



COLORADO

Division of Reclamation, Mining and Safety

Department of Natural Resources
1313 Sherman Street, Room 215
Denver, Colorado 80203

October 22, 2018

Bill Schenderlein
Blue Earth Solutions, LLC
P.O. Box 2427
Fort Collins, CO 80522

**Re: Irwin/Thomas Mine, File No. M-2016-054, 112c Permit Application
Adequacy Review No. 2, Bond Estimate for Proposed Operation**

Mr. Schenderlein:

The Division of Reclamation, Mining and Safety (Division) has completed its adequacy review of your response submitted on October 19, 2018. The Division has calculated a reclamation bond (see enclosed estimate) for the proposed operation based on the mining and reclamation plans provided. Please review the enclosed estimate and submit any comments at your earliest convenience.

If the Division receives no comments from you by the application decision date of **October 31, 2018**, the application will be approved with the required financial warranty set at the amount provided in the estimate, \$2,747,911.00.

If you have any questions, you may contact me by telephone at 303-866-3567, ext. 8129, or by email at amy.eschberger@state.co.us.

Sincerely,

Amy Eschberger
Environmental Protection Specialist

Encl: Division's Bond Estimate

Ec: Christine Felz at: christine.felz@lafargeholcim.com
Michael Cunningham, DRMS at: michaela.cunningham@state.co.us



COST SUMMARY WORK

Task description: Cost Summary

Site: Irwin/Thomas Mine

Permit Action: 2018 Bond Estimate

Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 000

State: Colorado

Abbreviation: None

Date: 10/22/2018

County: Boulder

Filename: M054-000

User: AME

Agency or organization name: DRMS

TASK LIST (DIRECT COSTS)

Task	Description	Form Used	Fleet Size	Task Hours	Cost
001	Replace topsoil on prepared area ahead of mining	SCRAPER1	1	2.98	\$1,782.00
002	Backfill highwall to 3H:1V slopes	TRUCK1	1	83.95	\$61,740.00
003	Rough grade highwall backfill	DOZER	2	9.41	\$2,502.00
004	Replace topsoil on backfilled highwall	SCRAPER1	1	5.80	\$3,474.00
005	Final grade prepared area ahead of mining and highwall	DOZER	2	4.21	\$1,120.00
006	Slurry wall (10,200' x 25') installation + 3 months dewatering	NA	1	900.00	\$1,768,694.00
007	Replace topsoil on internal haul roads and main site entrance	SCRAPER1	1	7.78	\$4,656.00
008	Replace topsoil on scale house and staging areas	SCRAPER1	1	12.96	\$7,761.00
009	Replace topsoil on stockpile area	SCRAPER1	1	14.26	\$8,536.00
010	Rip roads, scale house area, and stockpile area	RIPPER	2	10.75	\$3,079.00
011	Final grade roads, scale house area, and stockpile area	DOZER	2	42.86	\$11,398.00
012	Revegetate 114.9 acres	REVEGE	1	115.00	\$192,334.00
013	Mobilization/Demobilization	MOBILIZE	1	24.80	\$70,912.00
<u>SUBTOTALS:</u>				1234.76	\$2,137,988

INDIRECT COSTS

OVERHEAD AND PROFIT:

Liability insurance: 2.02

Total = \$43,187.36

Performance bond: 1.05

Total = \$22,448.87

Job superintendent: 300.00

Total = \$21,915.00

Profit: 10.00

Total = \$213,798.80

TOTAL O & P = \$301,350.03

CONTRACT AMOUNT (direct + O & P) = \$2,439,338.03

LEGAL - ENGINEERING - PROJECT MANAGEMENT:

Financial warranty processing (legal/related costs): 500.00

Total = 500.00

Engineering work and/or contract/bid preparation: 5.00

Total = \$121,966.90

Reclamation management and/or administration: 5.00

\$121,966.90

CONTINGENCY: 3.00

Total = \$64,139.64

TOTAL INDIRECT COST = \$609,923.47

TOTAL BOND AMOUNT (direct + indirect) = \$2,747,911.47

SCRAPER TEAM WORKTask description: **Replace topsoil on prepared area ahead of mining**Site: **Irwin/Thomas Mine**Permit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 001State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-001User: AMEAgency or organization name: DRMS**HOURLY EQUIPMENT**COSTShift basis: 1 per day

Equipment Description	
-Scraper:	Cat 637G
-Dozer:	NA
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:**Scraper Work Team****Support Equipment****Maintenance Equipment**

	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	NA	NA	NA	100	100
Ownership cost/hour:	\$155.61	NA	NA	NA	\$77.19	\$12.39
Operating cost/hour:	\$166.86	NA	NA	NA	\$63.34	\$26.02
%Utilization-ripper:	NA	NA	NA	NA	50	NA
Ripper own. cost/hour:	NA	NA	NA	NA	\$4.07	\$0.00
Ripper op. cost/hour:	NA	NA	NA	NA	\$1.77	\$0.00
Operator cost/hour:	\$45.84	NA	NA	NA	\$45.64	\$0.00
Unit Subtotals:	\$368.30	NA	NA	NA	\$192.00	\$38.41
Number of Units:	1	0	0	0	1	1
Group Subtotals:	Work: \$368.30		Support:	\$0.00	Maint:	\$230.41

Total work team cost/hour: **\$598.71****MATERIAL QUANTITIES**Initial volume: 1,852

CCY

Swell factor: 1.215Loose volume: **2,250**

LCY

Source of estimated volume: Application: 500' x 100' x 1' deepSource of estimated swell factor: Cat Handbook**HOURLY PRODUCTION****Scraper Bowl (volume) Basis:**

Material weight: 1,600 lbs/LCY
 Material description: Top Soil
 Rated Payload: 81,600 pounds
 Payload Capacity: 51.00 LCY

Struck Volume: 24.00 LCY
 Heaped Volume: 34.00 LCY
 Average Volume: 29.00 LCY
 Adjusted Capacity: **29.00** LCY

Cycle Time:Scraper Loading Time: 0.80 MinutesManeuver and Spread Time: 0.60 MinutesJob Condition Correction:

Site Altitude: 4930 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	NA	(CAT HB)
Job Efficiency:	0.830	NA	(CAT HB)
Net Correction:	0.830	NA	

Travel Time:Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	1.00	3.00	4.00	2394	0.28

Haul Time: 0.28 minutesReturn Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	-1.00	3.00	2.00	2960	0.23

Return Time: 0.23 minutesTotal Scraper team cycle time: 1.91 minutesAdjusted for job conditions: 756.13 LCY/HourSelected Number of Scrapers: 1 Scraper(s)Adjusted single scraper team (unit) hourly production: 756.13 LCY/HourAdjusted multiple scraper team (fleet) hourly production: 756.13 LCY/HourUnadjusted unit production/hour: 910.99 LCY/Hour

Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COSTFleet size: 1 Team(s)Total job time: 2.98 HoursUnit cost: \$0.792 /LCYTotal job cost: \$1,782

TRUCK/LOADER TEAM WORKTask description: **Backfill highwall to 3H:1V slopes**Site: **Irwin/Thomas Mine**Permit Action: **2018 Bond Estimate**Permit/Job#: **M2016054****PROJECT IDENTIFICATION**Task #: **002**State: **Colorado**Abbreviation: **None**Date: **10/22/2018**County: **Boulder**Filename: **M054-002**User: **AME**Agency or organization name: **DRMS****HOURLY EQUIPMENT COST**Shift basis: **1 per day**

	Equipment Description
Truck Loader Team -Truck:	Cat 730
-Loader:	CAT 966H
Support Equipment -Load Area:	Cat D6T LGP
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:**Truck/Loader Team****Support Equipment****Maintenance Equipment**

	Truck	Loader	Load Area	Dump Area	Motor Grader	Water Truck
% Utilization-machine:	100	100	100	NA	100	100
Ownership cost/hour:	\$57.82	\$39.42	\$50.71	NA	\$77.19	\$12.39
Operating cost/hour:	\$44.78	\$45.86	\$42.03	NA	\$63.34	\$26.02
% Utilization-ripper:	NA	0	NA	NA	NA	NA
Ripper own. cost/hour:	NA	\$0.00	\$0.00	NA	\$0.00	\$0.00
Ripper op. cost/hour:	NA	\$0.00	\$0.00	NA	\$0.00	\$0.00
Operator cost/hour:	\$25.65	\$36.13	\$40.23	NA	\$45.64	\$0.00
Unit Subtotals:	\$128.24	\$121.40	\$132.97	NA	\$186.17	\$38.41
Number of Units:	2	1	1	0	1	1
Group Subtotals:	Work: \$377.88		Support: \$132.97		Maint: \$224.58	

Total work team cost/hour: **\$735.43****MATERIAL QUANTITIES**Initial volume: **33,350**

CCY

Swell factor: **1.125**Loose volume: **37,519**

LCY

Source of estimated volume: **Application: 1,500' L x 20' H**Source of estimated swell factor: **Cat Handbook**Material Purchase Cost: **\$0.00**Total Cost: **\$0.00****HOURLY PRODUCTION****Truck Capacity:****Truck Payload (weight) Basis:**Material weight: **2,650**

Pounds/LCY

Description: **Decomposed rock - 25% Rock, 75% Earth**Rated Payload: **62,000**

Pounds

Payload Capacity: **23.40**

LCY

Truck Bed (volume) Basis:

Struck Volume:	17.10	LCY
Heaped Volume:	22.10	LCY
Average Volume:	19.60	LCY
Adjusted Volume:	22.10	LCY

Final Truck Volume Based on Number of Loader Passes: 22.00 LCY

Loading Tool Capacity

Bucket Size Class: NA

Rated Capacity:	5.000	LCY (heaped)
Bucket Fill Factor:	1.100	Other - rock/dirt mixtures (100-120%) 1.100
Adjusted Capacity:	5.500	LCY

Job Condition Corrections:

Site Altitude (ft.): 4930 feet

	Truck	Loader	Source
Altitude Adj:	1.000	1.000	(CAT HB)
Job Efficiency:	0.830	0.830	(CAT HB)
Net Correction:	0.830	0.830	

Loading Tool Cycle Time: Number of Loading Tool Passes Required to Fill Truck: 4 passes

Excavators and Front Shovels:

Machine Cycle Time vs. Job Condition Rating: NA
 Selected Value within this Basic Rating: NA

Track Loaders – Material Description: _____

Cycle Time Elements (min.):

Load: NA Maneuver: NA Dump: 0.100

Wheel and Track Loaders - Unadjusted Basic Loader Cycle Time (load, dump, maneuver): 0.500 minutes

Cycle Time Factors		Factor (min.)	Source
Material:	Material 1/8" to 3/4" diameter -0.02	-0.020	(Cat HB)
Stockpile:	Dumped by truck 0.02	0.020	(Cat HB)
Truck Ownership:	Common ownership of trucks and loaders -0.04	-0.040	(Cat HB)
Operation:	Constant operation -0.04	-0.040	(Cat HB)
Dump Target:	Nominal target 0.00	0.000	(Cat HB)
Net Cycle Time Adjustment:		-0.080	minutes
Adjusted Loader Cycle Time:		0.420	minutes
Net Load Time per Truck:		1.360	minutes

Truck Cycle Time:

Truck Exchange Time:	0.60	Minutes	Adjusted for site altitude:	0.600	Minutes
Truck Load Time:	1.360	Minutes	Adjusted for site altitude:	1.360	Minutes
Truck Maneuver and Dump Time:	1.00	Minutes	Adjusted for site altitude:	1.000	Minutes

Truck Travel (Haul & Return) Time:
maintained 3.0

Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered,

Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	1800.00	1.00	3.00	4.00	1774	1.204

Haul Time: **1.204** minutes

Return Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	1800.00	-1.00	3.00	2.00	3040	0.739

Return Time: **0.739** minutesTotal Truck Cycle Time: **4.903** minutes

Loading Tool unit

Production	<u>673.47</u>	LCY/Hour	Adjusted for job efficiency:	<u>558.98</u>	LCY/Hour
Truck Unit Production	<u>269.22</u>	LCY/Hour	Adjusted for job efficiency:	<u>223.46</u>	LCY/Hour

Optimal No. of Trucks:	<u>3</u>	Truck(s)	Selected Number of Trucks:	<u>2</u>	Truck(s)
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Adjusted hourly truck team production:	<u>446.91</u>	LCY/Hour
Adjusted single truck/loader team production:	<u>446.91</u>	LCY/Hour
Adjusted multiple truck/loader team production:	<u>446.91</u>	LCY/Hour

JOB TIME AND COST

Fleet size:	<u>1</u>	Team(s)	Total job time:	<u>83.95</u>	Hours
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Unit cost:	<u>\$1.646</u>	/LCY	Total job cost:	<u>\$61,740</u>
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BULLDOZER WORKTask description: **Rough grade highwall backfill**Site: Irwin/Thomas Mine Permit Action: 2018 Bond Estimate Permit/Job#: M2016054**PROJECT IDENTIFICATION**

Task #: 003 State: Colorado Abbreviation: None
 Date: 10/22/2018 County: Boulder Filename: M054-003
 User: AME

Agency or organization name: DRMS**HOURLY EQUIPMENT COST**

Basic Machine: Cat D6T LGP
 Horsepower: 200
 Blade Type: Straight
 Attachment: NA
 Shift Basis: 1 per day
 Data Source: (CRG)

Cost Breakdown:

		<u>Utilization %</u>
Ownership Cost/Hour:	<u>\$50.71</u>	<u>NA</u>
Operating Cost/Hour:	<u>\$42.03</u>	<u>100</u>
Ripper own. Cost/Hour:	<u>\$0.00</u>	<u>NA</u>
Ripper op. Cost/Hour:	<u>\$0.00</u>	<u>0</u>
Operator Cost/Hour:	<u>\$40.23</u>	<u>NA</u>

Total unit Cost/Hour: \$132.97
 Total Fleet Cost/Hour: **\$265.94**

MATERIAL QUANTITIES

Initial Volume: 3,610
 Swell factor: 1.000
 Loose volume: **3,610 LCY**

Source of estimated volume: Application: 65' x 1,500' x 1' deep
 Source of estimated swell factor: Cat Handbook

HOURLY PRODUCTION

Average push distance: 60 feet
 Unadjusted hourly production: 409.6 LCY/hr

Materials consistency description: Loose stockpile 1.2

Average push gradient: 5 %
 Average site altitude: 4,930 feet

Material weight: 2,650 lbs/LCYWeight description: Decomposed rock - 25% Rock, 75% Earth**Job Condition Correction Factor**

		<u>Source</u>
Operator Skill:	<u>0.750</u>	<u>(AVG.)</u>
Material consistency:	<u>1.200</u>	<u>(CAT HB)</u>
Dozing method:	<u>1.000</u>	<u>(GEN.)</u>
Visibility:	<u>1.000</u>	<u>(AVG.)</u>
Job efficiency:	<u>0.830</u>	<u>(1 SHIFT/DAY)</u>

Spoil pile:	0.800	(FND-RF)
Push gradient:	0.903	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	0.868	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.4684

Adjusted unit production: 191.86 LCY/hr

Adjusted fleet production: **383.72** LCY/hr

JOB TIME AND COST

Fleet size: 2 Dozer(s)

Unit cost: \$0.693/LCY

Total job time: **9.41** Hours

Total job cost: **\$2,502**

SCRAPER TEAM WORKTask description: **Replace topsoil on backfilled highwall**Site: **Irwin/Thomas Mine**Permit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 004State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-004User: AMEAgency or organization name: DRMS**HOURLY EQUIPMENT**COSTShift basis: 1 per day

Equipment Description	
-Scraper:	Cat 637G
-Dozer:	NA
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:**Scraper Work Team****Support Equipment****Maintenance Equipment**

	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	NA	NA	NA	100	100
Ownership cost/hour:	\$155.61	NA	NA	NA	\$77.19	\$12.39
Operating cost/hour:	\$166.86	NA	NA	NA	\$63.34	\$26.02
%Utilization-ripper:	NA	NA	NA	NA	50	NA
Ripper own. cost/hour:	NA	NA	NA	NA	\$4.07	\$0.00
Ripper op. cost/hour:	NA	NA	NA	NA	\$1.77	\$0.00
Operator cost/hour:	\$45.84	NA	NA	NA	\$45.64	\$0.00
Unit Subtotals:	\$368.30	NA	NA	NA	\$192.00	\$38.41
Number of Units:	1	0	0	0	1	1
Group Subtotals:	Work: \$368.30		Support:	\$0.00	Maint:	\$230.41

Total work team cost/hour: **\$598.71****MATERIAL QUANTITIES**Initial volume: 3,611

CCY

Swell factor: 1.215Loose volume: **4,387**

LCY

Source of estimated volume: Application: 65' x 1,500' x 1' deepSource of estimated swell factor: Cat Handbook**HOURLY PRODUCTION****Scraper Bowl (volume) Basis:**

Material weight:	<u>1,600 lbs/LCY</u>	Struck Volume:	<u>24.00</u>	LCY
Material description:	<u>Top Soil</u>	Heaped Volume:	<u>34.00</u>	LCY
Rated Payload:	<u>81,600 pounds</u>	Average Volume:	<u>29.00</u>	LCY
Payload Capacity:	<u>51.00 LCY</u>	Adjusted Capacity:	<u>29.00</u>	LCY

Cycle Time:Scraper Loading Time: 0.80 MinutesManeuver and Spread Time: 0.60 MinutesJob Condition Correction:

Site Altitude: 4930 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	NA	(CAT HB)
Job Efficiency:	0.830	NA	(CAT HB)
Net Correction:	0.830	NA	

Travel Time:Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	1.00	3.00	4.00	2394	0.28

Haul Time: 0.28 minutesReturn Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	-1.00	3.00	2.00	2960	0.23

Return Time: 0.23 minutesTotal Scraper team cycle time: 1.91 minutesAdjusted for job conditions: 756.13 LCY/HourSelected Number of Scrapers: 1 Scraper(s)Adjusted single scraper team (unit) hourly production: 756.13 LCY/HourAdjusted multiple scraper team (fleet) hourly production: 756.13 LCY/HourUnadjusted unit production/hour: 910.99 LCY/Hour

Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COSTFleet size: 1 Team(s)Total job time: 5.80 HoursUnit cost: \$0.792 /LCYTotal job cost: \$3,474

BULLDOZER WORKTask description: **Final grade prepared area ahead of mining and highwall**Site: **Irwin/Thomas Mine** Permit Action: **2018 Bond Estimate** Permit/Job#: **M2016054****PROJECT IDENTIFICATION**

Task #: **005** State: **Colorado** Abbreviation: **None**
 Date: **10/22/2018** County: **Boulder** Filename: **M054-005**
 User: **AME**

Agency or organization name: **DRMS****HOURLY EQUIPMENT COST**

Basic Machine: **Cat D6T LGP**
 Horsepower: **200**
 Blade Type: **Straight**
 Attachment: **NA**
 Shift Basis: **1 per day**
 Data Source: **(CRG)**

Cost Breakdown:

		<u>Utilization %</u>
Ownership Cost/Hour:	\$50.71	NA
Operating Cost/Hour:	\$42.03	100
Ripper own. Cost/Hour:	\$0.00	NA
Ripper op. Cost/Hour:	\$0.00	0
Operator Cost/Hour:	\$40.23	NA

Total unit Cost/Hour: **\$132.97**
 Total Fleet Cost/Hour: **\$265.94**

MATERIAL QUANTITIES

Initial Volume: **2,732**
 Swell factor: **1.000**
 Loose volume: **2,732 LCY**

Source of estimated volume: **Application: (65' x 1,500' x 0.5') + (500' x 100' x 0.5')**
 Source of estimated swell factor: **Cat Handbook**

HOURLY PRODUCTION

Average push distance: **65 feet**
 Unadjusted hourly production: **392.1 LCY/hr**

Materials consistency description: **Loose stockpile 1.2**

Average push gradient: **0 %**
 Average site altitude: **4,930 feet**

Material weight: **1,600 lbs/LCY**Weight description: **Top Soil****Job Condition Correction Factor**

		<u>Source</u>
Operator Skill:	0.750	(AVG.)
Material consistency:	1.200	(CAT HB)
Dozing method:	1.100	(50% SL)
Visibility:	1.000	(AVG.)
Job efficiency:	0.830	(1 SHIFT/DAY)

Spoil pile:	0.700	(FND-MF)
Push gradient:	1.000	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	1.438	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.8271

Adjusted unit production: 324.31 LCY/hr

Adjusted fleet production: **648.62** LCY/hr

JOB TIME AND COST

Fleet size: 2 Dozer(s)

Unit cost: \$0.410/LCY

Total job time: **4.21** Hours

Total job cost: **\$1,120**

SCRAPER TEAM WORKTask description: **Replace topsoil on internal haul roads + main site entrance**Site: **Irwin/Thomas Mine**Permit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 007State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-007User: AMEAgency or organization name: DRMS**HOURLY EQUIPMENT**COSTShift basis: 1 per day

Equipment Description	
-Scraper:	Cat 637G
-Dozer:	NA
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:

	Scraper Work Team		Support Equipment		Maintenance Equipment	
	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	NA	NA	NA	100	100
Ownership cost/hour:	\$155.61	NA	NA	NA	\$77.19	\$12.39
Operating cost/hour:	\$166.86	NA	NA	NA	\$63.34	\$26.02
%Utilization-ripper:	NA	NA	NA	NA	50	NA
Ripper own. cost/hour:	NA	NA	NA	NA	\$4.07	\$0.00
Ripper op. cost/hour:	NA	NA	NA	NA	\$1.77	\$0.00
Operator cost/hour:	\$45.84	NA	NA	NA	\$45.64	\$0.00
Unit Subtotals:	\$368.30	NA	NA	NA	\$192.00	\$38.41
Number of Units:	1	0	0	0	1	1
Group Subtotals:	Work:	\$368.30	Support:	\$0.00	Maint:	\$230.41

Total work team cost/hour: **\$598.71****MATERIAL QUANTITIES**Initial volume: 4,840

CCY

Swell factor: 1.215Loose volume: **5,881**

LCY

Source of estimated volume: Application: 3 ac x 1' deepSource of estimated swell factor: Cat Handbook**HOURLY PRODUCTION****Scraper Bowl (volume) Basis:**

Material weight:	<u>1,600 lbs/LCY</u>	Struck Volume:	<u>24.00</u>	LCY
Material description:	<u>Top Soil</u>	Heaped Volume:	<u>34.00</u>	LCY
Rated Payload:	<u>81,600 pounds</u>	Average Volume:	<u>29.00</u>	LCY
Payload Capacity:	<u>51.00 LCY</u>	Adjusted Capacity:	<u>29.00</u>	LCY

Cycle Time:Scraper Loading Time: 0.80 MinutesManeuver and Spread Time: 0.60 MinutesJob Condition Correction:

Site Altitude: 4930 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	NA	(CAT HB)
Job Efficiency:	0.830	NA	(CAT HB)
Net Correction:	0.830	NA	

Travel Time:Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	1.00	3.00	4.00	2394	0.28

Haul Time: 0.28 minutesReturn Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	-1.00	3.00	2.00	2960	0.23

Return Time: 0.23 minutesTotal Scraper team cycle time: 1.91 minutesAdjusted for job conditions: 756.13 LCY/HourSelected Number of Scrapers: 1 Scraper(s)Adjusted single scraper team (unit) hourly production: 756.13 LCY/HourAdjusted multiple scraper team (fleet) hourly production: 756.13 LCY/HourUnadjusted unit production/hour: 910.99 LCY/Hour

Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COSTFleet size: 1 Team(s)Total job time: 7.78 HoursUnit cost: \$0.792 /LCYTotal job cost: \$4,656

SCRAPER TEAM WORKTask description: **Replace topsoil on scale house + staging areas**Site: **Irwin/Thomas Mine**Permit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 008State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-008User: AMEAgency or organization name: DRMS**HOURLY EQUIPMENT**COSTShift basis: 1 per day

Equipment Description	
-Scraper:	Cat 637G
-Dozer:	NA
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:**Scraper Work Team****Support Equipment****Maintenance Equipment**

	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	NA	NA	NA	100	100
Ownership cost/hour:	\$155.61	NA	NA	NA	\$77.19	\$12.39
Operating cost/hour:	\$166.86	NA	NA	NA	\$63.34	\$26.02
%Utilization-ripper:	NA	NA	NA	NA	50	NA
Ripper own. cost/hour:	NA	NA	NA	NA	\$4.07	\$0.00
Ripper op. cost/hour:	NA	NA	NA	NA	\$1.77	\$0.00
Operator cost/hour:	\$45.84	NA	NA	NA	\$45.64	\$0.00
Unit Subtotals:	\$368.30	NA	NA	NA	\$192.00	\$38.41
Number of Units:	1	0	0	0	1	1
Group Subtotals:	Work: \$368.30		Support:	\$0.00	Maint:	\$230.41

Total work team cost/hour: **\$598.71****MATERIAL QUANTITIES**Initial volume: 8,067

CCY

Swell factor: 1.215Loose volume: **9,801**

LCY

Source of estimated volume: Application: 5 ac x 1' deepSource of estimated swell factor: Cat Handbook**HOURLY PRODUCTION****Scraper Bowl (volume) Basis:**

Material weight:	<u>1,600 lbs/LCY</u>	Struck Volume:	<u>24.00</u>	LCY
Material description:	<u>Top Soil</u>	Heaped Volume:	<u>34.00</u>	LCY
Rated Payload:	<u>81,600 pounds</u>	Average Volume:	<u>29.00</u>	LCY
Payload Capacity:	<u>51.00 LCY</u>	Adjusted Capacity:	<u>29.00</u>	LCY

Cycle Time:Scraper Loading Time: 0.80 MinutesManeuver and Spread Time: 0.60 MinutesJob Condition Correction:

Site Altitude: 4930 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	NA	(CAT HB)
Job Efficiency:	0.830	NA	(CAT HB)
Net Correction:	0.830	NA	

Travel Time:Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	1.00	3.00	4.00	2394	0.28

Haul Time: 0.28 minutesReturn Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	-1.00	3.00	2.00	2960	0.23

Return Time: 0.23 minutesTotal Scraper team cycle time: 1.91 minutesAdjusted for job conditions: 756.13 LCY/HourSelected Number of Scrapers: 1 Scraper(s)Adjusted single scraper team (unit) hourly production: 756.13 LCY/HourAdjusted multiple scraper team (fleet) hourly production: 756.13 LCY/HourUnadjusted unit production/hour: 910.99 LCY/Hour

Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COSTFleet size: 1 Team(s)Total job time: 12.96 HoursUnit cost: \$0.792 /LCYTotal job cost: \$7,761

SCRAPER TEAM WORKTask description: **Replace topsoil on tockpile area**Site: **Irwin/Thomas Mine**Permit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 009State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-009User: AMEAgency or organization name: DRMS**HOURLY EQUIPMENT**COSTShift basis: 1 per day

Equipment Description	
-Scraper:	Cat 637G
-Dozer:	NA
Support Equipment -Load Area:	NA
-Dump Area:	NA
Road Maintenance -Motor Grader:	CAT 16M
-Water Truck:	Water Tanker, 3,500 Gal.

Cost Breakdown:

Scraper Work Team

Support Equipment

Maintenance Equipment

	Scraper	Dozer	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	NA	NA	NA	100	100
Ownership cost/hour:	\$155.61	NA	NA	NA	\$77.19	\$12.39
Operating cost/hour:	\$166.86	NA	NA	NA	\$63.34	\$26.02
%Utilization-ripper:	NA	NA	NA	NA	50	NA
Ripper own. cost/hour:	NA	NA	NA	NA	\$4.07	\$0.00
Ripper op. cost/hour:	NA	NA	NA	NA	\$1.77	\$0.00
Operator cost/hour:	\$45.84	NA	NA	NA	\$45.64	\$0.00
Unit Subtotals:	\$368.30	NA	NA	NA	\$192.00	\$38.41
Number of Units:	1	0	0	0	1	1
Group Subtotals:	Work: \$368.30		Support:	\$0.00	Maint:	\$230.41

Total work team cost/hour: **\$598.71****MATERIAL QUANTITIES**Initial volume: 8,873

CCY

Swell factor: 1.215Loose volume: **10,781**

LCY

Source of estimated volume: Application: 5.5 ac x 1' deepSource of estimated swell factor: Cat Handbook**HOURLY PRODUCTION****Scraper Bowl (volume) Basis:**

Material weight:	<u>1,600 lbs/LCY</u>	Struck Volume:	<u>24.00</u>	LCY
Material description:	<u>Top Soil</u>	Heaped Volume:	<u>34.00</u>	LCY
Rated Payload:	<u>81,600 pounds</u>	Average Volume:	<u>29.00</u>	LCY
Payload Capacity:	<u>51.00 LCY</u>	Adjusted Capacity:	<u>29.00</u>	LCY

Cycle Time:Scraper Loading Time: 0.80 MinutesManeuver and Spread Time: 0.60 MinutesJob Condition Correction:

Site Altitude: 4930 feet

	Scraper	Push Dozer	Source
Altitude Adj:	1.000	NA	(CAT HB)
Job Efficiency:	0.830	NA	(CAT HB)
Net Correction:	0.830	NA	

Travel Time:Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	1.00	3.00	4.00	2394	0.28

Haul Time: 0.28 minutesReturn Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	300.00	-1.00	3.00	2.00	2960	0.23

Return Time: 0.23 minutesTotal Scraper team cycle time: 1.91 minutesAdjusted for job conditions: 756.13 LCY/HourSelected Number of Scrapers: 1 Scraper(s)Adjusted single scraper team (unit) hourly production: 756.13 LCY/HourAdjusted multiple scraper team (fleet) hourly production: 756.13 LCY/HourUnadjusted unit production/hour: 910.99 LCY/Hour

Optimal Number of Scrapers per push dozer: _____

JOB TIME AND COSTFleet size: 1 Team(s)Total job time: 14.26 HoursUnit cost: \$0.792 /LCYTotal job cost: \$8,536

BULLDOZER RIPPING WORK

Task description: Rip roads, scale house area, and stockpile area

Site: Irwin/Thomas Mine

Permit Action: 2018 Bond Estimate

Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 010

State: Colorado

Abbreviation: None

Date: 10/22/2018

County: Boulder

Filename: M054-010

User: AME

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Basic Machine: Cat D6T LGP
Ripper Attachment: 3-Shank Ripper

Horsepower: 200
Shift Basis: 1 per day
Data Source: (CRG)

Cost Breakdown:

		Utilization %
Ownership Cost/Hour:	\$50.71	NA
Operating Cost/Hour:	\$42.03	100
Ripper Ownership Cost/Hour:	\$6.02	NA
Ripper Operating Cost/Hour:	\$4.12	100
Operator Cost/Hour:	\$40.23	NA
Total Unit Cost/Hour:	\$143.11	
Total Fleet Cost/Hour:	\$286.21	

MATERIAL QUANTITIES

Selected estimating method: Area

Alternate Methods:

Seismic: NA Bank Volume: NA BCY NA
Area: 13.50 acres Rip Depth (ft): 2.00 Volume: 43,560 BCY or CCY

Source of estimated quantity: Application: 13.5 ac in Aspect C

HOURLY PRODUCTION

Seismic:

Seismic Velocity: NA feet/second

Area:

Average Ripping Depth: 1.64 mph
Average Ripping Width: 6.58 degrees
Average Ripping Length: 400.00 feet
Average Dozer Speed: 88.00 feet
Average Maneuver Time: 0.25 feet
Production per unit area: 0.756 acres/hour

Job Condition Correction Factors

Unadjusted Hourly Unit Production: 0.756 Acres/hr
Site Altitude: 4,930 feet
Altitude Adj: 1.00 (CAT HB)
Job Efficiency: 0.83 (1 shift/day)
Net Correction: 0.83 multiplier

Adjusted Hourly Unit Production: 0.63 Acres/hr
Adjusted Hourly Fleet Production: 1.25 Acres/hr

JOB TIME AND COST

Fleet size: 2 Grader(s) Total job time: 10.76 Hours

Unit cost: \$228.072 Per acre Total job cost: \$3,079

BULLDOZER WORKTask description: **Final grade roads, scale house area, and stockpile area**Site: **Irwin/Thomas Mine** Permit Action: **2018 Bond Estimate** Permit/Job#: **M2016054****PROJECT IDENTIFICATION**

Task #: **011** State: **Colorado** Abbreviation: **None**
 Date: **10/22/2018** County: **Boulder** Filename: **M054-011**
 User: **AME**

Agency or organization name: **DRMS****HOURLY EQUIPMENT COST**

Basic Machine: **Cat D6T LGP**
 Horsepower: **200**
 Blade Type: **Straight**
 Attachment: **NA**
 Shift Basis: **1 per day**
 Data Source: **(CRG)**

Cost Breakdown:

		<u>Utilization %</u>
Ownership Cost/Hour:	\$50.71	NA
Operating Cost/Hour:	\$42.03	100
Ripper own. Cost/Hour:	\$0.00	NA
Ripper op. Cost/Hour:	\$0.00	0
Operator Cost/Hour:	\$40.23	NA

Total unit Cost/Hour: **\$132.97**
 Total Fleet Cost/Hour: **\$265.94**

MATERIAL QUANTITIES

Initial Volume: **10,890**
 Swell factor: **1.000**
 Loose volume: **10,890 LCY**

Source of estimated volume: **Application: 13.5 ac x 0.5' deep**
 Source of estimated swell factor: **Cat Handbook**

HOURLY PRODUCTION

Average push distance: **200 feet**
 Unadjusted hourly production: **153.6 LCY/hr**

Materials consistency description: **Loose stockpile 1.2**

Average push gradient: **0 %**
 Average site altitude: **4,930 feet**

Material weight: **1,600 lbs/LCY**Weight description: **Top Soil****Job Condition Correction Factor**

		<u>Source</u>
Operator Skill:	0.750	(AVG.)
Material consistency:	1.200	(CAT HB)
Dozing method:	1.100	(50% SL)
Visibility:	1.000	(AVG.)
Job efficiency:	0.830	(1 SHIFT/DAY)

Spoil pile:	0.700	(FND-MF)
Push gradient:	1.000	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	1.438	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.8271

Adjusted unit production: 127.04 LCY/hr

Adjusted fleet production: **254.08** LCY/hr

JOB TIME AND COST

Fleet size: 2 Dozer(s)

Unit cost: \$1.047/LCY

Total job time: **42.86** Hours

Total job cost: **\$11,398**

REVEGETATION WORKTask description: Revegetate 114.9 acresSite: Irwin/Thomas MinePermit Action: 2018 Bond EstimatePermit/Job#: M2016054**PROJECT IDENTIFICATION**Task #: 012State: ColoradoAbbreviation: NoneDate: 10/22/2018County: BoulderFilename: M054-012User: AMEAgency or organization name: DRMS**FERTILIZING****Materials**

Description	Units / Acre	Unit	Cost / Unit	Cost /Acre
6-6-6	667.00	pound	\$0.17	\$113.39
			Total Fertilizer Materials Cost/Acre	\$113.39

Application

Description	Cost /Acre
Tractor towed spreader (MEANS 32 01 90.13 0120)	\$34.72
Total Fertilizer Application Cost/Acre	\$34.72

TILLING

Description	Cost /Acre
Subsoil scarification, (MEANS 32 91 13.23 3100)	\$191.66
Weed control spraying (MEANS 31 31 16.13 3100)	\$193.60
Total Tilling Cost/Acre	\$385.26

SEEDING

Seed Mix	Rate – PLS LBS / Acre	Seeds per SQ. FT	Cost /Acre
Alfalfa - Common	0.75	3.62	\$1.96
Blue Grama - Native	0.75	12.24	\$11.14
Intermediate Wheatgrass - Rush	3.00	6.40	\$11.52
Totals Seed Mix	4.50	22.26	\$24.62

Application

Description	Cost /Acre
Drill Seeding (DRMS Survey Cost)	\$232.00

Total Seed Application Cost/Acre	\$232.00
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MULCHING and MISCELLANEOUS**Materials**

Description	Units / Acre	Unit	Cost / Unit	Cost /Acre
Straw, delivered {MEANS 31 25 14.16 1200}	2.00	TON	\$288.00	\$576.00
Total Mulch Materials Cost/Acre				\$576.00

Application

Description	Cost /Acre
Crimping, with tractor {DMG survey data}	\$68.78
Weed spray, hand, aquatic area, nox. [DMG]	\$175.00
Total Mulch Application Cost/Acre	\$243.78

NURSERY STOCK PLANTING

Common Name	No / Acre	Type and Size	Planting Cost	Fertilizer Pellet Cost	Cost /Acre
					\$
Totals Nursery Stock Cost / Acre					\$0.00

JOB TIME AND COST

No. of Acres:	114.9	Cost /Acre:	\$1,609.77
Estimated Failure Rate:	25%	Cost /Acre*:	\$256.62
*Selected Replanting Work Items:	SEEDING		

Initial Job Cost:	\$184,962.57
Reseeding Job Cost:	\$7,371.41
Total Job Cost:	\$192,334
Job Hours:	115.00

EQUIPMENT MOBILIZATION/DEMOBILIZATIONTask description: **Mobilization/Demobilization**Site: **Irwin/Thomas Mine**Permit Action: **2018 Bond Estimate**Permit/Job#: **M2016054****PROJECT IDENTIFICATION**Task #: **013**State: **Colorado**Abbreviation: **None**Date: **10/22/2018**County: **Boulder**Filename: **M054-013**User: **AME**Agency or organization name: **DRMS****EQUIPMENT TRANSPORT RIG COST**Shift basis: **1 per day**Cost Data Source: **CRG Data**Truck Tractor Description: **GENERIC ON-HIGHWAY TRUCK TRACTOR, 6X4, DIESEL POWERED,
400 HP (2ND HALF, 2006)**Truck Trailer Description: **GENERIC FOLDING GOOSENECK, DROP DECK EQUIPMENT
TRAILER (25T, 50T, AND 100T)****Cost Breakdown:**

Available Rig Capacities	0-25 Tons	26-50 Tons	51+ Tons
Ownership Cost/Hour:	\$16.63	\$18.37	\$22.33
Operating Cost/Hour:	\$44.38	\$46.13	\$50.07
Operator Cost/Hour:	\$27.66	\$27.66	\$27.66
Helper Cost/Hour:	\$0.00	\$25.39	\$25.39
Total Unit Cost/Hour:	\$88.67	\$117.55	\$125.45

NON ROADABLE EQUIPMENT:

Machine Description	Weight/ Unit (TONS)	Owner ship Cost/hr/ unit	Haul Rig Cost/hr/unit	Fleet Size	Haul Trip Cost/hr/ fleet	Return Trip Cost/hr/ fleet	DOT Permit Cost/ fleet
Cat 637G	57.28	\$155.61	\$125.45	4	\$1,124.24	\$501.80	\$1,000.00
CAT 16M	28.73	\$77.19	\$117.55	2	\$389.48	\$235.10	\$500.00
Cat 730	25.19	\$57.82	\$88.67	2	\$292.98	\$177.34	\$500.00
CAT 966H	25.80	\$39.42	\$88.67	1	\$128.09	\$88.67	\$250.00
Cat D6T LGP	26.87	\$50.71	\$117.55	3	\$504.78	\$352.65	\$750.00
Cat D6T LGP	28.63	\$56.73	\$117.55	1	\$174.28	\$117.55	\$250.00

Subtotals: **\$2,613.85** **\$1,473.11** **\$3,250.00****ROADABLE EQUIPMENT:**

Machine Description	Total Cost/hr/ unit	Fleet Size	Haul Trip Cost/hr/ fleet	Return Trip Cost/hr/ fleet
Water Tanker, 3,500 Gal.	\$38.41	2	\$76.82	\$76.82
Drill/Broadcast Seeder with Tractor	\$36.08	1	\$36.08	\$36.08

Subtotals: **\$112.90** **\$112.90**

EQUIPMENT HAUL DISTANCE and Time

Nearest Major City or Town within project area region:	<u>LONGMONT</u>	
Total one-way travel distance:	<u>4.00</u>	miles
Average Travel Speed:	<u>20.00</u>	mph

Total Non-Roadable Mob/Demob Cost *	<u>\$70,867.18</u>
** two round trips with haul rig:	
Total Roadable Mob/Demob Cost **	<u>\$45.16</u>
** one round trip, no haul rig:	

Transportation Cycle Time:

	Non-Roadable Equipment	Roadable Equipment
Haul Time (Hours):	0.20	0.20
Return Time (Hours):	0.20	0.20
Loading Time (Hours):	6.00	NA
Unloading Time (Hours):	6.00	NA
Subtotals:	12.40	0.40

JOB TIME AND COST

Total job time:	<u>24.80</u>	Hours
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Total job cost:	<u>\$70,912</u>
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