker Truck	SWRDF			\$171.97	\$25.34	1	1,890	\$372,939			
Off-Hwy Water Tanker Truck	Hanover Mountain Deposit			\$171.97	\$25.34	1	495	\$97,606			
Off-Hwy Water Tanker Truck	Pearson-Barnes Mine Area			\$171.97	\$25.34	1	53	\$10,553			
Off-Hwy Water Tanker Truck	Low Grade WRF			\$171.97	\$25.34	1	42	\$8,226			
Off-Hwy Water Tanker Truck	MTI			\$171.97	\$25.34	1	561	\$8,226			
Off-Hwy Water Tanker Truck	Surface Impoundments			\$171.97	\$25.34	1	24	\$4,670			
Motor Grader	SWRDF			\$164.06	\$47.58	1	1,890	\$400,024			
Motor Grader	Hanover Mountain Deposit			\$164.06	\$47.58	1	495	\$104,695			
Motor Grader	Pearson-Barnes Mine Area			\$164.06	\$47.58	1	53	\$11,319			
Motor Grader	Low Grade WRF			\$164.06	\$47.58	1	42	\$8,824			
Motor Grader	MTI			\$164.06	\$47.58	1	561	\$118,778			
Motor Grader	Surface Impoundments			\$164.06	\$47.58	1	24	\$5,009			
			SWRDF					\$5,048,729			
			Hanover Mountain Deposit					\$1,273,698			
			Pearson-Barnes Mine Area					\$135,852			
			Low Grade WRF					\$98,784			
			MTI					\$1,628,987			
			Haul and Exploration Roads					\$14,715			
			Surface Impoundments					\$59,546			
			Earthwork Direct Cost					\$8,260,312			

EQUIPMENT				Fuel-Adjusted Own/Op Cost	Reference
Equipment Description	Fuel Consumption (gal/hr)	Fuel Cost (\$/hr)	Owning and Operating Cost (w/out fuel) (\$/hr)	Fuel-Adjusted Own/Op Cost (\$/hr)	
Cat D11T CD Bulldozer	29.8	\$95.65	\$413.47	\$509.12	1
Cat D11T Bulldozer w/ multi shank ripper	29.8	\$95.65	\$438.91	\$534.56	1
Cat 777F Truck	18.8	\$60.31	\$234.09	\$294.40	1
Cat 992K Loader	25.6	\$82.41	\$287.56	\$369.97	1
Cat 16M Motor Grader	9.5	\$30.56	\$133.50	\$164.06	1
Off-Hwy Water Tanker Truck, 10,000-gal.	15.3	\$49.33	\$122.64	\$171.97	1
FUEL					
Oil Broker Quote			\$3.2150 per gallon		2
LABOR					
Labor Description	NMDOL Type A Operator Group	NMDOL Type A Operator Classification	Total Rate (\$/hr)		
Cat D11T CD Bulldozer	Equipment Operator IV	Bulldozer (mult. Units)	\$47.58	3	
Cat D11T Bulldozer w/ multi shank ripper	Equipment Operator IV	Bulldozer (mult. Units)	\$47.58		
Cat 777F Truck	Truck Driver III	Haul Truck	\$42.82	3	
Cat 992K Loader	Equipment Operator VI	Loader (over 10 cy)	\$47.75	3	
Cat 16M Motor Grader	Equipment Operator IV	Motor Grader	\$47.58	3	
Off-Hwy Water Tanker Truck, 10,000-gal.	N/A	N/A	\$25.34	3	

References

1. Equipment unit rates from EquipmentWatch Custom Cost Evaluator Version 6.15.0B (<http://www.equipmentwatch.com>). See attachments for rate development.

2. Western Refining Quote, Lordsburg NM (June 18, 2014).

3. Labor rates based on NM Department of Labor Type H (Heavy Engineering) labor rates. See attachments for rate development.

Revegetation Costs

Description:

Chiseling or ripping, scarifying, disking, rangeland drill seeding, mulching, crimping, mobilization.

		Unit Cost (\$/acre)	Direct Cost (\$)
Unit or Disturbance	(acres)		
SWRDF Top	85	\$899	\$76,567
SWRDF Outcrops	256	\$899	\$229,701
SWRDF Top	25	\$899	\$22,197
Hanover Mountain Deposit	93	\$899	\$83,846
Pearson-Barnes Mine Area	12	\$899	\$10,694
Low Grade WRF	28	\$899	\$25,010
MTI Reclaim Pond	33	\$899	\$29,656
MTI Outslope	36	\$899	\$32,649
MTI Top	108	\$899	\$97,237
Tailing Pipeline Corridor	1.4	\$899	\$1,299
Haul Roads	45	\$899	\$40,440
Exploration Roads	37	\$899	\$33,251
Continental Pit berm and fence disturbance	18	\$899	\$15,817
Disturbed Area Adjacent and North of the SWRDF	21	\$899	\$18,782

Surface Impoundments

Grape Gulch Pond #3	0.4	\$899	\$341
Magnetite Seepage Pond	0.2	\$899	\$180
SWRF Dam 1	0.5	\$899	\$467
SWRF Dam 2	0.3	\$899	\$306
SWRF Dam 3	0.8	\$899	\$755
North Tailings Decant Pond	0.5	\$899	\$413
East WRF Containment	0.5	\$899	\$449
Blackman's Seep (Pond #2)	0.01	\$899	\$9
Decant Pond #4	0.6	\$899	\$557
Upper Creek Containment Pond 1	1.1	\$899	\$1,016

Borrow Areas

Top Soil Stockpile	0.2	\$899	\$202
NOBS (proposed)	17	\$899	\$15,606
South OB Stockpile (proposed)	18	\$899	\$16,446
Reclaim Pond Outlet Channel	1.7	\$899	\$1,528
OB Stockpile-1	4.6	\$899	\$4,155
OB Stockpile-2	0.9	\$899	\$818
OB Stockpile-3	5.0	\$899	\$4,526
OB Stockpile-4	4.3	\$899	\$3,832
OB Stockpile-5	3.3	\$899	\$3,007

SWRDF	\$376,401
Hanover Mountain Deposit	\$99,453
Pearson-Barnes Mine Area	\$10,694
Low Grade WRF	\$28,842
MTI	\$162,369
Haul and Exploration Roads	\$73,691
Surface Impoundments	\$4,493
Continental Pit	\$15,817

Revegetation Direct Cost \$771,760

*Rocky Mountain Reclamation Quote June, 18 2014, \$1153/acre minus 28.3% indirect costs. Quote includes cost for scarifying (ripping) surface.

Other Reclamation Activity Costs

Item	Activity	Quantity	Unit	Unit Cost (\$/unit)	Direct Cost (\$)	Reference	Line Item	Page	Description
Surface Impoundments									
Reinforced Concrete Wall Demolition	SWRF Dam 1	54	hr	\$198.01	\$10,692	Means	Crew B-12C	541	1 Equip. Oper (crane), 1 laborer, 1 Hyd. Excavator, 2 C.Y. Approximately 40 hrs to demo a 200' reinforced concrete dam.
Reinforced Concrete Wall Demolition	SWRF Dam 2	30.6	hr	\$198.01	\$6,059	Means	Crew B-12C	541	1 Equip. Oper (crane), 1 laborer, 1 Hyd. Excavator, 2 C.Y. Approximately 40 hrs to demo a 200' reinforced concrete dam.
Reinforced Concrete Wall Demolition	SWRF Dam 3	47	hr	\$198.01	\$9,306	Means	Crew B-12C	541	1 Equip. Oper (crane), 1 laborer, 1 Hyd. Excavator, 2 C.Y. Approximately 40 hrs to demo a 200' reinforced concrete dam.
Reinforced Concrete Wall Demolition	East WRF Containment	40	hr	\$198.01	\$7,920	Means	Crew B-12C	541	1 Equip. Oper (crane), 1 laborer, 1 Hyd. Excavator, 2 C.Y. Approximately 40 hrs to demo a 200' reinforced concrete dam.
Wells									
Plug & Abandon Well	close after 100-years	700	ft	\$11.13	\$7,791	MMD, 2013			\$14.00/ft minus 28.3% indirect costs then added 2% inflation from 2013 to 2014. "Estimated costs for abandoning boreholes using bentonite cement grout ranges from approximately \$14.00 to \$25.00 per foot. For the purposes of estimating a simplified cost of abandoning boreholes the MMD cost is \$14.00/ft. The FA cost estimate could be higher or lower based on site specific characteristics".
Channels and Benches									
SWRDF	Downdrain Length	8,595	ft	\$5.86	\$50,367	Appendix B.2.8	Excavate and waste 7.6 cy/lf material on slopes with D11T CD, 175-foot downslope excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 3 passes 1 mph.		
MTI	Downdrain Length	1,353	ft	\$5.86	\$7,929	Appendix B.2.8	Excavate and waste 7.6 cy/lf material on slopes with D11T CD, 175-foot downslope excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 3 passes 1 mph.		
SWRDF	3:1 slope Bench Grading	14,126	ft	\$2.12	\$29,947	Appendix B.2.8	Excavate and waste 9.26 cy/lf on slopes with D11T CD, 87-foot push. Finish grade with D9T SU 3 passes 1 mph.		
MTI	3:1 slope Bench Grading	3,894	ft	\$1.86	\$7,243	Appendix B.2.8	Excavate and waste 9.26 cy/lf on slopes with D11T CD, 87-foot push. Finish grade with D9T SU 3 passes 1 mph.		
SWRDF	2.5:1 slope Bench Grading	25,463	ft	\$1.81	\$46,088	Appendix B.2.8	Excavate and waste 9.52 cy/lf on slopes with D11T CD, 78-foot push. Finish grade with D6T SU 3 passes 1 mph.		
SWRDF	Outslope Channels	39,589	feet	\$0.48	\$19,003	Appendix B.2.8	Excavate and waste 0.43 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 1 pass 1 mph.		
MTI	Outslope Channels	3,894	feet	\$0.48	\$1,869	Appendix B.2.8	Excavate and waste 0.43 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 1 pass 1 mph.		
SWRDF	Type 1 Top Channels	3,964	feet	\$3.28	\$13,002	Appendix B.2.8	Excavate and waste 2.4 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D9T SU 3 passes 1 mph.		
MTI	Type 2 Top Channels	2,141	feet	\$9.38	\$20,083	Appendix B.2.8	Excavate and waste 2.4 cy/lf with D11T CD, 175-foot excavation, 200-foot lateral waste push. Finish grade with D9T SU 3 passes 1 mph.		
Riprap & Gravel									
SWRDF	Downdrain Gravel, Haul	9,025	cy	\$9.36	\$84,468	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
SWRDF	Downdrain Gravel, Backfill	9,025	cy	\$0.91	\$8,179	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
SWRDF	Downdrain Riprap, Haul	36,959	cy	\$9.36	\$345,912	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
SWRDF	Downdrain Riprap, Backfill	36,959	cy	\$0.91	\$33,496	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
MTI	Downdrain Gravel, Haul	1,421	cy	\$9.36	\$13,300	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
MTI	Downdrain Gravel, Backfill	1,421	cy	\$0.91	\$1,288	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
MTI	Downdrain Riprap, Haul	5,818	cy	\$9.36	\$54,453	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
MTI	Downdrain Riprap, Backfill	5,818	cy	\$0.91	\$5,273	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
SWRDF	Outslope Channel Riprap, Haul	17,023	cy	\$9.36	\$159,324	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
SWRDF	Outslope Channel Riprap, Backfill	17,023	cy	\$0.91	\$15,428	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
SWRDF	Top Channel Riprap, Haul	3,817	cy	\$9.36	\$35,725	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
SWRDF	Top Channel Riprap, Backfill	3,817	cy	\$0.91	\$3,459	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
MTI	Outslope Channel Riprap, Haul	1,647	cy	\$9.36	\$15,415	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
MTI	Top Channel Riprap, Haul	9,206	cy	\$9.36	\$86,162	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
MTI	Riprap, Backfill	10,853	cy	\$0.91	\$9,836	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
SWRDF	Top Channel Gravel, Haul	2,202	cy	\$9.36	\$20,609	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
SWRDF	Top Channel Gravel, Backfill	2,202	cy	\$0.91	\$1,996	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
MTI	Top Channel Gravel, Haul	2,248	cy	\$9.36	\$21,040	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
MTI	Top Channel Gravel, Backfill	2,248	cy	\$0.91	\$2,037	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
SWRDF	Riprap	57,799	cy	\$32.33	\$1,868,642	Fowler Brothers Riprap Verbal Quote February 2009 \$29.16/cy inflated to 2014 dollars			
MTI	Riprap	16,671	cy	\$32.33	\$538,973	Fowler Brothers Riprap Verbal Quote February 2009 \$29.16/cy inflated to 2014 dollars			
SWRDF	Gravel	11,227	cy	\$4.27	\$47,927	Means	321123.23-0301	302	Base Course Drainage Layers, Crushed 1 1/2 ", Compacted to 4" deep
MTI	Gravel	3,669	cy	\$4.27	\$15,663	Means	321123.23-0301	302	Base Course Drainage Layers, Crushed 1 1/2 ", Compacted to 4" deep
Continental Pit									
Safety berm, Pits perimeter		6,635	feet	\$2.82	\$18,711	Appendix B8	Excavate 3.7 cy/lf with	D6T XL SU, 100-foot push. Finish grade 1.2 cy/lf with D6T XL SU 50 ft push.	
Chain link fence, Pits perimeter		2,453	feet	\$20.34	\$49,906	Means	323113.20-0800	316	Fence, chain link industrial, schedule 40, including concrete, 6 ga. wire, 6' high, but omit barbed wire, galv. Steel
Hanover Mountain Mine									
Berm		6,670	feet	\$2.82	\$18,809	Appendix B8	Excavate 3.7 cy/lf with	D6T XL SU, 100-foot push. Finish grade 1.2 cy/lf with D6T XL SU 50 ft push.	
Chain link fence		3,286	feet	\$20.34	\$66,853	Means	323113.20-0800	316	Fence, chain link industrial, schedule 40, including concrete, 6 ga. wire, 6' high, but omit barbed wire, galv. Steel
				SWRDF	\$2,783,571				
				Hanover Mountain Deposit	\$85,663				
				Wells	\$7,791				
				MTI	\$800,562				
				Surface Impoundments	\$33,978				
				Continental Pit	\$68,617				
				Other Direct Cost	\$3,780,182				
References									
See Appendix B.2.8 for Channel, Bench, and Downdrain unit rate development.									
RS Means Heavy Construction Cost Data (28st Annual Edition 2014)									
	New Mexico Las Cruces	84.7%							

Reclamation Summary

Cobre Mining Company

Stockpiles, Tailings, Reservoirs, Haul Roads and Distrubed Area Reclamation
Based on Projected EOY 2019 Mine Plan

		Current Value
DIRECT COSTS	Facility and Structure Removal	-
	Earthmoving	\$8,260,312
	Revegetation	\$771,760
	Other	\$3,780,182
	Subtotal, Direct Costs	\$12,812,254
INDIRECT COSTS¹	Mobilization and Demobilization	3.8% \$486,865.67
	Contingencies	4.0% \$512,490
	Engineering Redesign Fee	2.5% \$320,306
	Contractor Profit and Overhead	15.0% \$1,921,838
	Project Management Fee	3.0% \$384,368
	State Procurement Cost	0.0% \$0
	Indirect Percentage Sum =	28.3%
	Subtotal, Indirect Costs	\$3,625,868
TOTAL COST		\$16,438,122

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.
OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).

Reclamation Summary

			SWRDF(a)	Hanover Mountain Deposit(b)	Pearson-Barnes Mine Area	Low Grade WRF	MTI (d)	Haul and Exploration Roads	Surface Impoundments	Wells	Continental Pit	Totals
DIRECT COSTS												
	Earthmoving		\$5,048,729	\$1,273,698	\$135,852	\$98,784	\$1,628,987	\$14,715	\$59,546	\$0	\$0	\$8,260,312
	Revegetation		\$376,401	\$99,453	\$10,694	\$28,842	\$162,369	\$73,691	\$4,493	\$0	\$15,817	\$771,760
	Other ^(c)		\$2,783,571	\$85,663	\$0	\$0	\$800,562	\$0	\$33,978	\$7,791	\$68,617	\$3,780,182
	Subtotal, Direct Costs		\$8,208,701	\$1,458,813	\$146,547	\$127,626	\$2,591,919	\$88,407	\$98,017	\$7,791	\$84,434	\$12,812,254
INDIRECT COSTS												
	Mobilization and Demobilization	3.8%	\$311,931	\$55,435	\$5,569	\$4,850	\$98,493	\$3,359	\$3,725	\$296	\$3,208	\$486,866
	Contingencies	4.0%	\$328,348	\$58,353	\$5,862	\$5,105	\$103,677	\$3,536	\$3,921	\$312	\$3,377	\$512,490
	Engineering Redesign Fee	2.5%	\$205,218	\$36,470	\$3,664	\$3,191	\$64,798	\$2,210	\$2,450	\$195	\$2,111	\$320,306
	Contractor Profit and Overhead	15.0%	\$1,231,305	\$218,822	\$21,982	\$19,144	\$388,788	\$13,261	\$14,703	\$1,169	\$12,665	\$1,921,838
	Project Management Fee	3.0%	\$246,261	\$43,764	\$4,396	\$3,829	\$77,758	\$2,652	\$2,941	\$234	\$2,533	\$384,368
	State Procurement Cost	0.0%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Indirect Percentage Sum =	28.3%										
	Subtotal, Indirect Costs		\$2,323,062	\$412,844	\$41,473	\$36,118	\$733,513	\$25,019	\$27,739	\$2,205	\$23,895	\$3,625,868
TOTAL COST PER STOCKPILE			\$10,531,763	\$1,871,658	\$188,019	\$163,744	\$3,325,432	\$113,426	\$125,756	\$9,996	\$108,328	\$16,438,122
TOTAL COST			\$16,438,122									

(a) Includes disturbed area adjacent and north of the SWRDF

(b) Includes berm and fence disturbed area

(c) Other includes benches, channels, downdrains, plug and abandon wells, fence, berms, and reinforced concrete wall demolition.

(d) Cost includes reclaiming south buttress area and burying tailing pipelines in place.

Facility Characteristics

Facility	SWRDF(a)	Hanover Mountain Deposit(b)	Pearson-Barnes Mine Area	Low Grade WRF	MTI (d)	Haul and Exploration Roads	Surface Impoundments	Wells	Continental Pit(c)
Reclaimed Acres	418.8	110.7	11.9	32.1	180.7	82.0	5.0	-	17.6
Item	Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost	Capital Cost
Cover Material (Load, haul, spread)	\$5,415,984	\$1,634,154	\$174,299	\$120,332	\$1,956,169	\$0	\$75,246	\$0	\$0
Regrade	\$1,061,535	\$0	\$0	\$6,408	\$133,822	\$18,880	\$1,151	\$0	\$0
Seed & Mulch	\$482,922	\$127,598	\$13,721	\$37,004	\$208,319	\$94,546	\$5,765	\$0	\$20,293
Other ^(c)	\$3,571,322	\$109,905	\$0	\$0	\$1,027,121	\$0	\$43,594	\$9,996	\$88,035
Capital Cost Totals	\$10,531,763	\$1,871,658	\$188,019	\$163,744	\$3,325,432	\$113,426	\$125,756	\$9,996	\$108,328
Capital Cost/Acre	\$25,147	\$16,907	\$15,800	\$5,101	\$18,403	\$1,383	\$25,151	-	\$6,155
Capital Cost/Acre Cover	\$12,932	\$14,762	\$14,647	\$3,749	\$10,826	\$0	\$15,049	-	\$0
Capital Cost/Acre Top/Outslope Adjustmen	\$2,535	\$0	\$0	\$200	\$741	\$230	\$230	-	\$0
Capital Cost/Acre Earthwork Total	\$15,467	\$14,762	\$14,647	\$3,948	\$11,566	\$230	\$15,279	-	\$0
Capital Cost/Acre Reveg	\$1,153	\$1,153	\$1,153	\$1,153	\$1,153	\$1,153	\$1,153	-	\$1,153
Capital Cost/Acre Other	\$8,528	\$993	\$0	\$0	\$5,684	\$0	\$8,719	-	\$5,002

(a) Includes disturbed area adjacent and north of the SWRDF

(b) Includes berm and fence disturbed area

(c) Other includes benches, channels, downdrains, plug and abandon wells, fence, berms, and reinforced concrete wall demolition.

(d) Cost includes reclaiming south buttress area and burying tailing pipelines in place.

General Information

Applicant	Cobre Mining Company Hanover, New Mexico 88041	
Disturbed Surface Area (acres)	6H	
Type of Operation	Existing/Surface/Copper	
Current value before escalation and discounting	\$1,303,120	Magnetite Tailings
Based on Projected EOY 2019 Mine Plan		

Demolition

Demo cost are addressed elsewhere.

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Material Handling Plan Summary Sheet

Item	Description	Location 1	Location 2	Total Haul/Push Distance (ft)	Grade (%)	Equipment
1100	Regrade Outslopes	Magnetite Tailings	-	250	see dozer	D11R CD
1101	Regrade Top	Magnetite Tailings	-	300	see dozer	D11R CD
1102	Dozer Assist	Magnetite Tailings Top	-	-	see dozer	D11R CD
1103	Dozer Assist	Magnetite Tailings Outslopes	-	-	see dozer	D11R CD
1200	Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top			992K
1201	Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes			992K
1202	Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top	6,480	see trucks	777F
1203	Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes	6,480	see trucks	777F
1300	Grade cover soil	Magnetite Tailings Top	-			D11R CD
1301	Grade cover soil	Magnetite Tailings Outslopes	-			D11R CD
1400	Off-Hwy Water Tanker Truck					10,000 gal
1401	Motor Grader					16M

Earthwork Quantity Worksheet

Cobre
Magnetite Tailings Worksheet #4
11/12/14

Item	Description	Location 1	Location 2	Area (ac)	Cover Depth (in)	Bank/stockpile Volume (bcy)	Swell Factor (%)	Loose/stockpile Volume (lcy)
1100	Regrade Outslopes	Magnetite Tailings	Outslopes			69,996	0%	69,996
1101	Regrade Top	Magnetite Tailings	Top			73,482	0%	73,482
1102	Dozer Assist	Magnetite Tailings Top	Top			276,616	0%	276,616
1103	Dozer Assist	Magnetite Tailings Outslopes	Outslopes			25,739	0%	25,739
1200	Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top	57.2	36	276,616	0%	276,616
1201	Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes	5.3	36	25,739	0%	25,739
1202	Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top			276,616	0%	276,616
1203	Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes			25,739	0%	25,739
1300	Grade cover soil	Magnetite Tailings Top	-	57.2		276,616	0%	276,616
1301	Grade cover soil	Magnetite Tailings Outslopes	-	5.3		25,739	0%	25,739
1801	Off-Hwy Water Tanker Truck							
1802	Motor Grader							

Productivity and Hours Required for Dozer Use—Earthmoving

				PERFORMANCE FACTORS														Direct Drive Trans. Factor	Grade (%)
Task Description	Location 1	Location 2	Equipment	Loose Volume (cy)	Productivity (cy/hr)	Total Task Time (hours)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor			
Regrade Outslopes	Magnetite Tailings	Outslopes	D11R CD	69,996	1,122	62	1.2	1.67	4,185	1.20	250	1362	0.75	50	1	1	1	-33.3	
Regrade Top	Magnetite Tailings	Top	D11R CD	73,482	616	119	1.2	1.07	4,185	1.20	300	1164	0.75	50	1	1	1	-3.5	
Dozer Assist	Magnetite Tailings Top	Top	D11R CD	N/A	N/A	257	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Dozer Assist	Magnetite Tailings Outslopes	Outslopes	D11R CD	N/A	N/A	24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Productivity and Hours Required for Dozer Use---Grading

PERFORMANCE FACTORS																						
Task Description	Location 1	Location 2	Equipment	Volume (cy)	Area (acres)	Productivity (acres/hr)	Productivity (cy/hr)	Task Time (hours)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Effective Blade Width (feet)	Speed (miles/hr)	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Factor	Grade (%)	Operator Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)
Grade cover soil	Magnetite Tailings Top	-	D11R CD	276,616		-	2,017	137.2	1.2	1.1	3,300	1.20	-	-	50	1.00	1.00	1.00	-3.5	0.75	100	3002
Grade cover soil	Magnetite Tailings Outslopes	-	D11R CD	25,739		-	3,126	8.2	1.2	1.7	3,300	1.20	-	-	50	1.00	1.00	1.00	-33.0	0.75	100	3002

*Productivity and Hours Required for
Ripper-Equipped Dozer Use*

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Note: Ripping Currently Included in Revegetation Costs

Productivity and Hours Required for Hydraulic Excavator

Cobre
Magnetite Tailings Worksheet #8
11/12/14

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Productivity and Hours Required for Truck Use

Truck-Loader Matching
Truck Loading Height (empty), Cat 777F - 14'7"
Loader Dump Clearance, Cat 992G - 15'3"

								PERFORMANCE FACTORS													
				Truck	Optimum					Loader	Total	Haul	Haul	Haul	Haul	Haul	Haul				
Task Description	Location 1	Location 2	Equipment	Volume	Time	Cycle	No. of	Productivity	Task	Struck	Heaped	Cycles	per Truck	Distance	Segment 1	Segment 2	Segment 3	Segment 1	Segment 2	Segment 3	Resistance
				(cy)	(min)		Trucks	(cy/hr)	(hrs)	(cy)	(cy)			(feet)	(feet)	(feet)	(feet)	(%)	(%)	(%)	(%)
Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top	777F	276,616	10.4		3	1,008	274	54.6	78.6	5		6,480	2,310	1,940	2,230	-8.9%	1.6%	-4.0%	2.5%
Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes	777F	25,739	10.4		3	1,012	25	54.6	78.6	5		6,480	2,310	1,940	2,230	-8.9%	1.6%	-4.0%	2.5%

*Cover material is assumed to be obtained for each facility based on the 2014 mine expansion plan, the volume of available cover material, and proximity to the facility being covered. These haul routes are subject to change based on those factors.

Productivity and Hours Required for Truck Use

Truck-Loader Matching
Truck Loading Height (empty), Cat 777F - 14'7"
Loader Dump Clearance, Cat 992G - 15'3"

			Haul	Haul	Haul	Haul	Haul	Haul	Return	Return	Return				Load/	Dump/		Travel Time	Travel Time	Travel Time	Travel Time	Travel Time	Travel Time
			Distance	Distance	Distance	Effective	Effective	Effective	Effective	Effective	Effective	Haul	Return	Loading	Maneuver	Maneuver	Work	Loaded	Loaded	Loaded	Empty	Empty	Empty
Task Description	Location 1	Location 2	Segment 1	Segment 2	Segment 3	Segment 1	Segment 2	Segment 3	Segment 1	Segment 2	Segment 3	Time	Time	Time	Time	Time	Hour	Segment 1	Segment 2	Segment 3	Segment 1	Segment 2	Segment 3
Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top	704.1	591.3	679.7	0.0%	4%	0%	11%	1%	7%	2.35	3.02	3.25	0.7	1.1	50	0.00090	0.00186	0.00090	0.00231	0.00088	0.00128
Haul cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes	704.1	591.3	679.7	0.0%	4%	0%	11%	1%	7%	2.35	2.98	3.25	0.7	1.1	50	0.00090	0.00187	0.00090	0.00225	0.00083	0.00133
Å																							

Productivity for Front End Loader

									PERFORMANCE FACTORS		
Task Description	Location 1	Location 2	Equipment	Volume (cy)	Net Bucket Capacity (cy)	Loader Cycle Time (min)	Productivity (cy/hr)	Task Time (hours)	Rated Bucket Capacity (cy)	Bucket Fill Factor	Work Hour (min/hr)
Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Top	992K	276,616	14	0.65	1,077	257	16	0.875	50
Load cover soil	North OB Stockpile, OB-5 Stockpile	Magnetite Tailings Outslopes	992K	25,739	14	0.65	1,077	24	16	0.875	50

Productivity and Hours Required for Scraper Use

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Productivity and Hours Required for Motor grader Use---Grading

Cobre
Magnetite Tailings Worksheet #12
11/12/2014

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Summary Calculation of Earthmoving Costs

Equipment Type	Task	Location 1	Location 2	Owning and Operating Cost (\$/hr)	Labor Cost (\$/hr)	Number of Units (Equipment)	Time Req'd (hrs)	Direct Cost (\$)	Total Production	Prod. Unit	Unit Cost (\$/unit)
Dozers-Earthmoving											
D11R CD	Regrade Outslopes	Magnetite Tailings	Outslopes	\$509.12	\$47.58	1	62	\$34,714	69,996 cy		\$0.50
D11R CD	Regrade Top	Magnetite Tailings	Top	\$509.12	\$47.58	1	119	\$66,355	73,482 cy		\$0.90
D11R CD	Dozer Assist	Magnetite Tailings Top	Top	\$509.12	\$47.58	1	257	\$142,993	276,616 cy		\$0.52
D11R CD	Dozer Assist	Magnetite Tailings	Outslopes	\$509.12	\$47.58	1	24	\$13,305	25,739 cy		\$0.52
Dozers-Grading											
D11R CD	Grade cover soil	Magnetite Tailings Top	-	\$509.12	\$47.58	1	137.2	\$76,363	276,615.7 cy		\$0.28
D11R CD	Grade cover soil	Magnetite Tailings	Outslopes	\$509.12	\$47.58	1	8.2	\$4,584	25,739.1 cy		\$0.18
Loaders											
992K	Load cover soil	North OB Stockpile, OB-5 Stc	Magnetite Tailings Top	\$369.97	\$47.75	1	257	\$107,294	276,616 cy		\$0.39
992K	Load cover soil	North OB Stockpile, OB-5 Stc	Magnetite Tailings Outslopes	\$369.97	\$47.75	1	24	\$9,984	25,739 cy		\$0.39
Trucks											
777F	Haul cover soil	North OB Stockpile, OB-5 Stc	Magnetite Tailings Top	\$294.40	\$42.82	3	274	\$277,598	276,616 cy		\$1.00
777F	Haul cover soil	North OB Stockpile, OB-5 Stc	Magnetite Tailings Outslopes	\$294.40	\$42.82	3	25	\$25,737	25,739 cy		\$1.00
Water Truck and Grader											
Off-Hwy Water Tanker Truck	Magnetite Tailings			\$171.97	\$25.34	1	281	\$55,396			
Motor Grader	Magnetite Tailings			\$164.06	\$47.58	1	281	\$59,420			

Magnetite Tailings \$873,743

Earthwork Direct Cost \$873,743

EQUIPMENT	Fuel Consumption (gal/hr)	Fuel Cost (\$/hr)	Owning and Operating Cost (w/out fuel) (\$/hr)	Fuel-Adjusted Own/Op Cost (\$/hr)	Reference
Equipment Description					
Cat D11T CD Bulldozer	29.8	\$95.65	\$413.47	\$509.12	1
Cat 777F Truck	18.8	\$60.31	\$234.09	\$294.40	1
Cat 992K Loader	25.6	\$82.41	\$287.56	\$369.97	1
Cat 16M Motor Grader	9.5	\$30.56	\$133.50	\$164.06	1
Off-Hwy Water Tanker Truck, 10,000-gal.	15.3	\$49.33	\$122.64	\$171.97	1

FUEL

Oil Broker Quote	\$3.2150 per gallon	2
------------------	---------------------	---

LABOR

LABOR	NMDOL Type A Operator Group	NMDOL Type A Operator Classification	Nominal Total Rate (\$/hr)	
Labor Description				
Cat D11T CD Bulldozer	Equipment Operator IV	Bulldozer (mult. Units)	\$47.58	3
Cat 777F Truck	Truck Driver III	Haul Truck	\$42.82	3
Cat 992K Loader	Equipment Operator VI	Loader (over 10 cy)	\$47.75	3
Cat 16M Motor Grader	Equipment Operator IV	Motor Grader	\$47.58	3
Off-Hwy Water Tanker Truck, 10,000-gal.	N/A	N/A	\$25.34	3

References

1. Equipment unit rates from EquipmentWatch Custom Cost Evaluator Version 6.15.0B (<http://www.equipmentwatch.com>). See attachments for rate development.
2. Western Refining Quote, Lordsburg NM (June 18, 2014).
3. Labor rates based on NM Department of Labor Type H (Heavy Engineering) labor rates. See attachments for rate development.

Revegetation Costs

Description:

Plow; apply fertilizer, seed mix, mulch, and crimp mulch

Unit or Disturbance	Area* (acres)	Unit Cost** (\$/acre)	Direct Cost (\$)
Magnetite Tailings Top	57	\$899	\$51,361
Magnetite Tailings Outcrops	5.3	\$899	\$4,779

Revegetation Direct Cost \$56,140

*Borrow Area reclamation included in Cobre_Stockpiles_Tails_Other_2014.xlsx

**Rocky Mountain Reclamation Quote June, 18 2014, \$1153/acre minus 28.3% indirect costs. Quote includes cost for scarifying (ripping) surface.

Other Reclamation Activity Costs

Stockpiles Area	Activity	Quantity	Unit	Unit Cost (\$/unit)	Direct Cost (\$)	Reference	Means Line Item	Means Page	Description
Magnetite Tailings	Downdrain Length	420	ft	\$5.86	\$2,461	Appendix B.2.8	-	-	Excavate and waste 7.6 cy/lf material on slopes with D11T CD, 175-foot downslope excavation, 200-foot lateral waste push. Finish grade with D6T XL SU 3 passes 1 mph.
Magnetite Tailings	Downdrain Gravel, Haul	441	cy	\$9.36	\$4,127	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
Magnetite Tailings	Downdrain Gravel, Backfill	441	cy	\$0.91	\$400	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
Magnetite Tailings	Downdrain Riprap, Haul	1,806	cy	\$9.36	\$16,903	Means	G1030 150 6600	483	Load & Haul rock, 3-cy loader, 7 20-cy trailers, 4-mile RT
Magnetite Tailings	Downdrain Riprap, Backfill	1,806	cy	\$0.91	\$1,637	Means	312323.14-5200	238	Gravel Backfill, 300 hp, 150' haul sand and gravel
Magnetite Tailings	Riprap	1,806	cy	\$32.33	\$58,388	Fowler Brothers Riprap Verbal Quote February 2009 \$29.16/cy inflated to 2014 dollars			
Magnetite Tailings	Gravel	441	cy	\$4.27	\$1,883	Means	321123.23-0301	302	Base Course Drainage Layers, Crushed 1 1/2 ", Compacted to 4" deep
					Other Direct Cost:	\$85,799			

References

See Appendix B.2.8 for Channel, Bench, and Downdrain unit rate development.
RS Means Heavy Construction Cost Data (28st Annual Edition 2014)
New Mexico Las Cruces 84.7%

Reclamation Summary

Cobre Mining Company

Magnetite Tailings Reclamation

Based on Projected EOY 2019 Mine Plan

			Current Value
DIRECT COSTS	Facility and Structure Removal		\$0
	Earthmoving		\$873,743
	Revegetation		\$56,140
	Other		\$85,799
	Subtotal, Direct Costs		\$1,015,682
INDIRECT COSTS'	Mobilization and Demobilization	3.8%	\$38,595.92
	Contingencies	4.0%	\$40,627
	Engineering Redesign Fee	2.5%	\$25,392
	Contractor Profit and Overhead	15.0%	\$152,352
	Project Management Fee	3.0%	\$30,470
	State Procurement Cost	0.0%	\$0
	Indirect Percentage Sum =	28.3%	
	Subtotal, Indirect Costs		\$287,438
TOTAL COST			\$1,303,120

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.

OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).

Reclamation Summary

DIRECT COSTS		Magnetite Tailings	
	Facility and Structure Removal		\$0
	Earthmoving		\$873,743
	Revegetation		\$56,140
	Other ¹		\$85,799
	Subtotal, Direct Costs		\$1,015,682
INDIRECT COSTS			
	Mobilization and Demobilization	3.8%	\$38,596
	Contingencies	4.0%	\$40,627
	Engineering Redesign Fee	2.5%	\$25,392
	Contractor Profit and Overhead	15.0%	\$152,352
	Project Management Fee	3.0%	\$30,470
	State Procurement Cost	0.0%	\$0
	Indirect Percentage Sum =	28.3%	
	Subtotal, Indirect Costs		\$287,438
GROSS RECEIPTS TAX	Grant County (unincorporated areas)	0.0%	\$0
	(applied to sum of indirect and direct costs)		
TOTAL COST PER FACILITY			\$1,303,120

¹Other includes: channels and downdrains

Facility Characteristics

Cobre
Magnetite Tailings Worksheet #18
11/12/2014

Facility	Magnetite Tailings
Reclaimed Acres	62.5
<u>Item</u>	Capital Cost
Cover Material (Load, haul, spread)	\$991,341
Regrade	\$129,672
Seed & Mulch	\$72,028
Other ¹	\$110,080
Capital Cost Totals	\$1,303,120
Capital Cost/Acre	\$20,850
Capital Cost/Acre Cover	\$15,861
Capital Cost/Acre Top/Outslope Adjustment	\$2,075
Capital Cost/Acre Earthwork Total	\$17,936
Capital Cost/Acre Reveg	\$1,152
Capital Cost/Acre Other	\$1,761

¹Other includes channels and downdrains

Demolition

Description	Building Information				Building Demolition		
	Dimensions (ft)				Unit Cost	Direct Cost	
	Length	Width	Height	Diameter	Quantity (cft)	(\$/unit)	(\$)
Mill Building #2	197	140	70	-	1930600	\$0.25	\$490,565
Thickener MCC	18.0	18	12	-	3888	\$0.25	\$988
Thickener MCC	12.0	22	15	-	3960	\$0.25	\$1,006
No. 2 Mill Stacker	820	20	15	-	246000	\$0.25	\$62,509
Stacker Hoist	28	23	18	-	11592	\$0.25	\$2,946
No. 2 Mill Secondary Crusher Building	36	38	50	-	68400	\$0.25	\$17,380
Pump House and Shed for Thickener	10	10	14	-	1400	\$0.25	\$356

Demo Total Direct Cost \$575,750

Data Sources:

Item	Base Unit Cost \$/unit	Units	Location Adjustment New Mexico Las Cruces	Adjusted Unit Cost \$/unit	Means Line Item	Means Page	Description
Structure Demolition 1	\$0.30	cft	84.7%	\$0.25	024116.13 0100	37	Structure Demolition Building demolition large urban projects includes 20 mi. haul no foundation or dump fees mixture of types

Quantities from: Telesto Solutions Inc, *Closure/Closeout Plan Earthwork Update Summary Report Revision II*, Prepared for: Cobre Mining Company, January 2005.
R.S. Means Heavy Construction Cost Data, 28th Annual Edition, 2014

Demolition

Soil Cover Depth ft: 3

Description	Building Information						
	Dimensions (ft)				Quantity (cy)	Unit Cost (\$/unit)	Direct Cost (\$)
	Length	Width	Height	Diameter			
Mill Building #2	197	140	70	-	3064	\$7.22	\$22,140
Thickener MCC	18	18	12	-	36	\$7.22	\$260
Thickener MCC	12	22	15	-	29	\$7.22	\$212
No. 2 Mill Stacker	820	20	15	-	1822	\$7.22	\$13,165
Stacker Hoist	28	23	18	-	72	\$7.22	\$517
No. 2 Mill Secondary Crusher Building	36	38	50	-	152	\$7.22	\$1,098
Pump House and Shed for Thickener	10	10	14	-	11	\$7.22	\$80

Demolition Cover Direct Cost: \$37,473

Data Sources:

Item	Adjusted Unit Cost \$/unit	Means Line Item	Means Page	Description
Load and Haul cover material	\$7.22	G1030140-7600	481	Load and Haul earth 5-cy loader, 12 20-cy trailers, 4-mile RT

R.S. Means Heavy Construction Cost Data, 28th Annual Edition, 2014
Location adjustment: New Mexico Las Cruces 84.7%

Demolition

Description	Building Information				
	Dimensions (ft)				Area (acres)
	Length	Width	Height	Diameter	
Mill Building #2	197	140	70	-	0.63
Thickener MCC	18	18	12	-	0.01
Thickener MCC	12	22	15	-	0.01
No. 2 Mill Stacker	820	20	15	-	0.38
Stacker Hoist	28	23	18	-	0.01
No. 2 Mill Secondary Crusher Building	36	38	50	-	0.03
Pump House and Shed for Thickener	10	10	14	-	0.00

Revegetation Area: 1.07 acres

Revegetation unit cost: \$899 \$/acre

Demolition Reveg Direct Cost: \$963

Data Sources:

Rocky Mountain Reclamation Quote June, 18
2014, \$1153/acre minus 28.3% indirect costs.
Quote includes cost for scarifying (ripping)
surface.

Reclamation Summary

Cobre Mining Company

Building Demolition

Based on Projected EOY 2019 Mine Plan

			Current Value
DIRECT COSTS	Facility and Structure Removal		\$575,750
	Ripping & Revegetation		\$963
	Cover		\$37,473
	Subtotal, Direct Costs		\$614,186
INDIRECT COSTS'	Mobilization and Demobilization	3.8%	\$23,339
	Contingencies	4.0%	\$24,567
	Engineering Redesign Fee	2.5%	\$15,355
	Contractor Profit and Overhead	15.0%	\$92,128
	Project Management Fee	3.0%	\$18,426
	State Procurement Cost	0.0%	\$0
	Indirect Percentage Sum =	28.3%	
	Subtotal, Indirect Costs		\$173,815
TOTAL COST			\$788,001

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.

OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

- 1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).

Vegetation Maintenance Costs

Location	Total Area (acres)	Reclamation Complete	Veg Maintenance Complete	# yrs veg Maint.	Percent loss per year	Quantity	Unit	Unit Cost* (\$/unit)	Item Cost (\$)	Description
Stockpiles and Tailings	921	0	11	12	2%	18.4	acres	\$935	\$206,754	2% of veg fails every year for 12 years.
Building Demolition	1.07	0	11	12	2%	0.0	acres	\$935	\$241	2% of veg fails every year for 12 years.

Notes: Vegetation Maintenance Total Direct Cost: \$206,994
Vegetation Maintenance Total Cost (with indirects): \$255,224
Reclamation Start Date: Dec-19

* Rocky Mountain Reclamation Quote June, 18 2014, \$1153/acre minus 23.3% indirect costs. Quote includes cost for scarifying (ripping) surface.
935 \$/acre

**Operations & Maintenance
Overall Site**

EROSION CONTROL AND MONITORING[1]

	Years 0-12	Years 13-39	Years 40-99
Base:	\$5,722.63	\$5,722.63	\$5,722.63 \$/day
Time:	12	4	1 day/yr
Annual:	\$68,671.51	\$22,890.50	\$5,722.63 \$/yr
	Annual Current		

ROAD MAINTENANCE [2]

	Years 0-19	Years 20-39	Years 40-99
Base:	\$12,618.92	\$12,618.92	\$12,618.92 \$/month
Time:	4	2	1 months/yr
Annual:	\$50,475.67	\$25,237.83	\$12,618.92 \$/yr
	Annual Current		

Year	Cost (\$)	Year	Cost (\$)	Total Reclaimed Area per Year (acres)	Percent Reclaimed
0	\$0 Weighted based on total reclaimed area	0	\$0 Weighted based on total reclaimed area	0	0%
1	\$0 Weighted based on total reclaimed area	1	\$0 Weighted based on total reclaimed area	0	0%
2	\$11,445 Weighted based on total reclaimed area	2	\$8,413 Weighted based on total reclaimed area	154	17%
3	\$22,891 Weighted based on total reclaimed area	3	\$16,825 Weighted based on total reclaimed area	307	33%
4	\$34,336 Weighted based on total reclaimed area	4	\$25,238 Weighted based on total reclaimed area	461	50%
5	\$45,781 Weighted based on total reclaimed area	5	\$33,650 Weighted based on total reclaimed area	615	67%
6	\$57,226 Weighted based on total reclaimed area	6	\$42,063 Weighted based on total reclaimed area	769	83%
7	\$68,672 Weighted based on total reclaimed area	7	\$50,476 Weighted based on total reclaimed area	922	100%
8	\$68,672	8	\$50,476		100%
9	\$68,672	9	\$50,476		100%
10	\$68,672	10	\$50,476		100%
11	\$68,672	11	\$50,476		100%
12	\$68,672	12	\$50,476		100%
13	\$22,891	13	\$50,476		
14	\$22,891	14	\$50,476		
15	\$22,891	15	\$50,476		
16	\$22,891	16	\$50,476		
17	\$22,891	17	\$50,476		
18	\$22,891	18	\$50,476		
19	\$22,891	19	\$50,476		
20	\$22,891	20	\$25,238		
21	\$22,891	21	\$25,238		
22	\$22,891	22	\$25,238		
23	\$22,891	23	\$25,238		
24	\$22,891	24	\$25,238		
25	\$22,891	25	\$25,238		
26	\$22,891	26	\$25,238		
27	\$22,891	27	\$25,238		
28	\$22,891	28	\$25,238		
29	\$22,891	29	\$25,238		
30	\$22,891	30	\$25,238		
31	\$22,891	31	\$25,238		
32	\$22,891	32	\$25,238		
33	\$22,891	33	\$25,238		
34	\$22,891	34	\$25,238		
35	\$22,891	35	\$25,238		
36	\$22,891	36	\$25,238		
37	\$22,891	37	\$25,238		
38	\$22,891	38	\$25,238		
39	\$22,891	39	\$25,238		
40	\$5,723	40	\$12,619		
41	\$5,723	41	\$12,619		
42	\$5,723	42	\$12,619		
43	\$5,723	43	\$12,619		
44	\$5,723	44	\$12,619		
45	\$5,723	45	\$12,619		
46	\$5,723	46	\$12,619		
47	\$5,723	47	\$12,619		
48	\$5,723	48	\$12,619		
49	\$5,723	49	\$12,619		
50	\$5,723	50	\$12,619		
51	\$5,723	51	\$12,619		
52	\$5,723	52	\$12,619		
53	\$5,723	53	\$12,619		
54	\$5,723	54	\$12,619		
55	\$5,723	55	\$12,619		
56	\$5,723	56	\$12,619		
57	\$5,723	57	\$12,619		
58	\$5,723	58	\$12,619		
59	\$5,723	59	\$12,619		
60	\$5,723	60	\$12,619		
61	\$5,723	61	\$12,619		
62	\$5,723	62	\$12,619		
63	\$5,723	63	\$12,619		
64	\$5,723	64	\$12,619		
65	\$5,723	65	\$12,619		
66	\$5,723	66	\$12,619		
67	\$5,723	67	\$12,619		
68	\$5,723	68	\$12,619		
69	\$5,723	69	\$12,619		
70	\$5,723	70	\$12,619		
71	\$5,723	71	\$12,619		
72	\$5,723	72	\$12,619		
73	\$5,723	73	\$12,619		
74	\$5,723	74	\$12,619		
75	\$5,723	75	\$12,619		
76	\$5,723	76	\$12,619		
77	\$5,723	77	\$12,619		
78	\$5,723	78	\$12,619		
79	\$5,723	79	\$12,619		
80	\$5,723	80	\$12,619		
81	\$5,723	81	\$12,619		
82	\$5,723	82	\$12,619		

**Operations & Maintenance
Overall Site**

EROSION CONTROL AND MONITORING[1]

	Years 0-12	Years 13-39	Years 40-99
Base:	\$5,722.63	\$5,722.63	\$5,722.63 \$/day
Time:	12	4	1 day/yr
Annual:	\$68,671.51	\$22,890.50	\$5,722.63 \$/yr

Annual
Current

ROAD MAINTENANCE [2]

	Years 0-19	Years 20-39	Years 40-99
Base:	\$12,618.92	\$12,618.92	\$12,618.92 \$/month
Time:	4	2	1 months/yr
Annual:	\$50,475.67	\$25,237.83	\$12,618.92 \$/yr

Annual
Current

Total
Reclaimed
Area per
Year
(acres)
Percent
Reclaimed

Year	Cost (\$)
83	\$5,723
84	\$5,723
85	\$5,723
86	\$5,723
87	\$5,723
88	\$5,723
89	\$5,723
90	\$5,723
91	\$5,723
92	\$5,723
93	\$5,723
94	\$5,723
95	\$5,723
96	\$5,723
97	\$5,723
98	\$5,723
99	\$5,723
SubTotal Costs (with indirects):	
\$1,545,109	

Year	Cost (\$)
83	\$12,619
84	\$12,619
85	\$12,619
86	\$12,619
87	\$12,619
88	\$12,619
89	\$12,619
90	\$12,619
91	\$12,619
92	\$12,619
93	\$12,619
94	\$12,619
95	\$12,619
96	\$12,619
97	\$12,619
98	\$12,619
99	\$12,619
SubTotal Costs (with indirects):	
\$2,044,264	

O&M Total Costs (with indirects): \$3,589,373

[1] Erosion Control

Modified Crew B-13A (1 Labor Foreman, 2 laborers, 2 equip. operators (med.),
2 truck drivers (heavy), 1 crawler loader (4 cy), 2 dump trucks (8 cy, 220 HP)
RS Means Heavy Construction Cost Data (28th Annual Edition, 2014)

	#	\$/hour	\$/day
Labor Foreman (outside)	1	\$38.65	\$309.20
Laborers	2	\$38.65	\$586.40
Equipment Operators (med.)	2	\$48.90	\$782.40
Truck Drivers (heavy)	2	\$37.55	\$600.80
		\$/day	\$/day
Crawler Loader, 4 C.Y.	1	\$1,532.00	\$1,532.00
Dump Trucks, 8 C.Y., 220 H.P.	2	\$834.40	\$1,668.80

Subtotal \$5,480 \$/day
84.70% Location Adjustment
Total Direct Cost \$4,641 \$/day
Indirect Cost Percentage 23.30%
Total Cost \$5,723 \$/day

[2] Road Maintenance Crew

Equipment - Equipment Watch Version 6.14.0B
Labor - NM Department of Labor Type H (Heavy Engineering) labor rates.
See Attachments for rate development.

	Operating Cost (\$/hr)	Labor Rate (\$/hr)	Subtotal 24 hrs/month (\$/month)
Cat 16M Motor Grader	\$164.06	\$47.58	\$5,079
10,000-gal Water Truck	\$171.97	\$42.82	\$5,155

Total Direct Cost \$10,234 \$/month
Indirect Cost Percentage 23.30%
Total Cost \$12,619 \$/month

Operations and Maintenance Summary

Cobre Mining Company

Operations and Maintenance

Current Value

Based on Projected EOY 2019 Mine Plan

DIRECT COSTS	Facility and Structure Removal		\$0
	Earthmoving		\$0
	Revegetation		\$206,994
	Other		\$2,911,090
	Subtotal, Direct Costs		\$3,118,084
INDIRECT COSTS¹	Mobilization and Demobilization	3.8%	\$118,487
	Contingencies	4.0%	\$124,723
	Engineering Redesign Fee	2.5%	\$77,952
	Contractor Profit and Overhead	10.0%	\$311,808
	Project Management Fee	3.0%	\$93,543
	State Procurement Cost	0.0%	\$0
	Indirect Percentage Sum =	23.3%	
	Subtotal, Indirect Costs		\$726,513

TOTAL COST **\$3,844,597**

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.

OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

- 1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).

APPENDIX B.2

SUPPORTING DOCUMENTATION

APPENDIX B.2.1
CALCULATION DOCUMENTATION

EQUATIONS USED IN CAPITAL COST SPREADSHEET

Sheet #4 Earthwork:

$$\text{Bank Volume (bcy)} = \text{Area (acre)} * \text{Cover Depth (in)} * \frac{43560(\text{ft}^2 / \text{acre})}{12(\text{in} / \text{ft}) * 27(\text{ft}^3 / \text{cy})}$$

$$\text{Loose or Stockpile Volume (lcy)} = \text{Bank or stockpile Volume (cy)} * [1 + \text{Swell Factor}]$$

Sheet #5 Dozer:

$$\text{Normal Production (cy / hr)} = 159372.008958 * \text{Maximum Push Distance (ft)}^{-0.862481}$$

(Caterpillar Performance Handbook Edition 42 D11T CD page1 - 53)

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

$$\text{Total Task Time (hr)} = \frac{\text{Loose or Stockpile Volume (cy)}}{\text{Productivity (cy / hr)}}$$

$$\text{Grade (Dozing Factor)} = -0.02 * \text{Grade (\%)} + 1$$

(Curve Fit Cat Handbook Ed 44 19 – 55)

Sheet #6 Grading:

Grade Surface:

$$\text{Grade (Dozing Factor)} = -0.02 * \text{Grade (\%)} + 1$$

(Curve Fit Cat Handbook Ed 44 19 – 55)

$$\begin{aligned} \text{Productivity (acre / hr)} &= \text{Speed (mi / hr)} * \frac{5280 (\text{ft} / \text{mi}) * \text{Effective Blade Width (ft)}}{43560 (\text{ft}^2 / \text{acre})} * \frac{\text{Work Hour (min/ hr)}}{60 (\text{min/ hr})} \\ &* \text{Operator} * \text{Material} * \text{Grade Factor} * \frac{2300(\text{lbs / cy})}{\text{Soil Weight (lbs / cy)}} * \text{Prod. Method} * \text{Visibility} * \text{Elev.} * \text{Drive Trans.} \end{aligned}$$

$$\text{Task Time (hr)} = \frac{\text{Area (acres)}}{\text{Productivity (acres / hr)}}$$

Grade**Cover:**

$$D11T\ CD\ Normal\ Production\ (cy / hr) = 159372.008958 * Maximum\ Push\ Distance\ (ft)^{-0.862481}$$

(Curve Fit Cat Handbook Ed 42 1–53)

$$Grade\ (Dozing\ Factor) = -0.02 * Grade\ (\%) + 1$$

(Curve Fit Cat Handbook Ed 44 19–55)

$$Productivity\ (cy / hr) = Normal\ Production\ (cy / hr) * \frac{Work\ Hour\ (min / hr)}{60\ (min / hr)} * Operator * Material * Grade\ Factor$$

$$* \frac{2300\ (lbs / cy)}{Soil\ Weight\ (lbs / cy)} * Production\ Method * Visibility * Elevation * DriveTrans$$

$$Task\ Time(hr) = \frac{Area\ or\ Volume}{Productivity}$$

Sheet #7 Ripper:

$$Ripper\ Width\ (ft) = \frac{Pocket\ Spacing\ (in)}{12\ (in / ft)}$$

$$1000\ ft\ Passes / Acre = \frac{43560\ (ft^2 / acre)}{Ripper\ Length\ (ft) * Ripper\ Width\ (ft)}$$

$$Volume\ (cy) = Area\ (acres) * 43560\ (ft^2 / acre) * \frac{Ripper\ Penetration\ (in)}{12\ (in / ft) * 27\ (ft^3 / cy)}$$

$$Productivity\ (acres / hr) = \frac{Work\ Hour\ (min / hr)}{\left[\left(\frac{Ripper\ Length\ (ft)}{5280\ (ft / mi) * \frac{Speed\ (mi / hr)}{60\ (min / hr)}} \right) + Turn\ Time\ (min / pass) \right] * 1000\ ft\ Passes / acre}$$

$$Task\ Time\ (hr) = \frac{Area\ (acres)}{Productivity\ (acres / hr)}$$

Sheet #8 Excavator NOT USED:

Sheet #9 Trucks:

$$\text{Total Haul Distance (ft)} = \sum \text{Segment Haul Distance (ft)}$$

$$\text{Haul Distance Segment (m)} = \text{Haul Distance (ft)} * 0.3048 \text{ (m / ft)}$$

$$\text{Haul Effective Grade (\%)} = (\text{Haul Grade (\%)} + \text{RollingResistance (\%)}) (\text{unless } < 0 \text{ then } 0)$$

$$\text{Return Effective Grade (\%)} = (\text{RollingResistance (\%)} - \text{Haul Grade (\%)}) (\text{unless } < 0 \text{ then } 0)$$

$$777F \text{ Segment Travel Time Loaded (min/m)} =$$

$$-1.6825 * \text{Haul Effective Grade Segment (\%)}^3 + 0.4592 * \text{Haul Effective Grade Segment (\%)}^2 \\ + 0.0079 * \text{Haul Effective Grade Segment (\%)} + 0.0009$$

$$777F \text{ Segment Travel Time Empty (min/m)} =$$

$$-6.2135 * \text{Return Effective Grade Segment (\%)}^4 + 1.0448 * \text{Return Effective Grade Segment (\%)}^3 + 0.1016 * \text{Return Effective Grade Segment (\%)}^2 \\ - 0.0035 * \text{Return Effective Grade Segment (\%)} + 0.0009$$

(Curve Fit Cat Handbook Ed 41 9–42)

$$\text{Loader (cycles / truck)} = \text{Maximum} \left[\frac{\text{Struck Capacity (cy)}}{\text{Loader Net Bucket Capacity (cy)}}, \frac{\text{Heaped Capacity (cy)}}{\text{Loader Net Bucket Capacity (cy)}} \right]$$

$$\text{Haul Time (min)} = \sum (\text{Segment Travel Time Loaded (min/m)} * \text{Segment Haul Dist (m)})$$

$$\text{Return Time (min)} = \sum (\text{Segment Travel Time Empty (min/m)} * \text{Segment Haul Dist (m)})$$

$$\text{Loading Time (min)} = \text{Loader Cycle Time (min)} * \text{Loader (cycles / truck)}$$

$$\text{Task Time (hr)} = \text{Maximum} \left[\frac{\text{Volume (cy)}}{\text{Productivity (cy / hr)}}, \text{Loader Task Time (hr)} \right]$$

$$\text{Truck Cycle Time (min)} =$$

$$\text{Haul Time (min)} + \text{Return Time (min)} + \text{Loading Time (min)} \\ + \text{Load / Maneuver Time (min)} + \text{Dump Maneuver Time (min)}$$

$$\text{Productivity (cy / hr)} =$$

$$\text{Work Hour (min / hr)} * \text{Loader (cycles / truck)} * \text{Loader Net Bucket Cap (cy)} * \frac{\text{Optimum Number of Trucks}}{\text{Truck Cycle Time (min)}}$$

Sheet #10 Loader:

992K Truck Loader

$$\text{Net Bucket Capacity (cy)} = \text{Rated Bucket Capacity (cy)} * \text{Bucket Fill Factor}$$

$$\text{Productivity (cy / hr)} = \frac{\text{Net Bucket Capacity (cy)} * \text{Work Hour (min / hr)}}{\text{Loader Cycle Time (min)}}$$

$$\text{Task Time (hr)} = \frac{\text{Volume (cy)}}{\text{Productivity (cy / hr)}}$$

Sheet #11 Scraper NOT USED

Sheet #13 Earth Sum:

$$\text{Direct Cost (\$)} = [\text{Owning \& Operating Cost (\$/hr)} + \text{Labor Cost (\$/hr)}] \\ * \text{TimeRequired (hr)} * \text{Number of Units of Equipment}$$

$$\text{Unit Cost (\$/unit)} = \frac{\text{Direct Cost (\$)}}{\text{Total Production (unit)}}$$

$$\text{Earthwork Total Direct Cost (\$)} = \sum \text{Total Cost (\$)}$$

Sheet #14 Reveg:

$$\text{Direct Cost (\$)} = \text{Area (acres)} * \text{Unit Cost (\$/acre)}$$

$$\text{Reveg Total Direct Cost (\$)} = \sum \text{Direct Costs (\$)}$$

Sheet #15 Other:

$$\text{Unit Cost (\$/unit)} = \text{Unadjusted Cost (\$/unit)} * \frac{\text{Location Adjustment (\%)}}{100}$$

$$\text{Direct Cost (\$)} = \text{Quantity (units)} * \text{Unit Cost (\$/unit)}$$

$$\text{Other Total Direct Cost (\$)} = \sum \text{Current Item Cost (\$)}$$

Sheet #16 & 17 Sum:

$$\begin{aligned} \text{Subtotal Direct Cost (\$)} &= \text{Earthwork Total Direct Cost (\$)} \\ &+ \text{Reveg Total Direct Cost (\$)} + \text{Other Total Direct Cost (\$)} \end{aligned}$$

$$\text{Subtotal Indirect Costs (\$)} = \text{SubTotal Direct Cost (\$)} * \frac{\text{Various Indirect Costs (\%)}}{100}$$

$$\text{Total Cost (\$)} = \text{Subtotal Direct Cost (\$)} + \text{Subtotal Indirect Cost (\$)}$$

OPTIMIZATION EQUATIONS:

Each Equation for number of trucks (n) from 2 to 25.

Productivity Sheet:

$$\text{Productivity (cy / hr)} =$$

$$\text{Work Hour (min / hr)} * \text{Loader (cycle / truck)} * \text{Loader Net Buckter Cap (cy)} * \frac{\text{Number of Trucks}[n]}{\text{Truck Cycle Time (min)}}$$

Time Sheet:

$$\text{Time (hr)} = \text{Maximum} \left(\frac{\text{Volume (cy)}}{\text{Productivity (cy / hr)}}, \text{Laoder Task Time (hr)} \right)$$

Truck Cost Sheet:

$$\text{Truck Cost (\$)} =$$

$$\text{Time (hr)} * \text{Number of Trucks}[n] * (\text{Owning \& Operating Cost (\$/ hr)} + \text{Labor Cost (\$/ hr)})$$

Loader Cost Sheet:

$$\text{Loader Cost for Number of Trucks}[n] (\$) =$$

$$\text{Time (hr)} * (\text{Owning \& Operating Cost (\$/ hr)} + \text{Labor Cost (\$/ hr)})$$

Total Cost Sheet:

Total Cost Number of Trucks[n] (\$) = Truck Cost (\$) + Loader Cost (\$)

Minimum Cost = Minimum (Total Cost for Number of Trucks[n](\$))

Optimum Number of Trucks:

Number of Trucks[n] =

when (Minimum Cost (\$) >= Total Cost for Number of Trucks[n])

then Number of Trucks[n]

else 0

Optimum Number of Trucks = $\sum_{n=2}^{25}$ Number of Trucks[n]

APPENDIX B.2.2

LABOR RATES

Labor Rate Detail

Labor	Equipment	Group	Base rate ¹	Fringes ¹	Apprentice Rate ¹	Subtotal	FICA ² 6.200%	Medicare ² 1.450%	Federal ^{3,4} Unemployment	State ^{3,4} Unemployment	Workmens Compensati on ⁵	Total per Hour
Power Equipment Operator	Front End Loaders	VI	\$34.03	\$6.98	\$0.35	\$41.36	\$2.56	\$0.60	\$0.02	\$0.22	\$2.986	\$47.75
Power Equipment Operator	Dozer	IV	\$33.88	\$6.98	\$0.35	\$41.21	\$2.56	\$0.60	\$0.02	\$0.22	\$2.975	\$47.58
Power Equipment Operator	Motor Grader (Rough)	IV	\$33.88	\$6.98	\$0.35	\$41.21	\$2.56	\$0.60	\$0.02	\$0.22	\$2.975	\$47.58
Power Equipment Operator	Mechanic	VI	\$34.03	\$6.98	\$0.35	\$41.36	\$2.56	\$0.60	\$0.02	\$0.22	\$2.986	\$47.75
Truck Drivers	Haul Trucks	III	\$15.55	\$4.72	\$0.26	\$20.53	\$1.27	\$0.30	\$0.02	\$0.22	\$2.997	\$25.34

<-Base Rate
90% x Dozer
Operator
\$42.82 Base Rate

	Federal Unemployment - 0.6% on the first \$7,000	New Mexico Unemployment - 2% on the first \$23,400
\$ Max ^{3,4}	\$7,000	\$23,400
Unemployment Tax ^{3,4}	0.60%	2.00% new employees' first 4 yrs
Unemployment Taxes Paid	\$42.00	\$468.00
Hours per Yr	2,085 (365 * 5/7 * 8 = 2085.71)	2,085
Unemployment rate per Hour	\$0.02	\$0.22

Class	Group	Class Code	Workmen's Comp (WC) Rate / \$100 ⁵	Base Rate W/ Fringes & Apprentice	Total Workman's Comp (Base rate / \$100 * Base Wage per Hour) \$/hr
Operators					
Loader/Mechanic	VI	6217	\$7.22	\$41.360	\$2.99
Dozer/Scraper/Grader	IV	6217	\$7.22	\$41.210	\$2.975
Haul Trucks	III	7228	\$14.60	\$20.530	\$2.997

References 10/30/2013

1. Base Rate, Fringes, Apprentice Rate	http://www.dws.state.nm.us/Portals/0/DM/LaborRelations/Type_H_2014.pdf
2. FICA, Medicare	http://www.ssa.gov/OACT/ProgData/taxRates.html
3. Federal Unemployment Tax	http://workforcesecurity.doleta.gov/unemploy/uitaxtopic.asp
4. New Mexico Unemployment Tax	http://www.dws.state.nm.us/UnemploymentInsurance/UIInformation/2014UITaxClaimsInfo
5. Workman's Comp	RSMeans Heavy Construction Cost Data 2014 New Mexico worker's compensation rates for: 6217 Excavation earth or rock - \$7.22 7228 or 7219 Trucking-local hauling only-all employees \$14.60

APPENDIX B.2.3
EQUIPMENT RATES
(EQUIPMENTWATCH)



www.equipmentwatch.com

Custom Cost Evaluator

July 7, 2014

Caterpillar 16M

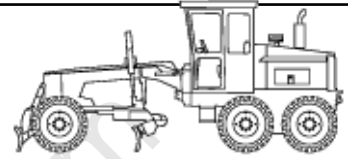
Articulated Frame Graders

Size Class:

Net Hp 250 HP & Over

Weight:

59,435 lbs.



Configuration for 16M

Power Mode	Diesel	Operator Protection	EROPS
Moldboard Size	16' ft	Net Horsepower	297.0 hp

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$39.01/hr	\$36.31/hr	-6.92%
Cost of Facilities Capital (CFC)	\$7.70/hr	\$6.35/hr	-17.53%
Overhead	\$33.35/hr	\$27.18/hr	-18.5%
Overhaul Labor	\$6.40/hr	\$5.00/hr	-21.88%
Overhaul Parts	\$21.99/hr	\$17.92/hr	-18.51%
Total Hourly Ownership Cost:	\$108.45/hr	\$92.76/hr	-14.47%

User Defined Adjustments: Annual Use Hours (1,400 hrs -> 1,718 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$5.34/hr	\$4.17/hr	-21.91%
Field Parts	\$21.32/hr	\$17.38/hr	-18.48%
Ground Engaging Component (GEC)	\$1.78/hr	\$1.45/hr	-18.54%
Tires	\$9.00/hr	\$9.00/hr	-
Electrical/Fuel	\$37.83/hr	\$30.56/hr	-19.22%
Lube	\$8.74/hr	\$8.74/hr	-
Total Hourly Operating Cost:	\$84.01/hr	\$71.30/hr	-15.13%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$108.45/hr	\$92.76/hr	-14.47%
Hourly Operating Cost	\$84.01/hr	\$71.30/hr	-15.13%
Total Hourly Cost	\$192.46/hr	\$164.06/hr	-14.76%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Caterpillar 777F

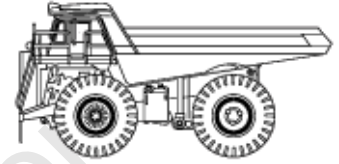
Mechanical Drive Rear Dumps

Size Class:

Rated Tonnage Capacity 90 - 104 MTons

Weight:

154,753 lbs.



Configuration for 777F

Power Mode	Diesel	Rated Payload	90.7 t
Body Capacity (Struck--Heaped)	54.8--78.8 cy	Net Horsepower	938.0 hp

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$73.39/hr	\$68.72/hr	-6.36%
Cost of Facilities Capital (CFC)	\$11.55/hr	\$10.54/hr	-8.74%
Overhead	\$39.04/hr	\$35.34/hr	-9.48%
Overhaul Labor	\$24.77/hr	\$21.49/hr	-13.24%
Overhaul Parts	\$28.04/hr	\$25.38/hr	-9.49%
Total Hourly Ownership Cost:	\$176.79/hr	\$161.47/hr	-8.67%

User Defined Adjustments: Annual Use Hours (1,850 hrs -> 2,044 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$15.21/hr	\$13.20/hr	-13.21%
Field Parts	\$17.31/hr	\$15.66/hr	-9.53%
Ground Engaging Component (GEC)	\$0.00/hr	\$0.00/hr	-
Tires	\$23.12/hr	\$23.12/hr	-
Electrical/Fuel	\$74.66/hr	\$60.31/hr	-19.22%
Lube	\$20.64/hr	\$20.64/hr	-
Total Hourly Operating Cost:	\$150.94/hr	\$132.93/hr	-11.93%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$176.79/hr	\$161.47/hr	-8.67%
Hourly Operating Cost	\$150.94/hr	\$132.93/hr	-11.93%
Total Hourly Cost	\$327.73/hr	\$294.40/hr	-10.17%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Caterpillar 992K

4-Wd Articulated Wheel Loaders

Size Class:

Net Hp 500 - 999 HP

Weight:

214,948 lbs.



Configuration for 992K

Power Mode	Diesel	Bucket Capacity - Heaped	14.00 cy
Net Horsepower	801.0 hp	Operator Protection	EROPS

Equipment Notes: Includes General Purpose bucket and ROPS, unless otherwise noted.

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$106.25/hr	\$98.58/hr	-7.22%
Cost of Facilities Capital (CFC)	\$18.99/hr	\$15.89/hr	-16.32%
Overhead	\$61.95/hr	\$51.12/hr	-17.48%
Overhaul Labor	\$8.62/hr	\$6.82/hr	-20.88%
Overhaul Parts	\$28.67/hr	\$23.66/hr	-17.47%
Total Hourly Ownership Cost:	\$224.48/hr	\$196.07/hr	-12.66%

User Defined Adjustments: Annual Use Hours (1,445 hrs -> 1,751 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$10.51/hr	\$8.32/hr	-20.84%
Field Parts	\$31.63/hr	\$26.11/hr	-17.45%
Ground Engaging Component (GEC)	\$4.31/hr	\$3.55/hr	-17.63%
Tires	\$31.05/hr	\$31.05/hr	-
Electrical/Fuel	\$102.02/hr	\$82.41/hr	-19.22%
Lube	\$22.46/hr	\$22.46/hr	-
Total Hourly Operating Cost:	\$201.98/hr	\$173.90/hr	-13.9%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$224.48/hr	\$196.07/hr	-12.66%
Hourly Operating Cost	\$201.98/hr	\$173.90/hr	-13.9%
Total Hourly Cost	\$426.46/hr	\$369.97/hr	-13.25%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Caterpillar D11T

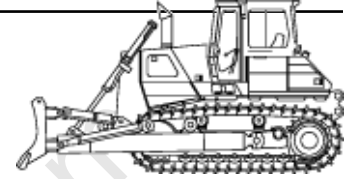
Standard Crawler Dozers

Size Class:

Net Hp 520 HP & Over

Weight:

208,885 lbs.



Configuration for D11T

Power Mode	Diesel	Dozer Type	U Blade
Operator Protection	EROPS	Net Horsepower	850.0 hp

Equipment Notes: Includes dozer blade and operator protection as listed.

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$117.19/hr	\$109.64/hr	-6.44%
Cost of Facilities Capital (CFC)	\$21.18/hr	\$17.86/hr	-15.68%
Overhead	\$59.40/hr	\$49.53/hr	-16.62%
Overhaul Labor	\$14.58/hr	\$11.66/hr	-20.03%
Overhaul Parts	\$102.61/hr	\$85.56/hr	-16.62%
Total Hourly Ownership Cost:	\$314.96/hr	\$274.25/hr	-12.93%

User Defined Adjustments: Annual Use Hours (1,400 hrs -> 1,679 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$17.07/hr	\$13.65/hr	-20.04%
Field Parts	\$99.94/hr	\$83.34/hr	-16.61%
Ground Engaging Component (GEC)	\$16.66/hr	\$13.89/hr	-16.63%
Tires	\$0.00/hr	\$0.00/hr	-
Electrical/Fuel	\$118.41/hr	\$95.65/hr	-19.22%
Lube	\$28.34/hr	\$28.34/hr	-
Total Hourly Operating Cost:	\$280.42/hr	\$234.87/hr	-16.24%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$314.96/hr	\$274.25/hr	-12.93%
Hourly Operating Cost	\$280.42/hr	\$234.87/hr	-16.24%
Total Hourly Cost	\$595.38/hr	\$509.12/hr	-14.49%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Caterpillar D6T XL

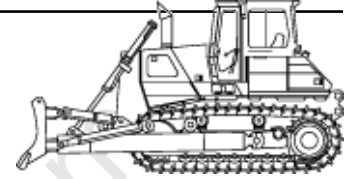
Standard Crawler Dozers

Size Class:

Net Hp 190 - 259 HP

Weight:

44,420 lbs.



Configuration for D6T XL

Power Mode	Diesel	Dozer Type	Semi-U
Operator Protection	EROPS	Net Horsepower	200.0 hp

Equipment Notes: Includes dozer blade and operator protection as listed.

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$21.30/hr	\$19.80/hr	-7.04%
Cost of Facilities Capital (CFC)	\$3.86/hr	\$3.15/hr	-18.39%
Overhead	\$12.86/hr	\$10.35/hr	-19.52%
Overhaul Labor	\$8.33/hr	\$6.43/hr	-22.81%
Overhaul Parts	\$14.49/hr	\$11.66/hr	-19.53%
Total Hourly Ownership Cost:	\$60.84/hr	\$51.39/hr	-15.53%

User Defined Adjustments: Annual Use Hours (1,285 hrs -> 1,597 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$10.27/hr	\$7.92/hr	-22.88%
Field Parts	\$14.05/hr	\$11.30/hr	-19.57%
Ground Engaging Component (GEC)	\$2.34/hr	\$1.88/hr	-19.66%
Tires	\$0.00/hr	\$0.00/hr	-
Electrical/Fuel	\$31.04/hr	\$25.08/hr	-19.2%
Lube	\$5.32/hr	\$5.32/hr	-
Total Hourly Operating Cost:	\$63.02/hr	\$51.50/hr	-18.28%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$60.84/hr	\$51.39/hr	-15.53%
Hourly Operating Cost	\$63.02/hr	\$51.50/hr	-18.28%
Total Hourly Cost	\$123.86/hr	\$102.89/hr	-16.93%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Caterpillar D9T

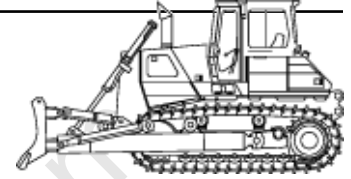
Standard Crawler Dozers

Size Class:

Net Hp 360 - 519 HP

Weight:

105,600 lbs.



Configuration for D9T

Power Mode	Diesel	Dozer Type	Semi-U
Operator Protection	EROPS	Net Horsepower	405.0 hp

Equipment Notes: Includes dozer blade and operator protection as listed.

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$46.02/hr	\$43.05/hr	-6.45%
Cost of Facilities Capital (CFC)	\$8.43/hr	\$7.11/hr	-15.66%
Overhead	\$25.56/hr	\$21.31/hr	-16.63%
Overhaul Labor	\$14.58/hr	\$11.66/hr	-20.03%
Overhaul Parts	\$40.83/hr	\$34.04/hr	-16.63%
Total Hourly Ownership Cost:	\$135.42/hr	\$117.17/hr	-13.48%

User Defined Adjustments: Annual Use Hours (1,400 hrs -> 1,679 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$17.07/hr	\$13.65/hr	-20.04%
Field Parts	\$39.77/hr	\$33.16/hr	-16.62%
Ground Engaging Component (GEC)	\$6.63/hr	\$5.53/hr	-16.59%
Tires	\$0.00/hr	\$0.00/hr	-
Electrical/Fuel	\$56.42/hr	\$45.57/hr	-19.23%
Lube	\$12.21/hr	\$12.21/hr	-
Total Hourly Operating Cost:	\$132.10/hr	\$110.12/hr	-16.64%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$135.42/hr	\$117.17/hr	-13.48%
Hourly Operating Cost	\$132.10/hr	\$110.12/hr	-16.64%
Total Hourly Cost	\$267.52/hr	\$227.29/hr	-15.04%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Crawler Tractor Multi-Shank Rippers

Miscellaneous Models

Size Class:

Net Hp 260 HP & Over

Configuration for Crawler Tractor Multi-Shank Rippers

Number of Shanks	3	Engine Horsepower	520 - 699
Ripper Type	Parallelogram	Engine Horsepower	520 - 699
Number of Shanks	3	Ripper Type	Parallelogram

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$10.36/hr	\$9.78/hr	-5.6%
Cost of Facilities Capital (CFC)	\$0.84/hr	\$0.68/hr	-19.05%
Overhead	\$2.39/hr	\$1.89/hr	-20.92%
Overhaul Labor	\$2.33/hr	\$1.77/hr	-24.03%
Overhaul Parts	\$3.35/hr	\$2.65/hr	-20.9%
Total Hourly Ownership Cost:	\$19.27/hr	\$16.77/hr	-12.97%

User Defined Adjustments: Annual Use Hours (1,285 hrs -> 1,623 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$4.26/hr	\$3.24/hr	-23.94%
Field Parts	\$3.37/hr	\$2.67/hr	-20.77%
Ground Engaging Component (GEC)	\$2.81/hr	\$2.23/hr	-20.64%
Tires	\$0.00/hr	\$0.00/hr	-
Electrical/Fuel	\$0.00/hr	\$0.00/hr	-
Lube	\$0.53/hr	\$0.53/hr	-
Total Hourly Operating Cost:	\$10.97/hr	\$8.67/hr	-20.97%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$19.27/hr	\$16.77/hr	-12.97%
Hourly Operating Cost	\$10.97/hr	\$8.67/hr	-20.97%
Total Hourly Cost	\$30.24/hr	\$25.44/hr	-15.87%

Revised Date: 2nd Half 2014



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Custom Cost Evaluator

July 7, 2014

Off-Highway Water Tanker Trucks

Miscellaneous Models

Size Class:

Net Hp 400 - 499 HP

Configuration for Off-Highway Water Tanker Trucks

Power Mode	Diesel	Power Mode	Diesel
Tank Capacity	10,000 gal	Horsepower	450
Tank Capacity	10,000 gal	Horsepower	450.0

Equipment Notes: Rates include off-highway prime mover complete with a semi-trailer water tanker, hydraulic drive centrifugal pump and rear spraybar.

Hourly Ownership Costs

	Standard Value	User Adjusted Value	Variance
Depreciation	\$37.55/hr	\$34.91/hr	-7.03%
Cost of Facilities Capital (CFC)	\$5.82/hr	\$4.95/hr	-14.95%
Overhead	\$11.91/hr	\$9.97/hr	-16.29%
Overhaul Labor	\$10.96/hr	\$8.79/hr	-19.8%
Overhaul Parts	\$9.02/hr	\$7.55/hr	-16.3%
Total Hourly Ownership Cost:	\$75.26/hr	\$66.17/hr	-12.08%

User Defined Adjustments: Annual Use Hours (1,500 hrs -> 1,793 hrs) Sales Tax (5.6% -> 0%)

Hourly Operating Costs

	Standard Value	User Adjusted Value	Variance
Field Labor	\$26.56/hr	\$21.31/hr	-19.77%
Field Parts	\$17.41/hr	\$14.56/hr	-16.37%
Ground Engaging Component (GEC)	\$0.00/hr	\$0.00/hr	-
Tires	\$10.47/hr	\$10.47/hr	-
Electrical/Fuel	\$61.07/hr	\$49.33/hr	-19.22%
Lube	\$10.13/hr	\$10.13/hr	-
Total Hourly Operating Cost:	\$125.64/hr	\$105.80/hr	-15.79%

User Defined Adjustments: Diesel Cost (\$3.98/gal -> \$3.21/gal) Mechanics Wage (\$49.80 -> \$47.75)

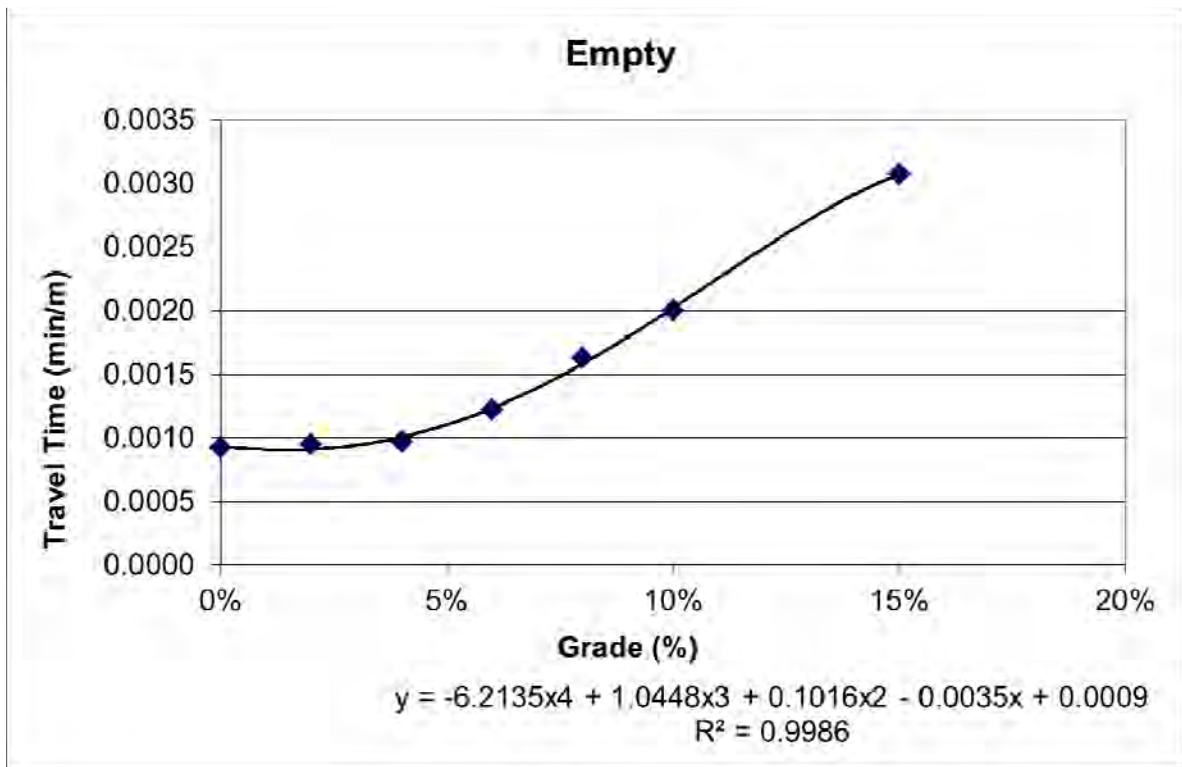
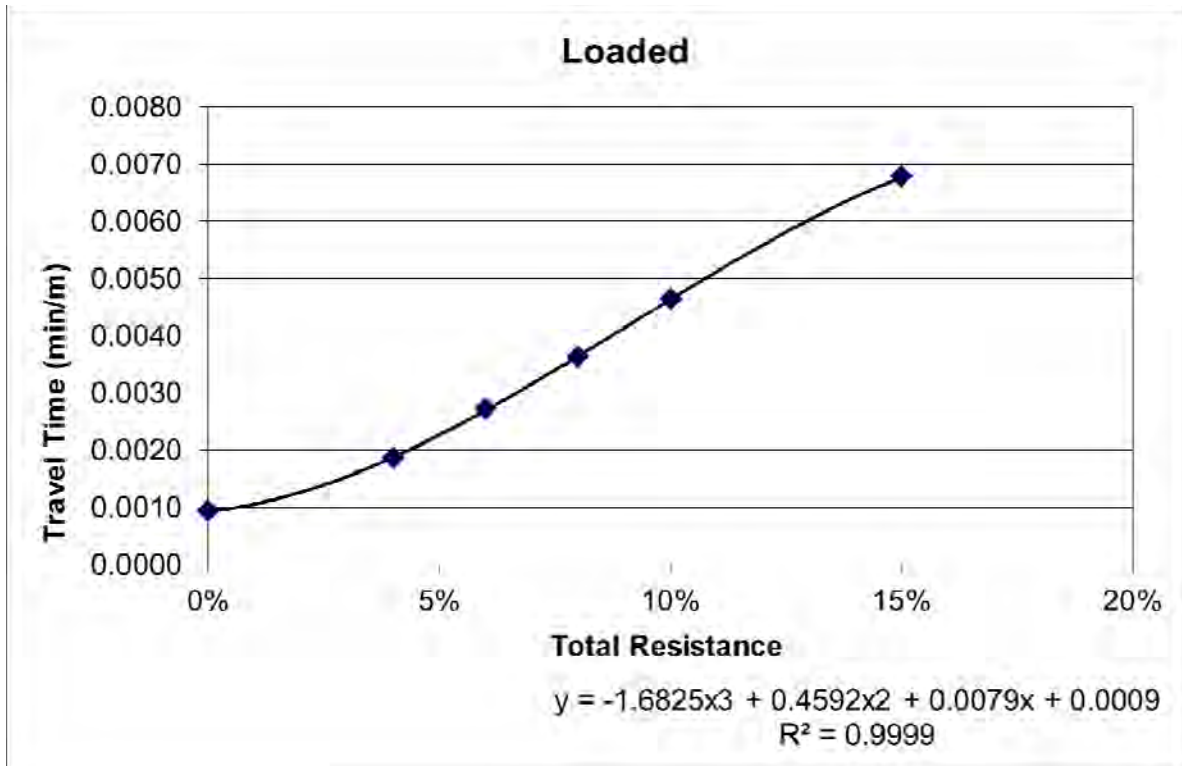
Total

	Standard Value	User Adjusted Value	Variance
Hourly Ownership Cost	\$75.26/hr	\$66.17/hr	-12.08%
Hourly Operating Cost	\$125.64/hr	\$105.80/hr	-15.79%
Total Hourly Cost	\$200.90/hr	\$171.97/hr	-14.4%

Revised Date: 2nd Half 2014

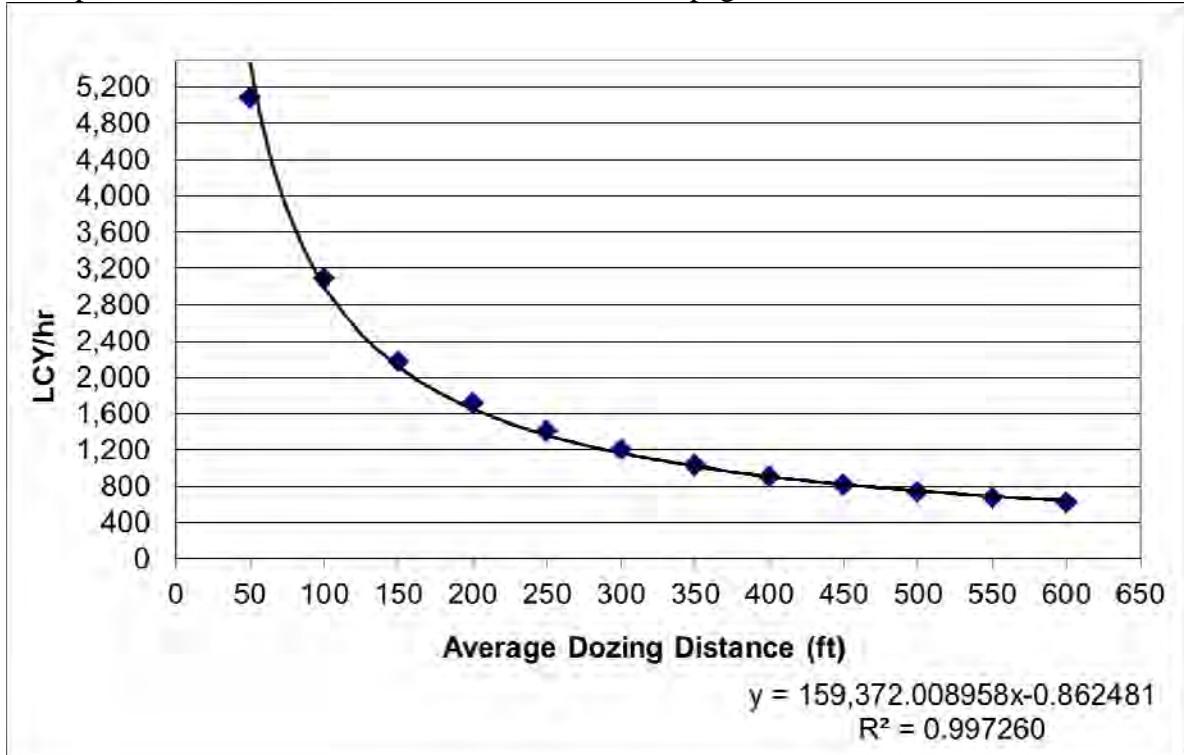
	Dozer	Ripper	Finish Grading Dozer	Dozer	Truck	Loader	Grader	
	D11T (520 HP)	Multishank Parallelogram (520+ HP)	D6T XL	D9T (360+ HP)	777F	992K	16M	Water Truck
Hours per year	2085	2085	2085	2085	2085	2085	2085	2085
Annual overhaul hours	410	60	215	410	920	250	180	330
Subtotal	1675	2025	1870	1675	1165	1835	1905	1755
50 minute hour	279	338	312	279	194	306	318	293
Annual Use Hours	1396	1688	1558	1396	971	1529	1588	1463
Adjusted Annual Use Hours	1679	1623	1597	1679	2044	1751	1718	1793
Equipment Watch Annual Use Hours	1400	1285	1285	1400	1850	1445	1400	1500
Delta	-279	-338	-312	-279	-194	-306	-318	-293

APPENDIX B.2.4
EQUIPMENT PRODUCTIVITY
CURVE FITS



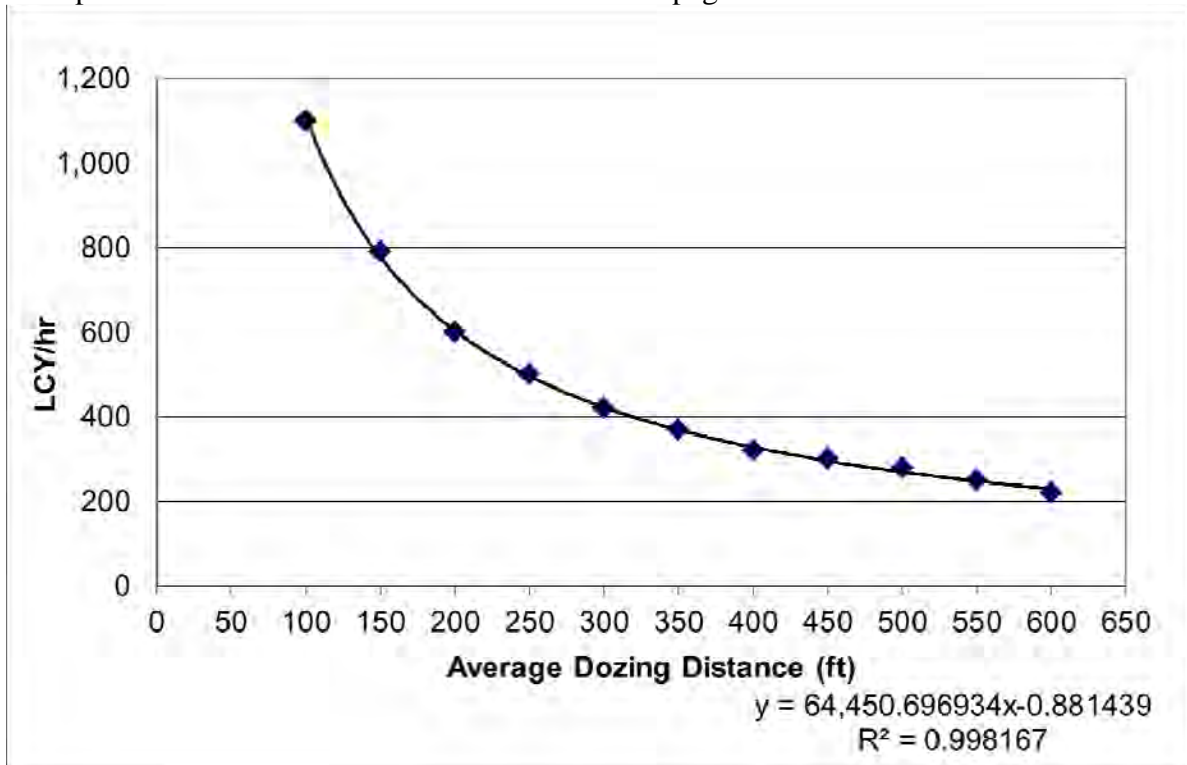
D11T CD

Caterpillar Performance Handbook Edition 42 D11R page1-53



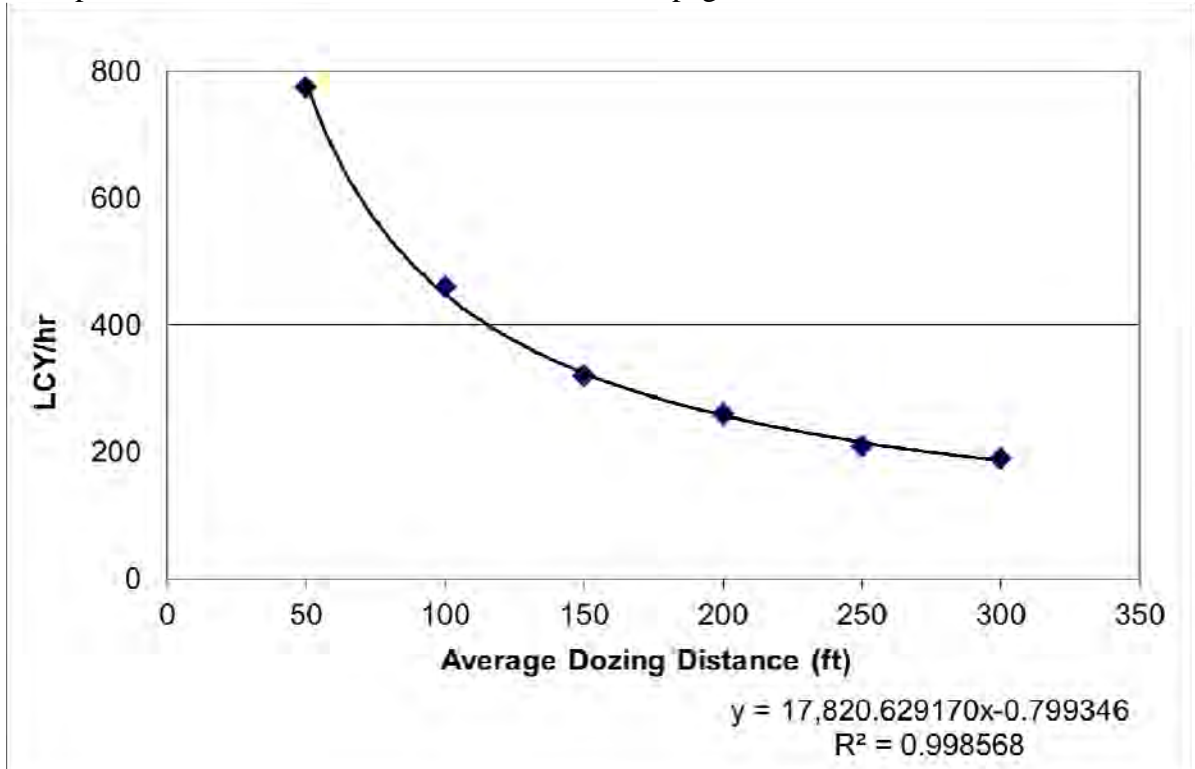
D9T

Caterpillar Performance Handbook Edition 41 D9T page1-54



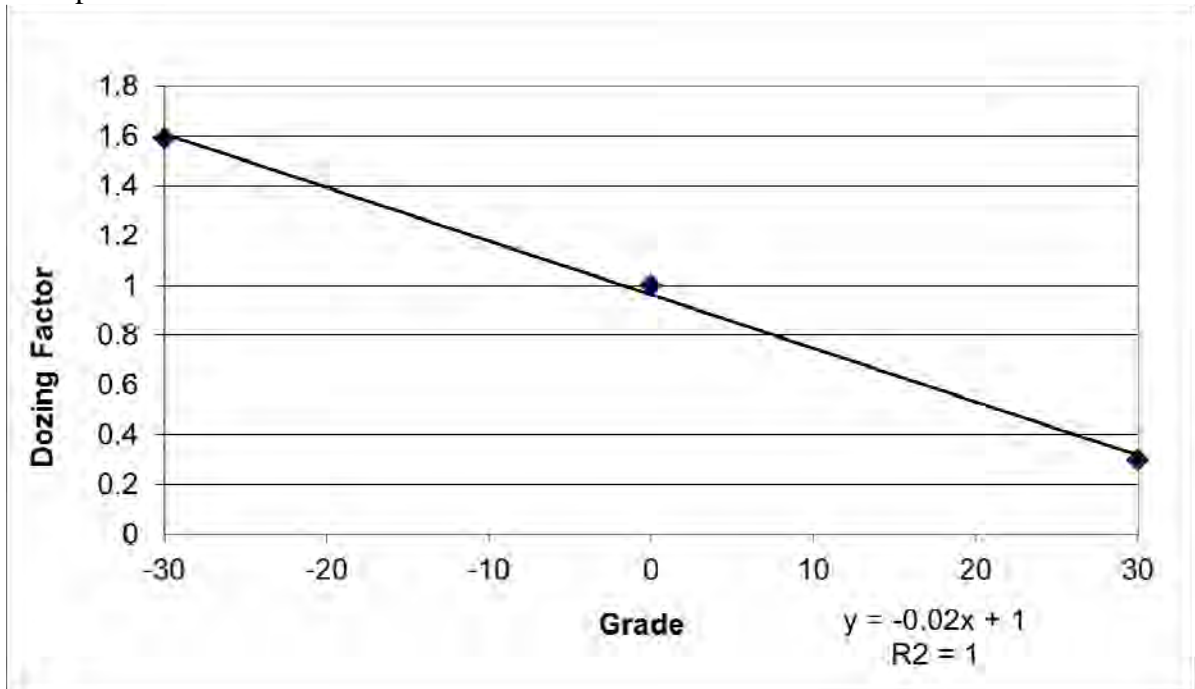
D6T

Caterpillar Performance Handbook Edition 41 D6T page1-55



Dozing Factor

Caterpillar Handbook Ed. 44 19-55



APPENDIX B.2.5
CATERPILLAR PERFORMANCE HANDBOOK
REFERENCES

CATERPILLAR PERFORMANCE HANDBOOK

a publication by Caterpillar, Peoria, Illinois, U.S.A.

JANUARY 2014

Please direct any inquiries about the Performance Handbook to the Caterpillar Performance Handbook Coordinator at *Sherman_Ashley_E@cat.com*.

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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SEBD0351-44

MODEL	777D		777G Tier 4 Final****		777G Tier 4 Final****	
Body Type	Dual Slope		Dual Slope		X-Body	
Gross Machine Weight	163 360 kg	360,143 lb	164 654 kg	363,000 lb	164 654 kg	363,000 lb
Chassis Weight*	50 610 kg	111,575 lb	52 241 kg	115,171 lb	52 241 kg	115,171 lb
Body Weight	16 687 kg	36,788 lb	16 075 kg	35,429 lb	15 878 kg	35,005 lb
Payload without Liner	95 996 kg	212,055 lb	96 338 kg	212,389 lb	96 535 kg	212,823 lb
Standard Liner Weight	5460 kg	12,040 lb	5695 kg	12,555 lb	4686 kg	10,331 lb
Target Payload**	90 536 kg	199,597 lb	90 643 kg	199,833	91 849 kg	202,492 lb
Capacity:						
Struck (SAE)	42 m ³	54.6 yd³	42 m ³	54.6 yd³	42 m ³	54.6 yd³
Heaped (2:1) (SAE)	60.2 m ³	78.6 yd³	60.2 m ³	78.6 yd³	60.2 m ³	78.6 yd³
Distribution Empty:						
Front	47%		41.8%		41.8%	
Rear	53%		58.2%		58.2%	
Distribution Loaded:						
Front	33%		33%		33%	
Rear	67%		67%		67%	
Engine Model	3508B EUI		C32 ACERT		C32 ACERT	
Number of Cylinders	8		12		12	
Bore	170 mm	6.7"	145 mm	5.7"	145 mm	5.7"
Stroke	190 mm	7.5"	162 mm	6.4"	162 mm	6.4"
Displacement	34.5 L	2105 in³	32.1 L	1959 in³	32.1 L	1959 in³
Net Power	699 kW	938 hp	683 kW	916 hp	683 kW	916 hp
Gross Power	746 kW	1000 hp	765 kW	1025 hp	765 kW	1025 hp
Standard Tires	27.00R49		27.00R49		27.00R49	
Machine ClearanceTurning Circle	28.4 m	83'0"	28.4 m	83'0"	28.4 m	83'0"
Fuel Tank Refill Capacity	1137 L	300 U.S. gal	1137 L	300 U.S. gal	1137 L	300 U.S. gal
Top Speed (Loaded)	60.4 km/h	39.9 mph	67.0 km/h	41.7 mph	67.0 km/h	41.7 mph
GENERAL DIMENSIONS (Empty):						
Height to Canopy Rock Guard Rail	5.17 m	17'0"	4.91 m	16'1"	5.17 m	17'0"
Wheelbase	4.6 m	15'0"	4.6 m	15'0"	4.6 m	15'0"
Overall Length (Operating)	10.3 m	33'8"	10.3 m	33'8"	10.54 m	34'7"
Overall Length (Shipping)	9.78 m	32'1"	9.78 m	32'1"	9.78 m	32'1"
Loading Height (Empty)	4.39 m	14'5"	4.39 m	14'5"	4.38 m	14'4"
Height at Full Dump	10.05 m	33'0"	10.05 m	33'0"	10.33 m	33'11"
Body Length (Target Length)	7.28 m	23'11"	7.28 m	23'11"	7.28 m	23'11"
Width (Operating)	6.1 m	20'0"	6.1 m	20'0"	6.55 m	21'6"
Width (Shipping)***	3.51 m	11'5"	3.51 m	11'5"	3.51 m	11'5"
Front Tire Tread	4.17 m	13'8"	4.17 m	13'8"	4.17 m	13'8"

*Weights include lubricants, coolants and 100% fuel.

**Refer to Caterpillar's 10/10/20 Payload Policy for Off-Highway Trucks.

***Disassembled.

****Gateless Coal Bodies are available through OEM Solutions.

MODEL	785C		785D		789D	
Body Type	Dual Slope		Dual Slope		Dual Slope	
Target Gross Machine Weight §	249 476 kg	550,000 lb	249 476 kg	550,000 lb	324 319 kg	715,000 lb
Basic Machine Weight*	59 385 kg	130,922 lb	46 240 kg	101,942 lb	48 554 kg	107,043 lb
Attachments**	21 602 kg	47,624 lb	35 781 kg	78,885 lb	52 249 kg	115,190 lb
Body Weight without Liners***	22 997 kg	50,700 lb	22 997 kg	50,700 lb	26 606 kg	58,656 lb
Full Liner	8113 kg	17,886 lb	8113 kg	17,886 lb	9692 kg	21,367 lb
Operating Machine Weight	112 097 kg	247,132 lb	113 131 kg	249,412 lb	137 101 kg	302,256 lb
Debris (3% of Operating Machine Weight)	3363 kg	7414 lb	3394 kg	7482 lb	4113 kg	9068 lb
Empty Operating Weight	115 460 kg	254,546 lb	116 525 kg	256,894 lb	141 214 kg	311,324 lb
Target Payload §	134.0 m tons	147.7 tons	133.0 m tons	146.6 tons	183.1 m tons	201.8 tons
Capacity:						
Heaped (2:1) (SAE) Base Body	78 m³	102 yd³	78 m³	102 yd³	108 m³	141 yd³
Heaped (2:1) (SAE) with Std. Sideboards	91 m³	119 yd³	91 m³	119 yd³	125 m³	161 yd³
Distribution Empty:						
Front		45%		45.5%		46%
Rear		55%		54.5%		54%
Distribution Loaded:						
Front		33.3%		33.3%		33%
Rear		66.7%		66.7%		66%
Engine Model	3512B EUI		3512C HD-EUI		3516C HD	
Number of Cylinders	12		12		16	
Bore	170 mm	6.7"	170 mm	6.7"	170 mm	6.7 in
Stroke	190 mm	7.5"	215 mm	8.46"	210 mm	8.3 in
Displacement	51.8 L	3158 in³	58.56 L	3574 in³	78.1 L	4766 in³
Net Power	979 kW	1313 hp	979 kW	1313 hp	1468 kW	1969 hp
Gross Power	1082 kW	1450 hp	1082 kW	1450 hp	1566 kW	2100 hp
Standard Tires	33.00R51		33.00R51		37.00R57	
Machine Clearance Turning Circle	30.6 m	100'5"	33.2 m	108'11"	30.23 m	99'2"
Fuel Tank Refill Capacity	1893 L	500 U.S. gal	1893 L	500 U.S. gal	2082 L	550 U.S. gal
Top Speed (Loaded)	56.5 km/h	35.1 mph	56.5 km/h	35.1 mph	57.2 km/h	35.5 mph
GENERAL DIMENSIONS (Empty):						
Height to Canopy Rock Guard Rail	5.77 m	19'0"	5.68 m	18'7"	6.50 m	21'4"
Wheelbase	5.18 m	17'0"	5.18 m	17'0"	5.70 m	18'8"
Overall Length (Base Body)	11.02 m	36'3"	11.55 m	37'9"	12.72 m	41'9"
Loading Height (Base Body)	4.97 m	16'4"	4.97 m	16'4"	5.60 m	18'4"
Height at Full Dump	11.21 m	36'10"	11.81 m	38'9"	13.20 m	43'4"
Body Length (Target Length)	7.65 m	25'2"	7.65 m	25'2"	8.29 m	27'3"
Width (Operating)	6.64 m	21'10"	7.06 m	23'2"	7.65 m	25'1"
Width (Shipping)****	3.91 m	12'10"	3.91 m	12'10"	3.84 m	12'7"
Front Tire Tread	4.85 m	15'11"	4.85 m	15'11"	5.37 m	17'8"

*See Weight Definitions and Relations on page 18 of this section. Note: No mandatory or optional attachments or fuel.

**Typical selection of mandatory and optional attachments.

***Data provided is for a representative body and liner package. Several dual slope, flat floor, and mine specific design (MSD) bodies and liner packages are available. All weights, capacities, and dimensions are dependent on the machine configuration (body type, attachments, tires, and optional equipment selected).

****Disassembled.

§Reference Caterpillar's latest 10/10/20 Payload Policy for information on gross machine operating weight and target payload.

NOTE: Contact Mining Representative to use Caterpillar Weight Configurator for application specific weights.

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 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.

(50 kg/metric ton) = 50 ÷ 10 = 5% Effective Grade
(from Rolling Resistance)
100 lb/ton = 100 ÷ 20 = 5% Effective Grade
20% (grade) – 5% (resistance) =
15% Total Effective Grade

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

	988F	5130B
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.

MODEL	14M		16M		24M	
Base Power — Net	193 kW	259 hp	221 kW	297 hp	397 kW	533 hp
VHP Range — Net	193-204 kW	259-274 hp	221-233 kW	297-312 hp	—	—
VHP Plus Range — Net	193-219 kW	259-294 hp	221-248 kW	297-332 hp	—	—
Operating Weight*	21 423 kg	47,229 lb	27 531 kg	60,695 lb	62 726 kg	138,287 lb
Engine Model	C11 ACERT		C13 ACERT		C18 ACERT	
Rated Engine RPM	1800		2000		1800	
No. of Cylinders	6		6		6	
Displacement	11.1 L	677 in ³	12.5 L	763 in ³	18.1 L	1104.5 in ³
Max. Torque	1422 N·m	1049 lb-ft	1712 N·m	1263 lb-ft	2713 N·m	2001 lb-ft
No. of Speeds Forward/Reverse	8/6		8/6		6/3	
Top Speed: Forward	50.4 km/h	31.3 mph	51.7 km/h	32.1 mph	43.4 km/h	27.0 mph
Reverse	39.8 km/h	24.7 mph	40.8 km/h	25.3 mph	41.6 km/h	25.8 mph
Std. Tires — Front and Rear	16R24		23.5R25		29.5R29	
Front Axle/Steering:						
Oscillation Angle	32°		32°		32°	
Wheel Lean Angle	17.1°		18.2°		18.0°	
Steering Angle	47.5°		47.5°		47.5°	
Articulation Angle	20°		20°		25°	
Minimum Turning Radius**	7.9 m	25'11"	8.9 m	29'3"	12.4 m	40'9"
No. Circle Support Shoes	6		6		6	
Hydraulics:						
Pump Type	Variable Piston		Variable Piston		Variable Piston	
Max. Pump Flow	280 L/min	74 gpm	280 L/min	74 gpm	550 L/min	145 gpm
Tank Capacity	60 L	15.9 U.S. gal	65 L	17.2 U.S. gal	135 L	36 U.S. gal
Implement Pressure: Max.	24 150 kPa	3500 psi	24 150 kPa	3500 psi	24 150 kPa	3500 psi
Min.	3100 kPa	450 psi	3100 kPa	450 psi	3100 kPa	450 psi
Interior Sound Level/SAE J919	70 dB(A)		72 dB(A)		74 dB(A)	
Electrical:						
System Size	24V		24V		24V	
Std. Battery CCA @ 0° F	1125		1400		1500	
Std. Alternator	80		150		150	
GENERAL DIMENSIONS:						
Height (to top of ROPS)	3535 mm	139.2"	3718 mm	146.4"	4452 mm	175.3"
Overall Length	9349 mm	368.1"	9963 mm	392.2"	14 194 mm	558.8"
With Ripper and Pushplate	10 896 mm	429"	11 672 mm	459.5"	16 102 mm	633.9"
Wheelbase	6559 mm	258"	6985 mm	275"	10 278 mm	404.6"
Blade Base	2840 mm	111.8"	3069 mm	120.8"	4048 mm	159.4"
Overall Width						
(at top of front tires)	2801 mm	110.3"	3096 mm	121.9"	4280 mm	168.5"
Standard Blade: Length	4267 mm	14'0"	4877 mm	16'0"	7315 mm	24'0"
Height	686 mm	27"	787 mm	31"	1025 mm	40"
Thickness	25 mm	1"	25 mm	1"	50 mm	2"
Lift Above Ground	419 mm	16.5"	395 mm	15.6"	634 mm	25"
Max. Shoulder Reach:***						
Frame Straight — left	2169 mm	85.4"	2282 mm	90"	3222 mm	126.9"
Frame Straight — right	2279 mm	89.7"	2587 mm	101.9"	3228 mm	127.1"
Fuel Tank Capacity	492 L	130 U.S. gal	534 L	141 U.S. gal	1326 L	350 U.S. gal

*Operating Weight — based on standard machine configuration with full fuel tank, coolant, lubricants and operator. 24M includes ripper.

**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.

MODEL	D6R							
	6S		6SU		6SU XL		6S LGP	
Gauge	—		1880 mm 74"		1880 mm 74"		2.23 m 90"	
Type	Straight		Semi-Universal		Semi-Universal		Straight	
Blade Capacities*	3.27 m ³	4.27 yd ³	5.35 m ³	6.99 yd ³	5.35 m ³	6.99 yd ³	5.50 m ³	7.20 yd ³
Weight, Shipping** (Dozer)	2599 kg	5717 lb	2973 kg	6540 lb	2973 kg	6540 lb	3054 kg	6733 lb
Tractor and Dozer Dimensions:								
A Length (Blade Straight)	5.12 m	16'9"	5.08 m	16'8"	5.33 m	17'6"	5.48 m	18'0"
Blade Dimensions:								
B Width (including std. end bits)	3.36 m	11'0"	3.26 m	10'8"	3.26 m	10'8"	4.08 m	13'4"
C Height	1257 mm	4'1.5"	1411 mm	4'8"	1411 mm	4'8"	1104 mm	3'7"
D Max. Digging Depth	473 mm	18.6"	453 mm	1'6"	453 mm	1'6"	658 mm	2'2"
E Ground Clearance @ Full Lift	1104 mm	3'7.5"	1204 mm	3'11"	1204 mm	3'11"	1088 mm	3'7"
F Manual Tilt	689 mm	2'3.1"	—		—		—	
G Max. Pitch Adjustment	+5.3 to 4.8°		+5.6° to -5.2°		+5.6° to -5.2°		+4.4° to -4.4°	
H Max. Hydraulic Tilt	764 mm	2'6.1"	811 mm	2'8"	811 mm	2'8"	747 mm	2'5"
J Hydraulic Tilt (Manual Brace Centered)	420 mm	16.5"	455 mm	1'6"	455 mm	1'6"	421 mm	1'5"
K Push Arm Trunnion Width (to Ball Centers)	—		2.58 m	8'6"	2.58 m	8'6"	3.42 m	11'5"

MODEL	D6T							
	6A		6SU		6A XL		6SU XL	
Gauge	1880 mm	74"	1880 mm	74"	1.88 m	74"	1.88 m	74"
Type	Angling		Semi-Universal		Angling		Semi-Universal	
Blade Capacities*	3.64 m³	4.75 yd³	5.35 m³	6.99 yd³	3.94 m³	5.15 yd³	5.35 m³	6.99 yd³
Weight, Shipping** (Dozer)	3138 kg	6904 lb	2973 kg	6540 lb	3195 kg	7044 lb	2973 kg	6540 lb
Tractor and Dozer Dimensions:								
A Length (Blade Straight)	5.00 m	16'5"	5.08 m	17'6"	5.21 m	17'1"	5.33 m	17'6"
Length (Blade Angled)	5.83 m	19'2"	—		6.05 m	19'10"	—	
Width (Blade Angled)	3.78 m	12'5"	—		3.77 m	12'5"	—	
Width (with C-Frame only)	2.93 m	9'8"	—		2.99 m	9'10"	—	
Blade Dimensions:								
B Width (including std. end bits)	4.16 m	13'8"	3.26 m	10'8"	4.16 m	13'8"	3.26 m	10'8"
C Height	1154 mm	3'10"	1411 mm	4'8"	1154 mm	3'10"	1411 mm	4'8"
D Max. Digging Depth	506 mm	1'8"	453 mm	1'6"	511 mm	1'8"	453 mm	1'6"
E Ground Clearance @ Full Lift	1144 mm	3'9"	1204 mm	3'11"	1217 mm	4'0"	1204 mm	3'11"
G Max. Pitch Adjustment	—		+5.6° to -5.2°		—		+5.6° to -5.2°	
H Max. Hydraulic Tilt	519 mm	1'8"	811 mm	2'8"	485 mm	1'4"	811 mm	2'8"
Blade Angle	25°		—		25°		—	
J Hydraulic Tilt (Manual Brace Centered)	—		455 mm	1'6"	—		455 mm	1'6"
K Push Arm Trunnion Width (to Ball Centers)	2.58 m	8'6"	2.58 m	8'6"	2.58 m	8'6"	2.58 m	8'6"

*Blade capacities as determined by SAE J1265. Tractor and dozer dimensions variations due to SystemOne undercarriage products are negligible.

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 ³	17.7 yd ³	16.4 m ³	21.4 yd ³
Weight, Shipping** (Dozer)	6543 kg	14,425 lb	7134 kg	15,727 lb
Tractor and Dozer Dimensions:				
A Length (Blade Straight)	6.84 m	22'5"	7.18 m	23'7"
Blade Dimensions:				
B Width (including std. end bits)	4.35 m	14'3"	4.68 m	15'4"
C Height	1934 mm	6'4.1"	1934 mm	6'4.1"
D Max. Digging Depth	606 mm	1'11.9"	606 mm	1'11.9"
E Ground Clearance @ Full Lift	1422 mm	4'8"	1422 mm	4'8"
G Max. Pitch Adjustment	+3.4° to 2.9°		+3.4° to 2.9°	
H Max. Hydraulic Tilt	940 mm	3'1"	1014 mm	3'3.9"
J Hydraulic Tilt (Manual Brace Centered)	570 mm	1'10.4"	616 mm	2'0.3"
K Push Arm Trunnion Width (to Ball Centers)	3.17 m	10'3"	3.17 m	10'3"
Maximum Track Width Permitted	762 mm	2'6"	762 mm	2'6"
Dual Tilt Option				
G Dual Pitch Adj.	+4.8° to 5.2°		+4.8° to 4.9°	
H Dual Max. Hyd. Tilt	1139 mm	3'8.8"	1231 mm	4'0.5"

*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.

	D11T					
MODEL	11SU		11U		11 CD	
Type	Semi-U		Universal		CarryDozer	
Blade Capacities*	27.2 m³	35.5 yd³	34.4 m³	45.0 yd³	43.6 m³	57.0 yd³
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	8.38 m	27'6"	8.83 m	28'11"	8.34 m	26'8"
Width	5.60 m	18'4"	6.35 m	20'10"	6.71 m	22'0"
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	2.77 m	9'1"	2.77 m	9'1"	2.74 m***	9'0"****
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°		+7.5° to 7.6°		+47.8° to 10.4°	
	or		or			
G Dual Pitch Adjustment	+0° to 13°		+0° to 13°			
H Dual Max. Hyd. Tilt	1706 mm	5'7.2"	1938 mm	6'4.3"	—	

*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.

***Blade height with cutting edge at 53°.

All dimensions are approximate.

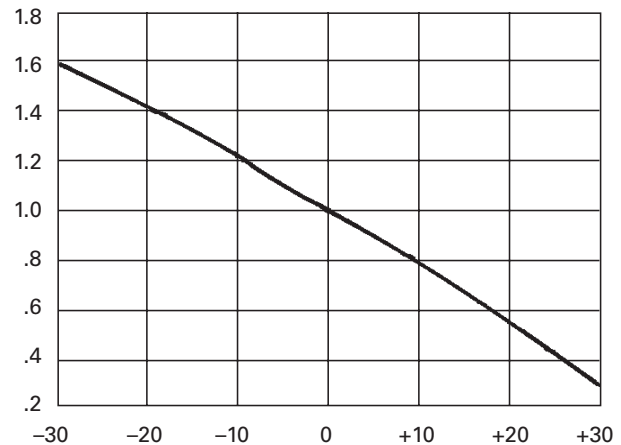
JOB CONDITION CORRECTION FACTORS

	TRACK-TYPE TRACTOR
OPERATOR —	
Excellent	1.00
Average	0.75
Poor	0.60
MATERIAL —	
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
SLOT DOZING	1.20
SIDE BY SIDE DOZING	1.15-1.25
VISIBILITY —	
Dust, rain, snow, fog or darkness	0.80
JOB EFFICIENCY —	
50 min/hr	0.83
40 min/hr	0.67
BULLDOZER*	
Adjust based on SAE capacity relative to the base blade used in the Estimated Dozing Production graphs.	
GRADES — 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 D8T/8SU (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/Lm³ (2650 lb/LCY). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 458 Lm³/h (600 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

$$\begin{aligned}
 \text{Production} &= \text{Maximum Production} \times \text{Correction Factors} \\
 &= (600 \text{ LCY/hr}) (0.80) (1.30) (1.20) (0.75) \\
 &\quad (0.83) (0.87) \\
 &= 405.5 \text{ LCY/hr}
 \end{aligned}$$

To obtain production in metric units, the same procedure is used substituting maximum uncorrected production in Lm³.

$$\begin{aligned}
 &= 458 \text{ Lm}^3/\text{h} \times \text{Factors} \\
 &= 309.6 \text{ Lm}^3/\text{h}
 \end{aligned}$$

TRACTOR/RIPPER	D11T		D11T	
Ripper Type	CD Multi-shank		Multi-shank	
Dimensions:				
Ripper to Track				
Ripper length behind track, shank vertical, ripper up (A)				
A With Pushblock		N/A		N/A
B Without Pushblock	1.71 m	5'8"	1.69 m	5'6"
Ripper length behind track, shank vertical, ripper down (A)				
C With Pushblock		N/A		N/A
D Without Pushblock	2.16 m	7'1"	2.16 m	7'1"
Tip to track distance, shank vertical (A)				
E Ripper Up	0.78 m	2'7"	0.78 m	2'7"
F Ripper Down	1.96 m	6'5"	1.95 m	6'5"
Shank*				
G Maximum digging depth	1.01 m	3'4"	1.01 m	3'4"
H Dig adjustment per hole	280 mm	11"	280 mm	11"
I Total dig adjustment	280 mm	11"	280 mm	11"
Pitch Adjustment, ripper down:				
J Forward		12.2°		12.2°
K Backward		31.8°		31.8°
L Maximum reach at ground line	1.71 m	5'7"	1.71 m	5'7"
M Maximum ground clearance under tooth (shank pinned in bottom hole)	1.14 m	3'9"	1.16 m	3'10"
N 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"
Ripper Beam				
O Overall width	3.33 m	10'11"	3.33 m	10'11"
P Height	1.98 m	6'6"	1.98 m	6'6"
Q Length	1.01 m	3'4"	1.01 m	3'4"
Clearance under beam, shank vertical				
R Ripper Up	2.06 m	6'9"	2.06 m	6'9"
S Ripper Down	282 mm	11.1"	282 mm	11.1"
Number of Pockets		3		3
T Pocket Spacing	1500 mm	5'9"	1500 mm	5'9"
U Shank Gauge	2.99 m	9'10"	2.99 m	9'10"
V Track Clearance with standard shoe	166 mm	5.6"	166 mm	5.6"
W Width across widest part of lift cylinders	1.9 m	6'3"	1.9 m	6'3"
Installed Weights:				
Ripper with standard shank	12 026 kg	26,513 lb	9251 kg	20,395 lb
Each additional tooth group	668 kg	1472 lb	668 kg	1472 lb
Ripper Forces:**				
Penetration Force, shank vertical	305.8 kN	68,739 lb	277.1 kN	62,297 lb
Pryout Force, shank vertical	650.0 kN	146,118 lb	646.4 kN	145,310 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.

Minutes added (+)
 or Subtracted (-)
 From Basic Cycle

Machine

— Material handler -.05

Materials

— 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

Pile

— Conveyor or Dozer piled 3 m
 (10 ft) and up00
 — Conveyor or Dozer piled 3 m
 (10 ft) or less +.01
 — Dumped by truck +.02

Miscellaneous

— 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.

$$\text{Cycles per hour at 100\% Efficiency} = \frac{60 \text{ min}}{\text{Total Cycle Time in Minutes}}$$

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.

$$\begin{array}{lcl} \text{Cycles per hour} & & \\ \text{at 50 minutes} & \text{Cycles per hour} & 50 \text{ min} \\ \text{per hour} & = \text{at 100\%} & \times \text{actual work} \\ \text{(83\% efficiency)} & \text{efficiency} & \frac{\text{time}}{60 \text{ min hour}} \end{array}$$

TRUCK LOADING

Average loader cycle times

914G2-962H 0.45-0.50 min
 966H-980H 0.50-0.55 min
 988H-990H 0.55-0.60 min
 992K-994H 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/m³ (3000 lb/yd³), 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

992K — Standard

Up to specified density for 100% fill factor

Bucket Volume		Material Density	
m ³	yd ³	kg/m ³	lb/yd ³
12.2	16	1780	3000
11.5	15	1890	3200
10.7	14	2030	3430

992K — High Lift

Up to specified density for 100% fill factor

Bucket Volume		Material Density	
m ³	yd ³	kg/m ³	lb/yd ³
12.2	16	1560	2630
11.5	15	1560	2630
10.7	14	1560	2630

993K — Standard

Up to specified density for 100% fill factor

Bucket Volume		Material Density	
m ³	yd ³	kg/m ³	lb/yd ³
15.3	20	1780	3000
14.5	19	1870	3160
13.8	18	1970	3330

993K — High Lift

Up to specified density for 100% fill factor

Bucket Volume		Material Density	
m ³	yd ³	kg/m ³	lb/yd ³
14.5	19	1720	2890
13.8	18	1810	3060
13.0	17	1920	3240

Specifications

- Single Engine Open Bowl
- Optional Push-Pull

Wheel Tractor-Scrapers

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MODEL	621K		631G	
Flywheel Power	304 kW	407 hp	345/373 kW	462/500 hp
Approx. Operating Weight (Empty)◀	36 185 kg	79,787 lb	47 628 kg	105,002 lb
Scraper Capacity: Struck	13 m ³	17.1 yd³	18.3 m ³	24 yd³
Heaped	18.4 m ³	24 yd³	26 m ³	34 yd³
Rated Load	26 127 kg	57,610 lb	37 013 kg	81,600 lb
Weight Distribution — Empty:				
Drive		65%		64%
Rear		35%		36%
Weight Distribution — Loaded:				
Drive		53%		52%
Rear		47%		48%
Engine Model	C13 ACERT™		C18 ACERT	
Rated Engine RPM	2000		1800	
Displacement	12.5 L	763 in³	18.1 L	1105 in³
Top Speed (Loaded)	53.9 km/h	33.5 mph	53 km/h	33 mph
180° Curb-to-Curb Turning Width	11.8 m	38'7"	12.2 m	40'1"
Tires — Tractor Drive	33.25R29**E3		37.25R35**E3	
Scraper	33.25R29**E3		37.25R35**E3	
Width of Cut	3.14 m	10'4"	3.51 m	11'6"
Maximum Depth of Cut	315 mm	12.4"	437 mm	17.2"
Maximum Depth of Spread	540 mm	21.3"	480 mm	18.9"
Fuel Tank Refill Capacity	763 L	201 U.S. gal	814 L	215 U.S. gal
GENERAL DIMENSIONS: Non Push-Pull				
Height — Overall Shipping	4.03 m	13'2"	3.86 m	12'8"
Wheelbase	7.99 m	26'2"	8.77 m	28'9"
Overall Length	14.02 m	45'10"	14.71 m	48'3"
Overall Width	3.57 m	11'7"	3.94 m	** 12'11"
Shipping Width (Draft Arm on Inside of Bowl)		—	3.63 m	* 11'11"
Center Line of Scraper Tread	2.29 m	7'5"	2.46 m	8'1"
Center Line of Tractor Tread	2.28 m	7'4"	2.46 m	8'1"
GENERAL DIMENSIONS: Push-Pull				
Operating Weight (Empty)	36 567 kg	80,630 lb		
Overall Length (With Bail Down)	15.58 m	51'1"		
Weight Distribution — Empty:				
Drive		65%		
Rear		35%		
Weight Distribution — Loaded:				
Drive		53%		
Rear		47%		

*Optional Shipping Configuration.

**Standard Shipping Configuration.

◀ Operating weight includes standard machine, coolant, lubricants, full fuel tank, and operator. Operating weights for the 621K are based on Tier 4 Final/Stage IV platforms machines. Deduct 247 kg (545 lb) for the operating weight for the 621K Tier 2 equivalent.

Single Engine Open Bowl

The Open Bowl Wheel Tractor-Scraper is available as a self-loading, 621K push pull or push-loaded hauling system with a broad material appetite. The broad material appetite allows the Open Bowl Wheel Tractor-Scraper to be used in general construction, heavy construction, mining, and waste applications.

Open Bowl Advantages:

- Quick load/unload
- Spread evenly on-the-go
- Broad material appetite
- Aids in compaction
- Varying material conditions
- High production

Single Engine Advantages

(Compared to Tandem Engine):

- Low fuel usage
- Lower gross vehicle weight
- Loads quickly with the aid of a Track-Type Tractor and hauls to fill carrying minimum machine weight

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
631G	One D9	0.6	0.7
637G	One D9	0.6	0.6
631G	One D10	0.5	0.7
637G	One D10	0.5	0.6
637G/PP	Self	1.0*	0.6
657G	One D11	0.6	0.6
657G	Push Pull Self	1.1*	0.6
627G	Auger	0.7	0.7
637G	Auger	0.8	0.7
637G	Coal	0.8	0.7
657G	Auger	1.0	0.6
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. The travel times will remain within acceptable limits when applied to a non-ROPS equipped machine. 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.

Total Effective Grade = 15% Grade Assistance — 5%

Rolling Resistance = 10% 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.

Empty Weight + Payload = Gross Weight
 = 60 950 kg + 47 175 kg = 108 125 kg
 (134,370 lb + 104,000 lb = 238,370 lb)

Then adjust if necessary:

Load Time — controlled by D9T, at 100% power, no change.

Travel, Maneuver and Spread time — 631G, no change.

5. Compare Total Resistance to Tractive Effort on haul:

Grade Resistance —

GR = lb/ton × tons × adverse grade in percent

$$\text{Sec. C:} = 20 \text{ lb/ton} \times 88.4 \text{ tons} \times 4\% \text{ grade} = 7072 \text{ lb}$$

Rolling Resistance —

RR = RR Factor (lb/ton) × GMW (tons)

$$\text{Sec. A:} = 200 \text{ lb/ton} \times 88.4 \text{ tons} = 17,686 \text{ lb}$$

$$\text{Sec. B:} = 80 \text{ lb/ton} \times 88.4 \text{ tons} = 7072 \text{ lb}$$

$$\text{Sec. C:} = 80 \text{ lb/ton} \times 88.4 \text{ tons} = 7072 \text{ lb}$$

$$\text{Sec. D:} = 200 \text{ lb/ton} \times 88.4 \text{ tons} = 17,686 \text{ lb}$$

Total Resistance —

TR = RR + GR

$$\text{Sec. A:} = 17,686 \text{ lb} + 0 = 17,686 \text{ lb}$$

$$\text{Sec. B:} = 7072 \text{ lb} + 0 = 7072 \text{ lb}$$

$$\text{Sec. C:} = 7072 \text{ lb} + 6496 \text{ lb} = 14,144 \text{ lb}$$

$$\text{Sec. D:} = 17,686 \text{ lb} + 0 = 17,686 \text{ lb}$$

Check usable pounds pull against maximum pounds pull required to move the 631G.

Pull usable ... 47,628 lb loaded

Pull required ... 17,686 lb maximum total resistance

Estimate travel time for haul from 631G (loaded) travel time curve; read travel time from distance and effective grade.

Travel time (from curves):

$$\text{Sec. A:} 0.60 \text{ min}$$

$$\text{Sec. B:} 1.00$$

$$\text{Sec. C:} 1.20$$

$$\text{Sec. D:} 0.60$$

$$\underline{3.40 \text{ min}}$$

NOTE: This is an estimate only; it *does not account for all the acceleration and deceleration time*, therefore it is not as accurate as the information obtained from a computer program.

6. Compare Total Resistance to Tractive Effort on return:

Grade Assistance —

GA = 20 lb/ton × tons × negative grade in percent

$$\text{Sec. C:} = 20 \text{ lb/ton} \times 51.2 \text{ tons} \times 4\% \text{ grade} = 4096 \text{ lb}$$

Rolling Resistance —

RR = RR Factor × Empty Wt (tons)

$$\text{Sec. D:} = 200 \text{ lb/ton} \times 51.2 \text{ tons} = 10,240 \text{ lb}$$

$$\text{Sec. C:} = 80 \text{ lb/ton} \times 51.2 \text{ tons} = 4091 \text{ lb}$$

$$\text{Sec. B:} = 80 \text{ lb/ton} \times 51.2 \text{ tons} = 4091 \text{ lb}$$

$$\text{Sec. A:} = 200 \text{ lb/ton} \times 51.2 \text{ tons} = 10,240 \text{ lb}$$

Total Resistance —

TR = RR + GA

$$\text{Sec. D:} = 10,240 \text{ lb} + 0 = 10,240 \text{ lb}$$

$$\text{Sec. C:} = 4096 \text{ lb} + 4096 \text{ lb} = 0$$

$$\text{Sec. B:} = 4096 \text{ lb} + 0 = 4096 \text{ lb}$$

$$\text{Sec. A:} = 10,240 \text{ lb} + 0 = 10,240 \text{ lb}$$

Check usable pounds pull against maximum pounds pull required to move the 631G.

Pounds pull usable ... 35,349 lb empty

Pounds pull required ... 10,240 lb

Estimate travel time for return from 631G empty travel time curve.

Travel time (from curves):

$$\text{Sec. A:} 0.40 \text{ min}$$

$$\text{Sec. B:} 0.55$$

$$\text{Sec. C:} 0.80$$

$$\text{Sec. D:} 0.40$$

$$\underline{2.15 \text{ min}}$$

7. Estimate Cycle Time:

$$\text{Total Travel Time (Haul plus Return)} = 5.55 \text{ min}$$

$$\text{Adjusted for altitude: } 100\% \times 5.55 \text{ min} = 5.55 \text{ min}$$

$$\text{Load Time} \quad 0.7 \text{ min}$$

$$\text{Maneuver and Spread Time} \quad 0.7 \text{ min}$$

$$\text{Total Cycle Time} \quad \underline{6.95 \text{ min}}$$

8. Check pusher-scraper combinations:

Pusher cycle time consists of load, boost, return and maneuver time. Where actual job data is not available, the following may be used.

$$\text{Boost time} = 0.10 \text{ minute}$$

$$\text{Return time} = 40\% \text{ of load time}$$

$$\text{Maneuver time} = 0.15 \text{ minute}$$

$$\text{Pusher cycle time} = 140\% \text{ of load time} + 0.25 \text{ minute}$$

$$\begin{aligned} \text{Pusher cycle time} &= 140\% \text{ of } 0.7 \text{ min} + 0.25 \text{ minute} \\ &= 0.98 + 0.25 = 1.23 \text{ minute} \end{aligned}$$

Scraper cycle time divided by pusher cycle time indicates the number of scrapers which can be handled by each pusher.

$$\frac{6.95 \text{ min}}{1.23 \text{ min}} = 5.65$$

TABLES

SWELL — VOIDS — LOAD FACTORS

SWELL (%)	VOIDS (%)	LOAD FACTOR
5	4.8	0.952
10	9.1	0.909
15	13.0	0.870
20	16.7	0.833
25	20.0	0.800
30	23.1	0.769
35	25.9	0.741
40	28.6	0.714
45	31.0	0.690
50	33.3	0.667
55	35.5	0.645
60	37.5	0.625
65	39.4	0.606
70	41.2	0.588
75	42.9	0.571
80	44.4	0.556
85	45.9	0.541
90	47.4	0.526
95	48.7	0.513
100	50.0	0.500

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
Blasted Rock	
Well Blasted	80-95%
Average Blasted	75-90
Poorly Blasted	60-75
Other	
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, rackback 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.

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 Earth-moving Section for more detail.

UNDERFOOTING	ROLLING RESISTANCE, PERCENT*			
	Tires Bias	Tires Radial	Track **	Track +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.

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

ALTITUDE DERATION

**PERCENT FLYWHEEL HORSEPOWER
AVAILABLE AT SPECIFIED ALTITUDES**

MODEL	0-760 m (0-2500')	760-1500 m (2500-5000')	1500-2300 m (5000-7500')	2300-3000 m (7500-10,000')	3000-3800 m (10,000-12,500')	3800-4600 m (12,500-15,000')
D3K XL	100	100	100	100	88	85
D3K LGP	100	100	100	100	88	85
D4K XL	100	100	100	100	88	85
D4K LGP	100	100	100	100	88	85
D5K XL	100	100	100	100	88	85
D5K LGP	100	100	100	100	88	85
D5N XL & LGP	100	100	100	100	100	100
D6K XL & LGP	100	100	100	100	N/A	N/A
D6N XL & LGP	100	100	100	100	N/A	N/A
D6N XL & LGP**	100	100	100	100	100	100
D6G	100	100	100	100	94	87
D6G Series 2 XL	100	100	100	94	87	80
D6G Series 2 LGP	100	100	100	94	87	80
D6R	100	100	100	100	92	84
D6R Series 3 (All)	100	100	100	100	92	84
D6T (Tier 4 Interim/Stage IIIB)	100	100	100	100	100	88
D7E	100	100	100	98	95	88
D7G	100*	100*	100*	94	86	80
D7G Series 2	100	100	100	100	100	94
D7R Series 2 (All)	100	100	100	100	100	96
D8R	100	100	100	93	85	77
D8T	100	100	100	100	100	93
D9R	100	100	100	93	85	77
D9T U.S. EPA Tier 4 Final	100	100	100	100	100	100
D9T Tier 3 equivalent NACD Std. Altitude	100	100	100	99	92	83
D9T Tier 3 equivalent NACD High Altitude	100	100	100	100	100	100
D9T EU Stage IIIA equivalent	100	100	100	98	91	80
D9T Tier 2 equivalent	100	100	100	100	99	88
D10T2 Tier 2 equivalent ***	100	100	100	100	100	100
D10T2 Tier 4 Final***	100	100	100	100	100	100
D11T/D11T CDT Tier 2 equivalent****	100	100	100	100	100	86
D11T/D11T CDT Tier 4 Final****	100	100	100	100	83	67
120H STD	100	100	100	100	100	100
120M	100	100	100	100	95	88
135H STD	100	100	100	100	100	98
12H STD	100	89	83	77	71	65
12M	100	100	100	100	95	88

*Refer to "Captive Vehicle Engine Fuel Specifications" microfiche at your local dealer.

**Information not available at time of printing.

***In forward gears.

****D11T — High altitude arrangement available.

CATERPILLAR PERFORMANCE HANDBOOK

a publication by Caterpillar Inc., Peoria, Illinois, U.S.A.

JANUARY 2011

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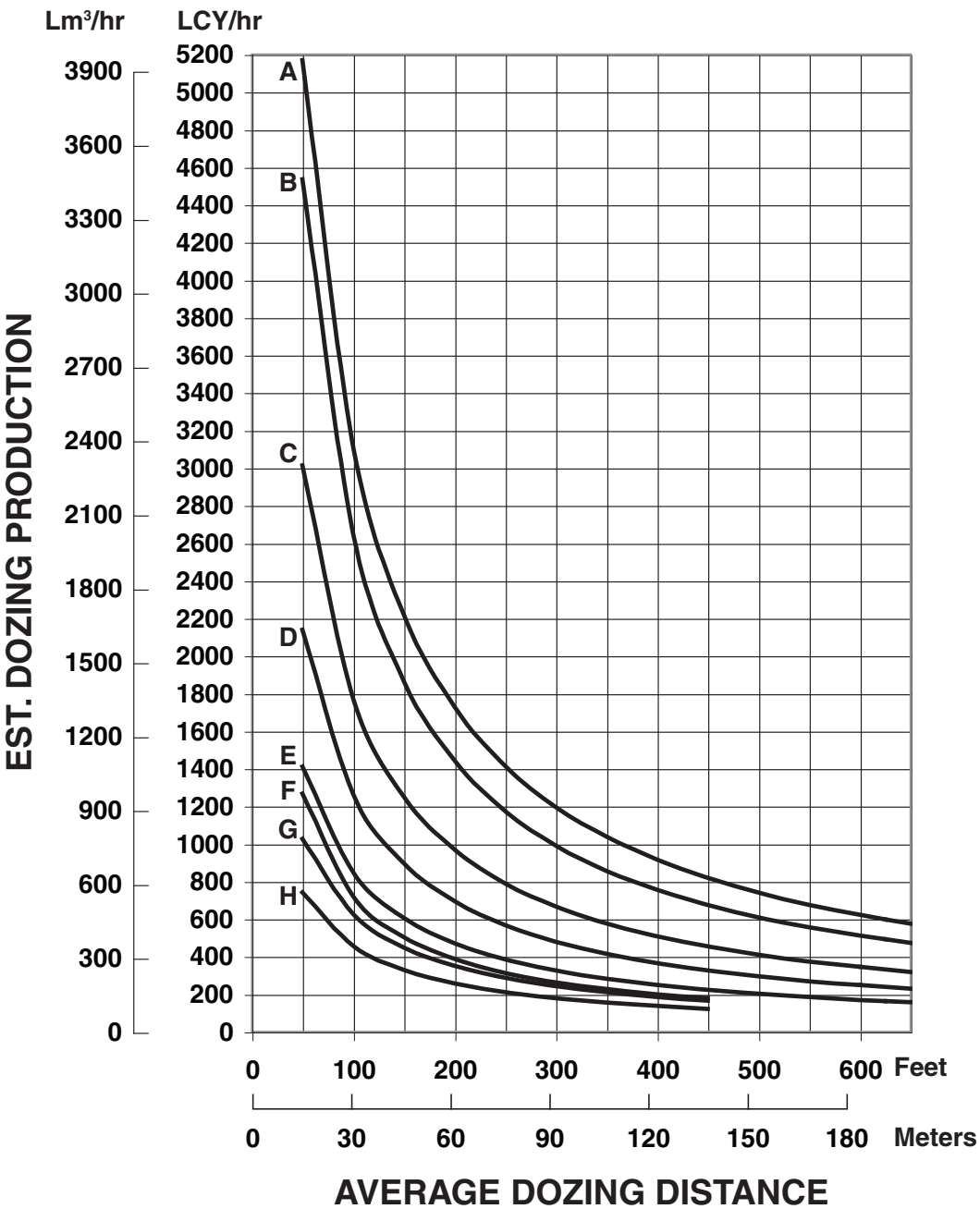
Performance information in this booklet is intended for estimating purposes only. Because of the many variables peculiar to individual jobs (including material characteristics, operator efficiency, underfoot conditions, altitude, etc.), neither Caterpillar Inc. nor its dealers warrant that the machines described will perform as estimated.

NOTE: Always refer to the appropriate Operation and Maintenance Manual for specific product information.

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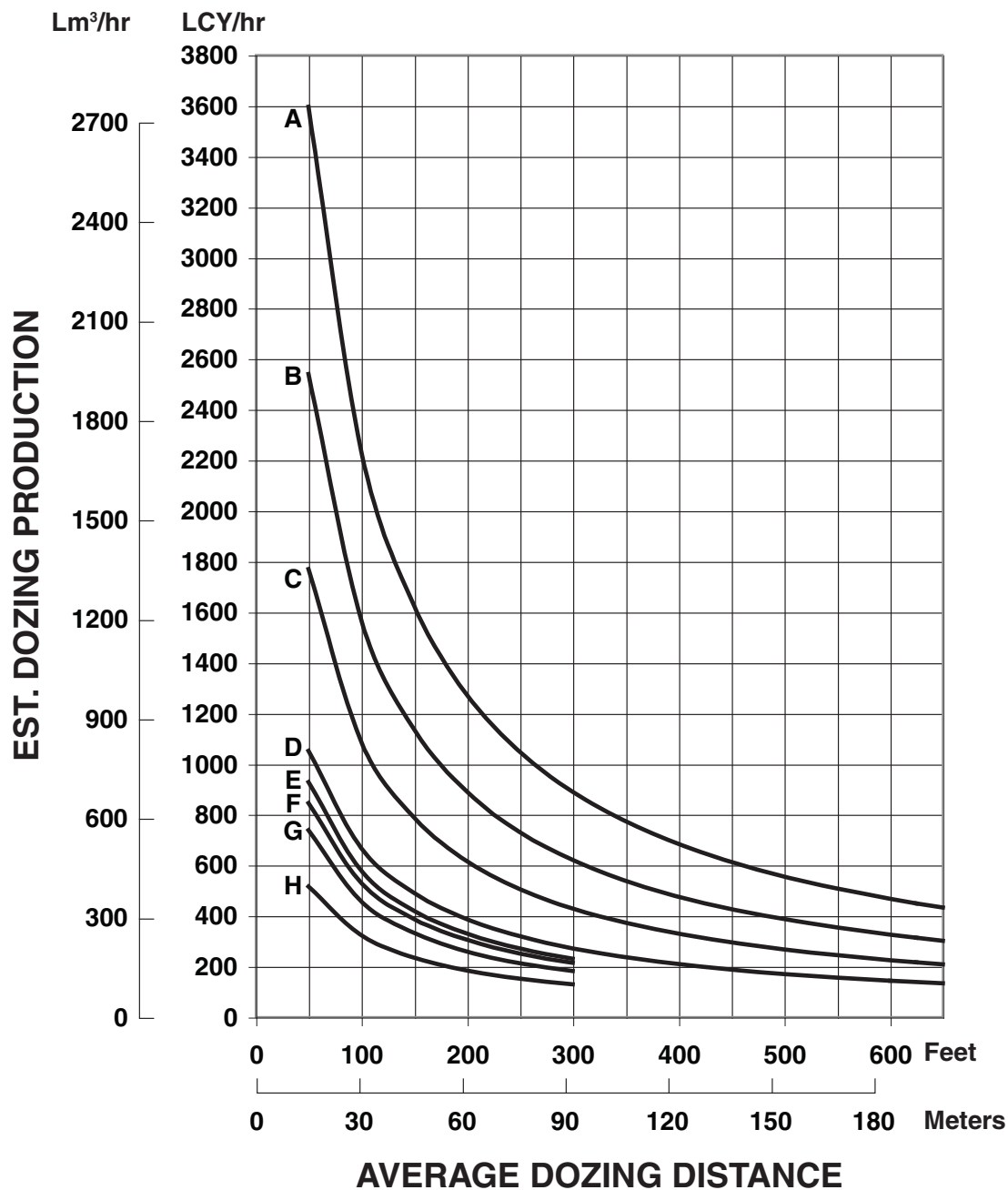
ESTIMATED DOZING PRODUCTION ● Universal Blades ● D7G through D11T CD



- KEY
- A — D11T CD
 - B — D11T
 - C — D10T
 - D — D9T
 - E — D8T
 - F — D7E
 - G — D7R Series 2
 - H — 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 ● Semi-Universal Blades ● D6N through D11T

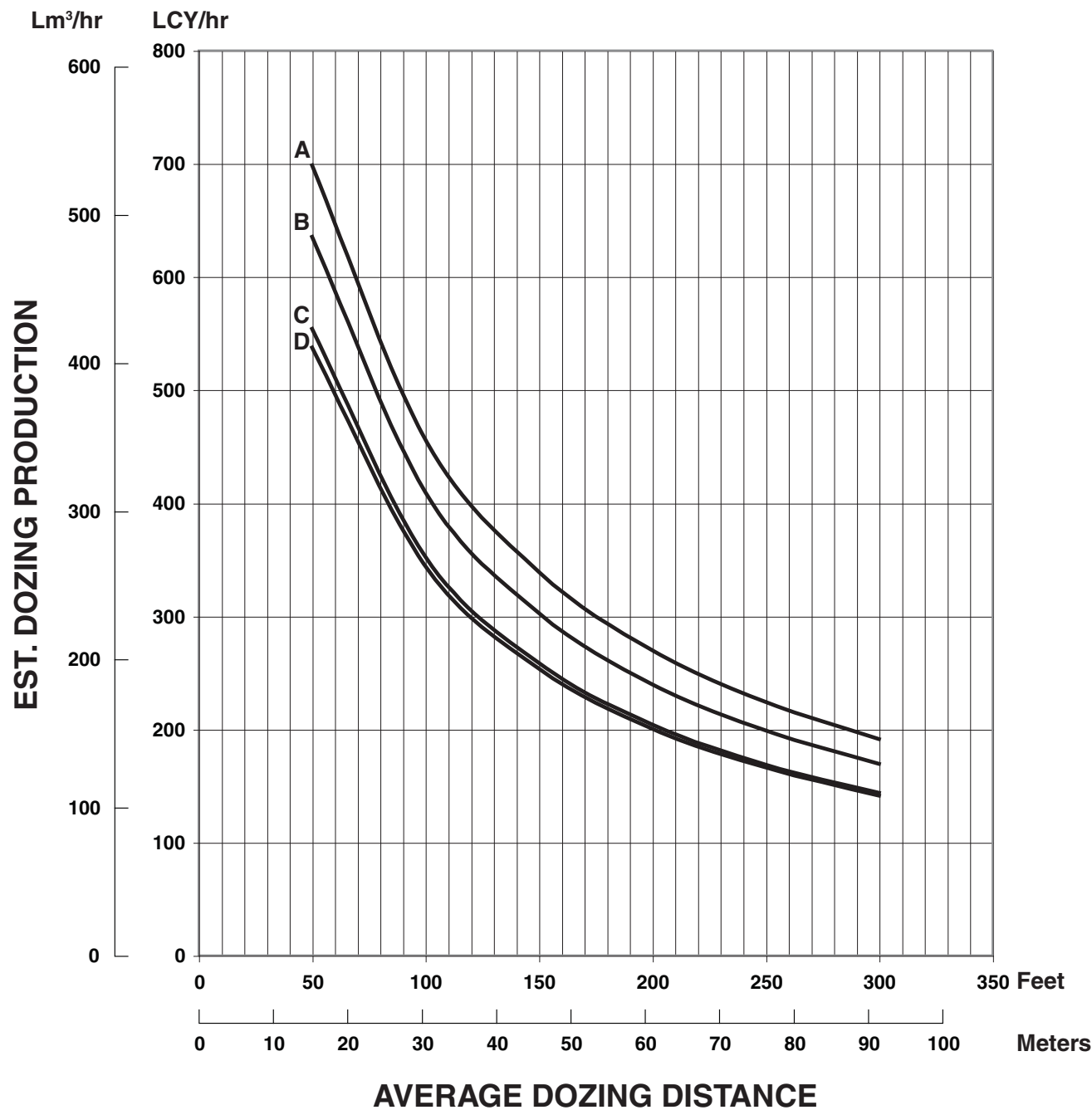


KEY

- A — D11T
- B — D10T
- C — D9T
- D — D8T
- E — D7E
- F — D7R Series 2
- G — D6T
- H — D6N

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 ● D6T through D7R Series 2



- KEY
- A — D7E
 - B — D7R Series 2
 - 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.

Bulldozers

Job Factors Estimating Production Off-the-Job ● Example Problem

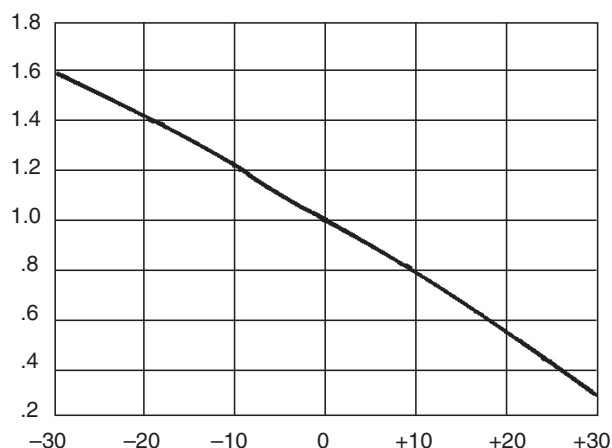
JOB CONDITION CORRECTION FACTORS

	TRACK-TYPE TRACTOR
OPERATOR —	
Excellent	1.00
Average	0.75
Poor	0.60
MATERIAL —	
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
SLOT DOZING	1.20
SIDE BY SIDE DOZING	1.15-1.25
VISIBILITY —	
Dust, rain, snow, fog or darkness	0.80
JOB EFFICIENCY —	
50 min/hr	0.83
40 min/hr	0.67
BULLDOZER*	
Adjust based on SAE capacity relative to the base blade used in the Estimated Dozing Production graphs.	
GRADES — 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 D8T/8SU (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/Lm³ (2650 lb/LCY). Operator is average. Job efficiency is estimated at 50 min/hr.

Uncorrected Maximum Production — 458 Lm³/h (600 LCY/hr) (example only)

Applicable Correction Factors:

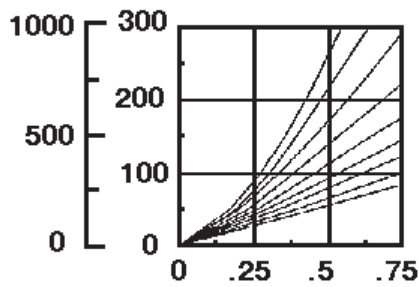
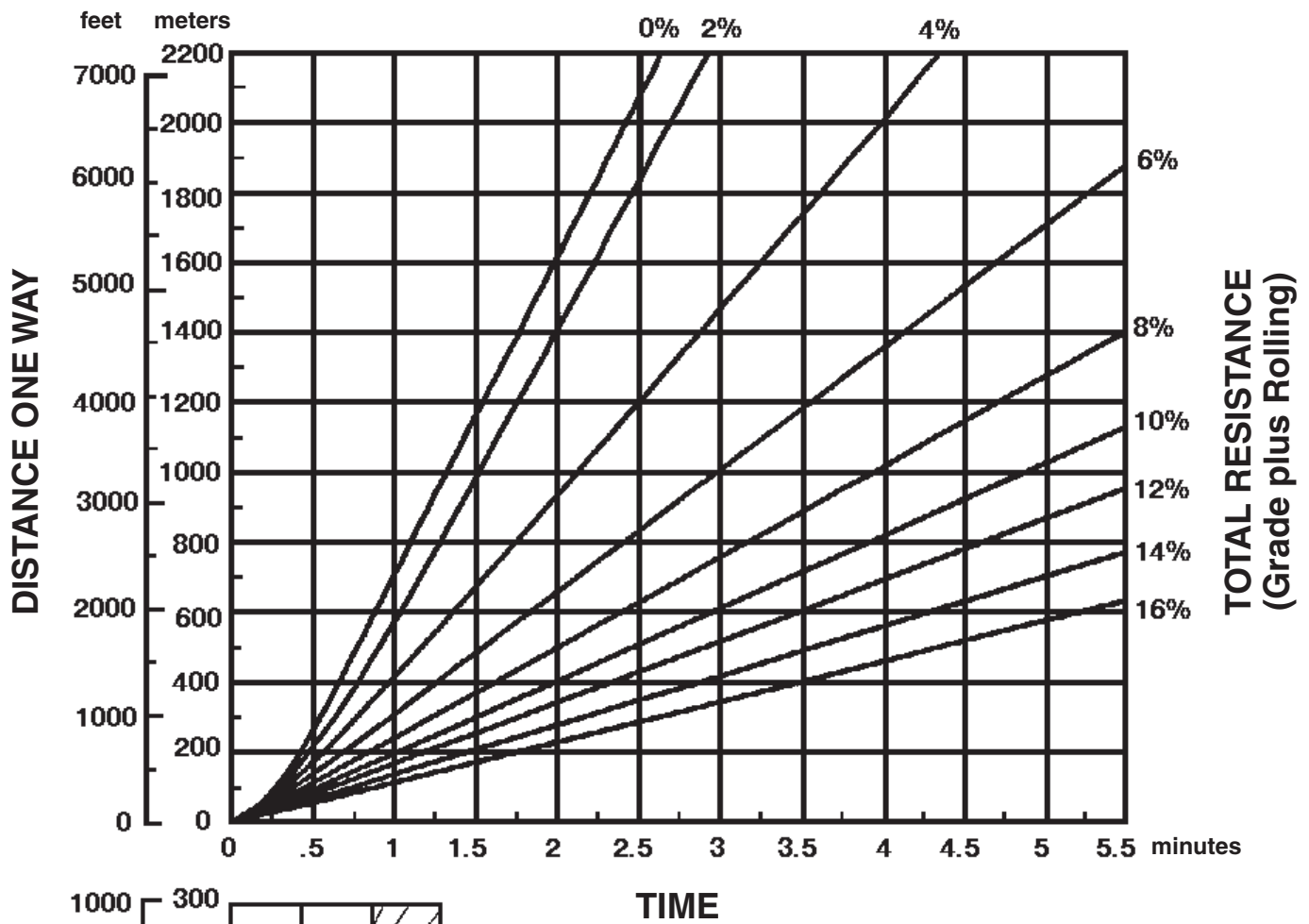
Hard-packed clay is “hard to cut” material -0.80
 Grade correction (from graph)-1.30
 Slot dozing-1.20
 Average operator-0.75
 Job efficiency (50 min/hr)-0.83
 Weight correction(2300/2650)-0.87

$$\begin{aligned}
 \text{Production} &= \text{Maximum Production} \times \text{Correction Factors} \\
 &= (600 \text{ LCY/hr}) (0.80) (1.30) (1.20) \\
 &\quad (0.75) (0.83) (0.87) \\
 &= 405.5 \text{ LCY/hr}
 \end{aligned}$$

To obtain production in metric units, the same procedure is used substituting maximum uncorrected production in Lm³.

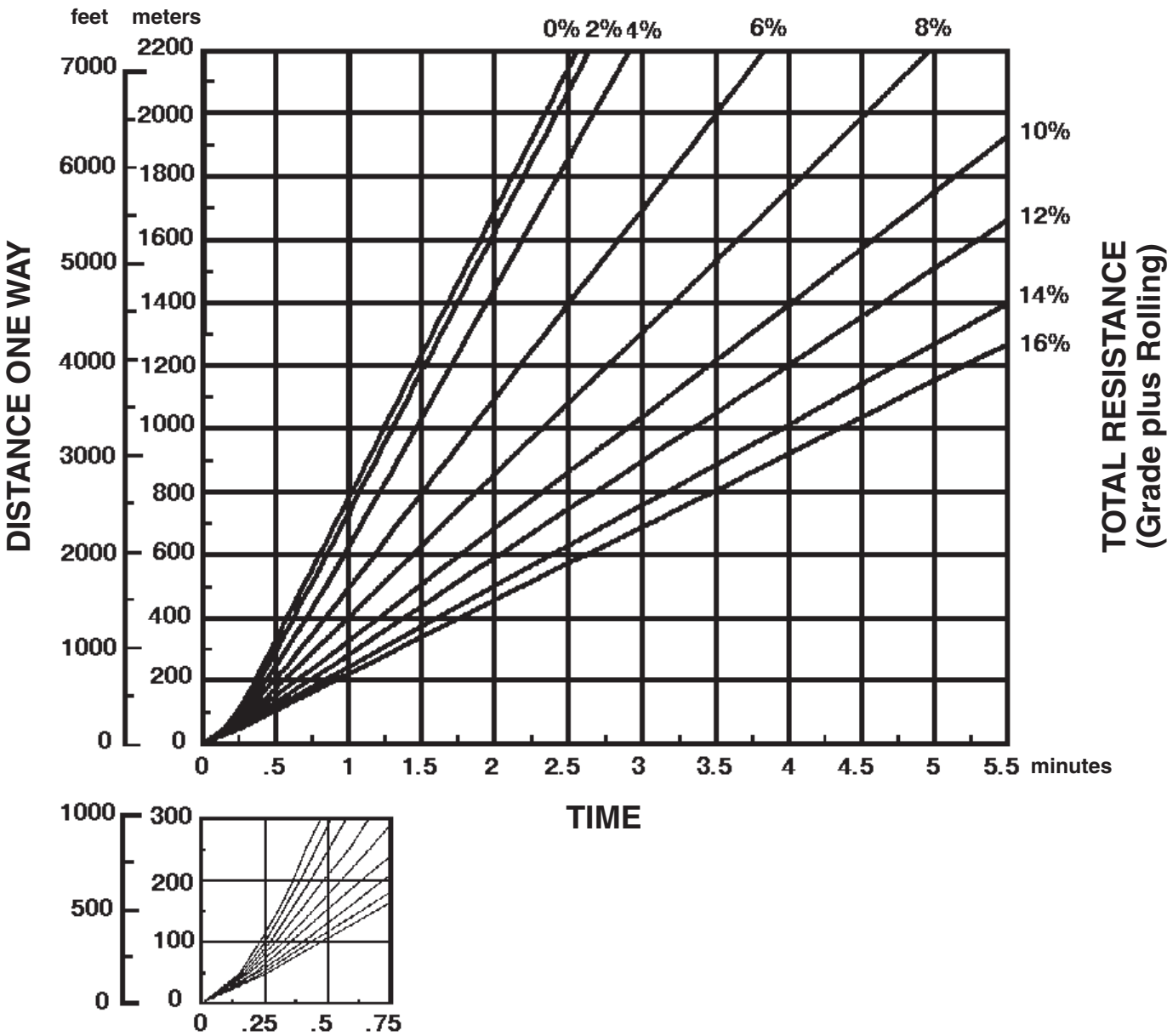
$$\begin{aligned}
 &= 458 \text{ Lm}^3/\text{h} \times \text{Factors} \\
 &= 309.6 \text{ Lm}^3/\text{h}
 \end{aligned}$$

LOADED



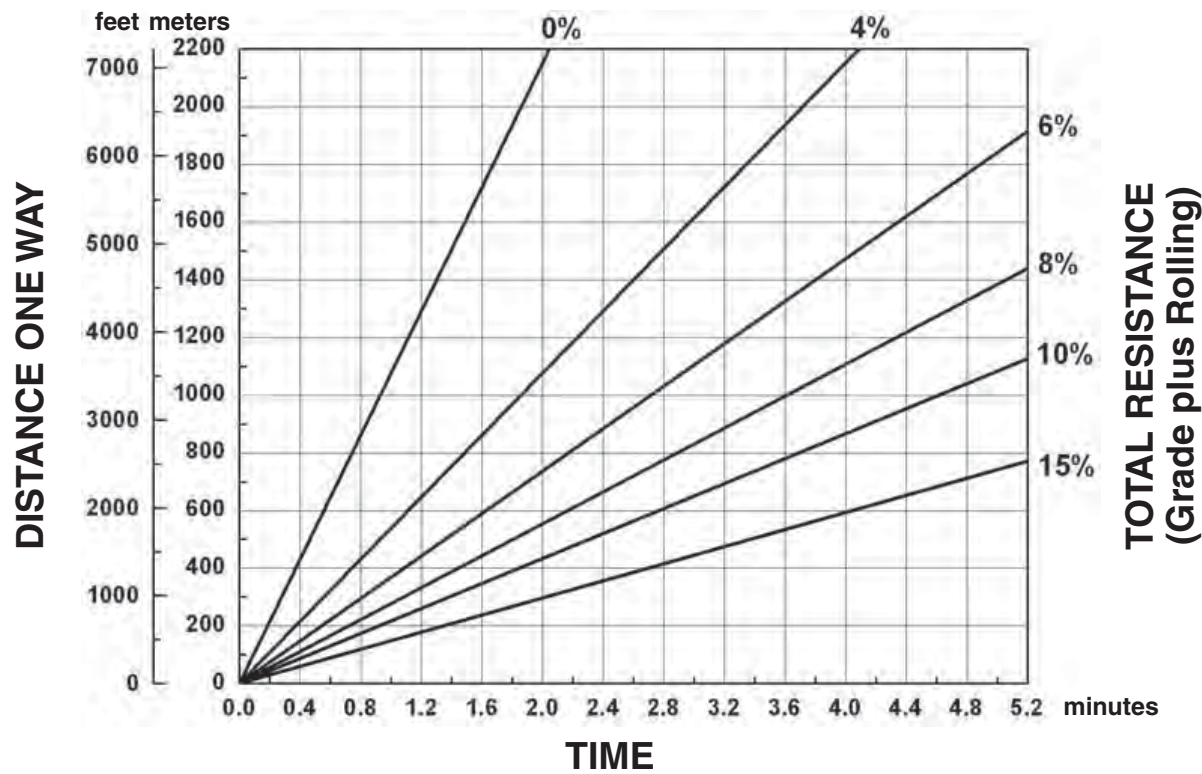
Empty weight: 47 628 kg (105,002 lb)
Payload: 37 013 kg (81,600 lb)

EMPTY

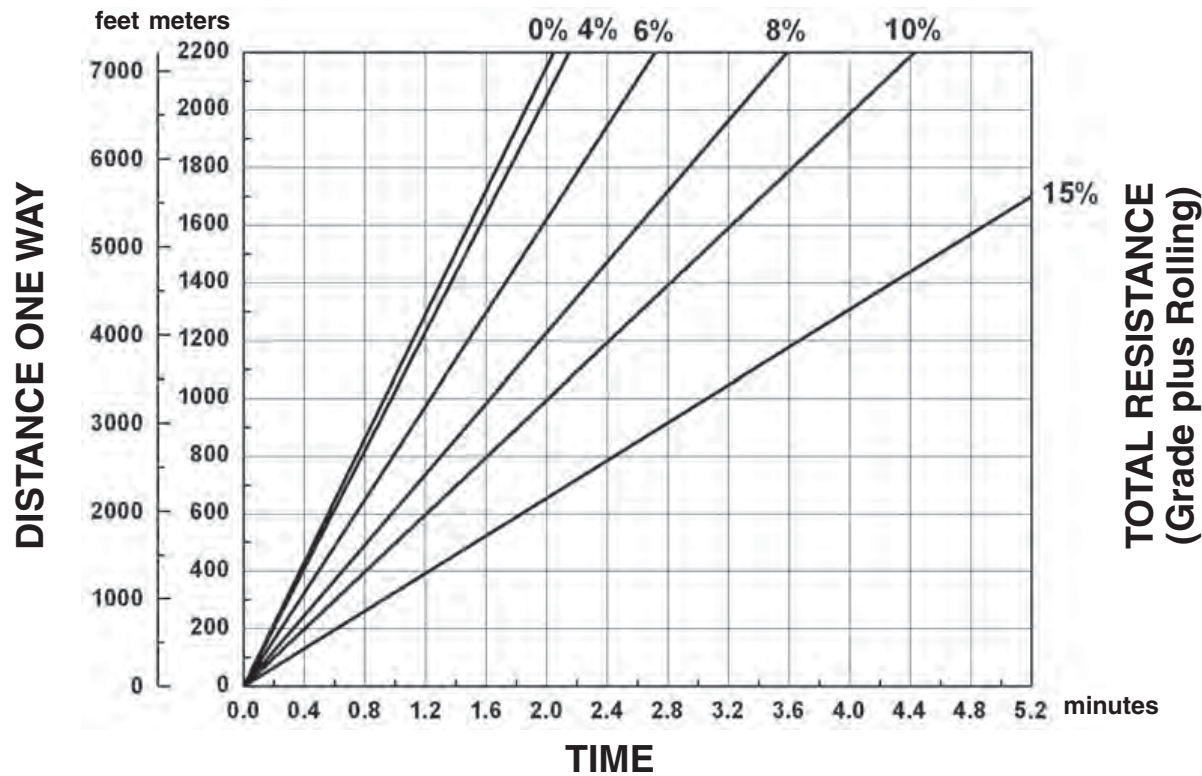


Empty weight: 47 628 kg (105,002 lb)

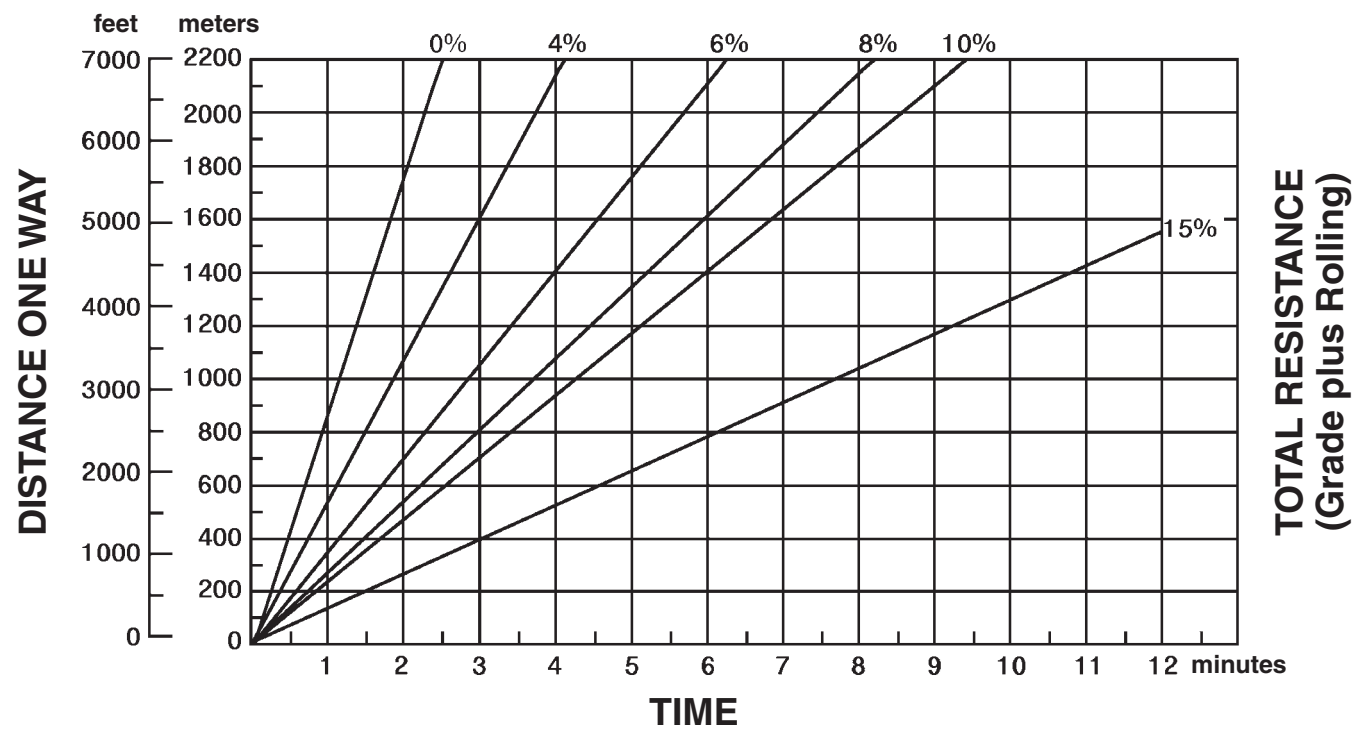
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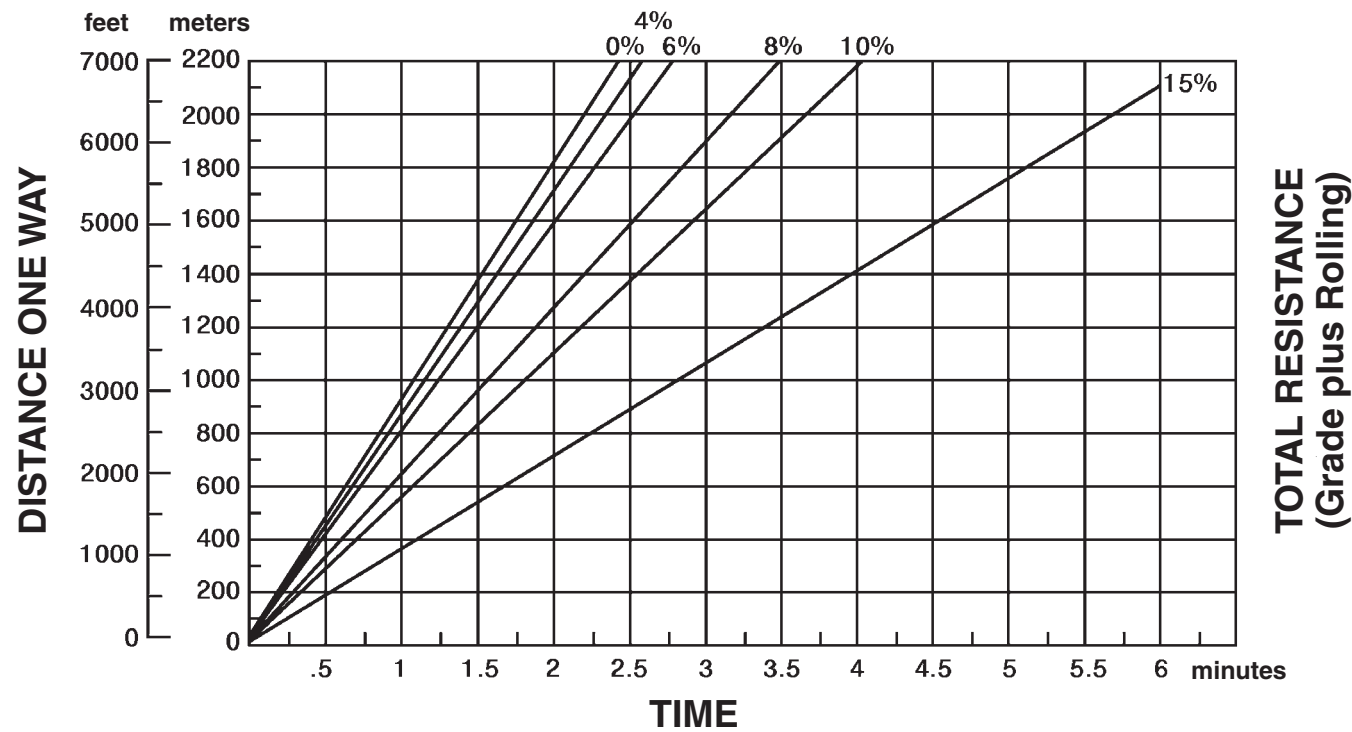
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EMPTY



APPENDIX B.2.6
MISCELLANEOUS UNIT COSTS

RSMMeans[®] Heavy Construction Cost Data



Large civil projects including marine, waterways, airports, highways, and tunnels

2014

28th annual edition

Cost data from the most quoted name in construction

02 41 Demolition

02 41 13 - Selective Site Demolition

02 41 13.88 Selective Demolition, Lawn Sprinkler Systems		Crew	Daily Output	Labor-Hours	Unit	Material	2014 Bare Costs		Total	Total Incl O&P
							Labor	Equipment		
0400	Sprinkler heads, plastic	2 Skwk	150	.107	Ea.		5.05		5.05	7.80
0500	Impact circle pattern, 28" - 76" diam.		75	.213			10.10		10.10	15.65
0600	Pop-up, 42" - 76" diam.		50	.320			15.15		15.15	23.50
0700	39" - 99" diameter		50	.320			15.15		15.15	23.50
0800	Sprinkler valves		40	.400			18.90		18.90	29.50
0900	Valve boxes		40	.400			18.90		18.90	29.50
1000	Controls		2	8			380		380	585
1100	Backflow preventer		4	4			189		189	293
1200	Vacuum breaker		4	4			189		189	293

02 41 13.90 Selective Demolition, Retaining Walls

0010	SELECTIVE DEMOLITION, RETAINING WALLS									
0020	See other retaining wall items in Section 02 41 13.83									
0100	Concrete retaining wall, 6' high, no reinforcing	B-9	12.70	3.150	L.F.		117	18.40	135.40	200
0200	8' high		10	4			148	23.50	171.50	255
0300	10' high		7.80	5.128			190	30	220	325
0400	With reinforcing, 6' high		11.50	3.478			129	20.50	149.50	222
0500	8' high		9	4.444			165	26	191	283
0600	10' high		7	5.714			212	33.50	245.50	360
0700	20' high		4	10			370	58.50	428.50	635
0800	Concrete cribbing, 12' high, open/closed face		126	.317	S.F.		11.75	1.85	13.60	20
0900	Interlocking segmental retaining wall	B-62	800	.030			1.20	.22	1.42	2.08
1000	Wall caps	"	600	.040			1.60	.29	1.89	2.78
1100	Metal bin retaining wall, 10' wide, 4-12' high	B-13	1200	.047			1.86	.62	2.48	3.53
1200	10' wide, 16-28' high		1000	.056			2.23	.75	2.98	4.24
1300	Stone filled gabions, 6' x 3' x 1'		170	.329	Ea.		13.15	4.39	17.54	25
1400	6' x 3' x 1'-6"		75	.747			30	9.95	39.95	56.50
1500	6' x 3' x 3'		25	2.240			89.50	30	119.50	170
1600	9' x 3' x 1'		75	.747			30	9.95	39.95	56.50
1700	9' x 3' x 1'-6"		33	1.697			67.50	22.50	90	129
1800	9' x 3' x 3'		12	4.667			186	62	248	355
1900	12' x 3' x 1'		42	1.333			53	17.75	70.75	101
2000	12' x 3' x 1'-6"		20	2.800			112	37.50	149.50	212
2100	12' x 3' x 3'		6	9.333			370	124	494	705

02 41 13.92 Selective Demolition, Parking Appurtenances

0010	SELECTIVE DEMOLITION, PARKING APPURTENANCES									
0100	Bumper rails, garage, 6" wide	B-6	300	.080	L.F.		3.21	1.22	4.43	6.25
0200	12" channel rail		300	.080			3.21	1.22	4.43	6.25
0300	Parking bumper, timber		1000	.024			.96	.37	1.33	1.88
0400	Folding, with locks	B-1	100	.240	Ea.		8.95		8.95	13.80
0500	Flexible fixed garage stanchion	B-6	150	.160			6.40	2.44	8.84	12.55
0600	Wheel stops, precast concrete		120	.200			8	3.04	11.04	15.65
0700	Thermoplastic		120	.200			8	3.04	11.04	15.65
0800	Pipe bollards, 6" - 12" dia		80	.300			12.05	4.57	16.62	23.50

02 41 16 - Structure Demolition

02 41 16.13 Building Demolition

0010	BUILDING DEMOLITION Large urban projects, incl. 20 mi. haul		R024119-10							
0011	No foundation or dump fees, C.F. is vol. of building standing									
0020	Steel	B-8	21500	.003	C.F.		.12	.15	.27	.36
0050	Concrete		15300	.004			.17	.22	.39	.50
0080	Masonry		20100	.003			.13	.17	.30	.38
0100	Mixture of types		20100	.003			.13	.17	.30	.38
0500	Small bldgs, or single bldgs, no salvage included, steel	B-3	14800	.003			.13	.17	.30	.39

31 23 Excavation and Fill

31 23 23 - Fill

31 23 23.14 Backfill, Structural		Crew	Daily Output	Labor Hours	Unit	Material	2014 Base Costs		Total	Total Incl O&P
							Labor	Equipment		
3300	300' haul, sand & gravel	B-10W	465	.026	L.C.Y.		1.16	1.27	2.43	3.16
3310	Sandy clay & loam		455	.026			1.18	1.30	2.48	3.23
3320	Common earth		415	.029			1.30	1.43	2.73	3.54
3340	Clay		370	.032			1.45	1.60	3.05	3.97
4000	200 H.P., 50' haul, sand & gravel	B-10B	2500	.005			.22	.53	.75	.91
4010	Sandy clay & loam		2435	.005			.22	.54	.76	.94
4020	Common earth		2200	.005			.24	.60	.84	1.03
4040	Clay		1950	.006			.28	.68	.96	1.17
4200	150' haul, sand & gravel		1225	.010			.44	1.08	1.52	1.86
4210	Sandy clay & loam		1200	.010			.45	1.10	1.55	1.89
4220	Common earth		1100	.011			.49	1.20	1.69	2.07
4240	Clay		975	.012			.55	1.36	1.91	2.34
4400	300' haul, sand & gravel		805	.015			.67	1.65	2.32	2.83
4410	Sandy clay & loam		790	.015			.68	1.68	2.36	2.89
4420	Common earth		735	.016			.73	1.80	2.53	3.10
4440	Clay		660	.018			.81	2.01	2.82	3.45
5000	300 H.P., 50' haul, sand & gravel	B-10M	3170	.004			.17	.57	.74	.89
5010	Sandy clay & loam		3110	.004			.17	.58	.75	.90
5020	Common earth		2900	.004			.19	.63	.82	.97
5040	Clay		2700	.004			.20	.67	.87	1.04
5200	150' haul, sand & gravel		2200	.005			.24	.83	1.07	1.28
5210	Sandy clay & loam		2150	.006			.25	.84	1.09	1.31
5220	Common earth		1950	.006			.28	.93	1.21	1.44
5240	Clay		1700	.007			.32	1.07	1.39	1.66
5400	300' haul, sand & gravel		1500	.008			.36	1.21	1.57	1.88
5410	Sandy clay & loam		1470	.008			.37	1.24	1.61	1.92
5420	Common earth		1350	.009			.40	1.35	1.75	2.09
5440	Clay		1225	.010			.44	1.48	1.92	2.30
6000	For compaction, see Section 31 23 23.23									
6010	For trench backfill, see Section 31 23 16.13 and 31 23 16.14									

31 23 23.15 Borrow, Loading And/Or Spreading

0010	BORROW, LOADING AND/OR SPREADING									
4000	Common earth, shovel, 1 C.Y. bucket	B-12N	840	.019	B.C.Y.	16.65	.83	1.48	18.96	21
4010	1-1/2 C.Y. bucket	B-120	1135	.014		16.65	.61	1.11	18.37	20.50
4020	3 C.Y. bucket	B-12T	1800	.009		16.65	.39	.89	17.93	19.85
4030	Front end loader, wheel mounted									
4050	3/4 C.Y. bucket	B-10R	550	.022	B.C.Y.	16.65	.98	.54	18.17	20.50
4060	1-1/2 C.Y. bucket	B-10S	970	.012		16.65	.55	.39	17.59	19.55
4070	3 C.Y. bucket	B-10T	1575	.008		16.65	.34	.33	17.32	19.20
4080	5 C.Y. bucket	B-10U	2600	.005		16.65	.21	.40	17.26	19.05
5000	Select granular fill, shovel, 1 C.Y. bucket	B-12N	925	.017		21	.75	1.34	23.09	25.50
5010	1-1/2 C.Y. bucket	B-120	1250	.013		21	.56	1.01	22.57	25
5020	3 C.Y. bucket	B-12T	1980	.008		21	.35	.81	22.16	24.50
5030	Front end loader, wheel mounted									
5050	3/4 C.Y. bucket	B-10R	800	.015	B.C.Y.	21	.67	.37	22.04	24.50
5060	1-1/2 C.Y. bucket	B-10S	1065	.011		21	.51	.35	21.86	24
5070	3 C.Y. bucket	B-10T	1735	.007		21	.31	.30	21.61	24
5080	5 C.Y. bucket	B-10U	2850	.004		21	.19	.37	21.56	23.50
6000	Clay, till, or blasted rock, shovel, 1 C.Y. bucket	B-12N	715	.022		12.35	.97	1.74	15.06	16.95
6010	1-1/2 C.Y. bucket	B-120	965	.017		12.35	.72	1.30	14.37	16.10
6020	3 C.Y. bucket	B-12T	1530	.010		12.35	.45	1.04	13.84	15.40
6030	Front end loader, wheel mounted									

32 11 Base Courses

32 11 23 – Aggregate Base Courses

32 11 23.23 Base Course Drainage Layers		Daily Crew	Output	Labor- Hours	Unit	Material	2014 Base Costs		Total	Total Incl O&P
0010 BASE COURSE DRAINAGE LAYERS							Labor	Equipment		
0011	For roadways and large areas									
0050	Crushed 3/4" stone base, compacted, 3" deep	B-36C	5200	.008	S.Y.	2.76	.34	.79	3.89	4.42
0100	6" deep		5000	.008		5.50	.36	.82	6.68	7.50
0200	9" deep		4600	.009		8.30	.39	.89	9.58	10.65
0300	12" deep		4200	.010		11.05	.42	.98	12.45	13.85
0301	Crushed 1-1/2" stone base, compacted to 4" deep	B-36B	6000	.011		3.80	.46	.79	5.05	5.75
0302	6" deep		5400	.012		5.70	.51	.88	7.09	8
0303	8" deep		4500	.014		7.60	.61	1.05	9.26	10.45
0304	12" deep		3800	.017		11.40	.73	1.24	13.37	15.05
0350	Bank run gravel, spread and compacted									
0370	6" deep	B-32	6000	.005	S.Y.	4.26	.24	.38	4.88	5.50
0390	9" deep		4900	.007		6.40	.30	.46	7.16	8
0400	12" deep		4200	.008		8.55	.35	.54	9.44	10.55
0600	Cold laid asphalt pavement, see Section 32 12 16.19									
1500	Alternate method to figure base course									
1510	Crushed stone, 3/4", compacted, 3" deep	B-36C	435	.092	E.C.Y.	28.50	4.10	9.45	42.05	47.50
1511	6" deep	B-36B	835	.077		28.50	3.31	5.65	37.46	42.50
1512	9" deep		1150	.056		28.50	2.40	4.11	35.01	39
1513	12" deep		1400	.046		28.50	1.97	3.38	33.85	37.50
1520	Crushed stone, 1-1/2", compacted 4" deep		665	.096		28.50	4.15	7.10	39.75	45
1521	6" deep		900	.071		28.50	3.07	5.25	36.82	41.50
1522	8" deep		1000	.064		28.50	2.76	4.73	35.99	40.50
1523	12" deep		1265	.051		28.50	2.18	3.74	34.42	38.50
1530	Gravel, bank run, compacted, 6" deep	B-36C	835	.048		22	2.14	4.91	29.05	32.50
1531	9" deep		1150	.035		22	1.55	3.57	27.12	30.50
1532	12" deep		1400	.029		22	1.27	2.93	26.20	29
2010	Crushed stone, 3/4" maximum size, 3" deep	B-36	540	.074	Ton	17.10	3.11	2.98	23.19	27
2011	6" deep		1625	.025		17.10	1.03	.99	19.12	21.50
2012	9" deep		1785	.022		17.10	.94	.90	18.94	21
2013	12" deep		1950	.021		17.10	.86	.82	18.78	21
2020	Crushed stone, 1-1/2" maximum size, 4" deep		720	.056		17.10	2.33	2.23	21.66	25
2021	6" deep		815	.049		17.10	2.06	1.97	21.13	24
2022	8" deep		835	.048		17.10	2.01	1.93	21.04	24
2023	12" deep		975	.041		17.10	1.72	1.65	20.47	23
2030	Bank run gravel, 6" deep	B-32A	875	.027		14.75	1.23	1.60	17.58	19.85
2031	9" deep		970	.025		14.75	1.11	1.44	17.30	19.50
2032	12" deep		1060	.023		14.75	1.01	1.32	17.08	19.20
6000	Stabilization fabric, polypropylene, 6 oz./S.Y.	B-6	10000	.002	S.Y.	1.27	.10	.04	1.41	1.59
6900	For small and irregular areas, add						50%	50%		
7000	Prepare and roll sub-base, small areas to 2500 S.Y.	B-32A	1500	.016	S.Y.		.72	.93	1.65	2.12
8000	Large areas over 2500 S.Y.	"	3500	.007			.31	.40	.71	.91
8050	For roadways	B-32	4000	.008			.37	.57	.94	1.19

32 11 26 – Asphaltic Base Courses

32 11 26.13 Plant Mix Asphaltic Base Courses

0010	PLANT MIX ASPHALTIC BASE COURSES									
0011	Roadways and large paved areas									
0500	Bituminous concrete, 4" thick	B-25	4545	.019	S.Y.	15.30	.78	.61	16.69	18.70
0550	6" thick		3700	.024		22.50	.96	.75	24.21	27
0560	8" thick		3000	.029		30	1.18	.92	32.10	36
0570	10" thick		2545	.035		37	1.39	1.08	39.47	44.50
1600	Macadam base, crushed stone or slag, dry-bound	B-36D	1400	.023	E.C.Y.	67	1.06	2.30	70.36	77.50

32 31 Fences and Gates

32 31 13 – Chain Link Fences and Gates

32 31 13.20 Fence, Chain Link Industrial		Daily Crew	Labor- Output	Hours	Unit	Material	2014 Base Costs		Total	Total Incl O&P
FENCE, CHAIN LINK INDUSTRIAL							Labor	Equipment		
0010	Schedule 40, including concrete									
0020	3 strands barb wire, 2" post @ 10' O.C., set in concrete, 6' H									
0200	9 ga. wire, galv. steel, in concrete	B-80C	240	.100	L.F.	19.10	3.66	1.16	23.92	28
0248	Fence, add for vinyl coated fabric				S.F.	.68			.68	.75
0300	Aluminized steel	B-80C	240	.100	L.F.	19.70	3.66	1.16	24.52	28.50
0500	6 ga. wire, galv. steel		240	.100		20.50	3.66	1.16	25.32	30
0600	Aluminized steel		240	.100		29.50	3.66	1.16	34.32	39.50
0800	6 ga. wire, 6' high but omit barbed wire, galv. steel		250	.096		19.40	3.51	1.11	24.02	28
0900	Aluminized steel, in concrete		250	.096		23.50	3.51	1.11	28.12	32.50
0920	8' H, 6 ga. wire, 2-1/2" line post, galv. steel, in concrete		180	.133		31	4.88	1.55	37.43	43
0940	Aluminized steel, in concrete		180	.133		37.50	4.88	1.55	43.93	50.50
1400	Gate for 6' high fence, 1-5/8" frame, 3' wide, galv. steel		10	2.400	Eq.	191	88	28	307	375
1500	Aluminized steel, in concrete		10	2.400	"	191	88	28	307	375
2000	5'-0" high fence, 9 ga., no barbed wire, 2" line post, in concrete									
2010	10' O.C., 1-5/8" top rail, in concrete									
2100	Galvanized steel, in concrete	B-80C	300	.080	L.F.	18.10	2.93	.93	21.96	25.50
2200	Aluminized steel, in concrete		300	.080	"	18.75	2.93	.93	22.61	26
2400	Gate, 4' wide, 5' high, 2" frame, galv. steel, in concrete		10	2.400	Eq.	176	88	28	292	360
2500	Aluminized steel, in concrete		10	2.400	"	192	88	28	308	380
3100	Overhead slide gate, chain link, 6' high, to 18' wide, in concrete		38	.632	L.F.	92.50	23	7.30	122.80	146
3105	8' high, in concrete	B-80	30	1.067		92.50	42.50	25.50	160.50	195
3108	10' high, in concrete		24	1.333		154	53	31.50	238.50	285
3110	Cantilever type, in concrete		48	.667		118	26.50	15.80	160.30	188
3120	8' high, in concrete		24	1.333		157	53	31.50	241.50	288
3130	10' high, in concrete		18	1.778		198	70.50	42	310.50	370
5000	Double swing gates, incl. posts & hardware, in concrete									
5010	5' high, 12' opening, in concrete	B-80C	3.40	7.059	Opng.	365	258	82	705	885
5020	20' opening, in concrete		2.80	8.571		485	315	99.50	899.50	1,125
5060	6' high, 12' opening, in concrete		3.20	7.500		435	275	87	797	990
5070	20' opening, in concrete		2.60	9.231		605	340	107	1,052	1,300
5080	8' high, 12' opening, in concrete	B-80	2.13	15.002		435	595	355	1,385	1,775
5090	20' opening, in concrete		1.45	22.069		655	875	525	2,055	2,650
5100	10' high, 12' opening, in concrete		1.31	24.427		770	970	580	2,320	2,950
5110	20' opening, in concrete		1.03	31.068		835	1,225	735	2,795	3,625
5120	12' high, 12' opening, in concrete		1.05	30.476		1,250	1,200	720	3,170	4,025
5130	20' opening, in concrete		.85	37.647		1,325	1,500	890	3,715	4,725
5190	For aluminized steel add					20%				
7055	Braces, galv. steel	B-80A	960	.025	L.F.	2.79	.92	.35	4.06	4.85
7056	Aluminized steel	"	960	.025	"	3.34	.92	.35	4.61	5.45
7075	Fence, for small jobs 100 L.F. or less fence w/or w/o gate, add				S.F.	20%				

32 31 13.25 Fence, Chain Link Residential

FENCE, CHAIN LINK RESIDENTIAL										
0010	Schedule 20, 11 ga. wire, 1-5/8" post									
0020	10' O.C., 1-3/8" top rail, 2" corner post, galv. stl. 3' high	B-80C	500	.048	L.F.	2	1.76	.56	4.32	5.50
0050	4' high		400	.060		7.05	2.20	.70	9.95	11.90
0100	6' high		200	.120		9.70	4.39	1.39	15.48	18.95
0150	Add for gate 3' wide, 1-3/8" frame, 3' high		12	2	Eq.	81	73	23	177	228
0170	4' high		10	2.400		87	88	28	203	261
0190	6' high		10	2.400		110	88	28	226	287
0200	Add for gate 4' wide, 1-3/8" frame, 3' high		9	2.667		88	97.50	31	216.50	281
0220	4' high		9	2.667		96	97.50	31	224.50	290

G10 Site Preparation

G1030 Site Earthwork



The Loading and Hauling of Common Earth System balances the productivity of loading equipment to hauling equipment. It is assumed that the hauling equipment will encounter light traffic and will move up no considerable grades on the haul route.

The Expanded System Listing shows Loading and Hauling systems that use either a track or wheel front-end loader. Track loaders indicated range from 1-1/2 Cubic Yards capacity to 4-1/2 Cubic Yards capacity. Wheel loaders range from 1-1/2 Cubic Yards to 5 Cubic Yards. Trucks for hauling range from 8 Cubic Yards capacity to 20 Cubic Yards capacity. Each system lists the number of trucks involved and the distance (round trip) that each must travel.

System Components	QUANTITY	UNIT	COST PER C.Y.		
			EQUIP.	LABOR	TOTAL
SYSTEM G1030 140 1000					
LOAD & HAUL COMMON EARTH, 1-1/2 CY LOADER, SIX 8 CY TRUCKS, 1 MRT					
Excavating bulk, F.E. loader track mtd., 1.5 C.Y.	1.000	B.C.Y.	.76	1.08	1.84
8 C.Y. truck, cycle 2 miles	1.280	L.C.Y.	4.31	4.31	8.62
Spotter at earth fill dump or in cut	.010	Hr.		.57	.57
TOTAL			5.07	5.96	11.03

G1030 140	Load & Haul Common Earth	COST PER C.Y.		
		EQUIP.	LABOR	TOTAL
1000	Load & haul common earth, 1-1/2 C.Y. tr. loader, six 8 C.Y. trucks, 1 MRT	5.05	5.95	11
1200	Four 12 C.Y. dump trucks, 2 mile round trip	6.25	4.81	11.06
1400	Three 16 C.Y. dump trailers, 2 mile round trip	5.05	3.94	8.99
1600	Four 16 C.Y. dump trailers, 4 mile round trip	6.60	4.80	11.40
2000	2-1/2 C.Y. track loader, six 12 C.Y. dump trucks, 3 mile round trip	7	4.94	11.94
2200	Four 16 C.Y. dump trailers, 2 mile round trip	5.40	3.58	8.98
2400	Five 16 C.Y. dump trailers, 4 mile round trip	6.95	4.48	11.43
2600	Three 20 C.Y. dump trailers, 1 mile round trip	4.22	2.82	7.04
3000	3-1/2 C.Y. track loader, six 12 C.Y. dump trucks, 1 mile round trip	4.92	3.33	8.25
3200	Seven 16 C.Y. dump trailers, 4 mile round trip	6.85	4.32	11.17
3400	Four 20 C.Y. dump trailers, 1 mile round trip	4.14	2.54	6.68
3600	Six 20 C.Y. dump trailers, 4 mile round trip	5.95	3.77	9.72
4000	4-1/2 C.Y. track loader, eight 12 C.Y. dump trucks, 1 mile round trip	4.89	3.11	8
4200	Six 16 C.Y. dump trailers, 1 mile round trip	4.73	2.87	7.60
4400	Six 20 C.Y. dump trailers, 2 mile round trip	4.63	2.77	7.40
4600	Eight 20 C.Y. dump trailers, 4 mile round trip	5.95	3.47	9.42
5000	1-1/2 C.Y. wheel loader, eight 8 C.Y. dump trucks, 2 mile round trip	5.40	6.50	11.90
5200	Four 12 C.Y. dump trucks, 1 mile round trip	4.36	3.60	7.96
5400	Six 12 C.Y. dump trucks, 3 mile round trip	6.25	4.94	11.19
5600	Five 16 C.Y. dump trailers, 4 mile round trip	6.20	4.48	10.68
6000	3 C.Y. wheel loader, eight 12 C.Y. dump trucks, 2 mile round trip	5.70	4.03	9.73
6200	Five 16 C.Y. dump trailers, 1 mile round trip	4	2.68	6.68
6400	Eight 16 C.Y. dump trailers, 3 mile round trip	5.55	3.62	9.17
6600	Six 20 C.Y. dump trailers, 2 mile round trip	3.80	2.62	6.42
7000	5 C.Y. wheel loader, eight 16 C.Y. dump trailers, 1 mile round trip	4.23	2.69	6.92
7200	Twelve 16 C.Y. dump trailers, 3 mile round trip	5.75	3.55	9.30
7400	Nine 20 C.Y. dump trailers, 2 mile round trip	4.03	2.48	6.51
7600	Twelve 20 C.Y. dump trailers, 4 mile round trip	5.35	3.18	8.53

G10 Site Preparation

G1030 Site Earthwork



The Loading and Hauling of Rock System balances the productivity of loading equipment to hauling equipment. It is assumed that the hauling equipment will encounter light traffic and will move up no considerable grades on the haul route.

The Expanded System Listing shows Loading and Hauling systems that use either a track or wheel front-end loader. Track loaders indicated range from 1-1/2 Cubic Yards capacity to 4-1/2 Cubic Yards capacity. Wheel loaders range from 1-1/2 Cubic Yards to 5 Cubic Yards. Trucks for hauling range from 8 Cubic Yards capacity to 20 Cubic Yards capacity. Each system lists the number of trucks involved and the distance (round trip) that each must travel.

System Components	QUANTITY	UNIT	COST PER C.Y.		
			EQUIP.	LABOR	TOTAL
SYSTEM G1030 150 1000					
LOAD & HAUL ROCK, 1-1/2 C.Y. TRACK LOADER, SIX 8 C.Y. TRUCKS, 1 MRT					
Excavating bulk, F.E. loader, track mtd., 1.5 C.Y.	1,000	B.C.Y.	1	1.42	2.42
8 C.Y. truck, cycle 2 miles	1,650	L.C.Y.	5.56	5.56	11.12
Spotter at earth fill dump or in cut	.010	Hr.		.79	.79
TOTAL			6.56	7.77	14.33

G1030 150	Load & Haul Rock	COST PER C.Y.		
		EQUIP.	LABOR	TOTAL
1000	Load & haul rock, 1-1/2 C.Y. track loader, six 8 C.Y. trucks, 1 MRT	6.55	7.75	14.30
1200	Nine 8 C.Y. dump trucks, 3 mile round trip	8.95	10.20	19.15
1400	Six 12 C.Y. dump trucks, 4 mile round trip	9.80	7.50	17.30
1600	Three 16 C.Y. dump trucks, 2 mile round trip	6.55	5.10	11.65
2000	2-1/2 C.Y. track loader, twelve 8 C.Y. dump trucks, 3 mile round trip	9.35	9.60	18.95
2200	Five 12 C.Y. dump trucks, 1 mile round trip	6.35	4.33	10.68
2400	Eight 12 C.Y. dump trucks, 4 mile round trip	10.15	7	17.15
2600	Four 16 C.Y. dump trailers, 2 mile round trip	7	4.61	11.61
3000	3-1/2 C.Y. track loader, eight 12 C.Y. dump trucks, 2 mile round trip	8.25	5.45	13.70
3200	Five 16 C.Y. dump trucks, 1 mile round trip	6.05	3.71	9.76
3400	Seven 16 C.Y. dump trailers, 3 mile round trip	8.10	5.10	13.20
3600	Seven 20 C.Y. dump trailers, 4 mile round trip	7.50	4.69	12.19
4000	4-1/2 C.Y. track loader, nine 12 C.Y. dump trucks, 1 mile round trip	6.20	3.92	10.12
4200	Eight 16 C.Y. dump trailers, 2 mile round trip	6.65	4	10.65
4400	Eleven 16 C.Y. dump trailers, 4 mile round trip	8.60	5.10	13.70
4600	Seven 20 C.Y. dump trailers, 2 mile round trip	5.80	3.46	9.26
5000	1-1/2 C.Y. wheel loader, nine 8 C.Y. dump trucks, 2 mile round trip	6.90	8.20	15.10
5200	Four 12 C.Y. dump trucks, 1 mile round trip	5.65	4.64	10.29
5400	Seven 12 C.Y. dump trucks, 4 mile round trip	9.40	7.20	16.60
5600	Five 16 C.Y. dump trailers, 4 mile round trip	8	5.80	13.80
6000	3 C.Y. wheel loader, eight 12 C.Y. dump trucks, 2 mile round trip	7.40	5.25	12.65
6200	Five 16 C.Y. dump trailers, 1 mile round trip	5.15	3.48	8.63
6400	Seven 16 C.Y. dump trailers, 3 mile round trip	6.20	4.30	10.50
6600	Seven 20 C.Y. dump trailers, 4 mile round trip	6.60	4.45	11.05
7000	5 C.Y. wheel loader, twelve 12 C.Y. dump trucks, 1 mile round trip	5.60	3.66	9.26
7200	Nine 16 C.Y. dump trailers, 1 mile round trip	5.40	3.36	8.76
7400	Eight 20 C.Y. dump trailers, 1 mile round trip	4.63	2.88	7.51
7600	Twelve 20 C.Y. dump trailers, 3 mile round trip	6.25	3.79	10.04

Crews

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
Crew B-11J						
1 Equipment Oper. (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$42.77	\$65.35
1 Laborer	36.65	293.20	56.55	452.40		
1 Grader, 30,000 Lbs.		707.00		777.70		
1 Ripper, Beam & 1 Shank		81.40		89.54	49.27	54.20
16 L.H., Daily Totals		\$1472.80		\$1912.84	\$92.06	\$119.55
Crew B-11K						
1 Equipment Oper. (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$42.77	\$65.35
1 Laborer	36.65	293.20	56.55	452.40		
1 Trencher, Chain Type, 8" D		3376.00		3713.60	211.00	232.10
16 L.H., Daily Totals		\$4060.40		\$4799.20	\$253.78	\$297.45
Crew B-11L						
1 Equipment Oper. (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$42.77	\$65.35
1 Laborer	36.65	293.20	56.55	452.40		
1 Grader, 30,000 Lbs.		707.00		777.70	44.19	48.61
16 L.H., Daily Totals		\$1391.40		\$1823.30	\$86.96	\$113.96
Crew B-11M						
1 Equipment Oper. (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$42.77	\$65.35
1 Laborer	36.65	293.20	56.55	452.40		
1 Backhoe Loader, 80 H.P.		397.60		437.36	24.85	27.34
16 L.H., Daily Totals		\$1082.00		\$1482.96	\$67.63	\$92.69
Crew B-11N						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$40.19	\$61.31
2 Equipment Operators (med.)	48.90	782.40	74.15	1186.40		
6 Truck Drivers (heavy)	37.55	1802.40	57.30	2750.40		
1 F.E. Loader, W.M., 5.5 C.Y.		1049.00		1153.90		
1 Dozer, 410 H.P.		2409.00		2649.90		
6 Dump Trucks, Off Hwy., 50 Ton		10722.00		11794.20	196.94	216.64
72 L.H., Daily Totals		\$17074.00		\$20012.00	\$237.14	\$277.94
Crew B-11Q						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 Dozer, 140 H.P.		883.80		972.18	73.65	81.02
12 L.H., Daily Totals		\$1421.60		\$1791.58	\$118.47	\$149.30
Crew B-11R						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 Dozer, 200 H.P.		1325.00		1457.50	110.42	121.46
12 L.H., Daily Totals		\$1862.80		\$2276.90	\$155.23	\$189.74
Crew B-11S						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 Dozer, 300 H.P.		1817.00		1998.70		
1 Ripper, Beam & 1 Shank		81.40		89.54	158.20	174.02
12 L.H., Daily Totals		\$2436.20		\$2907.64	\$203.02	\$242.30
Crew B-11T						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 Dozer, 410 H.P.		2409.00		2649.90		
1 Ripper, Beam & 2 Shanks		91.60		100.76	208.38	229.22
12 L.H., Daily Totals		\$3038.40		\$3570.06	\$253.20	\$297.51

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
Crew B-11U						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 Dozer, 520 H.P.		3116.00		3427.60	259.67	285.63
12 L.H., Daily Totals		\$3653.80		\$4247.00	\$304.48	\$353.92
Crew B-11V						
3 Laborers	\$36.65	\$879.60	\$56.55	\$1357.20	\$36.65	\$56.55
1 Roller, 2 Drum, W.B., 7.5 H.P.		182.80		201.08	7.62	8.38
24 L.H., Daily Totals		\$1062.40		\$1558.28	\$44.27	\$64.93
Crew B-11W						
1 Equipment Operator (med.)	\$48.90	\$391.20	\$74.15	\$593.20	\$38.42	\$58.64
1 Common Laborer	36.65	293.20	56.55	452.40		
10 Truck Drivers (heavy)	37.55	3004.00	57.30	4584.00		
1 Dozer, 200 H.P.		1325.00		1457.50		
1 Vibratory Roller, Towed, 23 Ton		412.00		453.20		
10 Dump Trucks, 8 C.Y., 220 H.P.		4172.00		4589.20	61.55	67.71
96 L.H., Daily Totals		\$9597.40		\$12129.50	\$99.97	\$126.35
Crew B-11Y						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$40.96	\$62.76
5 Common Laborers	36.65	1466.00	56.55	2262.00		
3 Equipment Operators (med.)	48.90	1173.60	74.15	1779.60		
1 Dozer, 80 H.P.		481.00		529.10		
2 Roller, 2 Drum, W.B., 7.5 H.P.		365.60		402.16		
4 Vibrating Plate, Gas, 21"		184.00		202.40	14.31	15.75
72 L.H., Daily Totals		\$3979.40		\$5652.46	\$55.27	\$78.51
Crew B-12A						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$43.45	\$66.38
1 Laborer	36.65	293.20	56.55	452.40		
1 Hyd. Excavator, 1 C.Y.		814.80		895.28	50.92	56.02
16 L.H., Daily Totals		\$1510.00		\$1958.28	\$94.38	\$122.39
Crew B-12B						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$43.45	\$66.38
1 Laborer	36.65	293.20	56.55	452.40		
1 Hyd. Excavator, 1.5 C.Y.		1031.00		1134.10	64.44	70.88
16 L.H., Daily Totals		\$1726.20		\$2196.10	\$107.89	\$137.26
Crew B-12C						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$43.45	\$66.38
1 Laborer	36.65	293.20	56.55	452.40		
1 Hyd. Excavator, 2 C.Y.		1175.00		1292.50	73.44	80.78
16 L.H., Daily Totals		\$1870.20		\$2354.50	\$116.89	\$147.16
Crew B-12D						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$43.45	\$66.38
1 Laborer	36.65	293.20	56.55	452.40		
1 Hyd. Excavator, 3.5 C.Y.		2442.00		2685.20	152.63	167.89
16 L.H., Daily Totals		\$3137.20		\$3748.20	\$196.07	\$234.26
Crew B-12E						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$43.45	\$66.38
1 Laborer	36.65	293.20	56.55	452.40		
1 Hyd. Excavator, 5 C.Y.		448.00		492.80	28.00	30.80
16 L.H., Daily Totals		\$1143.20		\$1554.80	\$71.45	\$97.17

Crews

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
Crew B-13A						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$40.69	\$62.24
2 Laborers	36.65	586.40	56.55	904.80		
2 Equipment Operators (med.)	48.90	782.40	74.15	1186.40		
2 Truck Drivers (heavy)	37.55	600.80	57.30	916.80		
1 Crawler Crane, 75 Ton		1492.00		1841.20		
1 Crawler Loader, 4 C.Y.		1532.00		1685.20		
2 Dump Trucks, 8 C.Y., 220 H.P.		834.40		917.84	68.90	75.79
56 L.H., Daily Totals		\$6137.20		\$7729.44	\$109.59	\$138.03
Crew B-13B						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$39.86	\$61.15
4 Laborers	36.65	1172.80	56.55	1809.60		
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Equip. Oper. (loader)	43.55	348.40	66.00	528.00		
1 Hyd. Crane, 55 Ton		1137.00		1250.70	20.30	22.33
56 L.H., Daily Totals		\$3369.40		\$4675.10	\$60.17	\$83.48
Crew B-13C						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$39.86	\$61.15
4 Laborers	36.65	1172.80	56.55	1809.60		
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Equip. Oper. (loader)	43.55	348.40	66.00	528.00		
1 Crawler Crane, 100 Ton		1703.00		1873.30	30.41	33.45
56 L.H., Daily Totals		\$3995.40		\$5297.70	\$70.28	\$94.60
Crew B-13D						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Hyd. Excavator, 1 C.Y.		814.80		896.28		
1 Trench Box		84.05		92.45	56.18	61.80
16 L.H., Daily Totals		\$1994.05		\$2050.74	\$99.63	\$128.17
Crew B-13E						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Hyd. Excavator, 1.5 C.Y.		1031.00		1134.10		
1 Trench Box		84.05		92.45	69.69	76.66
16 L.H., Daily Totals		\$1810.25		\$2288.55	\$113.14	\$143.03
Crew B-13F						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Hyd. Excavator, 3.5 C.Y.		2442.00		2686.20		
1 Trench Box		84.05		92.45	157.88	173.67
16 L.H., Daily Totals		\$3221.25		\$3840.66	\$201.33	\$240.04
Crew B-13G						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Hyd. Excavator, .75 C.Y.		662.00		728.20		
1 Trench Box		84.05		92.45	46.63	51.29
16 L.H., Daily Totals		\$1441.25		\$1882.66	\$90.08	\$117.67
Crew B-13H						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Grapple, 5/8 C.Y.		881.60		969.76		
1 Trench Box		84.05		92.45	60.35	66.39
16 L.H., Daily Totals		\$1660.85		\$2124.22	\$103.80	\$132.76

Crew No.	Bare Costs		Incl. Subs O&P		Cost Per Labor-Hour	
	Hr.	Daily	Hr.	Daily	Bare Costs	Incl. O&P
Crew B-13I						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Grapple, 3 Tons, 1 C.Y.		1005.00		1105.50		
1 Trench Box		84.05		92.45	68.07	74.87
16 L.H., Daily Totals		\$1784.25		\$2259.95	\$111.52	\$141.25
Crew B-13J						
1 Laborer	\$36.65	\$293.20	\$56.55	\$452.40	\$43.45	\$66.38
1 Equip. Oper. (crane)	50.25	402.00	76.20	609.60		
1 Hyd. Excavator, 2.5 C.Y.		1637.00		1800.70		
1 Trench Box		84.05		92.45	107.57	118.32
16 L.H., Daily Totals		\$2416.25		\$2955.16	\$151.02	\$184.70
Crew B-14						
1 Labor Foreman (outside)	\$38.65	\$309.20	\$59.65	\$477.20	\$38.72	\$59.53
4 Laborers	36.65	1172.80	56.55	1809.60		
1 Equip. Oper. (light)	47.05	376.40	71.35	570.80		
1 Backhoe Loader, 48 H.P.		365.20		401.72	7.61	8.37
48 L.H., Daily Totals		\$2223.60		\$3259.32	\$46.33	\$67.90
Crew B-14A						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$45.72	\$69.65
5 Laborer	36.65	146.60	56.55	226.20		
1 Hyd. Excavator, 4.5 C.Y.		3043.00		3347.30	253.58	278.94
12 L.H., Daily Totals		\$3591.60		\$4183.10	\$299.30	\$348.59
Crew B-14B						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$45.72	\$69.65
5 Laborer	36.65	146.60	56.55	226.20		
1 Hyd. Excavator, 6 C.Y.		3523.00		3875.30	293.58	322.94
12 L.H., Daily Totals		\$4071.60		\$4711.10	\$339.30	\$392.59
Crew B-14C						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$45.72	\$69.65
5 Laborer	36.65	146.60	56.55	226.20		
1 Hyd. Excavator, 7 C.Y.		3596.00		3955.60	299.67	329.63
12 L.H., Daily Totals		\$4144.60		\$4791.40	\$345.38	\$399.28
Crew B-14F						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$45.72	\$69.65
5 Laborer	36.65	146.60	56.55	226.20		
1 Hyd. Shovel, 7 C.Y.		3714.00		4085.40	309.50	340.45
12 L.H., Daily Totals		\$4262.60		\$4921.20	\$355.22	\$410.10
Crew B-14G						
1 Equip. Oper. (crane)	\$50.25	\$402.00	\$76.20	\$609.60	\$45.72	\$69.65
5 Laborer	36.65	146.60	56.55	226.20		
1 Hyd. Shovel, 12 C.Y.		5204.00		5724.40	433.67	477.03
12 L.H., Daily Totals		\$5752.60		\$6560.20	\$479.38	\$546.68
Crew B-14J						
1 Equip. Oper. (medium)	\$48.90	\$391.20	\$74.15	\$593.20	\$44.82	\$68.28
5 Laborer	36.65	146.60	56.55	226.20		
1 F.E. Loader, 8 C.Y.		1989.00		2187.90	165.75	182.32
12 L.H., Daily Totals		\$2526.80		\$3007.30	\$210.57	\$250.61

City Cost Indexes

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			98.4	98.4		100.6	100.6		100.6	100.6		98.4	98.4		100.6	100.6		98.4	98.4
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		111.8	105.3	107.3	114.4	105.4	108.1	110.9	105.5	107.1	113.5	105.3	107.7	110.1	105.4	106.8	96.6	105.3	102.7
0310	Concrete Forming & Accessories		104.6	128.9	125.6	97.2	129.0	124.6	99.4	128.9	124.8	99.3	120.3	117.4	100.2	129.0	125.0	99.9	128.6	124.6
0320	Concrete Reinforcing		80.0	128.6	104.3	103.3	128.6	116.0	103.8	128.6	116.2	80.0	128.5	104.2	80.0	128.6	104.3	103.3	115.7	109.5
0330	Cast-in-Place Concrete		103.9	132.3	115.7	109.6	127.3	117.0	101.6	127.3	112.3	103.9	128.4	114.1	84.9	127.3	102.5	99.5	132.0	113.0
03	CONCRETE		109.8	128.9	119.3	106.9	127.4	117.0	103.4	127.3	115.2	109.5	123.7	116.5	92.3	127.4	109.6	102.3	126.3	114.1
04	MASONRY		96.6	125.9	114.7	93.4	125.9	113.5	87.8	125.9	111.4	86.4	124.6	110.0	89.3	125.9	112.0	92.1	125.4	112.7
05	METALS		95.7	111.2	100.4	102.8	113.6	106.1	95.7	113.5	101.2	95.7	110.7	100.3	95.6	113.6	101.1	100.4	105.7	102.0
06	WOOD, PLASTICS & COMPOSITES		108.9	130.1	120.9	99.0	130.2	116.6	104.1	130.2	118.8	101.6	119.1	111.5	105.3	130.2	119.3	101.4	130.1	117.8
07	THERMAL & MOISTURE PROTECTION		104.8	129.9	115.0	102.0	130.6	113.6	101.6	123.3	110.4	104.8	122.1	111.8	101.9	130.6	113.6	104.2	123.1	111.9
08	OPENINGS		97.2	127.9	104.5	107.5	127.9	112.3	111.6	127.9	115.4	99.1	122.2	104.6	113.6	127.9	117.0	106.7	124.4	110.9
0920	Plaster & Gypsum Board		103.9	130.5	122.0	99.9	130.5	120.7	103.2	130.5	121.8	99.4	119.1	112.8	101.7	130.5	121.3	99.9	130.5	120.7
0950, 0980	Ceilings & Acoustic Treatment		88.9	130.5	116.6	102.4	130.5	121.1	99.5	130.5	120.1	88.9	119.1	109.0	88.6	130.5	116.5	101.4	130.5	120.8
0960	Flooring		100.0	172.3	121.6	98.5	172.3	120.6	97.7	172.3	120.0	97.8	160.6	113.6	98.0	172.3	120.2	99.3	172.3	121.1
0970, 0990	Wall Finishes & Painting/Coating		93.0	119.3	108.8	96.0	119.3	110.0	94.6	119.3	109.4	93.0	117.3	107.6	94.6	119.3	109.4	98.3	117.3	109.7
09	FINISHES		99.7	135.4	119.6	98.6	135.5	119.1	100.0	135.5	119.8	98.5	125.9	113.7	98.0	135.5	118.9	100.1	136.0	120.1
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44, 46		100.0	113.4	102.7	100.0	113.6	102.7	100.0	113.6	102.7	100.0	104.2	100.8	100.0	113.6	102.7	100.0	110.4	102.1
21, 22, 23	FIRE SUPPRESSION, PLUMBING & HVAC		99.6	122.9	108.9	100.0	122.8	109.1	100.0	123.4	109.4	99.6	122.5	108.7	99.6	122.8	108.9	100.0	122.5	108.0
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.		93.4	137.6	116.5	99.2	139.7	120.3	95.5	137.6	117.5	92.7	131.5	112.9	91.5	137.6	115.6	101.4	138.7	120.8
MF2010	WEIGHTED AVERAGE		99.7	125.2	110.8	101.9	125.6	112.2	100.2	125.2	111.1	99.2	121.4	108.8	98.7	125.2	110.3	100.8	124.0	110.9

DIVISION			NEW MEXICO																	
			VINELAND			ALBUQUERQUE			CARRIZO			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			98.8	98.8		109.6	109.6		109.6	109.6		109.6	109.6		109.6	109.6		109.6	109.6
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		102.7	104.7	104.1	82.2	104.1	97.6	102.9	104.1	103.7	91.2	104.1	100.2	88.4	104.1	99.4	96.0	104.1	101.7
0310	Concrete Forming & Accessories		96.8	128.4	124.1	101.4	65.0	70.0	99.2	65.0	69.7	99.1	64.9	69.6	101.4	65.0	70.0	101.5	65.0	70.0
0320	Concrete Reinforcing		79.1	118.5	98.7	100.5	71.1	85.8	109.9	71.1	90.5	111.2	71.1	91.2	109.9	71.1	90.5	105.2	71.1	88.2
0330	Cast-in-Place Concrete		90.7	132.2	107.9	96.9	71.2	86.2	96.4	71.2	85.3	95.3	71.1	85.3	97.8	71.2	86.8	92.1	71.2	83.4
03	CONCRETE		97.6	126.7	111.9	101.9	69.4	85.9	119.1	69.4	94.6	107.6	69.3	88.7	105.7	69.4	87.8	112.5	69.4	91.2
04	MASONRY		87.9	125.4	111.1	99.5	60.6	75.4	101.6	60.6	76.2	101.7	60.6	76.2	106.3	60.6	78.0	95.4	60.6	73.8
05	METALS		95.6	106.0	98.8	103.8	87.9	98.9	98.4	87.9	95.2	98.1	87.8	94.9	101.4	87.9	97.2	100.6	87.9	96.6
06	WOOD, PLASTICS & COMPOSITES		98.5	130.2	116.4	92.8	65.5	77.4	88.9	65.5	75.7	88.9	65.5	75.7	92.9	65.5	77.4	92.9	65.5	77.4
07	THERMAL & MOISTURE PROTECTION		104.4	123.2	112.1	99.4	71.8	88.2	100.7	71.8	89.0	99.6	71.8	88.3	99.6	71.8	88.3	100.5	71.8	88.8
08	OPENINGS		98.6	125.0	104.9	101.4	68.5	93.6	98.6	68.5	91.5	98.8	68.5	91.6	104.0	68.5	95.6	104.1	68.5	95.7
0920	Plaster & Gypsum Board		98.0	130.5	120.1	88.3	64.1	71.8	75.4	64.1	67.7	75.4	64.1	67.7	81.6	64.1	69.7	81.6	64.1	69.7
0950, 0980	Ceilings & Acoustic Treatment		88.9	130.5	116.6	106.3	64.1	78.2	104.2	64.1	77.5	104.2	64.1	77.5	103.1	64.1	77.2	103.1	64.1	77.2
0960	Flooring		97.1	150.6	113.1	100.2	67.2	90.3	100.2	67.2	90.4	100.2	67.2	90.4	101.7	67.2	91.4	101.7	67.2	91.4
0970, 0990	Wall Finishes & Painting/Coating		93.0	117.3	107.6	109.1	68.1	84.4	102.9	68.1	82.0	102.9	68.1	82.0	102.9	68.1	82.0	102.9	68.1	82.0
09	FINISHES		97.2	132.5	116.8	98.3	65.5	80.0	99.0	65.5	80.3	97.6	65.5	79.7	96.9	65.5	79.4	98.1	65.5	79.9
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44, 46		100.0	110.5	102.1	100.0	76.3	95.2	100.0	76.3	95.2	100.0	76.3	95.2	100.0	76.3	95.2	100.0	76.3	95.2
21, 22, 23	FIRE SUPPRESSION, PLUMBING & HVAC		99.6	119.6	107.6	100.2	70.7	88.4	97.2	70.7	86.6	97.2	70.5	86.5	100.1	70.7	88.3	97.1	70.7	86.6
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.		92.7	141.4	118.1	88.5	72.9	80.4	90.6	72.9	81.4	88.1	72.9	83.2	86.8	72.9	79.6	86.0	72.9	79.2
MF2010	WEIGHTED AVERAGE		97.5	123.4	108.8	99.2	73.6	88.0	100.1	73.6	88.5	98.1	73.5	87.4	99.7	73.6	88.3	99.3	73.6	88.1

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			86.0	86.0		109.6	109.6		109.6	109.6		109.6	109.6		109.6	109.6		86.1	86.1
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION		91.6	83.8	86.1	87.8	104.1	99.2	93.3	104.1	100.9	92.9	104.1	100.7	84.3	104.1	98.2	101.9	83.8	89.2
0310	Concrete Forming & Accessories		95.6	63.8	68.2	101.4	65.0	70.0	99.2	65.0	69.7	100.1	65.0	69.8	101.5	65.0	70.0	98.7	63.8	68.6
0320	Concrete Reinforcing		107.3	71.0	89.1	106.9	71.1	89.0	111.2	71.1	91.2	106.0	71.1	88.6	109.1	71.1	90.1	102.8	71.0	86.9
0330	Cast-in-Place Concrete		89.9	63.7	79.0	95.2	71.2	85.2	95.3	71.2	85.3	103.2	71.2	89.9	93.2	71.2	84.1	102.1	63.7	86.1
03	CONCRETE		86.1	65.9	76.1	103.1	69.4	86.4	108.3	69.4	89.1	105.6	69.4	87.7	102.0	69.4	85.9	95.1	65.9	80.7
04	MASONRY		97.5	60.2	74.4	95.6	60.6	73.9	112.2	60.6	80.3	99.5	60.6	75.4	95.5	60.6	73.9	93.1	60.2	72.8
05	METALS		97.1	81.3	92.2	100.3	87.9	95.4	99.3	87.9	95.8	97.7	87.9	94.7	100.6	87.9	96.6	100.1	81.4	94.3
06	WOOD, PLASTICS & COMPOSITES		78.8	64.4	70.7	92.9	65.5	77.4	88.9	65.5	75.7	94.6	65.5	78.2	92.9	65.5	77.4	84.6	64.4	71.2
07	THERMAL & MOISTURE PROTECTION		86.2	67.2	78.5	99.2	71.8	88.1	99.7	71.8	88.4	101.7	71.8	89.5	99.1	71.8	88.0	86.9	67.2	78.9
08	OPENINGS		91.5	67.9	85.9	100.3	68.5	92.8	98.6	68.5	91.5	102.4	68.5	94.4	100.1	68.5	92.7	93.3	67.9	87.

R013113-60 Workers' Compensation Insurance Rates by Trade and State (cont.)

State	Carpentry — 3 stories or less 5651	Carpentry — interior cab. work 5437	Carpentry — general 5403	Concrete Work — NOC 5213	Concrete Work — flat (fr., slab.) 5221	Electrical Wiring — inside 5190	Excavation — earth NOC 6217	Excavation — rock 6217	Glaziers 5462	Insulation Work 5479	Lathing 5443	Masonry 5022	Painting & Decorating 5474	Pile Driving 6003	Plastering 5480	Plumbing 5183
AL	34.03	17.01	24.59	13.79	10.37	8.87	16.42	16.42	19.75	19.84	9.24	23.79	15.91	18.57	15.88	8.73
AK	17.14	9.44	11.58	10.41	9.44	5.63	8.23	8.23	32.03	14.36	11.73	10.86	10.79	21.68	11.31	6.20
AZ	21.40	9.27	20.28	10.31	6.93	6.08	7.07	7.07	10.80	14.99	5.47	13.01	12.78	10.80	8.64	6.84
AR	12.80	4.77	9.18	6.63	5.16	4.03	6.82	6.82	8.14	7.67	3.99	8.30	7.08	8.10	13.00	4.55
CA	34.87	34.83	34.86	16.55	16.55	13.24	18.65	18.65	24.16	16.48	17.83	25.13	23.59	23.18	35.04	17.48
CO	8.95	4.93	6.07	6.68	4.75	2.92	5.49	5.49	6.00	7.27	3.95	8.29	6.56	6.51	5.69	4.16
CT	30.95	18.48	31.07	26.49	14.43	7.89	16.02	16.02	20.24	20.60	9.92	31.53	18.60	20.17	18.75	11.28
DE	12.46	12.46	9.93	10.07	8.80	4.53	7.70	7.70	10.90	9.93	6.60	11.53	13.39	15.03	10.90	6.60
DC	8.92	7.25	6.94	12.65	7.38	4.69	8.02	8.02	9.61	6.63	9.83	9.32	5.82	17.36	8.00	7.80
FL	11.32	8.62	11.92	12.51	6.20	6.17	7.30	7.30	10.56	10.45	5.53	10.92	10.23	17.84	9.68	5.63
GA	68.34	20.32	28.40	21.36	15.09	12.05	17.32	17.32	19.39	18.80	11.94	35.11	33.04	26.44	19.65	12.76
HI	8.51	6.92	12.69	7.05	4.02	4.47	5.40	5.40	8.22	5.20	6.26	7.01	6.19	7.32	8.33	5.31
ID	14.63	6.84	12.43	11.48	5.28	4.43	7.25	7.25	8.81	9.06	4.46	10.55	9.38	7.65	8.43	5.10
IL	33.34	21.75	28.57	38.59	16.83	10.03	14.53	14.53	25.55	21.41	14.32	28.94	18.57	24.53	32.84	12.51
IN	8.36	4.21	6.98	4.56	4.15	2.83	3.92	3.92	5.29	6.15	3.85	5.14	4.97	7.23	3.71	2.56
IA	15.46	11.35	19.21	14.85	11.16	5.20	11.01	11.01	15.76	9.89	6.48	14.30	10.13	11.38	21.73	7.80
KS	14.92	7.39	9.74	8.07	5.70	4.46	5.55	5.55	7.54	8.17	4.09	8.38	7.75	7.56	6.20	5.23
KY	18.75	13.00	20.00	8.50	6.50	6.00	14.00	14.00	22.12	11.15	7.60	7.50	9.00	16.03	12.93	5.00
LA	31.05	16.86	25.02	13.35	12.37	7.85	14.11	14.11	19.19	15.06	7.99	17.31	17.64	18.85	14.84	7.10
ME	12.24	8.87	16.18	16.43	8.70	4.74	12.34	12.34	14.82	12.79	5.09	10.88	12.44	9.00	9.99	5.90
MD	11.40	15.89	15.00	19.22	6.00	5.23	8.11	8.11	13.77	12.42	6.15	10.11	6.40	15.19	9.17	6.65
MA	8.68	5.23	9.61	18.85	6.24	2.84	4.35	4.35	9.58	7.78	5.27	10.55	5.09	12.92	4.68	3.50
MI	18.41	10.45	18.41	18.27	12.58	5.82	13.28	13.28	11.67	10.92	10.45	18.82	13.49	37.00	10.88	7.18
MN	20.27	20.82	34.13	11.58	13.15	5.83	11.00	11.00	36.85	18.37	11.55	15.59	17.55	27.58	11.58	8.09
MS	22.76	9.99	13.34	9.60	6.67	6.18	9.49	9.49	14.94	10.15	5.94	13.12	11.01	13.14	10.43	8.17
MO	19.66	11.10	12.81	12.38	10.34	6.15	9.96	9.96	9.47	11.55	7.44	15.13	11.42	13.38	12.15	9.00
MT	9.67	6.59	10.80	6.22	5.67	3.71	7.41	7.41	7.50	8.67	4.15	7.62	8.22	7.95	6.80	4.79
NE	21.80	13.15	21.48	18.23	11.20	8.03	17.38	17.38	12.05	21.53	8.35	18.73	13.00	13.93	13.68	8.73
NV	10.41	6.82	12.39	10.83	5.26	4.33	8.75	8.75	6.55	7.55	3.41	6.63	7.10	8.43	6.21	6.76
NH	24.24	11.06	19.63	28.40	16.47	5.63	12.61	12.61	14.12	12.63	7.30	16.19	20.93	18.53	11.20	9.49
NJ	18.69	13.18	18.69	15.51	11.69	5.13	10.83	10.83	11.21	12.63	15.13	18.71	11.28	15.79	15.13	6.96
NM	25.01	9.56	18.92	11.73	9.43	6.05	7.22	7.22	10.95	10.56	6.11	15.74	12.91	12.66	14.20	6.70
NY	12.54	10.74	19.18	23.71	17.15	7.85	12.16	12.16	18.72	10.88	12.86	21.24	14.99	20.13	10.02	10.83
NC	30.12	9.54	15.76	16.11	9.31	10.56	15.41	15.41	14.28	13.03	8.11	13.05	14.08	16.61	14.12	10.73
ND	9.54	4.31	9.54	5.43	5.43	3.75	4.13	4.13	10.50	10.50	9.93	6.52	6.00	10.59	9.93	6.11
OH	7.73	4.31	5.52	4.67	4.92	3.43	4.79	4.79	8.83	11.38	36.65	6.93	8.15	6.99	7.80	3.52
OK	18.82	10.32	12.49	13.50	7.66	6.82	9.48	9.48	11.79	11.31	5.13	14.63	10.66	11.24	14.01	6.82
OR	22.30	8.52	11.92	10.51	10.42	5.35	9.08	9.08	12.64	10.88	6.09	14.37	11.81	11.44	10.81	6.35
PA	19.22	19.22	15.60	19.54	13.58	7.39	11.11	11.11	14.34	15.60	14.34	16.04	17.13	19.44	14.34	9.19
RI	9.84	11.55	13.75	12.56	9.68	4.58	8.16	8.16	10.61	12.48	5.17	10.07	8.82	19.30	8.69	6.75
SC	29.32	13.80	17.10	12.84	8.21	9.82	12.01	12.01	12.92	14.13	9.57	15.39	16.10	15.67	14.47	9.40
SD	20.86	17.96	20.35	16.10	10.49	5.08	9.75	9.75	10.84	14.71	6.95	14.65	11.22	12.63	10.35	10.02
TN	22.71	10.14	11.54	10.75	7.08	5.49	10.05	10.05	11.07	10.34	6.60	11.69	8.27	12.08	11.04	5.17
TX	10.12	7.33	10.12	8.08	5.99	5.98	7.60	7.60	8.25	9.27	4.15	8.69	7.28	10.26	7.28	5.27
UT	14.72	6.59	7.50	7.34	6.57	3.56	6.79	6.79	7.45	7.15	6.41	8.96	7.73	6.72	5.56	4.17
VT	15.69	10.21	13.77	13.60	11.57	4.37	11.83	11.83	12.40	15.34	5.79	11.92	8.78	10.43	9.35	7.38
VA	12.38	8.14	8.89	10.51	5.76	4.50	7.40	7.40	8.02	7.27	5.45	7.98	8.93	8.31	6.69	5.07
WA	9.18	9.18	9.18	8.55	8.55	3.18	6.68	6.68	13.99	6.79	9.18	13.26	12.26	21.68	10.43	4.33
WV	14.85	5.54	8.34	7.68	4.51	3.53	6.46	6.46	6.74	6.29	4.33	8.39	6.03	8.09	6.54	3.52
WI	12.52	13.14	17.06	11.98	7.59	5.08	7.84	7.84	13.88	11.22	4.00	13.69	12.43	28.24	10.16	5.95
WY	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82
AVG.	18.19	11.07	15.38	13.15	8.92	5.83	9.69	9.69	13.15	11.67	8.12	13.49	11.54	14.65	11.55	7.08

General Requirements

R0131 Project Management & Coordination

R013113-60 Workers' Compensation Insurance Rates by Trade and State (cont.)

State	Roofing 5551	Sheet Metal Work (HVAC) 5538	Steel Erection — door & sash 5102	Steel Erection — inter., ornam. 5102	Steel Erection — structure 5040	Steel Erection — NOC 5057	Tile Work — (interior ceramic) 5348	Waterproofing 9014	Wrecking 5701	Boiler-making 3726	Millwrights 3724	Structural Painters 5037	Elevator Constructor 5160	Truck Drivers 7219	Sprinkler Installer 5188
AL	54.71	10.34	12.52	12.52	40.75	21.56	12.35	9.27	40.75	11.93	12.83	55.64	10.09	23.31	8.40
AK	25.49	8.05	7.82	7.82	29.28	26.40	5.33	5.77	29.28	8.56	8.24	31.37	4.06	11.75	5.13
AZ	29.22	10.31	13.61	13.61	26.91	12.89	4.50	6.21	26.91	9.07	7.41	59.76	5.09	8.01	5.48
AR	16.03	4.74	8.34	8.34	15.40	11.28	6.69	2.58	15.40	4.94	5.76	25.69	2.73	10.96	5.72
CA	71.13	18.78	18.41	18.41	35.28	19.69	14.59	23.59	19.69	8.98	13.58	35.28	5.07	27.13	18.32
CO	15.60	4.16	5.36	5.36	23.64	10.59	4.10	3.23	18.40	4.37	3.87	22.88	2.78	7.22	3.85
CT	58.74	12.93	21.24	21.24	65.13	29.83	15.63	6.43	65.13	19.44	14.12	66.07	11.07	22.67	10.49
DE	26.71	5.55	13.16	13.16	23.27	13.16	8.00	11.53	23.27	6.17	6.19	23.27	6.19	11.13	6.60
DC	17.05	6.45	23.33	23.33	26.02	7.91	6.08	4.38	26.02	15.31	7.62	35.16	9.65	14.34	4.00
FL	18.17	7.69	9.91	9.91	23.04	12.59	5.63	5.26	23.04	9.07	6.05	39.44	3.54	9.24	6.41
GA	93.33	16.61	22.17	22.17	60.89	25.88	13.50	11.64	60.89	19.54	14.79	72.60	7.53	19.39	15.17
HI	17.24	4.93	7.60	7.60	21.77	6.88	6.52	5.40	21.77	4.82	7.71	24.83	2.28	10.54	3.49
ID	24.73	7.46	12.31	12.31	25.42	10.44	6.15	4.84	25.42	5.30	5.61	29.98	3.26	9.46	4.65
IL	47.55	15.21	31.16	31.16	84.68	19.36	27.09	7.88	84.68	23.23	15.10	101.23	14.42	19.73	16.65
IN	11.57	4.32	5.32	5.32	11.59	4.80	3.26	2.77	11.59	3.85	3.70	13.20	1.58	5.75	3.20
IA	28.01	8.53	9.15	9.15	52.79	14.30	9.38	6.15	25.61	14.19	8.59	87.69	6.14	13.60	7.75
KS	16.26	5.64	6.71	6.71	18.97	11.93	5.23	4.63	11.96	6.01	7.60	26.96	3.22	7.88	5.30
KY	34.00	12.00	11.72	11.72	36.00	11.02	16.73	3.50	36.00	12.15	8.35	150.00	9.56	10.00	10.32
LA	43.53	14.84	20.14	20.14	44.26	12.79	9.99	7.91	44.20	15.48	10.94	55.57	6.11	23.25	11.22
ME	22.72	6.77	8.92	8.92	37.18	12.21	5.76	4.64	37.18	8.08	6.58	54.29	4.39	8.15	6.70
MD	29.05	11.90	11.92	11.92	59.02	17.92	6.49	5.84	32.91	14.58	9.95	43.60	4.46	16.02	11.88
MA	30.99	5.72	6.89	6.89	54.08	33.00	5.81	2.48	23.75	15.42	5.98	23.51	4.21	8.28	4.13
MI	41.18	9.83	12.28	12.28	37.00	11.27	11.73	6.46	37.00	9.41	8.67	11.27	5.13	9.09	8.21
MN	67.71	17.30	9.82	9.82	108.16	7.70	14.69	7.95	7.70	10.92	12.24	36.60	6.41	11.39	7.62
MS	31.61	7.46	15.08	15.08	38.45	7.53	8.45	5.85	38.45	7.77	9.97	38.74	4.78	52.03	7.53
MO	36.73	8.64	12.33	12.33	47.55	24.29	10.41	5.92	47.55	14.45	9.66	60.85	6.20	12.44	8.43
MT	29.42	4.80	6.98	6.98	18.72	5.89	5.47	4.64	5.89	5.03	5.91	28.63	3.01	6.06	3.67
NE	35.08	12.88	14.80	14.80	59.03	14.13	8.68	6.73	67.83	16.33	11.35	66.18	7.13	15.98	10.30
NV	16.59	7.34	7.06	7.06	19.32	12.20	4.42	4.23	12.20	4.79	6.15	28.67	4.30	10.30	5.47
NH	36.82	8.93	14.28	14.28	95.03	28.57	12.35	7.17	95.03	8.91	9.04	54.18	6.29	36.82	10.68
NJ	40.10	7.22	12.87	12.87	17.25	13.36	9.55	6.63	16.86	4.18	9.20	23.37	7.00	15.75	5.89
NM	35.07	9.63	11.79	11.79	45.52	16.76	7.73	7.53	45.52	8.00	8.00	42.38	8.41	14.60	7.75
NY	35.96	13.56	19.25	19.25	35.26	19.08	10.35	7.49	18.10	21.41	10.22	42.40	12.20	14.37	6.45
NC	35.39	11.87	14.43	14.43	45.05	22.54	7.62	6.10	45.05	18.41	9.71	78.32	8.90	17.84	10.60
ND	17.63	6.11	10.59	10.59	10.90	10.59	10.50	17.63	8.18	3.33	10.50	10.59	3.33	8.79	6.11
OH	14.89	4.00	6.58	6.58	11.33	5.84	4.85	4.58	5.84	2.76	4.52	24.79	2.13	10.02	3.68
OK	22.44	9.62	10.98	10.98	29.21	15.15	6.69	6.41	32.94	9.25	6.21	52.38	3.88	11.26	6.40
OR	27.22	6.85	7.08	7.08	22.04	13.44	9.10	6.73	22.04	9.10	9.28	11.81	3.70	14.41	6.02
PA	38.35	8.92	19.10	19.10	30.01	19.10	11.69	16.04	30.01	7.95	8.85	30.01	8.85	16.69	9.19
RI	23.59	8.48	7.37	7.37	35.11	24.46	5.33	4.98	22.15	11.33	6.32	39.60	4.85	10.13	5.85
SC	46.45	10.88	15.24	15.24	31.33	24.73	7.98	5.42	31.33	11.24	10.59	66.07	8.64	15.07	10.12
SD	34.39	7.29	14.74	14.74	33.52	23.05	6.19	5.30	33.52	22.67	11.38	66.74	6.69	10.62	8.14
TN	29.78	8.13	13.42	13.42	16.07	18.88	7.46	4.09	16.07	8.10	7.46	40.34	4.92	10.23	6.10
TX	16.22	11.69	7.60	7.60	22.99	9.48	4.68	5.57	7.13	4.30	5.95	7.34	3.34	12.75	5.27
UT	23.93	5.78	5.71	5.71	24.61	11.81	5.75	4.31	20.14	5.91	4.77	21.36	3.71	7.05	4.16
VT	27.01	7.30	12.01	12.01	34.39	18.99	7.01	7.90	34.39	8.67	7.28	48.29	6.07	13.40	6.27
VA	25.97	5.47	7.46	7.46	29.39	10.80	5.76	3.30	29.39	4.92	7.38	27.90	5.39	9.03	5.30
WA	21.14	4.47	8.09	8.09	8.09	8.09	7.86	21.14	8.09	2.77	6.15	12.26	2.46	8.52	4.70
WV	19.62	5.62	7.13	7.13	19.39	9.55	4.86	3.11	20.70	5.62	6.64	35.86	4.23	8.93	3.76
WI	28.04	9.43	12.08	12.08	20.72	16.12	13.78	5.07	20.72	9.68	8.34	24.08	4.11	10.15	4.64
WY	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82	5.82
AVG.	31.29	8.79	11.95	11.95	34.64	15.21	8.54	6.86	29.21	9.87	8.39	41.47	5.67	13.67	7.24

APPENDIX B.2.7
WELL ABANDON AND PLUGGING COSTS

Wet Drill Hole Abandonment Unit Costs

		w/o		
MMD	Indirects	Indirects	Inflation 2013 to 2014	Unit Cost
(\$/ft)	(%)	(\$/ft)	(%)	\$/ft
\$ 14.00	28.30%	\$ 10.91	2%	11.13

Unit cost based on NM EMNRD MMD Guidance:

http://www.emnrd.state.nm.us/MMD/MARP/documents/MMD_Part3FAGuidelines_Sept2013.pdf

APPENDIX B.2.8
DOWN DRAIN, CHANNEL, BENCH, BERM
LINEAR FOOT COSTS

Type 1 Top Channel Unit Cost Development

Task Description	Equipment	Productivity (cy/hr)	Productivity (hr/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	969	-	1.2	1.00	3,300	1.00	175	1853	0.75	50	1.00	1.00	1.00			
Waste	D11T CD	863	-	1.2	1.00	3,300	1.00	200	1651	0.75	50	1.00	1.00	1.00			
Finish Grade	D9T SU	-	0.0011	1.2	1.00	3,300	1.00	-	-	0.75	50	1.00	1.00	1.00	3	14.25	1

Task Description	Equipment	Volume ¹ (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	DownDrain Cost (\$/lf)
Excavate	D11T CD	2.4	0.003	\$509.12	\$47.58	\$556.70	\$1.41
Waste	D11T CD	2.4	0.003	\$509.12	\$47.58	\$556.70	\$1.58
Finish Grade	D9T SU	-	0.0011	\$227.29	\$47.58	\$274.87	\$0.30
Total							\$3.28

Notes:

10' Bottom width, 3:1 side slopes, 2' deep, 1' thick riprap, 0.5' thick gravel

Volumes based on cross-section area for excavation and waste

Finish Grade assume 3 passes

Type 2 Top Channel Unit Cost Development

Task Description	Equipment	Productivity (cy/hr)	Productivity (hr/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	969	-	1.2	1.00	3,300	1.00	175	1853	0.75	50	1.00	1.00	1.00			
Waste	D11T CD	863	-	1.2	1.00	3,300	1.00	200	1651	0.75	50	1.00	1.00	1.00			
Finish Grade	D6T XL SU -		0.0011	1.2	1.00	3,300	1.00	-	-	0.75	50	1.00	1.00	1.00	3	17.5	1

Task Description	Equipment	Volume ¹ (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	DownDrain Cost (\$/lf)
Excavate	D11T CD	7.6	0.008	\$509.12	\$47.58	\$556.70	\$4.34
Waste	D11T CD	7.6	0.009	\$509.12	\$47.58	\$556.70	\$4.87
Finish Grade	D6T XL SU	-	0.0011	\$102.89	\$47.58	\$150.47	\$0.16
Total							\$9.38

Notes:

20' Bottom width, 3:1 side slopes, 3' deep, 2.5' thick riprap, 0.5' thick gravel

Volumes based on cross-section area for excavation and waste

Finish Grade assume 2' overlap.

Downdrain (Type 2 Chanenel) Unit Cost Development

Task Description	Equipment	Productivity (cy/hr)	Productivity (hr/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	1,550	-	1.2	1.60	3,300	1.00	175	1853	0.75	50	1.00	1.00	1.00			
Waste	D11T CD	1,381	-	1.2	1.60	3,300	1.00	200	1651	0.75	50	1.00	1.00	1.00			
Finish Grade	D6T XL SU	-	0.0007	1.2	1.60	3,300	1.00	-	-	0.75	50	1.00	1.00	1.00	3	17.5	1

Task Description	Equipment	Volume ¹ (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	DownDrain Cost (\$/lf)
Excavate	D11T CD	7.6	0.005	\$509.12	\$47.58	\$556.70	\$2.71
Waste	D11T CD	7.6	0.005	\$509.12	\$47.58	\$556.70	\$3.05
Finish Grade	D6T XL SU	-	0.0007	\$102.89	\$47.58	\$150.47	\$0.10
Total							\$5.86

Notes:

20' Bottom width, 3:1 side slopes, 3' deep, 2.5' thick riprap, 0.5' thick gravel

Volumes based on cross-section area for excavation and waste

Finish Grade assume 2' overlap.

Outslope Channel Unit Cost Development

Task Description	Equipment	Productivity (cy/hr)	Productivity (hr/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	969	-	1.2	1.00	3,300	1.00	175	1853	0.75	50	1.00	1.00	1.00			
Waste	D11T CD	1,381	-	1.2	1.60	3,300	1.00	200	1651	0.75	50	1.00	1.00	1.00			
Finish Grade	D6T XL SU	-	0.0004	1.2	1.00	3,300	1.00	-	-	0.75	50	1.00	1.00	1.00	1	17.5	1

Task Description	Equipment	Volume ¹ (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	DownDrain Cost (\$/lf)
Excavate	D11T CD	0.43	0.000	\$509.12	\$47.58	\$556.70	\$0.25
Waste	D11T CD	0.43	0.000	\$509.12	\$47.58	\$556.70	\$0.17
Finish Grade	D6T XL SU	-	0.0004	\$102.89	\$47.58	\$150.47	\$0.05
Total							\$0.48

Notes:

Bench width 30 ft, 5% slope towards interior, 0.5' deep riprap by 20' wide riprap on 5% slope and 3' wide riprap on the 3:1 slope

Volumes based on cross-section area for excavation and waste

Finish Grade assume 2' overlap.

Bench Unit Cost Development for Stockpiles 3:1 slope

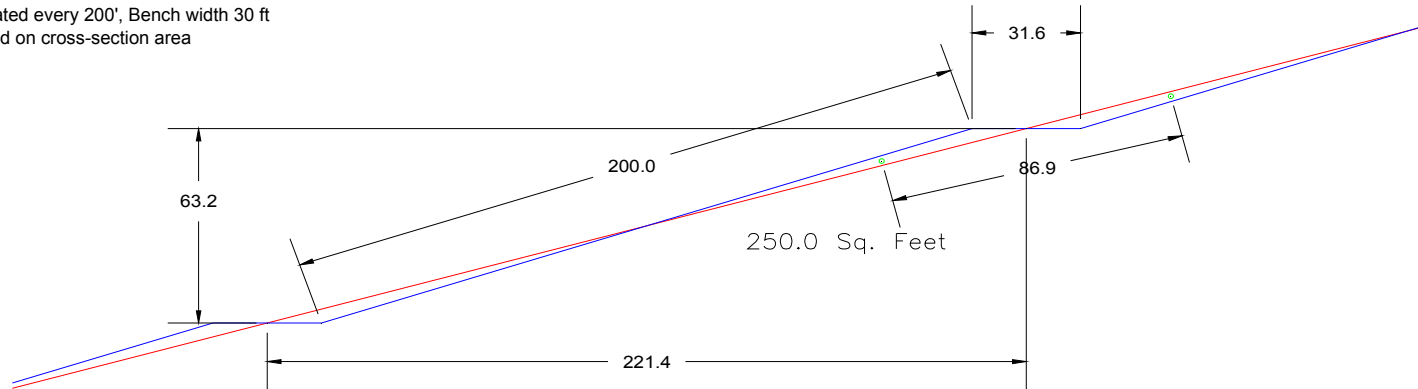
Task Description	Equipment	Productivity (cy/hr)	Productivity (hrs/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# Passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	2834		1.2	1.6	3300	1.0	86.9	3389	0.75	50	1.0	1.0	1.0	-	-	-
Finish Grade	D9T SU		0.0011	1.2	1.0	3300	1.0	-	-	0.75	50	1.0	1.0	1.0	3	14.25	1.0

Task Description	Equipment	Volume (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	Bench Cost (\$/lf)
Excavate	D11T CD	9.26	0.0033	\$509.12	\$47.58	\$556.70	\$1.82
Finish Grade	D9T SU	-	0.0011	\$227.29	\$47.58	\$274.87	\$0.30
Total							\$2.12

Notes:

3:1 slope Located every 200', Bench width 30 ft

Volumes based on cross-section area



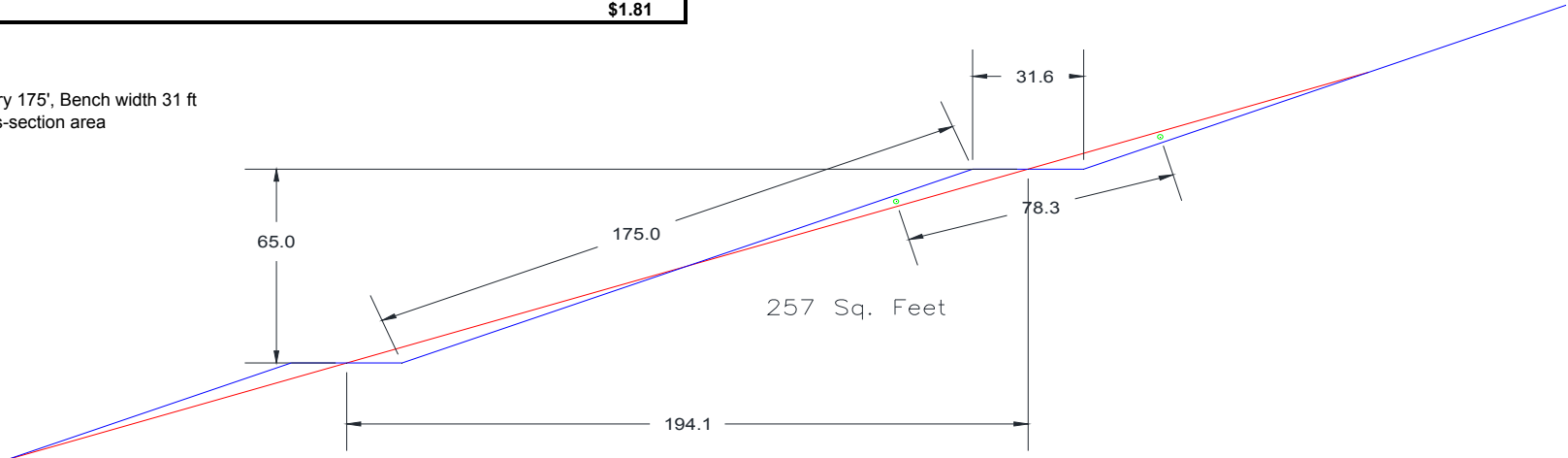
Bench Unit Cost Development for Stockpiles 2.5:1 slope

Task Description	Equipment	Productivity (cy/hr)	Productivity (hrs/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# Passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	3500	-	1.2	1.8	3300	1.0	78.0	3720	0.75	50	1.0	1.0	1.0			
Finish Grade	D9T SU	-	0.0011	1.2	1.0	3300	1.0	-	-	0.75	50	1.0	1.0	1.0	3	14.25	1.0

Task Description	Equipment	Volume (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	Bench Cost (\$/lf)
Excavate	D11T CD	9.52	0.0027	\$509.12	\$47.58	\$556.70	\$1.51
Finish Grade	D9T SU	-	0.0011	\$227.29	\$47.58	\$274.87	\$0.30
Total							\$1.81

Notes:

2.5:1 slope Located every 175', Bench width 31 ft
Volumes based on cross-section area



Bench Unit Cost Development for Tailings 3:1 slope

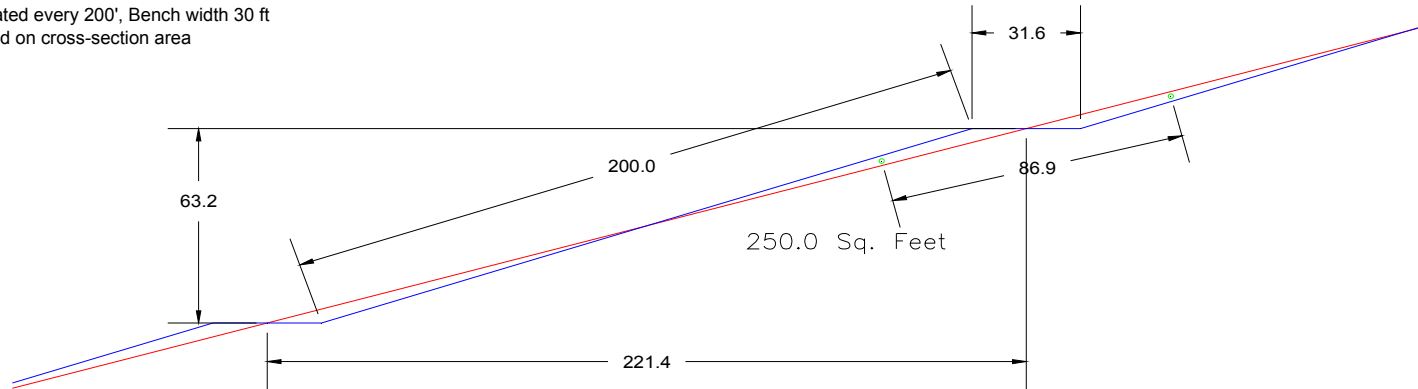
Task Description	Equipment	Productivity (cy/hr)	Productivity (hrs/lf)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator Factor	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor	# Passes	Width (feet)	Speed (miles/hr)
Excavate	D11T CD	3225		1.2	1.6	2900	1.0	86.9	3389	0.75	50	1.0	1.0	1.0	-	-	-
Finish Grade	D9T SU		0.0010	1.2	1.0	2900	1.0	-	-	0.75	50	1.0	1.0	1.0	3	14.25	1.0

Task Description	Equipment	Volume (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	Bench Cost (\$/lf)
Excavate	D11T CD	9.26	0.0029	\$509.12	\$47.58	\$556.70	\$1.60
Finish Grade	D9T SU	-	0.0010	\$227.29	\$47.58	\$274.87	\$0.26
Total							\$1.86

Notes:

3:1 slope Located every 200', Bench width 30 ft

Volumes based on cross-section area



Berm Unit Cost Development

Task Description	Equipment	Productivity (cy/hr)	Material Factor	Grade Factor	Soil Weight (lb/cy)	Production Method/ Blade Factor	Maximum Push Distance (feet)	Normal Production (cy/hr)	Operator	Work Hour (min/hr)	Visibility Factor	Elevation Factor	Direct Drive Trans. Factor
Excavate	D6T XL SU	235	1.2	1.00	3,300	1.00	100	449	0.75	50	1.00	1.00	1.00
Finish	D6T XL SU	408	1.2	1.00	3,300	1.00	50	781	0.75	50	1.00	1.00	1.00

Task Description	Equipment	Volume (cy/lf)	Productivity (hrs/lf)	Equipment Cost (\$/hr)	Operator Cost (IV) (\$/hr)	Dozer Cost (\$/hr)	Berm Cost (\$/lf)
Excavate	D6T XL SU	3.7	0.0158	\$102.89	\$47.58	\$150.47	\$2.37
Finish Grade	D6T XL SU	1.2	0.0029	\$102.89	\$47.58	\$150.47	\$0.44
Total							\$2.82

Berm 2:1 slope, 5' high, 10' top width

Excavate			
Berm Dimensions	10	5	50 ft3/lf
	10	5	50 ft3/lf
Total			100 ft3/lf
Volume			3.7 cy/lf

Finish Grade	
Slope length x1	11.2 ft
Slope length x1	11.2 ft
Top length	10 ft
Total Length	32.4 ft
Depth	1 ft
Width	1 ft
Volume	32.4 ft3/lf
Volume	1.2 cy/lf

APPENDIX B.3

ENGINEERING QUANTITIES

TECHNICAL MEMORANDUM

DATE: October 8, 2014 **Telesto #** 200189

TO: Cobre Mining Company

FROM: April Tischer

SUBJECT: Earthwork Cost Estimate Takeoff Summary Quantity Definitions

This technical memorandum presents a summary discussion of the engineering quantities used in developing the reclamation earthwork cost estimate for the Continental Mine for the anticipated end of year 2019 topography. The reclamation quantities are summarized in Tables 1 through 3. Tables 1 and 2 list the quantities associated with the earthwork. Table 3 provides the riprap and gravel volume per foot for each channel type. The quantities for each facility were separated into sections of uniform slope, and matching reclamation criteria. A summary description of each item shown in Table 1 is presented below which includes the basis for determining each particular quantity.

Item 1.1 Outslope Cut - Pushdown

This item includes earthwork cut volume (cut) required for regrading tailings pond and stockpile outslopes. Quantities were calculated using Autodesk Civil 3D. The cut and fill volumes within each section were balanced to within 10%. The average of the cut and fill volumes were used in the cost estimate. The cut area is near the top of the slope and the fill area is near the base. It was assumed that the cut material will be pushed down the slope, where it will be placed as fill. Quantities required to excavate benches are included separately in Item 6.1.

Item 1.2 Outslope Fill - Pushdown

This item includes earthwork fill volumes (fill) required for regrading the tailings pond and stockpile outslopes. Quantities were calculated using Autodesk Civil 3D.

The cut and fill volumes within each section were balanced to within 10%. The average of the cut and fill volumes was used in the cost estimate. The cut area is near the top of the slope and the fill area is near the base. It was assumed that the cut material will be pushed down the slope, where it will be placed as fill. Quantities required to excavate benches are included separately in Item 6.1.

Item 1.3 Outslope Cut/Fill Pushdown Distance

This item is the average sloped distance between the approximate centroids of the cut and fill blocks for regrading the stockpile and tailings outslopes.

Item 1.4 Outslope Surface Grade

This item is the final overall grade of the regraded outslope, prior to cutting in any benches. For locations where benches are not required it is equal to the final slope.

Item 2.1 Top Cut

This item includes the earthwork cut volume required for regrading the tailings pond and stockpile top surfaces. Quantities were calculated using Autodesk Civil 3D. The cut and fill volumes within each section were balanced to within 10%. The average of the cut and fill volumes was used in the cost estimate. It was assumed that the cut material will be pushed to where it will be placed as fill.

Item 2.2 Top Fill

This item includes the earthwork fill volume required for regrading the tailings pond and stockpile top surfaces. Quantities were calculated using Autodesk Civil 3D. The cut and fill volumes within each section were balanced to within 10%. The average of the cut and fill volumes was used in the cost estimate. It was assumed that the cut material will be pushed to where it will be placed as fill.

Item 2.3 Top Cut/Fill Push Distance

This item is the average distance between the estimated centroid of the cut and fill blocks for regrading the stockpile and tailings top surfaces.

Item 2.4 Top Surface Grade %

This item is the final overall grade of the regraded top surface. Where no quantities are indicated in Items 2.2 and 2.3, the grading is done by area, Item 4.1, to obtain a smooth finish at the grade specified.

Item 3.1 Outslope Surface Approximate Sloped Area

This item includes the outslope area that will receive cover, and revegetation. Revegetation costs include chiseling or ripping, scarifying, discing, rangeland drill seeding, mulching, crimping, and mobilization. The planer (horizontal) area was multiplied by a slope correction factor to approximate the true sloped surface area.

Item 3.2 Outslope Surface Cover Push Distance

This item is the estimated average push distance to spread cover material over tailings or stockpile outslopes. It assumes the truck haul and dumping can be coordinated to minimize push distance.

Item 3.3 Outslope Surface Cover Depth

This item is the depth of cover, measured normal to the slope, to be placed over the tailings and stockpile outslopes. It does not include material that may already be approved as cover already in place for a particular facility.

Item 3.4 Outslope Surface Cover Fill

This item is the quantity of cover fill to cover the stockpile and tailings outslopes at the depth specified in Item 3.3, over the area specified in Item 3.1. Cover fill

volumes were obtained by multiplying the area specified in Item 3.1 by Item 3.3 and converting to cubic yards.

Item 4.1 Top Surface Area

This item includes stockpile and tailings top surfaces as well as surface impoundments that will receive grading, cover, and revegetation where indicated. Grading involves making one pass with a blade over the surface to obtain a smooth finished grade. Revegetation costs include chiseling or ripping, scarifying, discing, rangeland drill seeding, mulching, crimping, and mobilization. This item includes borrow areas that require revegetation.

Item 4.2 Top Surface Cover Push Distance

This item is the estimated average push distance to spread cover material over stockpile and tailings top surfaces as well as surface impoundments. It assumes the truck haul and dumping can be coordinated to minimize push distance.

Item 4.3 Top Surface Cover Depth

This item is the depth of cover to be placed over stockpile and tailings top surfaces as well as surface impoundments. It does not include material that may already be approved as cover already in place for a particular facility.

Item 4.4 Top Surface Cover Fill

This item is the quantity of cover fill to cover the stockpile and tailings top surfaces as well as surface impoundments at the depth specified in Item 4.3 over the area specified in Item 4.1. Cover fill volumes were obtained by multiplying the area specified in Item 4.1 by Item 4.3 and converting to cubic yards.

Item 5.1 Cover Source

This item provides the location cover material is assumed to be obtained for each facility based on the 2014 mine expansion plan, the volume of available cover

material, and proximity to the facility being covered. These haul routes are subject to change based on those factors. Borrow locations are used to determine haul distance and grades in Items 5.2 through 5.8.

Item 5.2 - 5.5 Cover Haul Distance

These items describe the two-dimensional haul distance between the approximate centroid of the borrow source and cover areas. Depending on the terrain, the haul route has been divided into as many as three segments. If the grades along the haul route are generally uniform, the haul route was described using one or two haul segments. The Drawings in the CCP show the main haul routes.

Item 5.6 - 5.8 Cover Haul Grades

These items represent the grades of the haul segments described in Items 5.2-5.5.

Item 6.1 Outslope Bench Length

This item represents the length of benches to be cut into the stockpile outslopes. The length of benches is equal to the length of the outslope channels. Bench cross sections are shown in the CCP Drawings.

Item 6.2 Outslope Channel Length

This item represents the length of surface water channels to be constructed on benches of the stockpile outslopes. It was assumed that channels will be located on each outslope bench. The conceptual channel locations and channel cross sections are shown on the CCP Drawings.

Item 6.3 Outslope Channel Riprap

This item includes the volume of riprap material required for the outslope channels described in Item 6.2. Because there is no known source of material that can supply these quantities in the vicinity of the stockpiles, it was assumed that all

riprap is purchased. This assumption may change if a nearby source is identified. The riprap quantity calculations are summarized in Table 3.

Item 7.1 Channel Length

This item represents the length of surface water channels to be constructed on the stockpile and tailings top surfaces. The conceptual channel locations and channel cross-sections are shown on the CCP Drawings.

Item 7.2 Channel Riprap

This item includes the volume of riprap material required for the top channels described in Item 7.1. The riprap quantity calculations are summarized in Table 3.

Item 7.3 Gravel

This item includes the volume of gravel required for the top channels described in Item 7.1. The gravel quantity calculations are summarized in Table 3.

Item 8.1 Downdrain Length

This item represents the length of the downdrains to be constructed on the stockpiles and tailings. The conceptual downdrain locations, and channel cross-sections are shown on the Drawings in the CCP.

Item 8.2 Downdrain Riprap

This item includes the volume of riprap material required for the downdrains described in Item 8.1. The downdrain riprap calculations are summarized in Table 3.

Item 8.3 Downdrain Gravel

This item includes the volume of gravel required for the downdrains described in Item 8.1. The gravel quantity calculations are summarized in Table 3.

TECHNICAL MEMORANDUM

To: Cobre Mining Company

Date: October 8, 2014

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Item 9.1 Perimeter

This item describes the length of safety berm and fence.

<div>TELESTO</div> <div>SOLUTIONS • CONSULTING</div>	Continental Mine Closure/Closeout Plan Update															Made By: AAT			Date: 5-Dec-14	
	Quantity Summary Sheet																			

TABLE 1 - STOCKPILE QUANTITY SUMMARY

Facility Type	Item	Outslope Cut Pushdown	Outslope Fill Pushdown	Outslope Cut/Fill Pushdown	Outslope Surface Grade %	Top Cut	Top Fill	Top Cut/Fill Push Distance	Top Surface Grade %	Outslope Surface Area ¹	Outslope Surface Cover Push Distance	Outslope Surface Cover depth	Outslope Surface Cover Fill	Top Surface Surface Area	Top Surface Cover Push Distance	Top Surface Cover depth	Top Surface Cover Fill	Cover Source	Cover Fill Haul Dist. Distance Total	Cover Fill Haul Dist. Distance Leg 1	Cover Fill Haul Dist. Distance Leg 2	Cover Fill Haul Dist. Distance Leg 3	Cover Fill Haul Grade Grade Leg 1	Cover Fill Haul Grade Grade Leg 2	Cover Fill Haul Grade Grade Leg 3
		(CY)	(CY)	(ft)	Item 1.4	(CY)	(CY)	(ft)	Item 2.4	(Acres)	(FT)	(Inches)	(CY)	(Acres)	(FT)	(Inches)	(CY)		(ft)	(ft)	(ft)	(ft)	(%)	(%)	(%)
		Item 1.1	Item 1.2	Item 1.3	Item 1.4	Item 2.1	Item 2.2	Item 2.3	Item 2.4	Item 3.1	Item 3.2	Item 3.3	Item 3.4	Item 4.1	Item 4.2	Item 4.3	Item 4.4		Item 5.2	Item 5.3	Item 5.4	Item 5.5	Item 5.6	Item 5.7	Item 5.8
Stockpiles	South Waste Rock Disposal Facility	-	-	-	-33% to -28%	666,680	666,680	540	-1%	256	100	36	1,237,104	85	100	36	412,368	OB-1 Stockpile, OB-2 Stockpile, OB-3 Stockpile, Topsoil Stockpile, South OB Stockpile, OB-4 Stockpile	3,630	3,630	-	-	-0.3%	-	-
	South Waste Rock Disposal Facility	-	-	-	-	-	-	-	-1%	-	-	-	-	25	100	36	119,548	North OB Stockpile	12,559	2,310	7,312	2,937	-8.9%	-1.0%	4.1%
	Disturbed Area Adjacent and North of South Waste Rock Disposal Facility	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-		-	-	-	-	-	-	-
	Hanover Mountain Deposit	-	-	-	-	-	-	-	-	-	-	-	-	93	100	36	451,572	North OB Stockpile	5,707	1,759	2,466	1482	-9.9%	-8.1%	6.7%
	Pearson-Barnes Mine Area	-	-	-	-	-	-	-	17%	-	-	-	-	12	100	36	57,596	OB-1 Stockpile, OB-2 Stockpile, OB-3 Stockpile, Topsoil Stockpile, South OB Stockpile	600	600	-	-	4.2%	-	-
	Low Grade WRF	-	-	-	-33%	-	-	-	-	28	100	12	44,899	-	-	-	-	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-
Tailings	Magnetite Tailings Impoundment	70,131	69,861	250	-33%	76,174	70,789	300	-3.54%	5	100	36	25,740	57	100	36	276,848	OB-5 Stockpile, North OB Stockpile	6,480	2,310	1,940	2,230	-8.9%	1.5%	-4.0%
	Main Tailings Impoundment Reclaim Pond	65,768	69,762	200	-33%	-	-	-	-	33	100	36	159,720	-	-	-	-	North OB Stockpile	7,193	2,310	1,940	2,943	-8.9%	1.5%	3.6%
	Main Tailings Impoundment ¹	176,903	163,685	250	-33%	42,514	59,075	200	-0.8%	36.3	100	36	175,837	108	100	18	261,844	North OB Stockpile; Reclaim Pond	7,193	2,310	1,940	2,943	-8.9%	1.5%	3.6%
	Reclaim Pond Outlet Channel	-	-	-	-	62,226	-	-	-	-	-	-	-	-	-	-	-	Outlet Channel cut	1,172	1172	-	-	-0.9%	-	-
	Tailing Pipeline Corridor	-	-	-	-	-	-	-	-1%	-	-	-	-	1.4	100	36	7,000	Reclaim Pond Outlet Channel cut used for cover material	7,193	2,310	1,940	2,943	-8.9%	1.5%	3.6%
	Tailing Pipeline Corridor	-	-	-	-	-	-	-	-1%	-	-	-	-	-	-	-	-	North OB Stockpile	7,193	2,310	1,940	2,943	-8.9%	1.5%	3.6%
Borrow Areas	Top Soil Stockpile	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-
	NOBS (proposed)	-	-	-	-	-	-	-	-	-	-	-	-	17.4	-	-	-	-	-	-	-	-	-	-	-
	South OB Stockpile (proposed)	-	-	-	-	-	-	-	-	-	-	-	-	18.3	-	-	-	-	-	-	-	-	-	-	-
	Channel Cut used as Borrow Area Near Main Tailings Impoundment	-	-	-	-	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-1	-	-	-	-	-	-	-	-	-	-	-	-	4.6	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-2	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-3	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-4	-	-	-	-	-	-	-	-	-	-	-	-	4.3	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-5	-	-	-	-	-	-	-	-	-	-	-	-	3.3	-	-	-	-	-	-	-	-	-	-	-
	OB Stockpile-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roads	Haul Roads ²	-	-	-	-	-	-	-	-1%	-	-	-	-	45	-	-	-	-	-	-	-	-	-	-	-
	Exploration Roads	-	-	-	-	-	-	-	-1%	-	-	-	-	37	-	-	-	-	-	-	-	-	-	-	-
Continental Pit	Continental Pit berm and fence disturbance	-	-	-	-	-	-	-	-	-	-	-	-	17.6	-	-	-	-	-	-	-	-	-	-	-
Surface Impoundments ⁴	Grape Gulch Pond #3 (HDPE lined; reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.4	100	36	1,839	North OB Stockpile	3,856	2310	1,546	-	-8.9%	-7.8%	-
	Blackman's Seep (HDPE Lined; reclaimed year 5)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.01	100	36	48	North OB Stockpile	3,856	2310	1,546	-	-8.9%	-7.8%	-
	Upper Creek Containment Pond 1 (HDPE Lined; Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	1.1	100	36	5,469	North OB Stockpile	3,856	2310	1,546	-	-8.9%	-7.8%	-
	Magnetite Seepage Pond (HDPE Lined) (Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.2	100	36	968	North OB Stockpile	6,480	2,310	1,940	2,230	-8.9%	1.5%	-4.0%
	SWRF Dam 1 (Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.5	100	36	2,517	OB-1 Stockpile, OB-2 Stockpile, OB-3 Stockpile, Topsoil Stockpile, South OB Stockpile	3,630	3,630	-	-	-0.3%	-	-
	SWRF Dam 2 (Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.3	100	36	1,646	OB-1 Stockpile, OB-2 Stockpile, OB-3 Stockpile, Topsoil Stockpile, South OB Stockpile	3,630	3,630	-	-	-0.3%	-	-
	SWRF Dam 3 (Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.8	100	36	4,066	OB-1 Stockpile, OB-2 Stockpile, OB-3 Stockpile, Topsoil Stockpile, South OB Stockpile	3,630	3,630	-	-	-0.3%	-	-
	Decant Pond #4 (HDPE lined; reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.6	100	36	3,001	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-
	North Tailings Decant Pond (Reclaimed year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.5	100	36	2,226	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-
	East WRF Containment (Proposed; Reclaimed Year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.5	100	36	2,420	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-
	East WRF Containment (Proposed; Reclaimed Year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.5	100	36	2,420	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-
	East WRF Containment (Proposed; Reclaimed Year 12)	-	-	-	-	-	-	-	-1%	-	-	-	-	0.5	100	36	2,420	OB-4 Stockpile	1,000	1000	-	-	2.5%	-	-

Facility Type	Item	Bench		Outslope Channel		Type 1 Channel			Type 2 Channel			Downdrain			Perimeter
		Length 3:1 slope (ft)	Length 2.5:1 slope (ft)	Length (ft)	Riprap (CY)	Length (FT)	Riprap (CY)	Gravel (CY)	Length (ft)	Riprap (CY)	Gravel (CY)	Length (ft)	Riprap (CY)	Gravel (CY)	
		Item 6.1a	Item 6.1b	Item 6.2	Item 6.3	Item 7.1	Item 7.2	Item 7.3	Item 7.1	Item 7.2	Item 7.3	Item 8.1	Item 8.2	Item 8.3	Item 9.1
Stockpiles	South Waste Rock Disposal Facility	14,126	25,463	39,589	17,023	3,964	3,817	2,202	-	-	-	8,595	36,959	9,025	-
Tailings	Main Tailings Pond	3,894	-	3,894	1,674	-	-	-	2,141	9,206	2,248	1,353	5,818	1,421	-
	Magnetite Tailings	-	-	-	-	-	-	-	-	-	-	420	1,806	441	-
Continental Pit	Safety berm, Pits perimeter	-	-	-	-	-	-	-	-	-	-	-	-	-	6,635
	Chain link fence, Pits perimeter	-	-	-	-	-	-	-	-	-	-	-	-	-	2,453
Hanover Mountain Deposit	Safety berm, Pits perimeter	-	-	-	-	-	-	-	-	-	-	-	-	-	6,670
	Chain link fence, Pits perimeter	-	-	-	-	-	-	-	-	-	-	-	-	-	3,286

¹Includes South Buttrass area.

² Includes lengths of pipe from Mills 1 and 2 up to the top of the tailing impoundment, assumes pipelines on top of tailings are covered when the top is covered. Flushing the pipelines is covered under water management.

³ CHR is included separately in Appendix B.4

⁴Surface Impoundment Areas are equal to the top surface area of the pond as described by surveyed stage-volume relationships.

NOBS - North Overburden Stockpile

OB - Overburden

WRF - Waste Rock Facility

Table 2 Miscellaneous Quantities

Item	Description	Quantity	Units
Monitoring wells*	Reclamation year 100	7	each
Reinforced Concrete Wall Demolition	SWRF Dam 1 (Reclaimed year 12)	270	ft
Reinforced Concrete Wall Demolition	SWRF Dam 2 (Reclaimed year 12)	153	ft
Reinforced Concrete Wall Demolition	SWRF Dam 3 (Reclaimed year 12)	235	ft
Reinforced Concrete Wall Demolition	East WRF Containment (Proposed; Reclaimed Year 12)	200	ft

*Assume each well 100-feet deep based on average depth to water.

Table 3 Channel Quantities

Item	Material	Units	Amount	Description ¹
Outslope Channel	Riprap	(cy/ft)	0.43	Bench width 30 ft, 5% slope towards interior, 0.5' deep riprap by 20' wide riprap on 5% slope and 3' wide riprap on the 3:1 slope
Top Surface Channels Type 1	Riprap	(cy/ft)	0.96	10' Bottom width, 3:1 side slopes, 2' deep, 1' thick riprap, 0.5' thick gravel
	Gravel	(cy/ft)	0.56	
Top Surface Channels Type 2	Riprap	(cy/ft)	4.30	20' Bottom width, 3:1 side slopes, 3' deep, 2.5' thick riprap, 0.5' thick gravel
	Gravel	(cy/ft)	1.05	
Downdrain (Type 2 Channel)	Riprap	(cy/ft)	4.30	20' Bottom width, 3:1 side slopes, 3' deep, 2.5' thick riprap, 0.5' thick gravel
	Gravel	(cy/ft)	1.05	

¹Cross Sections are shown in the CCP Drawings.

APPENDIX B.4
2014 COBRE HAUL ROAD CLOSEOUT PLAN

2014 Cobre Haul Road Closeout Plan

Prepared for
**Freeport-McMoRan Copper & Gold
Cobre Mining Company
303 Fierro Road
Hanover, New Mexico 88041**

Prepared by
**Telesto Solutions Inc.
2950 East Harmony Rd. Suite 200
Fort Collins, Colorado 80528**

August 22, 2014



Signature Page

2014 Cobre Haul Road Closeout Plan

August 22, 2014



Report Authors and Contributors

Telesto Solutions, Inc.

A handwritten signature in black ink, appearing to read "April Tischer".

April Tischer P.E. – Primary Author

A handwritten signature in black ink, appearing to read "Jennifer Davis".

Jennifer Davis – Report Review

ÁÖUÜŸ

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Walt Niccoli

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1.0 INTRODUCTION

Freeport-McMoRan Cobre Mining Company (Cobre) is proposing a change to its existing permit, GR002RE, to enable construction of the Cobre Haul Road (CHR). The road will be used by haul trucks to transport ore from Cobre's facilities to Chino.

The proposed CHR includes current and new disturbances that will cover approximately 105 acres including approximately 91 acres of land controlled by Cobre, 8.7 acres of Bureau of Land Management (BLM) administered land and 5 acres of land controlled by Chino. The haul road will be approximately 3.5 miles long. In general the road follows current and historic roads used mostly for mining, monitor well access, and ranching activities.

The proposed CHR will be constructed using standard engineering practices that employ a balanced cut and fill design to minimize grade changes and to utilize locally available material. The proposed CHR includes spanning arch road crossings over the Hanover Creek and the forest service access road (forest access road) that extends off of Fierro Road.

This document provides the Closeout Plan (CP) and reclamation cost estimate to support the permit change associated with the CHR located within Cobre's proposed new permit boundary.

This CP complies with all applicable regulations and requirements stipulated in the New Mexico Mining and Mineral Act (19.10.5 NMAC). In addition, this CP conforms with all applicable mine reclamation regulations set forth by the BLM (43 Code of Federal Regulations (CFR) 3809).

Cobre is preparing an updated Closure/Closeout Plan for its other mining activities. That plan will be submitted in the near future.

2.0 REGULATORY LAND STATUS/FRAMEWORK

Pursuant to NMAC 19.10.5.506.B(2), this section list those regulatory permits relevant for pre- or final closeout activities.

2.1 State Permits

Discharges from Cobre's facilities are regulated under groundwater discharge permits (DPs) issued under the New Mexico Water Quality Control Commission Regulations (WQCC; 20.6.2.3101 *et seq.* NMAC). The proposed CHR is not a discharging unit; therefore the WQCC regulations governing closure requirements for copper mines do not apply to the CHR reclamation.

2.2 Federal Permits

The proposed CHR is expected to cross five isolated fragments of BLM land totaling approximately 8.7 acres. This Closeout Plan for the CHR meets the requirements of BLM Surface Management Regulations, 43 CFR 3809.

Compliance with the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) permitting program will be maintained through modification of Cobre's Stormwater Pollution Prevention Plan (SWPPP) to include the proposed CHR Closeout Plan as necessary.

The stormwater from ephemeral drainages will be conveyed under the haul road using culverts sized for the 100-year 24-hour storm event. Stormwater sediment traps and other best management practices (BMPs) useful for closeout purposes will be left in place or constructed as part of closeout. Stormwater runoff will be directed to the inside edge of the proposed CHR to run into the natural water channels and culverts that will remain in place during the post-closeout period and discharged through the BMPs.

An amendment to Cobre's SWPP for the closeout activities will ensure the proposed CHR will not contribute suspended solids or other stormwater and surface water

pollutants to the hydrologic system. The MSGP will establish the monitoring and inspection requirements, in addition to control measures and BMPs used to minimize suspended solids and other pollutants.

3.0 EXISTING CONDITIONS

Pursuant to NMAC 19.10.5.506.A, the following sections describe site-specific characteristics of the proposed expanded permit area.

3.1 Climate

Meteorological data collected at the Fort Bayard, New Mexico, National Weather Service Station are used to describe the climate at Cobre. This station is located approximately five miles west of the Chino Mine and is considered to be representative of the site area. Cobre's Amended MPO provides a detailed description of climate information. The area is considered representative of a dry desert climate with an average annual rainfall of 15.7 inches with July and August being the wettest months, months having average rainfalls between 3.2 and 3.4 inches. Annual snowfall is 10.4 inches falling mostly between December and March. Average maximum temperature varies from 52 degrees Fahrenheit in December and January to 87 degrees Fahrenheit in June and July. Average minimum temperatures vary between 25 degrees Fahrenheit in January and 58 degrees Fahrenheit in July. Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation.

3.2 Geology

The proposed CHR route would cross over several geologic units (Figures A-1 and A-2). As shown in Figure A-3, the primary mineralized zones that the proposed CHR would encounter are skarn deposits, which generally have a low potential to generate acid. Based on the geology at the site, the haul road material will make suitable reclamation substrate for closeout activities.

3.3 Soils and Vegetation

The soils in Grant County were previously mapped by the Soil Conservation Service (Cobre, 2012). The area mainly consists of Santa Fe-Rock outcrop complex, which is typically made up of shallow, gravelly sandy loam or barren bedrock.

3.4 Hydrology

The proposed CHR is located within the Hanover Creek watershed of the larger Mimbres River Basin. There are no perennial waters in the Hanover Creek watershed. The proposed CHR will cross Hanover Creek and several ephemeral drainages. The ephemeral drainages flow to Hanover Creek, which flows to Whitewater Creek near Chino. The CHR Closeout Plan will not change any existing watershed boundaries. Stormwater runoff from the closed CHR will be managed under a NPDES MSGP permit, and thus, BMPs and other controls will limit the potential to impact surface waters.

Due to the geochemistry of the rocks in the area (Cobre, 2009), the meteoric water that comes into contact with the closed CHR is not anticipated to affect existing groundwater quality.

4.0 PROPOSED CHR CONFIGURATION

The 120-foot wide road surface will be flanked by single or dual berms, depending upon their location on the haul road with respect to the cut and fill slopes. Each berm will measure approximately 24-feet wide and 8-feet tall to accommodate the largest haul trucks that will be using the road (Figure A4). Blasted rock faces will comprise some of the cut slopes. The proposed CHR will be cleared of spilled ore as part of operations.

5.0 RECLAMATION PRACTICES

Reclamation will provide for the establishment of a self-sustaining ecosystem consistent with the designated post-mining land uses, which is wildlife habitat. The proposed CHR will be reclaimed through minor regrading and revegetation, which includes ripping and

seeding. There will be no substantial change in topography. A smaller road (approximately 12 to 14 feet in width) equaling roughly 5 acres will remain on the footprint of the original CHR for post-closure maintenance vehicles and activities. Figures A5-A11 illustrate the conceptual plans for reclamation (i.e., closeout). Closeout of the proposed CHR will comply with all applicable permits.

The travel surfaces of the proposed CHR will be ripped to a depth of 18 to 24 inches. Minor grading will consist of incorporating berm material into the road. Surfaces will be seeded according to approved methods and seed mixes. The road crossing over the forest access road and Hanover Creek will be removed and demolished. Culverts in ephemeral drainages will remain in place. Road embankments will be monitored for erosion until vegetation is established.

6.0 POST CLOSEOUT MONITORING

Erosion, vegetation, and wildlife monitoring are required following completion of reclamation. Details can be found in the permits and the approved work plans for monitoring activities. The reclaimed proposed CHR will be visually inspected for signs of erosion (i.e. gullying or extensive rilling), and any significant erosion features will be mitigated to prevent future degradation. Inspections and repair will follow the practices currently in use by Cobre, which are outlined in existing permits. Revegetated slopes are designed to be stable by meeting all applicable standards.

Vegetation establishment monitoring of seeded areas will be conducted in accordance with Condition O and Appendix C of Revision 01-1 of the MMD Permit, GR002RE. The vegetation monitoring plan and results will be provided to MMD according to the permits.

Wildlife monitoring, as well as surface and groundwater quality monitoring, will be detailed in the 2014 Cobre Closure/Closeout Plan update for the mine as a whole.

7.0 CLOSEOUT COST ESTIMATE (CAPITAL AND O&M)

This section provides a description of the capital and operation and maintenance reclamation cost estimates for the CHR-Cobre Section. The reclamation cost estimate is used in determining the required amount of financial assurance. Details of the reclamation cost estimate can be found in Appendix A of this CP. The reclamation cost estimate is summarized as follows:

- Demolish the forest access road and Hanover Creek crossing structures
- Minor grading to support proper drainage and to integrate berm material
- Rip surface of proposed CHR to a depth of 18 to 24 inches and seed
- Erosion control and maintenance crew: 6 days a year for the first year and 1 day a year for 11 years, for a total of 12 years of maintenance
- Revegetation maintenance: 2% failure (2% of area is revegetated) every year for a total of 12 years, starting the year reclamation is completed

The reclamation cost estimate for the 8.7 acres of BLM land within the proposed CHR footprint totals \$23,000. The reclamation cost estimate for the proposed CHR on Cobre property totals \$279,000, for a combined total of \$302,000 for the CHR-Cobre Section (in current dollars; see Table 1).

8.0 REFERENCES

- Cobre, 2009. *Letter to NMED dated March 13, 2009 Re: Cobre Mining Company Shaft and Adit Program Completion Continental Mine-Conditions 29 and 63(c), of DP-1403 and 7J of GR002RE*, Hurley, New Mexico: Freeport-McMoRan Copper and Gold Cobre Mining Company.
- Cobre, 2012. *Freeport-McMoRan Cobre Mining Company Mine Plan of Operations Amendment No. 5*, Bayard, New Mexico: Freeport-McMoRan Cobre Mining Company.
- Jones, W., Hernon, R. & Moore, S., 1967. *General Geology of Santa Rita Quadrangle, Grant County, New Mexico*, s.l.: USGS Professional Paper555.
- Telesto, 2011. *Continental Mine Interim Stage 1 Ground Water Abatement Plan Report and Expanded Work Plan, Condition 32, DP-1403*, Fort Collins, Colorado: Telesto Solutions Inc.

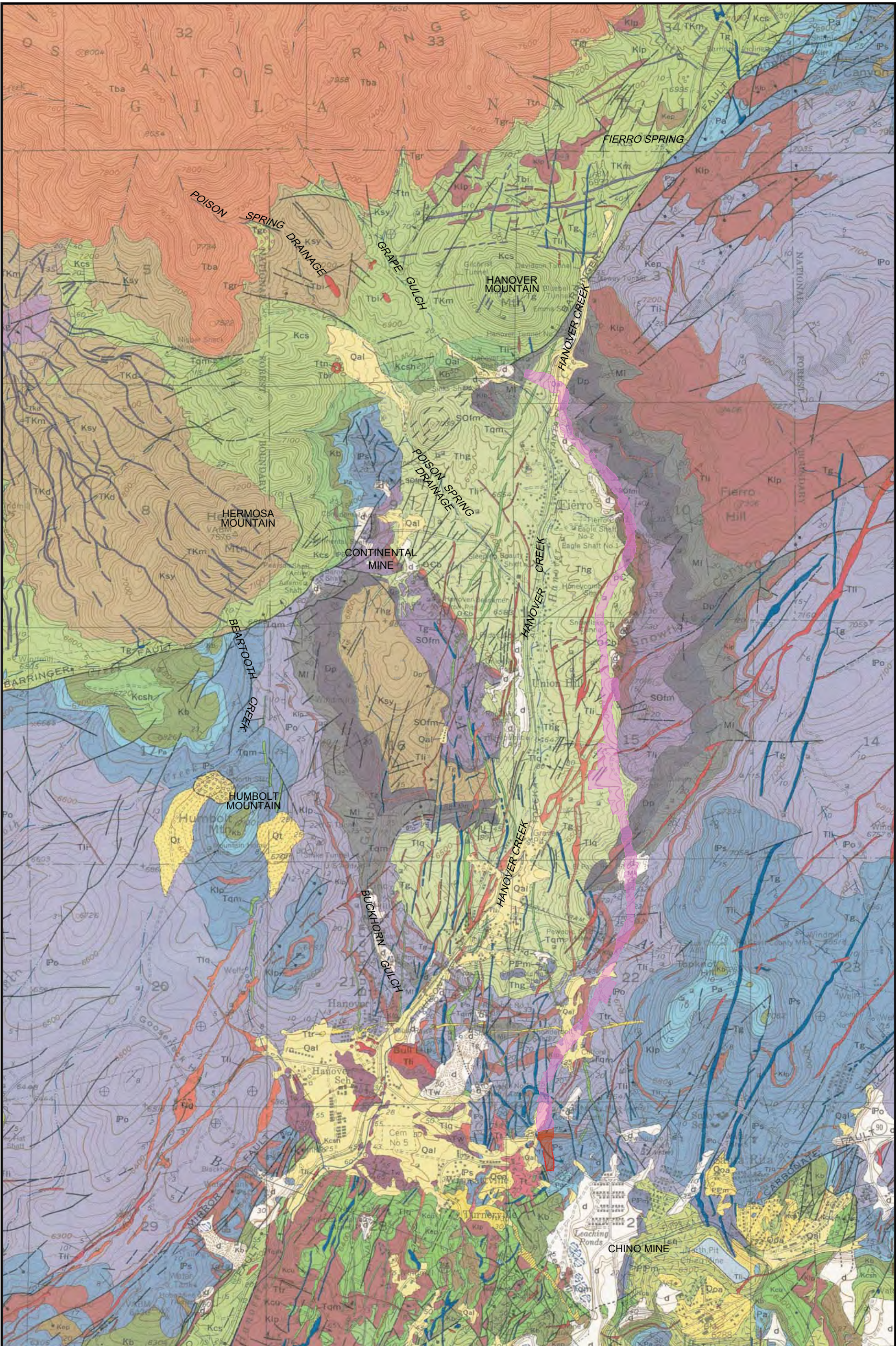
TABLES

Table 1 Cobre Haul Road Cobre Section

Item	Subtotal, Direct Costs	Subtotal, Indirect Costs 28.3%	Total Cost
Capital			
Hanover Creek and Forest Service Road Crossing Spanning Arch Demolition	\$34,576	\$9,785	\$44,000
Grade Surface CHR-Cobre Section	\$18,503	\$5,236	\$24,000
Grade Surface CHR BLM Land	\$1,749	\$495	\$2,000
Revegetation CHR-Cobre Section	\$77,169	\$21,839	\$99,000
Revegetation BLM Land	\$7,729	\$2,187	\$10,000
Total Capital Cost	\$140,000	\$40,000	\$180,000
Operations and Maintenance			
		23.3%	
Veg Maintenance CHR-Cobre Section	\$19,272	\$4,490	\$23,762
Veg Maintenance CHR BLM Land	\$1,930	\$450	\$2,380
Erosion Control CHR-Cobre Section*	\$71,718	\$16,710	\$88,428
Erosion Control BLM Land*	\$7,183	\$1,674	\$8,856
Total Operations and Maintenance	\$100,000	\$23,000	\$123,000
CHR-Cobre Section	\$221,000	\$58,000	\$279,000
CHR BLM Land	\$19,000	\$5,000	\$23,000
Total Current Dollar Cost	\$240,000	\$63,000	\$302,000

*Erosion Control was calculated for the entire CHR-Cobre Section, the costs for BLM land were broken out based on percentage of BLM Land.

FIGURES



LEGEND

- COBRE HAUL ROAD (COBRE SECTION)
- COBRE HAUL ROAD (CHINO SECTION)

REFERENCE:
MAP: GEOLOGY OF THE SANTA RITA QUADRANGLE, NEW MEXICO-GRANT COUNTY GO-306, PREPARED BY THE DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY, DATED 1964.

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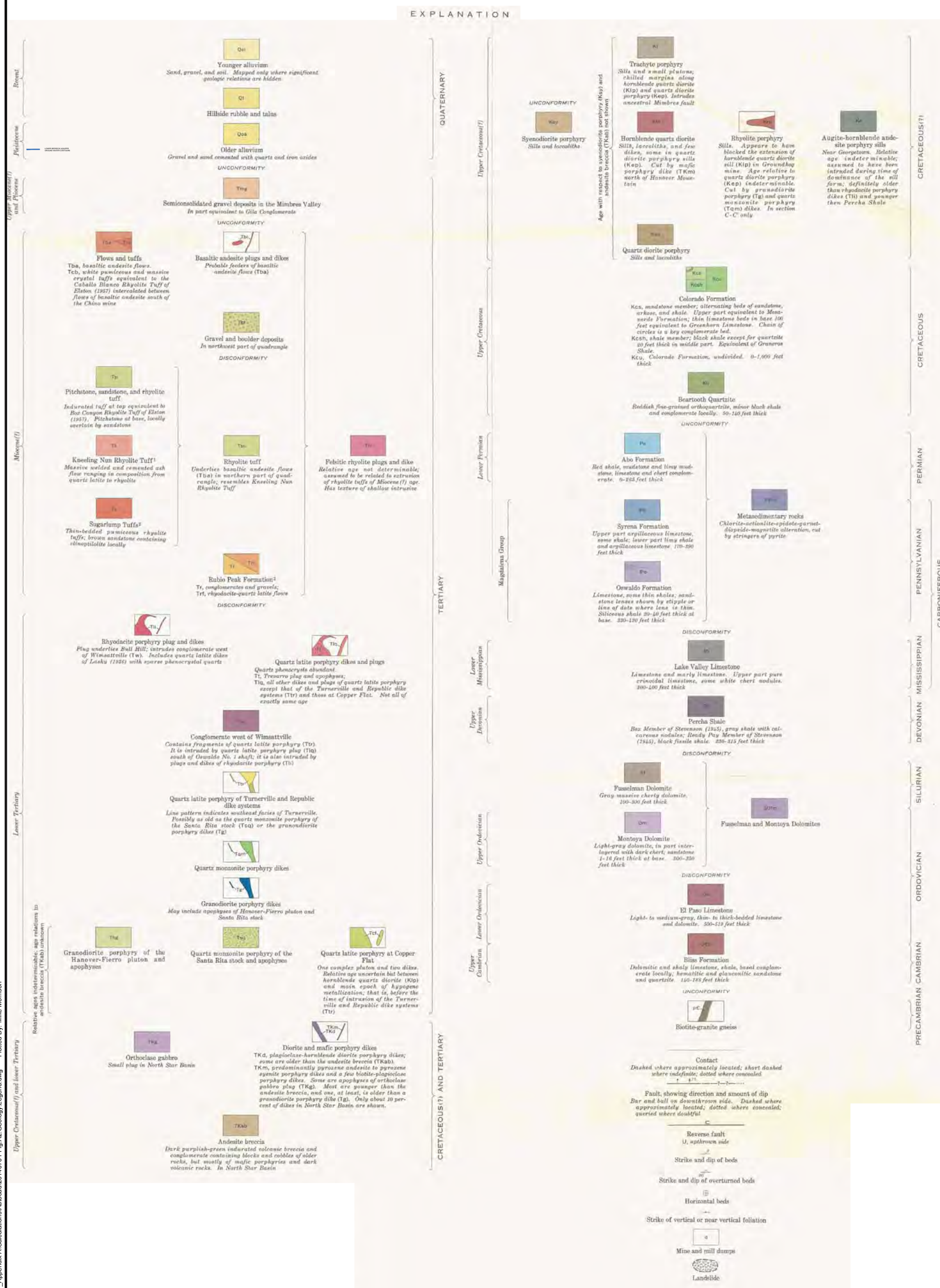
FIGURE A1
GENERALIZED GEOLOGY

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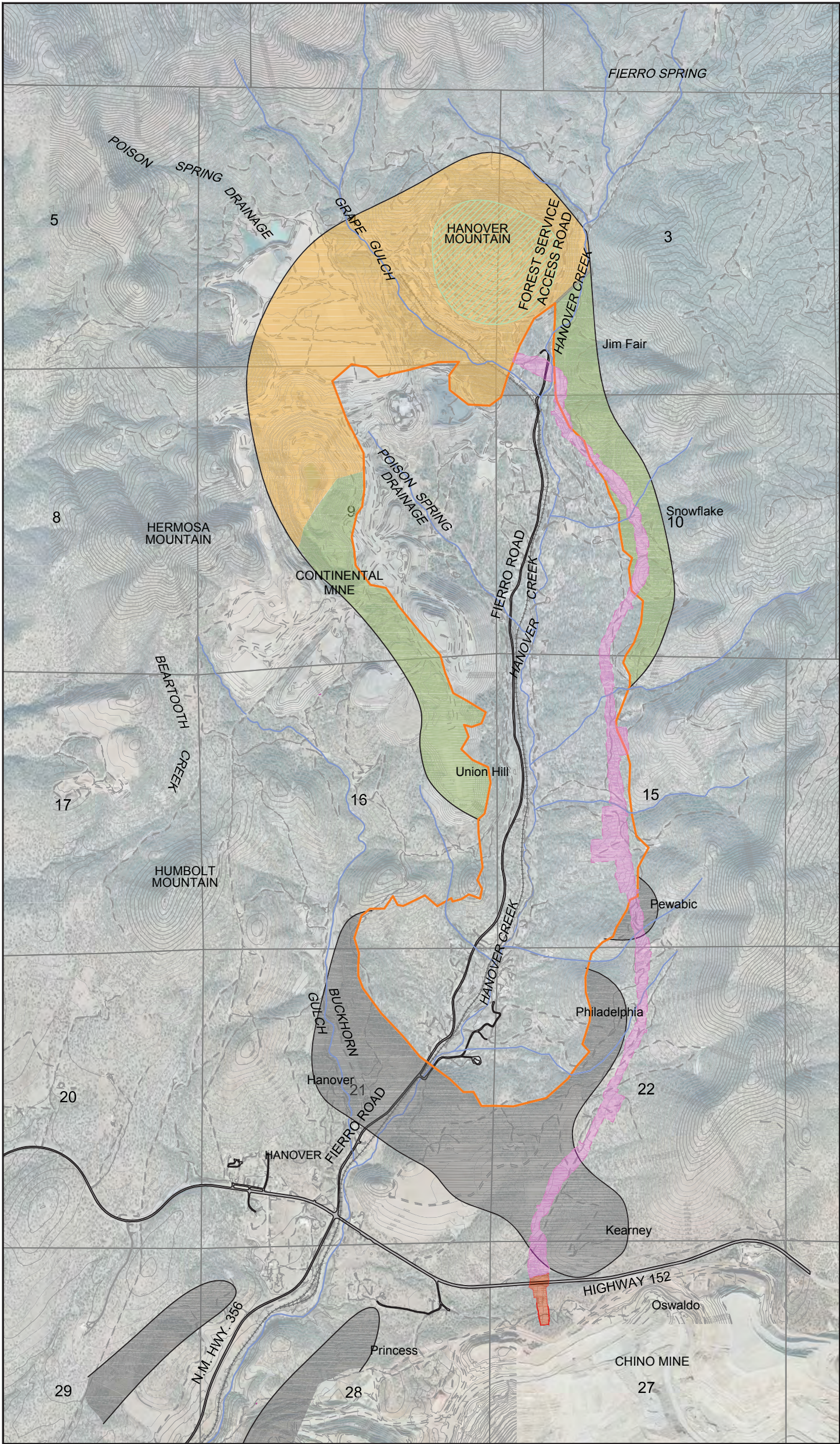
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Cobre Mining Company

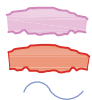
Date: 8/14/2014 2:24:52 PM R:\CobreRestart_Permittng_Support\Products\CP_Appendix A\Calculations\Autocad\2014\0701-Fig A1_Geology.dwg Plotted By: Mike Morrison



Date: 8/14/2014 2:24:52 PM R:\Cobre\Restart_Permitting_Support\Products\CP_Appendix A\Calculations\Autocad\20140701-Fig.A3-General Ore Types.dwg Plotted By: Mike Morrison



LEGEND



COBRE HAUL ROAD
(COBRE SECTION)
COBRE HAUL ROAD
(CHINO SECTION)
DRAINAGES

UNPAVED ROADS
RAILROAD
PAVED ROADS

HANOVER FIERRO STOCK BOUNDARY
ZINC SKARN MINERALIZATION
ZINC LEAD VEIN MINERALIZATION

COPPER SUPERGENE
MINERALIZATION
SERPENTINE-MAGNETITE SKARN
MINERALIZATION
COPPER SKARN
MINERALIZATION

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PROJECT: 200189

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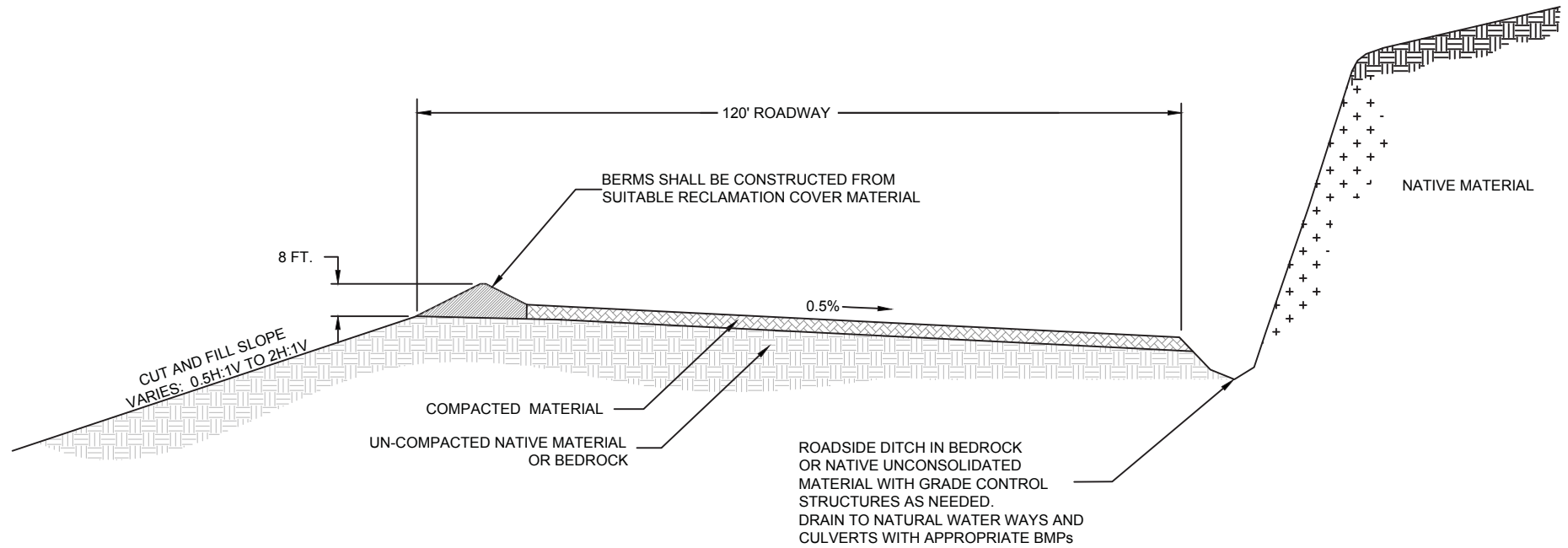
FIGURE A3
GENERAL ORE TYPES

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Cobre Mining Company

Date: 8/14/2014 2:24:52 PM R:\Cobre\Restart_Permittng_Support\Products\CP_Appendix A\Calculations\Autocad\20140701-Fig.A4 Cross Section.dwg Plotted By: Mike Morrison

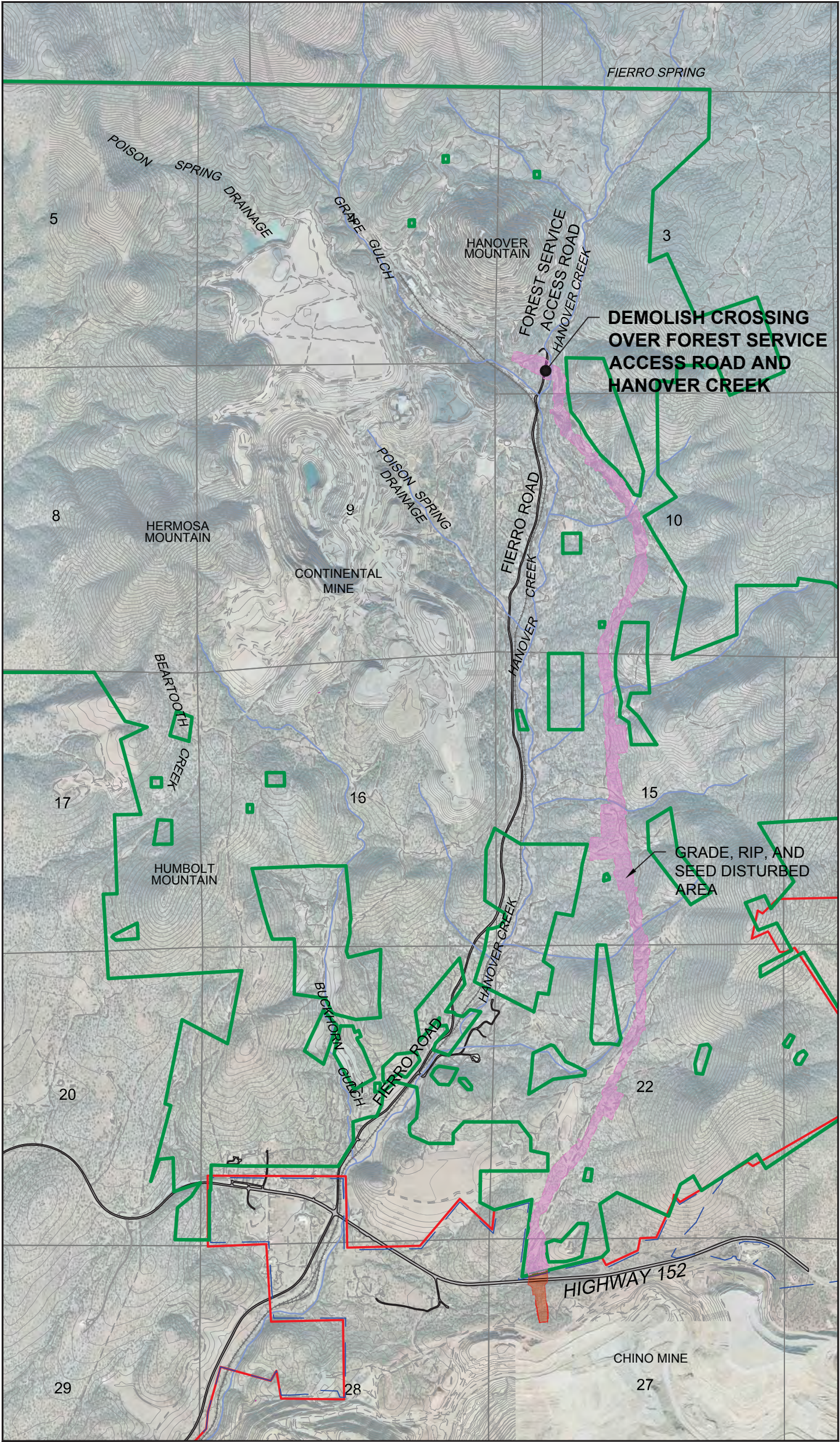


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PREPARED BY:	
TELESTO SOLUTIONS INCORPORATED	

FIGURE A4
PROPOSED COBRE HAUL ROAD GENERAL CROSS-SECTION

PREPARED FOR:
FREEPORT-McMoRAN
Cobre Mining Company



LEGEND					
	COBRE HAUL ROAD (COBRE SECTION)		UNPAVED ROADS		PAVED ROADS
	CHINO MMD PERMIT BOUNDARY		RAILROAD		PROPOSED COBRE MMD PERMIT BOUNDARY
					DRAINAGES

REFERENCES:
1. AERIAL PHOTOGRAPH BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.



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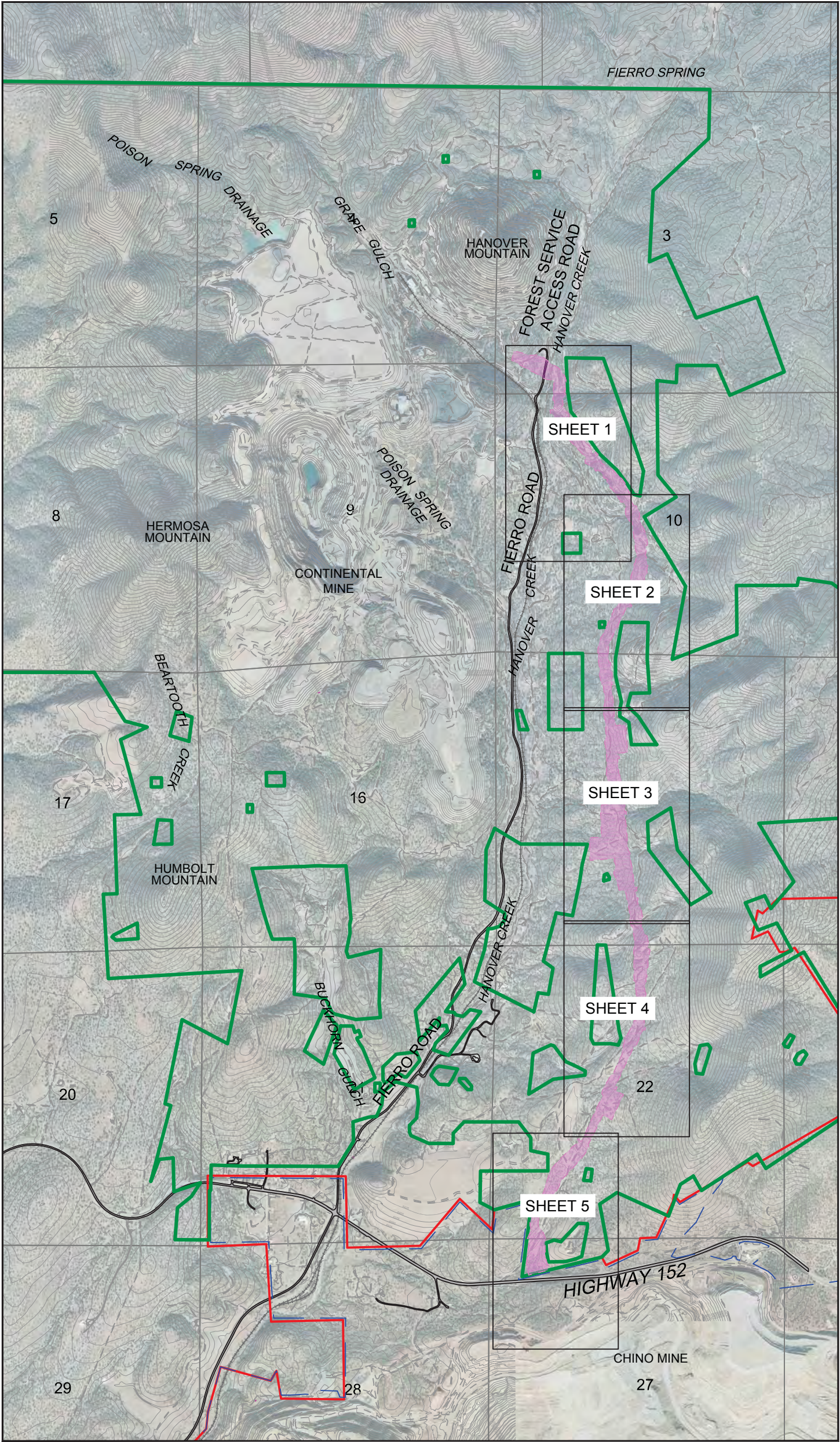
FIGURE A5
RECLAIMED PROPOSED COBRE HAUL ROAD (COBRE SECTION)

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FREEPORT-McMoRAN

Cobre Mining Company

Date: 8/19/2014 7:21:35 AM R:\CobreRestart_Permittng_Support\Products\CP_Appendix A\Calculations\Autocad\2014\0815-Fig A6 Reclaimed Haul Road.dwg Plotted By: Mike Morrison



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|--|---------------------------------|--|---------------|--|------------------------------------|--|-----------|
| | COBRE HAUL ROAD (COBRE SECTION) | | UNPAVED ROADS | | PAVED ROADS | | DRAINAGES |
| | CHINO MMD PERMIT BOUNDARY | | RAILROAD | | PROPOSED COBRE MMD PERMIT BOUNDARY | | |

REFERENCES:
1. AERIAL PHOTOGRAPH AND TOPOGRAPHY BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.

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PROJECT:	200189	TASK:	001

FIGURE A6 RECLAIMED PROPOSED COBRE HAUL ROAD OVERALL SHEET OVERVIEW	
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Prepared For	
Cobre Mining Company	



LEGEND			
	COBRE HAUL ROAD (COBRE SECTION)		UNPAVED ROADS
	RAILROAD		PAVED ROADS
	DRAINAGES		EXISTING TOPOGRAPHIC CONTOURS (25' INT. AMSL)
	PROPOSED HAUL ROAD CONTOURS (5' INT. AMSL)		

REFERENCES:
1. AERIAL PHOTOGRAPH, TOPOGRAPHY AND DRAINAGES BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.

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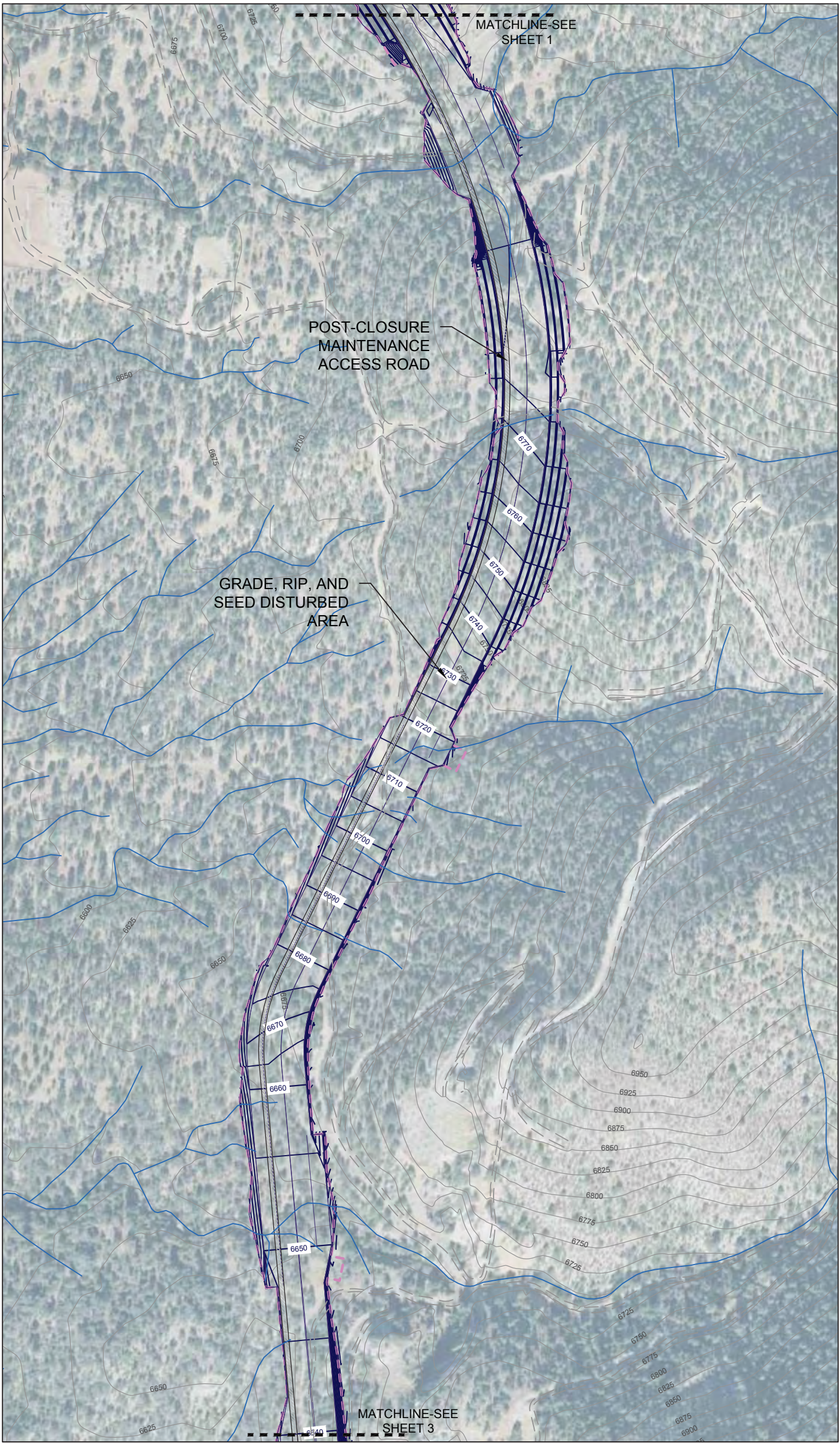
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FIGURE A7
RECLAIMED PROPOSED COBRE HAUL ROAD, SHEET 1

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| | COBRE HAUL ROAD
(COBRE SECTION) | | UNPAVED ROADS | | EXISTING TOPOGRAPHIC CONTOURS (25' INT. AMSL) |
| | DRAINAGES | | PROPOSED HAUL ROAD CONTOURS (5' INT. AMSL) | | |

REFERENCES:
1. AERIAL PHOTOGRAPH, TOPOGRAPHY
AND DRAINAGES BY: COOPER AERIAL
SURVEYS CO., TUCSON ARIZONA, DATE:
DECEMBER 15, 2013.



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	COBRE HAUL ROAD (COBRE SECTION)		UNPAVED ROADS
	PAVED ROADS		EXISTING TOPOGRAPHIC CONTOURS (25' INT. AMSL)
	DRAINAGES		PROPOSED HAUL ROAD CONTOURS (5' INT. AMSL)

REFERENCES:
1. AERIAL PHOTOGRAPH, TOPOGRAPHY AND DRAINAGES BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.

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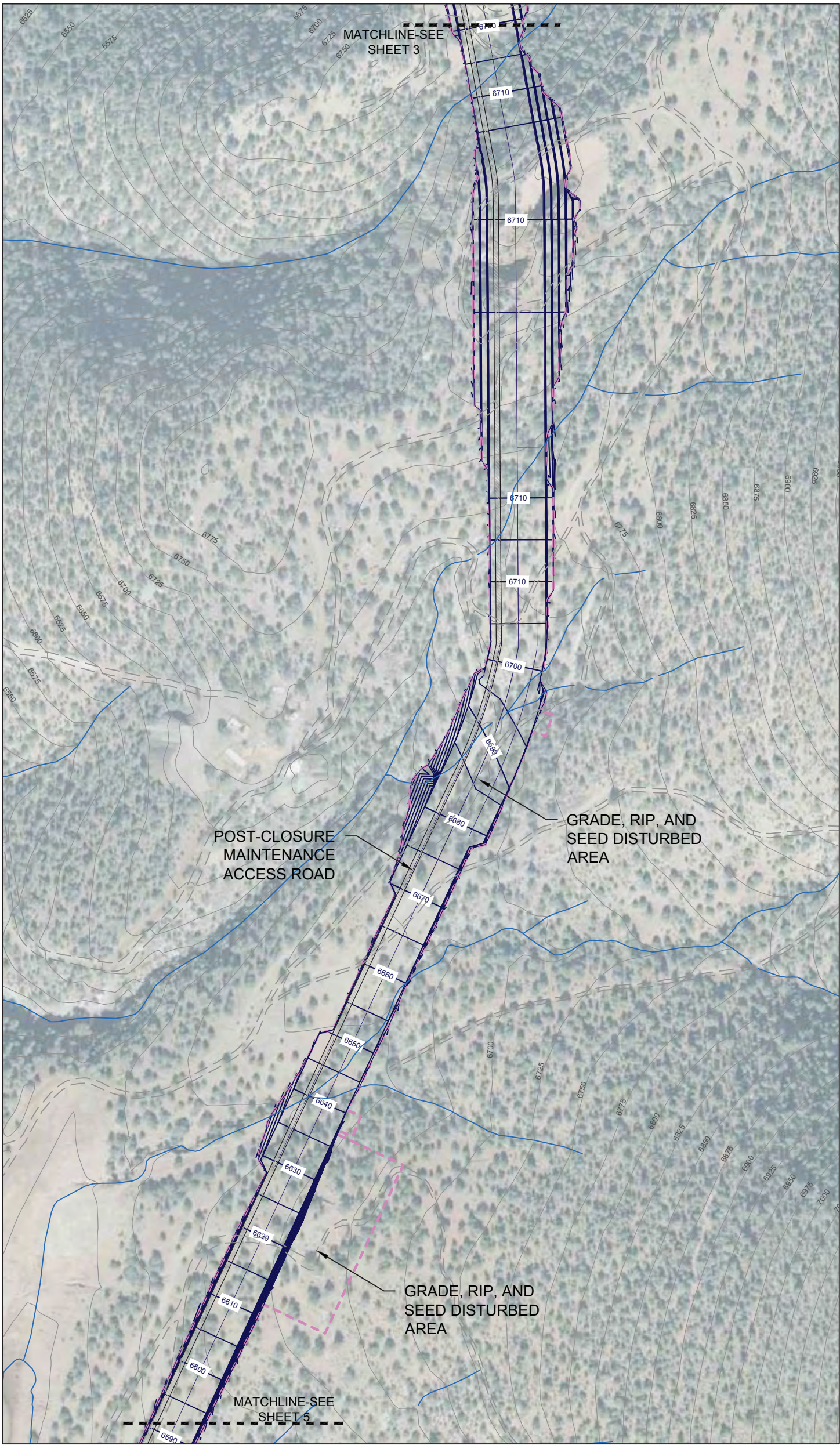
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FIGURE A9
RECLAIMED PROPOSED COBRE HAUL ROAD, SHEET 3

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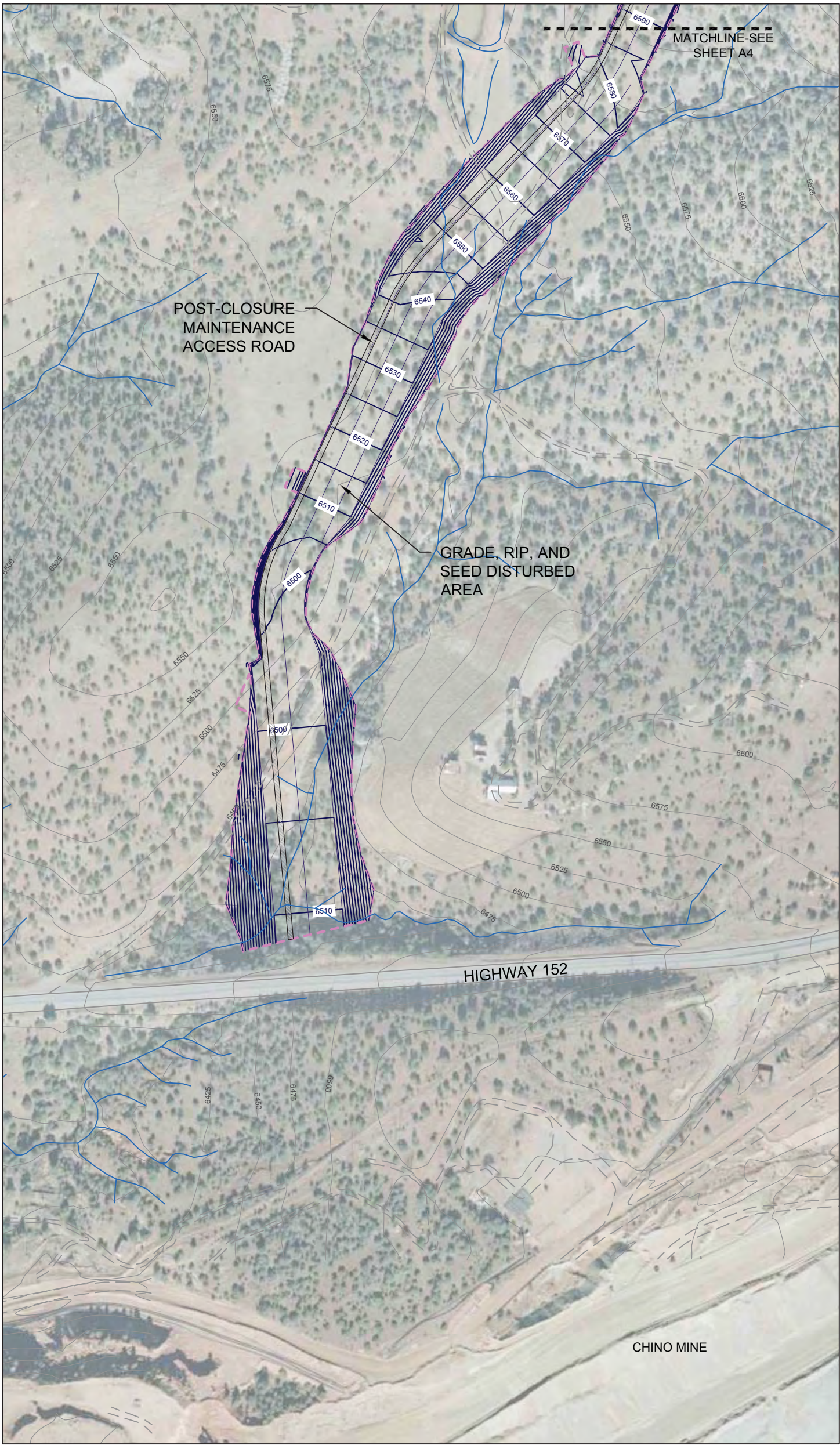
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Cobre Mining Company



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|--|---------------------------------|--|--|--|---|
| | COBRE HAUL ROAD (COBRE SECTION) | | UNPAVED ROADS | | EXISTING TOPOGRAPHIC CONTOURS (25' INT. AMSL) |
| | DRAINAGES | | PROPOSED HAUL ROAD CONTOURS (5' INT. AMSL) | | |

REFERENCES:
1. AERIAL PHOTOGRAPH, TOPOGRAPHY AND DRAINAGES BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.



LEGEND

- | | | | |
|---|--|---|---|
|  COBRE HAUL ROAD (COBRE SECTION) |  UNPAVED ROADS |  PAVED ROADS |  EXISTING TOPOGRAPHIC CONTOURS (25' INT. AMSL) |
|  DRAINAGES |  PROPOSED HAUL ROAD CONTOURS (5' INT. AMSL) | | |

REFERENCES:
1. AERIAL PHOTOGRAPH, TOPOGRAPHY AND DRAINAGES BY COOPER AERIAL SURVEYS CO., TUCSON ARIZONA, DATE: DECEMBER 15, 2013.

APPENDIX A

Cost Estimate

The reclamation cost estimate is developed based on a template originally created by MMD (1996). Cost calculations are located in the Cobre_CHR_RCE_2014.xlsx spreadsheet. PDF's of the cost spreadsheets are attached. The following describe the basis and assumptions used in the cost estimate. Specific unit cost documentation is available upon request.

- **Labor Rates:** All labor rates were developed based on the New Mexico Department of Labor (DOL) Type H (Heavy Engineering) labor rates effective January 1, 2014. These rates include the base, fringe benefit, and apprenticeship contribution rates. The following were added to the labor rates to obtain the total per hour labor rate: FICA (6.2%), Medicare (1.45%), Federal un-employment (0.6% on first \$7,000), State un-employment (2% on first \$23,400), and Workman's Compensation Insurance.
- **Equipment Rates:** The earth-moving equipment used in the estimate would commonly be available to a contractor. The equipment unit operating costs were taken from EquipmentWatch Custom Cost Evaluator (Penton Media, Inc., 2014).
- **Fuel Costs:** The off-road diesel fuel cost of \$3.22/gal is based on a quote obtained on June 18, 2014 from Western Refining for delivery of dyed ultra-low sulfur diesel to Hurley, NM.
- **Capital Indirect Costs:** Total indirect costs of 28.3% were applied to the capital direct costs per MMD (1996) and OSM (2000) guidance. The indirect costs are comprised of: Mobilization and Demobilization (3.8%), Contingencies (4.0%), Engineering Redesign Fee (2.5%), Contractor Profit and Overhead (15.0%), and Project Management Fee (3.0%). Indirect cost percentages are identical to the percentages presented to MMD and the New Mexico Environment Department (NMED) in meetings with Tyrone on September 20, 2012, and on November 2, 2012.
- **Operations and Maintenance Indirect Costs:** Total indirect costs of 23.3% were applied for longer term operations and maintenance per MMD (1996) and OSM (2000) guidance and comprise the same values and factors as the capital indirect costs with exception of Contractor Profit and Overhead. Contractor Profit and Overhead for long term operations and maintenance is 10.0%, to account for the long term contract and repetitive annual work. Indirect cost percentages are identical to the percentages presented to MMD and the NMED in meetings with Tyrone on September 20, 2012, and on November 2, 2012.
- **Equipment Production Factors:** Productivity factors are consistent with factors used in past closure cost estimates and with Caterpillar Performance Handbook.
- **Dust Suppression and Site Maintenance:** Assume there is a water truck running 1 hour twice a day when the dozers are running over an 8 hour work day.
- **Revegetation Unit Costs:** The revegetation unit cost was based on a quote obtained on June 18, 2014 from Rocky Mountain Reclamation of Laramie, WY, and includes: scarifying, discing, rangeland drill seeding, mulching, crimping, and daily per diem.

- **Miscellaneous Demolition Costs:** Miscellaneous unit costs were taken from R.S. Means Heavy Construction Cost Data Edition 26 (R.S. Means, 2014). All costs taken from R.S. Means were adjusted using the location factor for Las Cruces (84.7%).

Table A2 - 1
Demolition

Item	Activity	Quantity	Unit	Unit Cost (\$/unit)	Direct Item Cost (\$)	Reference	Means Line Item	Means Page	Description
Hanover Creek and Forest Service Road Crossing Spanning Arch Demolition	Earth Fill Removal (dozer excavate, haul, spread)	6,600	cy	\$4.73	\$31,193	R.S. Means	312316.46-6070	234	Earth fill is hauled an average of 300 feet and spread over the haul road or other nearby area, assume 15% swell. Conceptual spanning arch dimensions available upon request. Excavating Bulk Dozer 700 HP 300' haul common earth
Hanover Creek and Forest Service Road Crossing Spanning Arch Demolition	Concrete Foundation (excavate and load)	625	cy	\$1.41	\$879	R.S. Means	312316.46-6010	234	Concrete is excavated and loaded onto a truck. A 60% swell factor was used for the concrete foundations .
Hanover Creek and Forest Service Road Crossing Spanning Arch Demolition	Concrete Foundation (haul and dump)	625	cy	\$4.01	\$2,504	R.S. Means	312323.20-5040	253	Excavating Bulk Dozer 700 HP 50' haul common earth Concrete haul and disposal. A 60% swell factor was used for the concrete foundations . 22 cy off road, 15 min. cycle time, 5 mph, 1 mile cycle.

Demolition Total Direct Cost: \$34,576

Data Sources:
RS Means Heavy Construction Cost Data (28th Annual Edition 2014)

Location adjustment:
New Mexico Las Cruces

84.7%

Table A2 - 2
Productivity and Hours Required for Dozer Use—Grading

Task Description	Location	Equipment	Area (acres)	Productivity (acres/hr)	Task Time (hours)	Owning and Operating Cost (\$/hr)	Labor Cost (\$/hr)	Direct Cost (\$)	PERFORMANCE FACTORS											
									Material Factor -	Grade Factor -	Soil Weight (lb/cy)	Production Method/ Blade -	Effective Blade Width (feet)	Speed (miles/hr)	Work Hour (min/hr)	Visibility Factor -	Elevation Factor -	Direct Drive Trans. -	Grade (%)	Operator Factor -
Grade Surface	CHR-Cobre Section	D11R CD	91	3.0	31	\$509.12	\$47.58	\$16,997	1.2	1.0	3,300	1.20	16.00	2.50	50	1.00	1.00	1.00	1.0	0.75
Grade Surface	CHR BLM Land	D11R CD	9	3.0	3	\$509.12	\$47.58	\$1,606	1.2	1.0	3,300	1.20	16.00	2.50	50	1.00	1.00	1.00	1.0	0.75
Water Truck*	CHR-Cobre Section	Water Truck			8	\$171.97	\$25.34	\$1,506												
Water Truck*	CHR BLM Land	Water Truck			1	\$171.97	\$25.34	\$142												
Grading Total Direct Cost \$20,252																				

*Assume there is a water truck running 1 hour twice a day when the dozers are running over an 8 hour work day.

EQUIPMENT					Reference
Equipment Description	Fuel Consumption (gal/hr)	Fuel Cost (\$/hr)	Owning and Operating Cost (w/out fuel) (\$/hr)	Fuel- Adjusted Own/Op Cost (\$/hr)	
Cat D11T CD Bulldozer	29.8	\$95.65	\$413.47	\$509.12	1
Off-Hwy Water Tanker Truck, 10,000-gal.	15.3	\$49.33	\$122.64	\$171.97	1

FUEL					Reference
Oil Broker Quote					
		\$3.215	per gallon		2

LABOR					Reference
Labor Description	NMDOL Type A Operator Group	NMDOL Type A Operator Classification	Nominal Total Rate (\$/hr)		
Cat D11T CD Bulldozer	Equipment Operator IV	Bulldozer (mult. Units)	\$47.58	3	
Off-Hwy Water Tanker Truck, 10,000-gal.	N/A	N/A	\$25.34	3	

1. Equipment unit rates from EquipmentWatch Custom Cost Evaluator Version 6.15.0B (<http://www.equipmentwatch.com>).
2. Western Refining Quote, Lordsburg NM (June 18, 2014).
3. Labor rates based on NM Department of Labor Type H (Heavy Engineering) labor rates. Rate development available upon request.

Table A2 - 3
Revegetation Costs

Cobre Haul Road Cobre Section
 Revegetation
 08/21/14

Description:

Includes scarifying (ripping), discing, rangeland drill seeding, mulching, crimping, and daily per diem

Unit or Disturbance	Area (acres)	Unit Cost* (\$/acre)	Direct Cost (\$)
Revegetation Areas			
CHR-Cobre Section	86	\$ 899	\$ 77,169
CHR BLM Land	8.6	\$ 899	\$ 7,729
Reveg Total Direct Cost			\$84,898

*Rocky Mountain Reclamation Quote June, 18 2014, \$1153/acre minus 28.3% indirect costs. Quote includes cost for scarifying (ripping) surface.

Table A2 - 4
Reclamation Summary

Cobre Haul Road Cobre Section
 Capital Cost Summary
 8/21/2014

Cobre Mine		Current Value
DIRECT COSTS	Facility and Structure Removal	\$34,576
	Earthmoving	\$20,252
	Revegetation	\$84,898
	Subtotal, Direct Costs	\$140,000
INDIRECT COSTS¹	Mobilization and Demobilization	3.8% \$5,320
	Contingencies	4.0% \$5,600
	Engineering Redesign Fee	2.5% \$3,500
	Contractor Profit and Overhead	15.0% \$21,000
	Project Management Fee	3.0% \$4,200
	State Procurement Cost	0.0% \$0
	Indirect Percentage Sum =	28.3%
	Subtotal, Indirect Costs	\$40,000
TOTAL COST		\$180,000

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
 New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.

OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
 Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).

Table A2 - 5
Vegetation Maintenance Costs

Cobre Haul Road Cobre Section
O&M Vegetation Maintenance
8/21/2014

Activity	Total Area (acres)	# yrs veg Maint.	% loss per year	Quantity	Unit	Unit Cost* (\$/unit)	Item Cost (\$)
CHR-Cobre Section	86	12	2%	1.7	acres	\$935	\$19,272
CHR BLM Land	9	12	2%	0.2	acres	\$935	\$1,930

Veg Maintenance Total Direct Cost: \$21,202

*Rocky Mountain Reclamation Quote June, 18 2014, \$1153/acre minus 23.3% indirect costs.
Quote includes cost for scarifying (ripping) surface. \$ 935 (\$/acre)

Table A2 - 6
Operations & Maintenance

EROSION CONTROL [1]

	Year 1	Years 2-11
Base:	\$5,723	\$5,723 \$/day
Time:	6	1 day/yr
Annual:	\$34,336	\$5,723 \$/yr

Year	Annual Current Cost (\$)
0	\$34,336
1	\$5,723
2	\$5,723
3	\$5,723
4	\$5,723
5	\$5,723
6	\$5,723
7	\$5,723
8	\$5,723
9	\$5,723
10	\$5,723
11	\$5,723
Capital Cost	\$97,285

[1] Erosion Control

Modified Crew B-13A (1 Labor Foreman, 2 laborers, 2 equip. operators (med.),
2 truck drivers (heavy), 1 crawler loader (4 cy), 2 dump trucks (8 cy, 220 HP)
RS Means Heavy Construction Cost Data (28th Annual Edition, 2014)

	#	\$/hour	\$/day
Labor Foreman (outside)	1	\$ 38.65	\$ 309.20
Laborers	2	\$ 36.65	\$ 586.40
Equipment Operators med.	2	\$ 48.90	\$ 782.40
Truck Drivers (heavy)	2	\$ 37.55	\$ 600.80
		\$/day	\$/day
Crawler Loader, 4 C.Y.	1	\$ 1,532.00	\$ 1,532.00
Dump Trucks, 8 C.Y., 220 H.P.	2	\$ 834.40	\$ 1,668.80

Subtotal	\$5,480 \$/day
	84.70% Location Adjustment
Total Direct Cost	\$4,641 \$/day
Indirect Cost Percentage	23.30%
Total Cost	\$5,723 \$/day

Table A2 - 7
Operations and Maintenance Summary

Cobre Haul Road Cobre Section
O&M Summary
8/21/2014

Cobre Mine			Current Value
DIRECT COSTS	Facility and Structure Removal		\$0
	Earthmoving		\$0
	Vegetation		\$0
	Other		\$100,102
	Subtotal, Direct Costs		\$100,000
INDIRECT COSTS¹	Mobilization and Demobilization	3.8%	\$3,800
	Contingencies	4.0%	\$4,000
	Engineering Redesign Fee	2.5%	\$2,500
	Contractor Profit and Overhead	10.0%	\$10,000
	Project Management Fee	3.0%	\$3,000
	State Procurement Cost	0.0%	\$0
	Indirect Percentage Sum =	23.3%	
	Subtotal, Indirect Costs		\$23,000
TOTAL COST			\$123,000

Data Sources:

MMD. 1996. Closeout Plan Guidelines for Existing Mines, Mining Act Reclamation Bureau Mining and Minerals Division
New Mexico Energy, Minerals and Natural Resources Department. April 30, 1996.

OSM. 2000. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement
Handbook for Calculation of Reclamation Bond Amounts. April 5, 2000.

Notes:

- 1) Indirect costs are based on the guidance available from MMD (1996) and OSM (2000).