COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

1313 Sherman Street, Room 215
Denver, CO 80203

November 16, 2018

Mr. Lawrence Martin
Hourglass Sands, LLC
1183 E. Canvasback Dr.
Terre Haute, IN 47802

Re: Jemadojin Sand Mine, Permit No. M-2006-017,
Technical Revision (TR-3) Preliminary Adequacy Review

Dear Mr. Martin:

On June 18, 2018 the Division of Reclamation, Mining and Safety (Division) received a request for a Technical Revision (TR-03) addressing the following:

> *Expand the presently approved mining area within the existing permit boundary by approximately +- 15.0 acres.*

The submittal could not be called complete for the purpose of filing at the time as a succession of operator (SO) application was required to change the Permittee's name to the current Hourglass Sands LLC. The TR submittal was subsequently considered complete on November 2, 2018. **The decision date for TR-3 is October 22 to December 3, 2018**. Please be advised that if you are unable to satisfactorily address any concerns identified in this review before the decision date, **it will be your responsibility to request an extension of the review period**. If there are outstanding issues that have not been adequately addressed prior to the end of the review period, and no extension has been requested, the Division may deny this Technical Revision (TR).

The following comments are based on the Division's review of the request for TR-3:

1) Figures/Maps: The provided figures and maps have been revised and resubmitted based on telephone conversations since the June submittal. As such the Division has several versions of different drawings. The Division requests future submittals all have numbers (e.g., Drawing 1, Map C-1, etc.) to help identify the drawing in comment letters such as this one. Furthermore, pursuant to Rule 6.2.1(2)(e), maps require: an acceptable map scale not larger than 1 inch = 50 feet nor smaller than 1 inch = 660 feet; a scale; appropriate legend; map title; date and a north arrow. Please provide this information on all future figures and maps. The Division was able to discern appropriate quantities for reclamation costs associated with this TR. As such, revised maps are not required at this time unless you wish to debate the quantities in the attached cost estimate.
2) Commitments: The reclamation plan as presented in TR-3 requires the transport of fines from an offsite processing facility back to the site for backfilling the highwalls. The Division estimates this offsite facility to be at least 30 miles away. In addition, if Hourglass Sands is unable to complete the reclamation, access to these fines cannot be guaranteed for the reclamation contractor. Therefore the Division requests the Permittee make the following commitment in order to facilitate

reasonable reclamation approaches and reclamation liability associated with this TR: commit to stockpiling enough fines on site on an annual basis to backfill the west and north highwalls (as a minimum). Based on attached worksheets: Task # 003.1 West Highwall Backfill Volume Estimate and Task # 004.1 North Highwall Backfill Volume Estimate; this would be 39 CY/foot of highwall for the west highwall and 33 CY/foot of highwall for the north highwall. As the majority a necessary buffer for a push down flattening of the south highwall falls within the current affected area, a push down approach is favored. Similarly, a necessary buffer for a push down flattening of the east highwall falls within the TR-3 proposed affected area until the east highwall reaches approximately 40 feet (allowing for dozer maneuvering) of the east affected area boundary. Please provide a written commitment to this annual stockpile volume on site.

3) Reclamation Cost Estimate: The enclosed reclamation cost estimate summarizes the Division's reclamation liability calculations. Please review the estimate and if you concur, be prepared to provide the additional financial warranty amount upon the Division's approval of TR-3. If you disagree with any aspect of the cost estimate, please contact me to discuss how to proceed.

If you have any questions, please contact me.

Sincerely,

Timothy A. Cazier
Environmental Protection Specialist

Enclosure

ec: DRMS file
Scott McGuire, P.E., Sand Acquisition Holdings
Bruce Humphries, consultant

COST SUMMARY WORK

Task description: **Cost Summary**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 000 State: Colorado Abbreviation: None
Date: 11/16/2018 County: El Paso Filename: M017-000
User: TC1

Agency or organization name: DRMS

TASK LIST (DIRECT COSTS)

Task	Description	Form Used	Fleet Size	Task Hours	Cost
001	Knock east highwall down from 1.7H to 3.2H:1V	DOZER	1	39.02	$8,867.00
002	Knock south highwall down from 1.7H to 3.2H:1V	DOZER	1	23.71	$5,388.00
003	Backfill West Highwall	TRUCK1	1	129.52	$63,259.00
004	Backfill North Highwall	TRUCK1	1	78.70	$38,435.00
005	Apply 4 inches of topsoil over 24.3 acres	TRUCK1	1	42.57	$20,791.00
006	Revegetate 24.3 acres	REVEGE	1	47.00	$25,738.00
007	Mob/Demob Equipment	MOBILIZE	1	3.48	$3,064.00
		SUBTOTALS:		**364**	**$165,542**

INDIRECT COSTS

OVERHEAD AND PROFIT:

Liability insurance:	2.02	Total =	$3,343.95
Performance bond:	1.05	Total =	$1,738.19
Job superintendent:	180.26	Total =	$13,167.99
Profit:	10.00	Total =	$16,554.20
		TOTAL O & P =	$34,804.33
		CONTRACT AMOUNT (direct + O & P) =	$200,346.33

LEGAL - ENGINEERING - PROJECT MANAGEMENT:

Financial warranty processing (legal/related costs):	0.00	Total =	0.00
Engineering work and/or contract/bid preparation:	0.00	Total =	$0.00
Reclamation management and/or administration:	5.00		$10,017.32
CONTINGENCY:	0.00	Total =	$0.00
		TOTAL INDIRECT COST =	$44,821.65
		TOTAL BOND AMOUNT (direct + indirect) =	**$210,363.65**
		TOTAL BOND AMOUNT – ROUNDED (direct + indirect) =	**$210,365.00**

BULLDOZER WORK

Task description: **Knock east highwall down from 1.7H to 3.2H:1V**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 001 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-001
User: TC1

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Basic Machine: Cat D8T - 8SU
Horsepower: 310
Blade Type: Semi-Universal
Attachment: 1-shank ripper
Shift Basis: 1 per day
Data Source: (CRG)

Cost Breakdown:

		Utilization %
Ownership Cost/Hour:	$93.62	NA
Operating Cost/Hour:	$73.35	100
Ripper own. Cost/Hour:	$12.36	NA
Ripper op. Cost/Hour:	$7.67	100
Operator Cost/Hour:	$40.23	NA

Total unit Cost/Hour: $227.23
Total Fleet Cost/Hour: **$227.23**

MATERIAL QUANTITIES

Initial Volume: 8,061
Swell factor: 1.060
Loose volume: **8,545** LCY

Source of estimated volume: Task 001.1 spreadsheet/TR-03
Source of estimated swell factor: Cat Handbook

HOURLY PRODUCTION

Average push distance: 160 feet
Unadjusted hourly production: 605.4 LCY/hr

Materials consistency description: Compacted fill or embankment 0.9

Average push gradient: 0 %
Average site altitude: 4,100 feet

Material weight: 2,850 lbs/LCY

Weight description: Sand - Damp

Job Condition Correction Factor		Source
Operator Skill:	0.750	(AVG.)
Material consistency:	0.900	(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:	1.000	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	0.807	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.3617

Adjusted unit production: 218.97 LCY/hr

Adjusted fleet production: **218.97** LCY/hr

JOB TIME AND COST

Fleet size: 1 Dozer(s)
Unit cost: $1.038/LCY

Total job time: **39.02** Hours
Total job cost: **$8,867**

COLORADO
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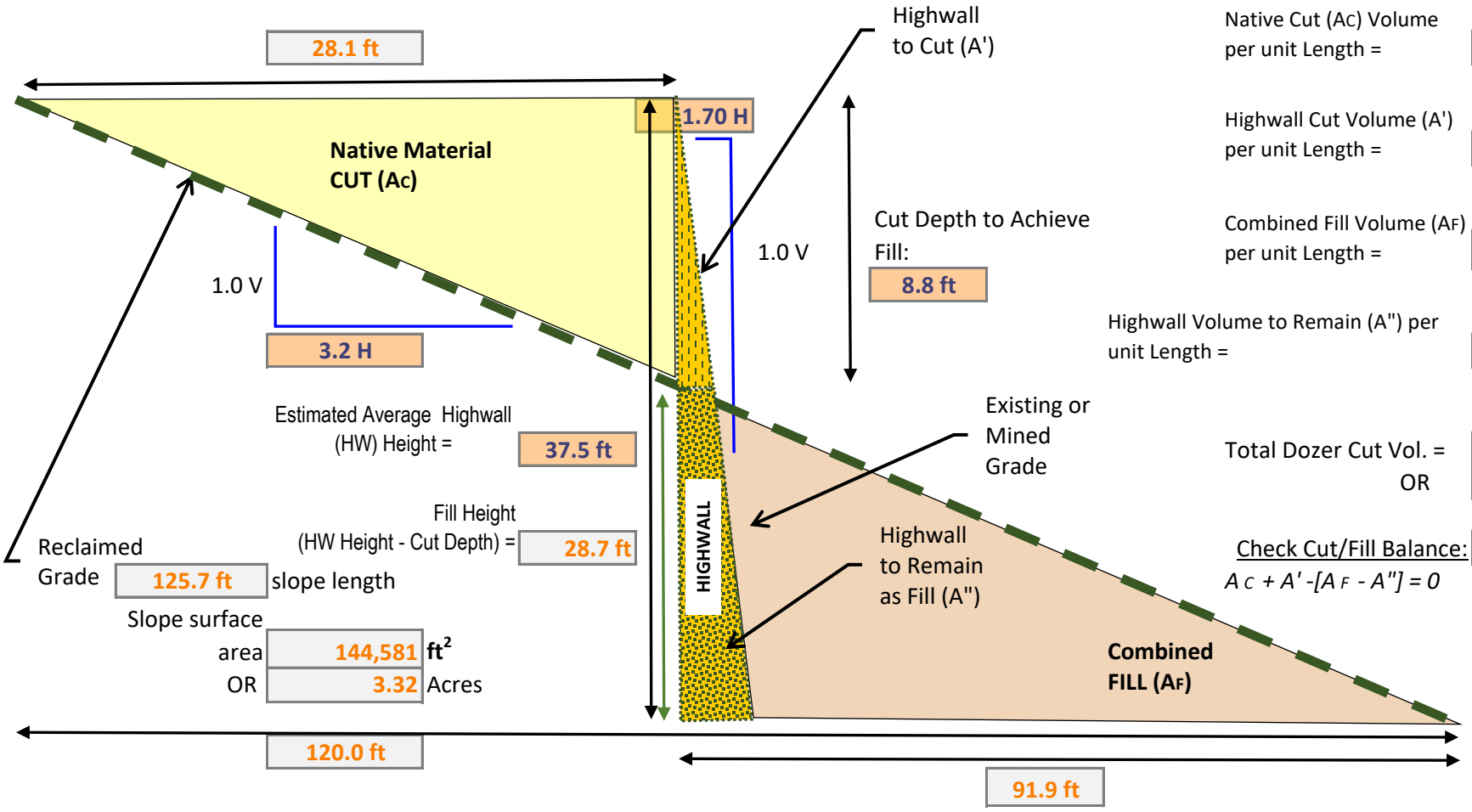
Task # 001.1 East Highwall Cut/Fill Volume Estimate

PROJECT: Jemadojin Sand Mine
PERMIT No.: M-2006-017
PERMIT ACTION: TR-03
HIGHWALL LOCATION: TR-03 New Pit

LEGEND
Input
Result

Highwall Length = 1150 ft
- See Section A-A', Mining & Reclamation Plan 5/11/18



Native Cut (Ac) Volume per unit Length = 123.6 ft²

Highwall Cut Volume (A') per unit Length = 65.7 ft²

Combined Fill Volume (AF) per unit Length = 1,318.9 ft²

Highwall Volume to Remain (A") per unit Length = 1,129.7 ft²

Total Dozer Cut Vol. = 217,645 ft³
OR 8,061 CY

Check Cut/Fill Balance: 0.0
$A_C + A' - [A_F - A''] = 0$

HIGHWALL CUT - FILL VOLUME ESTIMATE

BULLDOZER WORK

Task description: **Knock south highwall down from 1.7H to 3.2H:1V**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 002 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-002
User: TC1

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Basic Machine: Cat D8T - 8SU
Horsepower: 310
Blade Type: Semi-Universal
Attachment: 1-shank ripper
Shift Basis: 1 per day
Data Source: (CRG)

Cost Breakdown:

		Utilization %
Ownership Cost/Hour:	$93.62	NA
Operating Cost/Hour:	$73.35	100
Ripper own. Cost/Hour:	$12.36	NA
Ripper op. Cost/Hour:	$7.67	100
Operator Cost/Hour:	$40.23	NA

Total unit Cost/Hour: $227.23
Total Fleet Cost/Hour: **$227.23**

MATERIAL QUANTITIES

Initial Volume: 4,898
Swell factor: 1.060
Loose volume: **5,192** LCY

Source of estimated volume: Task 001.1 spreadsheet/TR-03
Source of estimated swell factor: Cat Handbook

HOURLY PRODUCTION

Average push distance: 160 feet
Unadjusted hourly production: 605.4 LCY/hr

Materials consistency description: Compacted fill or embankment 0.9

Average push gradient: 0 %
Average site altitude: 4,100 feet

Material weight: 2,850 lbs/LCY

Weight description: Sand - Damp

Job Condition Correction Factor		Source
Operator Skill:	0.750	(AVG.)
Material consistency:	0.900	(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:	1.000	(CAT HB)
Altitude:	1.000	(CAT HB)
Material Weight:	0.807	(CAT HB)
Blade type:	1.000	(PAT)

Net correction: 0.3617

Adjusted unit production: 218.97 LCY/hr

Adjusted fleet production: **218.97** LCY/hr

JOB TIME AND COST

Fleet size: 1 Dozer(s)
Unit cost: $1.038/LCY

Total job time: **23.71** Hours
Total job cost: **$5,388**

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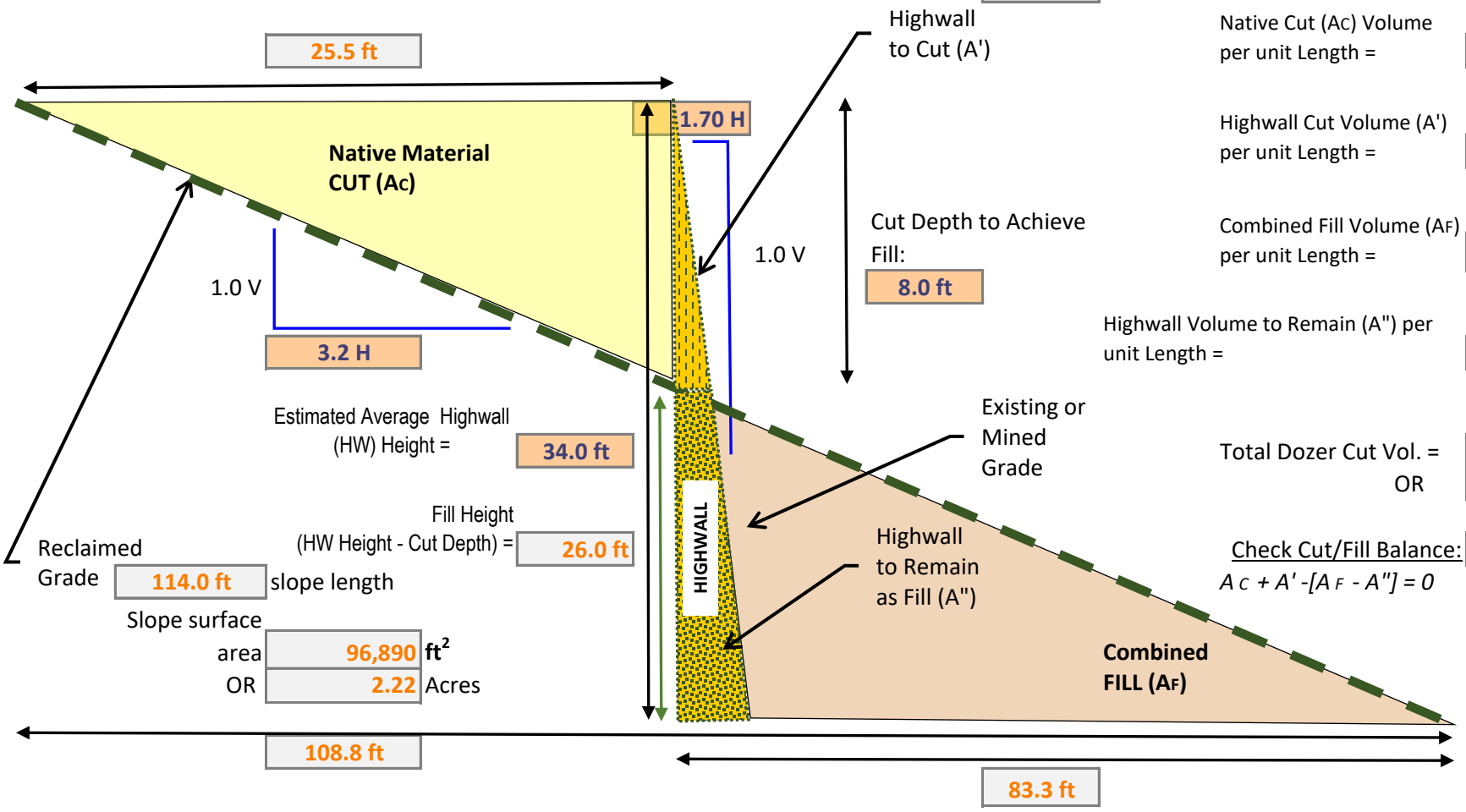
Task # 002.1 South Highwall Cut/Fill Volume Estimate

PROJECT: Jemadojin Sand Mine
PERMIT No.: M-2006-017 **PERMIT ACTION:** TR-03
HIGHWALL LOCATION: TR-03 New Pit

LEGEND
Input
Result

Highwall Length = 850 ft
- See Section B-B', Mining & Reclamation Plan 5/11/18



Native Cut (Ac) Volume per unit Length = 101.6 ft²

Highwall Cut Volume (A') per unit Length = 54.0 ft²

Combined Fill Volume (AF) per unit Length = 1,084.2 ft²

Highwall Volume to Remain (A") per unit Length = 928.6 ft²

Total Dozer Cut Vol. = 132,241 ft³
OR 4,898 CY

Check Cut/Fill Balance: 0.0
$A_C + A' - [A_F - A''] = 0$

HIGHWALL CUT - FILL VOLUME ESTIMATE

TRUCK/LOADER TEAM WORK

Task description: **Backfill West Highwall**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 003 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-003
User: TC1

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Shift basis: 1 per day

	Equipment Description
Truck Loader Team -Truck:	Generic 12-18 cy, 6x4
-Loader:	CAT 938H
Support Equipment -Load Area:	NA
-Dump Area:	Cat D8T - 8SU
Road Maintenance –Motor Grader:	NA
-Water Truck:	NA

Cost Breakdown:

	Truck/Loader Team		Support Equipment		Maintenance Equipment	
	Truck	Loader	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	100	NA	100	NA	NA
Ownership cost/hour:	$22.72	$25.88	NA	$93.62	NA	NA
Operating cost/hour:	$44.95	$32.57	NA	$73.35	NA	NA
%Utilization-riper:	NA	0	NA	NA	NA	NA
Ripper own. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Ripper op. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Operator cost/hour:	$25.65	$36.13	NA	$40.23	NA	NA
Unit Subtotals:	$93.31	$94.57	NA	$207.20	NA	NA
Number of Units:	2	1	0	1	0	0
Group Subtotals:	Work:	$281.19	Support:	$207.20	Maint:	$0.00

Total work team cost/hour: **$488.39**

MATERIAL QUANTITIES

Initial volume: 44,922 CCY Swell factor: 1.000
Loose volume: **44,922** LCY

Source of estimated volume: TR-03 calculation Task 003.1 spreadsheet
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: 2,550 Pounds/LCY
Description: Earth - Dry packed
Rated Payload: 50,300 Pounds
Payload Capacity: 19.73 LCY

Truck Bed (volume) Basis:

Struck Volume:	12.00	LCY
Heaped Volume:	18.00	LCY
Average Volume:	15.00	LCY
Adjusted Volume:	18.00	LCY

Final Truck Volume Based on Number of Loader Passes: **17.06** LCY

Loading Tool Capacity

Bucket Size Class: NA

Rated Capacity:	3.900	LCY (heaped)
Bucket Fill Factor:	0.875	Loose material - 1/2" to 3/4" (85 - 90%) 0.875
Adjusted Capacity:	**3.413**	LCY

Job Condition Corrections: Site Altitude (ft.): 4100 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: 5 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): 0.483 minutes

Cycle Time Factors		Factor (min.)	Source
Material:	Material up to 1/8" diameter 0.02	0.020	(Cat HB)
Stockpile:	Conveyor or dozer piled 10 ft. high and up 0.00	0.000	(Cat HB)
Truck Ownership:	Common ownership of trucks and loaders - 0.04	-0.040	(Cat HB)
Operation:	No adjustment - factor not applicable 0.00	0.000	(Cat HB)
Dump Target:	Nominal target 0.00	0.000	(Cat HB)
	Net Cycle Time Adjustment:	-0.020	minutes
	Adjusted Loader Cycle Time:	**0.463**	minutes
	Net Load Time per Truck:	**1.950**	minutes

Truck Cycle Time:

Truck Exchange Time:	0.50	Minutes	Adjusted for site altitude:	0.500	Minutes
Truck Load Time:	1.950	Minutes	Adjusted for site altitude:	1.950	Minutes
Truck Maneuver and Dump Time:	0.90	Minutes	Adjusted for site altitude:	0.900	Minutes

Truck Travel (Haul & Return) Time: Road Condition: Soft, rutted dirt, no maintenance or water, 8" tire penetration 14

Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	600.00	0.00	14.00	14.00	775	0.786

Haul Time: **0.786** minutes

Return Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	600.00	0.00	14.00	14.00	1274	0.478

Return Time: **0.478** minutes

Total Truck Cycle Time: **4.614** minutes

Loading Tool unit Production 417.86 LCY/Hour Adjusted for job efficiency: 346.82 LCY/Hour

Truck Unit Production 221.88 LCY/Hour Adjusted for job efficiency: 184.16 LCY/Hour

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

Adjusted hourly truck team production: 368.32 LCY/Hour

Adjusted single truck/loader team production: 346.82 LCY/Hour

Adjusted multiple truck/loader team production: **346.82** LCY/Hour

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **129.52** Hours

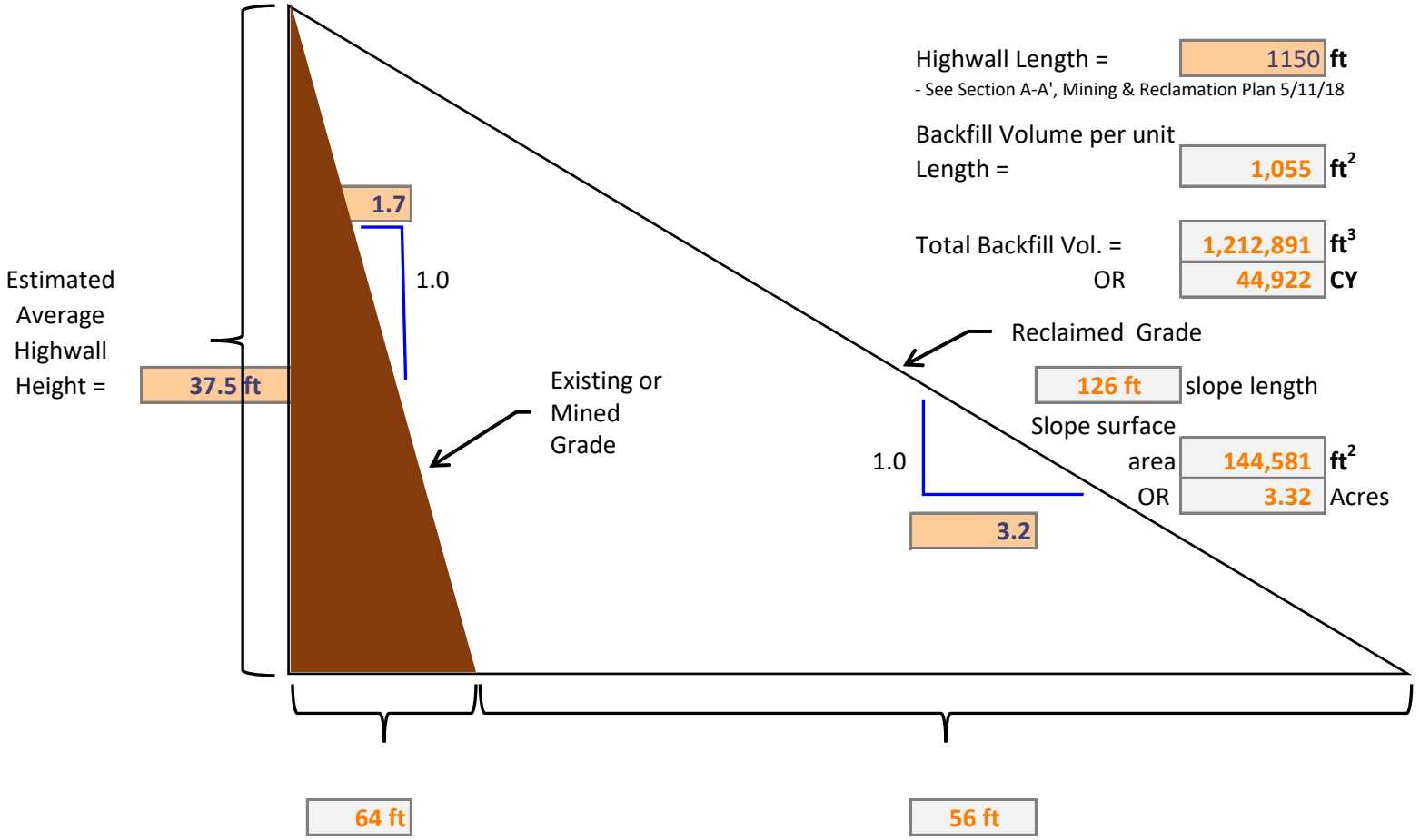
Unit cost: $1.408 /LCY Total job cost: **$63,259**

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Task # 003.1 West Highwall Backfill Volume Estimate

PROJECT: Jemadojin Sand Mine
DATE: 11/15/2018
PERMIT No.: M-2006-017
PERMIT ACTION: TR-03
HIGHWALL LOCATION: TR-03 New Pit

LEGEND
Input
Result



Highwall Length = 1150 ft
- See Section A-A', Mining & Reclamation Plan 5/11/18

Backfill Volume per unit Length = 1,055 ft^2

Total Backfill Vol. = 1,212,891 ft^3
OR 44,922 CY

Slope surface area = 144,581 ft^2
OR 3.32 Acres

HIGHWALL BACKFILL VOLUME ESTIMATE

TRUCK/LOADER TEAM WORK

Task description: **Backfill North Highwall**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 004 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-004
User: TC1

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Shift basis: 1 per day

	Equipment Description
Truck Loader Team -Truck:	Generic 12-18 cy, 6x4
-Loader:	CAT 938H
Support Equipment -Load Area:	NA
-Dump Area:	Cat D8T - 8SU
Road Maintenance –Motor Grader:	NA
-Water Truck:	NA

Cost Breakdown:

	Truck/Loader Team		Support Equipment		Maintenance Equipment	
	Truck	Loader	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	100	NA	100	NA	NA
Ownership cost/hour:	$22.72	$25.88	NA	$93.62	NA	NA
Operating cost/hour:	$44.95	$32.57	NA	$73.35	NA	NA
%Utilization-riper:	NA	0	NA	NA	NA	NA
Ripper own. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Ripper op. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Operator cost/hour:	$25.65	$36.13	NA	$40.23	NA	NA
Unit Subtotals:	$93.31	$94.57	NA	$207.20	NA	NA
Number of Units:	2	1	0	1	0	0
Group Subtotals:	Work:	$281.19	Support:	$207.20	Maint:	$0.00

Total work team cost/hour: **$488.39**

MATERIAL QUANTITIES

Initial volume: 27,294 CCY Swell factor: 1.000
Loose volume: **27,294** LCY

Source of estimated volume: TR-03 calculation Task 004.1 spreadsheet
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: 2,550 Pounds/LCY
Description: Earth - Dry packed
Rated Payload: 50,300 Pounds
Payload Capacity: 19.73 LCY

Truck Bed (volume) Basis:

Struck Volume:	12.00	LCY
Heaped Volume:	18.00	LCY
Average Volume:	15.00	LCY
Adjusted Volume:	18.00	LCY

Final Truck Volume Based on Number of Loader Passes: **17.06** LCY

Loading Tool Capacity

Bucket Size Class: NA

Rated Capacity:	3.900	LCY (heaped)
Bucket Fill Factor:	0.875	Loose material - 1/2" to 3/4" (85 - 90%) 0.875
Adjusted Capacity:	**3.413**	LCY

Job Condition Corrections: Site Altitude (ft.): 4100 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: 5 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): 0.483 minutes

Cycle Time Factors		Factor (min.)	Source
Material:	Material up to 1/8" diameter 0.02	0.020	(Cat HB)
Stockpile:	Conveyor or dozer piled 10 ft. high and up 0.00	0.000	(Cat HB)
Truck Ownership:	Common ownership of trucks and loaders - 0.04	-0.040	(Cat HB)
Operation:	No adjustment - factor not applicable 0.00	0.000	(Cat HB)
Dump Target:	Nominal target 0.00	0.000	(Cat HB)

Net Cycle Time Adjustment: -0.020 minutes
Adjusted Loader Cycle Time: **0.463** minutes
Net Load Time per Truck: **1.950** minutes

Truck Cycle Time:

Truck Exchange Time:	0.50	Minutes	Adjusted for site altitude:	0.500	Minutes
Truck Load Time:	1.950	Minutes	Adjusted for site altitude:	1.950	Minutes
Truck Maneuver and Dump Time:	0.90	Minutes	Adjusted for site altitude:	0.900	Minutes

Truck Travel (Haul & Return) Time: Road Condition: Soft, rutted dirt, no maintenance or water, 8" tire penetration 14

Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	600.00	0.00	14.00	14.00	775	0.786

Haul Time: **0.786** minutes

Return Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	600.00	0.00	14.00	14.00	1274	0.478

Return Time: **0.478** minutes

Total Truck Cycle Time: **4.614** minutes

Loading Tool unit Production 417.86 LCY/Hour Adjusted for job efficiency: 346.82 LCY/Hour

Truck Unit Production 221.88 LCY/Hour Adjusted for job efficiency: 184.16 LCY/Hour

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

Adjusted hourly truck team production: 368.32 LCY/Hour

Adjusted single truck/loader team production: 346.82 LCY/Hour

Adjusted multiple truck/loader team production: **346.82** LCY/Hour

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **78.70** Hours

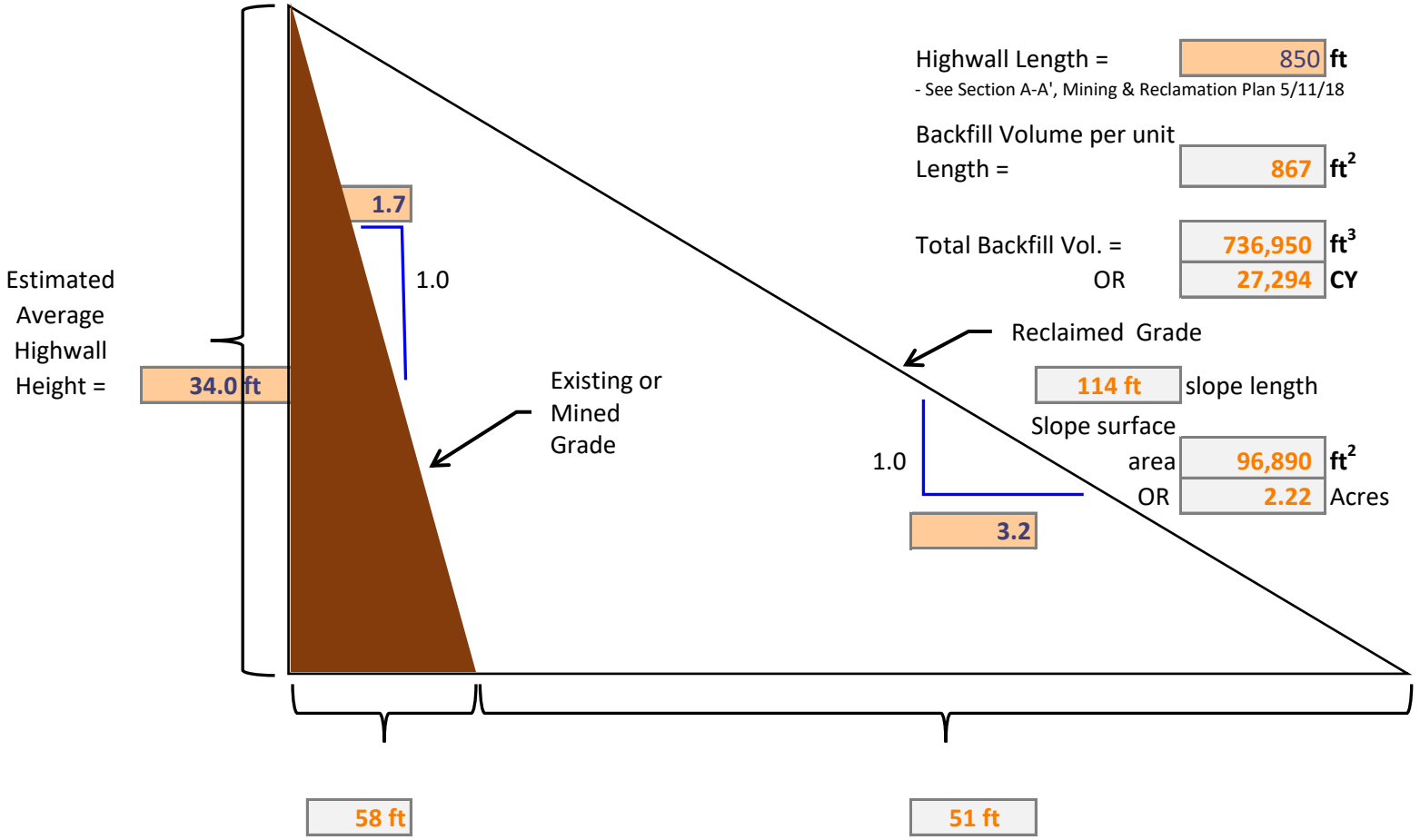
Unit cost: $1.408 /LCY Total job cost: **$38,435**

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Task # 004.1 North Highwall Backfill Volume Estimate

PROJECT: Jemadojin Sand Mine
DATE: 11/15/2018
PERMIT No.: M-2006-017
PERMIT ACTION: TR-03
HIGHWALL LOCATION: TR-03 New Pit

LEGEND
Input
Result



Highwall Length = 850 ft
- See Section A-A', Mining & Reclamation Plan 5/11/18

Backfill Volume per unit Length = 867 ft^2

Total Backfill Vol. = 736,950 ft^3
OR 27,294 CY

Slope surface area = 96,890 ft^2
OR 2.22 Acres

HIGHWALL BACKFILL VOLUME ESTIMATE

TRUCK/LOADER TEAM WORK

Task description: **Apply 4 inches of topsoil over 24.3 acres**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 005 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-005
User: TC1

Agency or organization name: DRMS

HOURLY EQUIPMENT COST

Shift basis: 1 per day

	Equipment Description
Truck Loader Team -Truck:	Generic 12-18 cy, 6x4
-Loader:	CAT 938H
Support Equipment -Load Area:	NA
-Dump Area:	Cat D8T - 8SU
Road Maintenance –Motor Grader:	NA
-Water Truck:	NA

Cost Breakdown:

	Truck/Loader Team		Support Equipment		Maintenance Equipment	
	Truck	Loader	Load Area	Dump Area	Motor Grader	Water Truck
%Utilization-machine:	100	100	NA	100	NA	NA
Ownership cost/hour:	$22.72	$25.88	NA	$93.62	NA	NA
Operating cost/hour:	$44.95	$32.57	NA	$73.35	NA	NA
%Utilization-riper:	NA	0	NA	NA	NA	NA
Ripper own. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Ripper op. cost/hour:	NA	$0.00	NA	$0.00	NA	NA
Operator cost/hour:	$25.65	$36.13	NA	$40.23	NA	NA
Unit Subtotals:	$93.31	$94.57	NA	$207.20	NA	NA
Number of Units:	2	1	0	1	0	0
Group Subtotals:	Work:	$281.19	Support:	$207.20	Maint:	$0.00

Total work team cost/hour: **$488.39**

MATERIAL QUANTITIES

Initial volume: 13,068 CCY Swell factor: 1.000
Loose volume: **13,068** LCY

Source of estimated volume: TR-03 calculation (4 inches over 24.3 acres)
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: 1,600 Pounds/LCY
Description: Top Soil
Rated Payload: 50,300 Pounds
Payload Capacity: 31.44 LCY

Truck Bed (volume) Basis:

Struck Volume:	12.00	LCY
Heaped Volume:	18.00	LCY
Average Volume:	15.00	LCY
Adjusted Volume:	18.00	LCY

Final Truck Volume Based on Number of Loader Passes: **17.06** LCY

Loading Tool Capacity

Bucket Size Class: NA

Rated Capacity:	3.900	LCY (heaped)
Bucket Fill Factor:	0.875	Loose material - 1/2" to 3/4" (85 - 90%) 0.875
Adjusted Capacity:	**3.413**	LCY

Job Condition Corrections: Site Altitude (ft.): 4100 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: 5 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): 0.483 minutes

Cycle Time Factors		Factor (min.)	Source
Material:	Material up to 1/8" diameter 0.02	0.020	(Cat HB)
Stockpile:	Conveyor or dozer piled 10 ft. high and up 0.00	0.000	(Cat HB)
Truck Ownership:	Common ownership of trucks and loaders - 0.04	-0.040	(Cat HB)
Operation:	No adjustment - factor not applicable 0.00	0.000	(Cat HB)
Dump Target:	Nominal target 0.00	0.000	(Cat HB)

Net Cycle Time Adjustment:	-0.020	minutes
Adjusted Loader Cycle Time:	**0.463**	minutes
Net Load Time per Truck:	**1.950**	minutes

Truck Cycle Time:

Truck Exchange Time:	0.50	Minutes	Adjusted for site altitude:	0.500	Minutes
Truck Load Time:	1.950	Minutes	Adjusted for site altitude:	1.950	Minutes
Truck Maneuver and Dump Time:	0.90	Minutes	Adjusted for site altitude:	0.900	Minutes

Truck Travel (Haul & Return) Time: Road Condition: Soft, rutted dirt, no maintenance or water, 8" tire penetration 14

Haul Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	1150.00	-5.00	14.00	9.00	1249	0.955

Haul Time: **0.955** minutes

Return Route:

Seg #	Haul Distance (Ft)	Grade (%)	Roll. Res (%)	Total Res (%)	Velocity (fpm)	Travel Time (min)
1	1150.00	5.00	14.00	19.00	937	1.231

Return Time: **1.231** minutes
Total Truck Cycle Time: **5.536** minutes

Loading Tool unit Production 417.86 LCY/Hour Adjusted for job efficiency: 346.82 LCY/Hour

Truck Unit Production 184.93 LCY/Hour Adjusted for job efficiency: 153.49 LCY/Hour

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

Adjusted hourly truck team production: 306.98 LCY/Hour
Adjusted single truck/loader team production: 306.98 LCY/Hour
Adjusted multiple truck/loader team production: **306.98** LCY/Hour

JOB TIME AND COST

Fleet size: 1 Team(s) Total job time: **42.57** Hours

Unit cost: $1.591 /LCY Total job cost: **$20,791**

REVEGETATION WORK

Task description: **Revegetate 24.3 acres**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 006 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-006
User: TC1

Agency or organization name: DRMS

FERTILIZING

Materials

Description	Units / Acre	Unit	Cost / Unit	Cost /Acre
			$	$
			Total Fertilizer Materials Cost/Acre	**$0.00**

Application

Description	Cost /Acre
	$
Total Fertilizer Application Cost/Acre	**$0.00**

TILLING

Description	Cost /Acre
	$
Total Tilling Cost/Acre	**$0.00**

SEEDING

Seed Mix	Rate – PLS LBS / Acre	Seeds per SQ. FT	Cost /Acre
Blue Grama - Lovington	0.20	3.26	$3.33
Little Bluestem - Cimarron	2.00	11.94	$29.36
Prairiegrass - Matua	0.10	0.18	$0.32
Streambank Wheatgrass - Sodar	2.20	7.17	$13.71
Thickspike Wheatgrass - Critana	1.00	3.54	$5.87
Western Wheatgrass - Barton	4.00	10.10	$31.08
Prairie Junegrass	0.10	5.32	$3.11
Totals Seed Mix	9.60	41.51	**$86.77**

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
Total Mulch Application Cost/Acre	**$68.78**

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: 24.3 Cost /Acre: $963.55
Estimated Failure Rate: 30% Cost /Acre*: $318.77
*Selected Replanting Work Items: FERTILIZING,TILLING,SEEDING

Initial Job Cost: **$23,414.27**
Reseeding Job Cost: **$2,323.83**
Total Job Cost: **$25,738**
Job Hours: **47.00**

EQUIPMENT MOBILIZATION/DEMOBILIZATION

Task description: **Mob/Demob Equipment**

Site: **Jemadojin Sand Mine** Permit Action: TR-03 Permit/Job#: M2006017

PROJECT IDENTIFICATION

Task #: 007 State: Colorado Abbreviation: None
Date: 11/15/2018 County: El Paso Filename: M017-007
User: TC1

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 D8T - 8SU	47.71	$93.62	$117.55	1	$211.17	$117.55	$250.00
CAT 938H	16.34	$25.88	$88.67	1	$114.55	$88.67	$250.00
Drill/Broadcast Seeder with Tractor	25.00	$15.54	$88.67	1	$104.21	$88.67	$250.00
Subtotals:					**$429.93**	**$294.89**	**$750.00**

ROADABLE EQUIPMENT:

Machine Description	Total Cost/hr/ unit	Fleet Size	Haul Trip Cost/hr/ fleet	Return Trip Cost/hr/ fleet
Generic 12-18 cy, 6x4	$93.32	2	$186.64	$186.64
Subtotals:			**$186.64**	**$186.64**

EQUIPMENT HAUL DISTANCE and Time

Nearest Major City or Town within project area region:	FOUNTAIN	
Total one-way travel distance:	28.00	miles
Average Travel Speed:	45.00	mph

Total Non-Roadable Mob/Demob Cost * '* two round trips with haul rig:	$2,831.93
Total Roadable Mob/Demob Cost ** ** one round trip, no haul rig:	$232.26

Transportation Cycle Time:

	Non-Roadable Equipment	Roadable Equipment
Haul Time (Hours):	0.62	0.62
Return Time (Hours):	0.62	0.62
Loading Time (Hours):	0.25	NA
Unloading Time (Hours):	0.25	NA
Subtotals:	1.74	1.24

JOB TIME AND COST

Total job time:	**3.49**	Hours
Total job cost:	**$3,064**	