STATE OF COLORADO

Eschberger - DNR, Amy <amy.eschberger@state.co.us>

Bond Estimate for Irwin/Thomas app

Christine FELZ <christine.felz@lafargeholcim.com> Tue, Oct 23, 2018 at 1:07 PM
To: "Eschberger - DNR, Amy" <amy.eschberger@state.co.us>, William Schenderlein <bill@blueearthsolutions.net>

Hi Amy,
We are good with the estimate. Thanks!
[Quoted text hidden]

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

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
		SUBTOTALS:		**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 WORK

Task description: **Replace topsoil on prepared area ahead of mining**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 001 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-001
User: AME

Agency 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: 1.215
Loose volume: **2,250** LCY

Source of estimated volume: Application: 500' x 100' x 1' deep
Source 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 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job 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 3.0

Haul 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** minutes

Return 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** minutes

Total Scraper team cycle time: **1.91** minutes
Adjusted for job conditions: 756.13 LCY/Hour
Selected Number of Scrapers: 1 Scraper(s)
Adjusted single scraper team (unit) hourly production: 756.13 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **756.13** LCY/Hour

Unadjusted unit production/hour: 910.99 LCY/Hour
Optimal Number of Scrapers per push dozer:

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **2.98** Hours

Unit cost: $0.792 /LCY Total job cost: **$1,782**

TRUCK/LOADER TEAM WORK

Task 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-riper:	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: Road Condition: Firm, smooth, rolling, dirt/lt. surfaced, watered, maintained 3.0

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** minutes
Total Truck Cycle Time: **4.903** minutes

Loading Tool unit Production 673.47 LCY/Hour Adjusted for job efficiency: 558.98 LCY/Hour
Truck Unit Production 269.22 LCY/Hour Adjusted for job efficiency: 223.46 LCY/Hour

Optimal No. of Trucks: 3 Truck(s) Selected Number of Trucks: 2 Truck(s)

Adjusted hourly truck team production: 446.91 LCY/Hour
Adjusted single truck/loader team production: 446.91 LCY/Hour
Adjusted multiple truck/loader team production: **446.91** LCY/Hour

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **83.95** Hours

Unit cost: $1.646 /LCY Total job cost: **$61,740**

BULLDOZER WORK

Task 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:

		Utilization %
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: 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/LCY

Weight description: Decomposed rock - 25% Rock, 75% Earth

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

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 WORK

Task description: **Replace topsoil on backfilled highwall**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 004 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-004
User: AME

Agency 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: 1.215
Loose volume: **4,387** LCY

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

HOURLY PRODUCTION

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

Scraper Bowl (volume) Basis:

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 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job 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 3.0

Haul 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** minutes

Return 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** minutes

Total Scraper team cycle time: **1.91** minutes
Adjusted for job conditions: 756.13 LCY/Hour
Selected Number of Scrapers: 1 Scraper(s)
Adjusted single scraper team (unit) hourly production: 756.13 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **756.13** LCY/Hour

Unadjusted unit production/hour: 910.99 LCY/Hour
Optimal Number of Scrapers per push dozer:

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **5.80** Hours

Unit cost: $0.792 /LCY Total job cost: **$3,474**

BULLDOZER WORK

Task 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:

		Utilization %
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		Source
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 WORK

Task description: **Replace topsoil on internal haul roads + main site entrance**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 007 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-007
User: AME

Agency 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: 1.215
Loose volume: **5,881** LCY

Source of estimated volume: Application: 3 ac x 1' deep
Source 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 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job 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 3.0

Haul 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** minutes

Return 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** minutes

Total Scraper team cycle time: **1.91** minutes
Adjusted for job conditions: 756.13 LCY/Hour
Selected Number of Scrapers: 1 Scraper(s)
Adjusted single scraper team (unit) hourly production: 756.13 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **756.13** LCY/Hour

Unadjusted unit production/hour: 910.99 LCY/Hour
Optimal Number of Scrapers per push dozer:

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **7.78** Hours

Unit cost: $0.792 /LCY Total job cost: **$4,656**

SCRAPER TEAM WORK

Task description: **Replace topsoil on scale house + staging areas**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 008 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-008
User: AME

Agency 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: 1.215
Loose volume: **9,801** LCY

Source of estimated volume: Application: 5 ac x 1' deep
Source 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 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job 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 3.0

Haul 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** minutes

Return 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** minutes

Total Scraper team cycle time: **1.91** minutes
Adjusted for job conditions: 756.13 LCY/Hour
Selected Number of Scrapers: 1 Scraper(s)
Adjusted single scraper team (unit) hourly production: 756.13 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **756.13** LCY/Hour

Unadjusted unit production/hour: 910.99 LCY/Hour
Optimal Number of Scrapers per push dozer:

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **12.96** Hours

Unit cost: $0.792 /LCY Total job cost: **$7,761**

SCRAPER TEAM WORK

Task description: **Replace topsoil on tockpile area**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 009 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-009
User: AME

Agency 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: 1.215
Loose volume: **10,781** LCY

Source of estimated volume: Application: 5.5 ac x 1' deep
Source 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 Minutes
Maneuver and Spread Time: 0.60 Minutes

Job 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 3.0

Haul 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** minutes

Return 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** minutes

Total Scraper team cycle time: **1.91** minutes
Adjusted for job conditions: 756.13 LCY/Hour
Selected Number of Scrapers: 1 Scraper(s)
Adjusted single scraper team (unit) hourly production: 756.13 LCY/Hour
Adjusted multiple scraper team (fleet) hourly production: **756.13** LCY/Hour

Unadjusted unit production/hour: 910.99 LCY/Hour
Optimal Number of Scrapers per push dozer:

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **14.26** Hours

Unit cost: $0.792 /LCY Total 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 Horsepower: 200
Ripper Attachment: 3-Shank Ripper 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 WORK

Task 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:

		Utilization %
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		Source
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 WORK

Task description: **Revegetate 114.9 acres**

Site: **Irwin/Thomas Mine** Permit Action: 2018 Bond Estimate Permit/Job#: M2016054

PROJECT IDENTIFICATION

Task #: 012 State: Colorado Abbreviation: None
Date: 10/22/2018 County: Boulder Filename: M054-012
User: AME

Agency 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**

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
Estimated Failure Rate: 25%
*Selected Replanting Work Items: SEEDING

Cost /Acre: $1,609.77
Cost /Acre*: $256.62

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

EQUIPMENT MOBILIZATION/DEMOBILIZATION

Task 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:	LONGMONT	
Total one-way travel distance:	4.00	miles
Average Travel Speed:	20.00	mph

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

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:	**24.80**	Hours
Total job cost:	**$70,912**	