Basic Traffic Study

Petroleum Development Corporation
Centralized Soil Treatment Facility

OA Project No. 011-2627

June 2012

826 21 ½ Road | Grand Junction, CO 81505 | TEL 970.263.7800 | FAX 970.263.7456

TRAFFIC IMPACT ANALYSIS
PETROLEUM DEVELOPMENT CORPORATION
PICEANCE SOIL TREATMENT FACILITY
GARFIELD COUNTY, COLORADO

OA Project No. 009-1180

April 2012

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INTRODUCTION & OBJECTIVE

This document summarizes findings of a traffic impact analysis performed for a proposed land farm facility located on Highway 6/24 northeast of the intersection of Garfield County Road (CR) 215 (Parachute Creek Road) & Highway 6/24. In the vicinity of the project, this highway also serves as the I-70 Frontage Road. The site is approximately six miles northeast of Parachute, CO and will be accessed at an existing gravel road approximately 3.5 miles northeast of Parachute, CO. A vicinity map is included in **Appendix A**.

Activity at the land farm facility will consist of three phases over approximately 20 years. These phases include:

- Facility Construction (14 days)
- Operation (20 years)
- Reclamation (14 days)

EXISTING NETWORK

This land farm facility will be accessed from Highway 6/24. According to the Colorado Department of Transportation (CDOT) State Highway Access Code, this road is classified as a Rural Highway (R-A). Highway 6/24 is a two-lane asphalt roadway with 12' driving lanes and 6' surfaced shoulders. The road has a posted speed limit of 50 mph. According to the most recent available traffic count (2004), the estimated ADT for Highway 6/24 is 835 vehicles per day (vpd).

EXISTING PARCELS

Current land uses for parcels along the gravel access are primarily natural gas development with limited rural residential and agricultural use. The majority of existing traffic is related to natural gas development activities. One access at the site exists and is permitted by Garfield County. No additional access to state highways or railroad crossings will be required.

BACKGROUND TRAFFIC

Traffic data is available on the CDOT Online Traffic Database for the section of Highway 6/24 southwest of the intersection at 1st Street within Parachute, CO. At this location the 2012 ADT is 5,200 vpd. Garfield County provided counts for the intersection of Highway 6/24 & CR 215 indicate that the west leg of the intersection had a 2004 ADT of 2680 vpd. Assuming these two locations are similar in volume and that all traffic at the intersection of Highway 6/24 & CR 215 has grown uniformly, applying the growth factor for the west leg to the east leg of the intersection, which has a 2004 ADT of 835 vpd, yields a 2012 ADT of 1,620 vpd. As there or no major traffic generators between this intersection and the site access, it is assumed that this is approximately the ADT of Highway 6/24 at the site access. Similarly, the 2032 ADT for Highway 6/24 was determined to be 2,900 vpd in the vicinity of the site access. Note that the 2032 horizon year corresponds with end of the site life cycle. Existing and future traffic data from the CDOT Online Data Access and Garfield County are included in **Appendix B**.

TRIP GENERATION & DISTRIBUTION

Trip generation is generally determined using rates found in the ITE *Trip Generation* manual. Rates from this publication are applied to values related to the size of the proposed site to estimate the trips expected to enter and exit the site. In this case, no rates are provided for facilities similar to these. To estimate trips expected for this site, information was gathered regarding the expected traffic based on previous projects similar to this one. **Table 1** summarizes the expected average and maximum trips for each phase discussed previously.

Table 1: Trip Generation – Land Farm Facility

Phase	Average Trips/Day (PCE)	Maximum Trips/Day (PCE)	Peak Hour Trips			Trip Distribution		Total Peak Hour Trips	
			Maximum Trips	Percent Trucks	PCE	Enter	Exit	Enter	Exit
AM Peak Hour									
Construction of Facility	18	32	6	33%	10	70%	30%	7	3
Operation	14	27	2	90%	6	50%	50%	3	3
Reclamation	20	30	5	40%	9	70%	30%	6	3
PM Peak Hour									
Construction of Facility			6	33%	10	30%	70%	3	7
Operation			2	90%	6	50%	50%	3	3
Reclamation			5	40%	9	30%	70%	3	6

For the Construction and Reclamation phases, it is assumed that all pickups enter during the AM peak and exit during the PM peak to coincide with workers arriving and leaving, respectively. For the Operation phase, there are not expected to be full time staff, so trips from pick-ups are assumed to be constant throughout the day. It is also assumed that entering and exiting heavy trucks will be constant throughout a work day. Detailed tables showing daily trips for each phase are shown in **Appendix C**.

Based on background traffic volumes and expected site trips, traffic added by the site will be approximately 0.5% increase in average daily traffic in 2012. Assuming the design hourly volume is 11% of the background ADT and that the site peak hour volumes are an approximation of the DHV, the peak hour volume site traffic is expected to be approximately 2% of the existing peak hour volume in 2012 and 1% in 2032.

With respect to the distribution of site trips, discussions with the client have indicated that all trips will be entering from and exiting to the west, using the I-70 interchange at Parachute.

CONSTRUCTION PHASE

Staging areas and temporary access points will not be required during construction for this project. The access into this facility from Highway 6/24 is already permitted by the Garfield County Road and Bridge Department; therefore, no additional permits are required. There will be no road closures or traffic interruptions. During the construction phase, it is expected that there will be approximately four to five heavy trucks enter and exit the site daily. This traffic will be primarily delivering and retrieving equipment on a 22-wheel low boy truck or delivering materials on 18-wheel flatbed trucks.

AUXILIARY LANE ANALYSIS

As defined by the Colorado State Access Code, Interstate 70 Frontage Road is classified as a Rural Highway (R-A). With this classification, auxiliary lanes are required for left turns greater than 10 vph and right turns greater than 25 vph in the peak hour.

During the Construction and Reclamation phases, the eastbound left turns at the site access are expected to be approximately 7 vph and 6 vph, respectively. While this does not reach the 10 vph threshold, it is possible that the addition of any existing turning volumes would exceed this threshold. However, note that these phases are 14 days each. A temporary solution, such as

appropriate traffic control and a public information effort to alert drivers of the increase in traffic during this short period, would be more appropriate than a permanent solution like an auxiliary lane.

For the majority of the life of this facility, it is expected that because the daily traffic will be of a continuous nature and evenly distributed throughout the day. The peak hour trips in and out will be approximately 3 vph (PCE) entering and 3 vph (PCE) exiting. Given the small addition of traffic the land farm facility is expected to generate during the peak hour, it is expected that turning volumes will not meet the required amount for auxiliary lanes.

SIGHT DISTANCE ANALYSIS

At the intersecting roads included in this analysis, existing sight distance along Highway 6/24 is summarized in **Table 3** below. Note that, for US-40, with posted speed limit of 50 mph, a minimum of 500', 650', and 850' for passenger cars, single unit trucks, and combination trucks, respectively, is required.

Table 3 - Existing Site Distance (ft)

Intersection	East	West
I-70 Frontage & Site Access	850+	850+
I-70 Frontage & CR 215	850+	850+

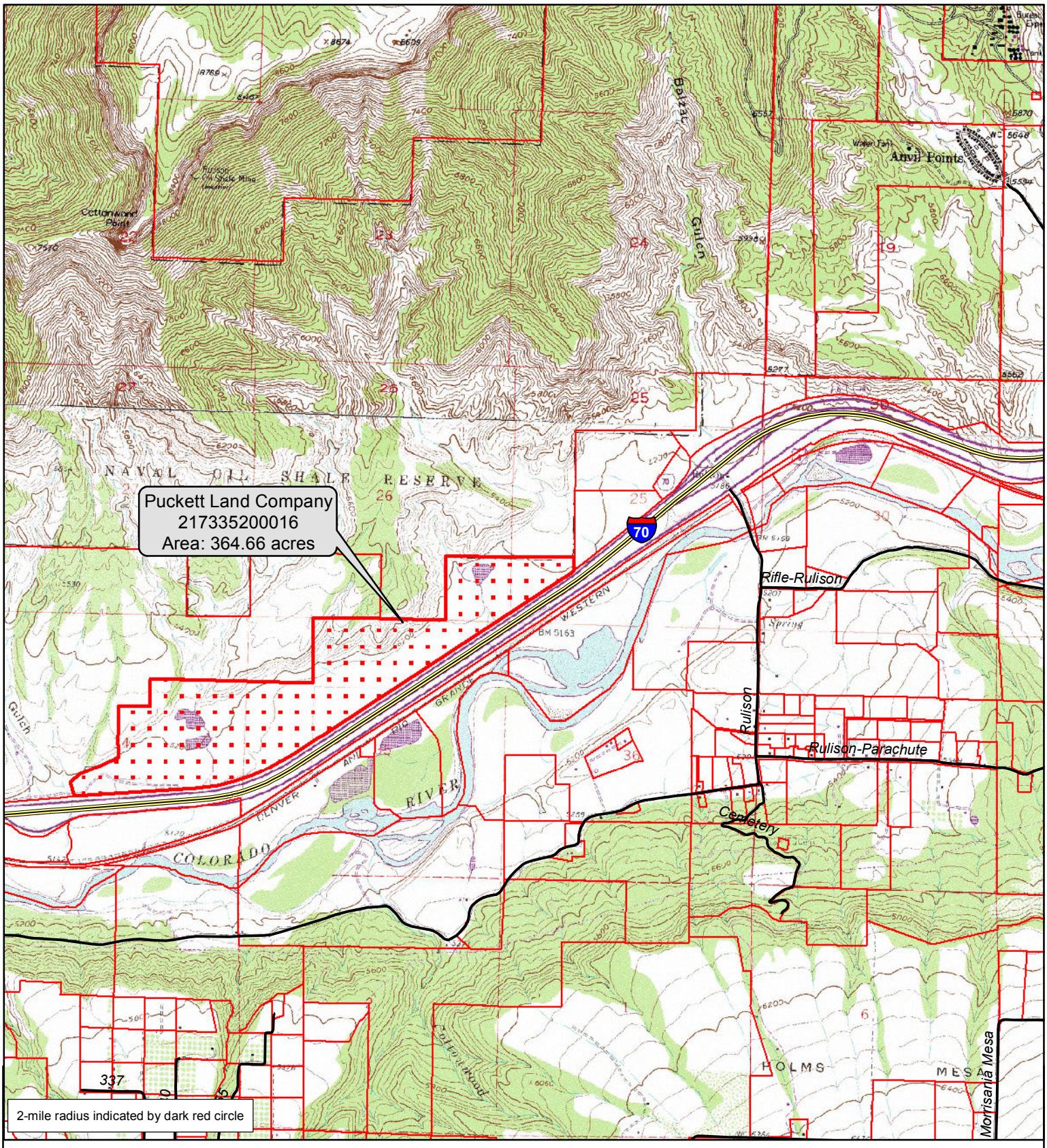
RECOMMENDATIONS

Based on the number of expected site trips discussed above, the increase in traffic is not expected to increase average daily traffic or peak hour traffic by 20%. Based on the results of the auxiliary lane analysis, no auxiliary lanes are recommended for the land farm facility. During the Construction and Reclamation phases, when truck traffic is at its peak, it is recommended that the owner implement a traffic control plan that will alert drivers of the increase in truck traffic.

Prepared Under the Supervision of:

Dion Plsek, P.E.

APPENDIX A



Legend

- Site Boundary
- 217335200016 (Area: 364.66 acres)
- Parcels
- 2 mile Radius
- Highway/Interstate
- County Roads

0 0.2 0.4 0.8 Miles

N W E S

PROJECT NO:	011-2627
DRAWN BY:	Jenna Muhlbach
DATE:	11/28/11

VICINITY MAP
PICEANCE CENTRALIZED SOIL TREATMENT FACILITY
PETROLEUM DEVELOPMENT CORPORATION

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FIGURE

VM - 1

APPENDIX B

Counter Measures

Site Code : 3
N/S STREET: CR-215
E/W STREET: I-70 FRONTAGE RD
: :

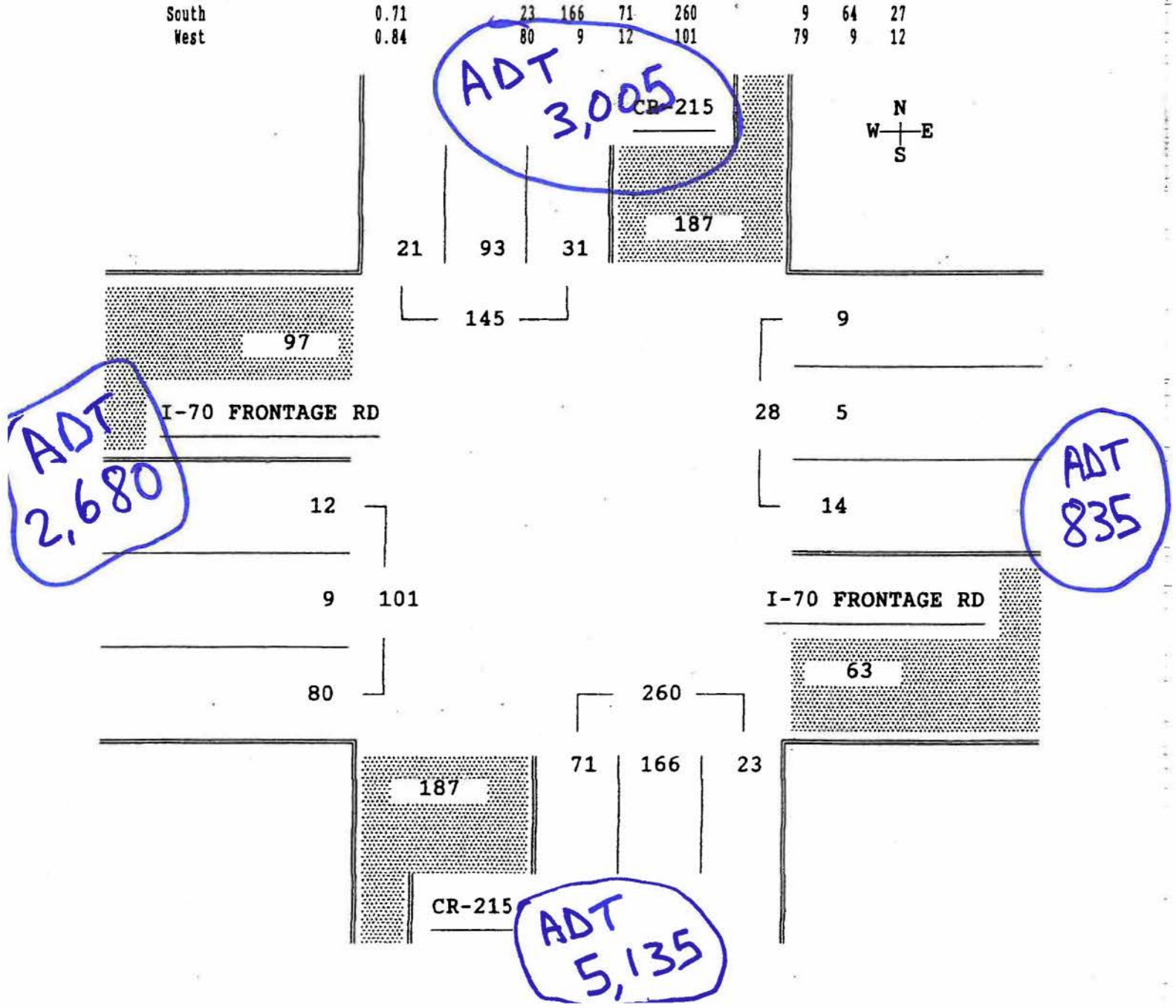
PAGE: 1
FILE: CR21I70F

Movements by: Primary

DATE: 6/03/04

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	6:45 AM	0.89	20	92	38	150	13	61	25
East	7:00 AM	0.73	14	6	9	29	48	21	31
South	6:30 AM	0.71	23	166	71	260	9	64	27
West	7:30 AM	0.89	103	11	17	131	79	8	13
Entire Intersection									
North	6:30 AM	0.86	21	93	31	145	14	64	21
East		0.70	9	5	14	28	32	18	50
South		0.71	23	166	71	260	9	64	27
West		0.84	80	9	12	101	79	9	12



Future Traffic Volumes for Highway 006m

From RefPoint 0 To RefPoint 500

Printable Report

set to landscape

Route	Ref Point	End Ref Point	Start Point Description	AADT	AADTYR	AADT Single Trucks	AADT Comb. Trucks	Design Hour Volume (% of AADT)	AADT 2012	AADT Single Trucks 2012	AADT Comb. Trucks 2012
006M	65.411	74.875	ON SH 6 N/O I-70 OVERPASS @ MESA-GARFIELD CO LINE	710	2010	80	60	12	780	88	66
006M	74.875	75.042	ON SH 6, 1ST ST SW/O PARACHUTE AVE, PARACHUTE	2,600	2010	150	100	11	2,816	162	108
006M	75.042	75.212	ON SH 6, 1ST ST NE/O PARACHUTE AVE, PARACHUTE	2,600	2010	150	90	11	2,816	162	97
006M	75.212	88.895	ON SH 6, 1ST ST SW/O PARACHUTE CREEK RD, CR 215, PARACHUTE	4,800	2010	330	230	11	5,198	357	249

If you notice an error, bug or have any questions, Please E-mail us.

For comments or questions about this site, please send e-mail to: DTD

Future Traffic Volumes for Highway 006m

From RefPoint 0 To RefPoint 500

Route	Ref Point	End Ref Point	Start Point Description	AADT	AADTYR	AADT Single Trucks	AADT Comb. Trucks	Design Hour Volume (% of AADT)	AADT 2032	AADT Single Trucks 2032	AADT Comb. Trucks 2032
006M	65.411	74.875	ON SH 6 N/O I-70 OVERPASS @ MESA-GARFIELD CO LINE	710	2010	80	60	12	1,475	166	125
006M	74.875	75.042	ON SH 6, 1ST ST SW/O PARACHUTE AVE, PARACHUTE	2,600	2010	150	100	11	4,974	287	191
006M	75.042	75.212	ON SH 6, 1ST ST NE/O PARACHUTE AVE, PARACHUTE	2,600	2010	150	90	11	4,974	287	172
006M	75.212	88.895	ON SH 6, 1ST ST SW/O PARACHUTE CREEK RD, CR 215, PARACHUTE	4,800	2010	330	230	11	9,182	631	440

If you notice an error, bug or have any questions, Please E-mail us.

APPENDIX C

CONSTRUCTION OF PICEANCE CENTRALIZED SOIL TREATMENT FACILITY										
Activity	**Day**	**Trucks**	**Weights**	**No. Trucks**	**Equipment**	**Equipment Wt.**	**Daily Trips/Truck**	**Daily Trips**	**Daily PCE Trips**	**Phase Total (PCE)**
Construction of Pad										
	1	22 Wheel low-boy	170000 GCW	1	D9	85000	1	1	3	3
	1	22 Wheel low-boy	85000 GCW	1			1	1	3	3
	1	22 Wheel low-boy	120000 GCW	1	Grader	35000	1	1	3	3
	1	22 Wheel low-boy	85000 GCW	1			1	1	3	3
	5	18-wheel belly dump	80000 GCW	3	Soils/Gravel	50000	1	3	9	9
	5	18-wheel belly dump	30000 GCW	3			1	3	9	9
	9	18-wheel belly dump	80000 GCW	3	Soils/Gravel	50000	1	3	9	9
	9	18-wheel belly dump	30000 GCW	3			1	3	9	9
	14	22 Wheel low-boy	85000 GVW	1			1	1	3	3
	14	22 Wheel low-boy	170000 GCW	1	D9	85000	1	1	3	3
	14	22 Wheel low-boy	85000 GVW	1			1	1	3	3
	14	22 Wheel low-boy	120000 GCW	1	Grader	35000	1	1	3	3
Every Day of Construction	1-14	Fuel/Maintenance	60000 GCW	1	Fuel	25000	1	1	3	42
	1-14	Fuel/Maintenance	35000 GCW	1			1	1	3	42
	1-14	Pickup or other light vehicle	8000 GVW	4			2	8	8	112
							Total Trips (One Way)			256
							Average Trips/Day			18
							Maximum Trips/Day			32

NOTE: All trips are one-way.

OPERATION OF PICEANCE CENTRALIZED SOIL TREATMENT FACILITY										
Activity	**Day**	**Trucks**	**Weights**	**No. Trucks**	**Equipment**	**Equipment Wt.**	**Daily Trips/Truck**	**Daily Trips**	**Daily PCE Trips**	**Phase Total (PCE)**
Operation of Facility										
		Pickup or other light vehicle	8000 GVW	2			0.29	0.57	0.57	3577.14
		Pickup or other light vehicle	8000 GVW	1			0.03	0.03	0.03	208.67
		30 Ton Dump Truck	115000 GCW	2	Soil	57500	1	2.00	6.00	37560.00
		30 Ton Dump Truck	57500 GCW	2			1	2.00	6.00	37560.00
		10 Wheel Water Truck	60000 GCW	1	Water	35000	0.14	0.14	0.43	2682.86
		10 Wheel Water Truck	25000 GCW	1			0.14	0.14	0.43	2682.86
		22 Wheel low-boy	170000 GCW	1	D9	85000	0.14	0.14	0.43	2682.86
		22 Wheel low-boy	85000 GVW	1			0.14	0.14	0.43	2682.86
For life of facility - assumed 20 years							Total Trips (One Way)			89637.24
							Average Trips/Day			14.32
							Maximum Trips/Day			27.00

NOTES: 1. All trips are one-way.

2. Trip Generation assumptions are as follows

1350 trucks per year

1 water truck per week

1 lowboy with equipment for soil movement per week

2 pickup trucks per week or oversight

1 pickup per month for samples

3. Average Trips are AADT

4. Maximum Trips assume all daily, weekly, and monthly trips arrive and leave the same day

RECLAMATION OF PICEANCE CENTRALIZED SOIL TREATMENT FACILITY									
Activity	**Day**	**Trucks**	**Weights**	**No. Trucks**	**Equipment**	**Equipment Wt.**	**Daily Trips**	**Daily PCE Trips**	**Phase Total (PCE)**
Regrading and Final Contour									
	1	22 Wheel low-boy	120000 GCW	1	Grader	35000	1	3	3
	1	22 Wheel low-boy	85000 GCW	1			1	3	3
	1	22 Wheel low-boy	170000 GCW	1	D9	85000	1	3	3
	1	22 Wheel low-boy	85000 GCW	1			1	3	3
	14	22 Wheel low-boy	85000 GVW	1			1	3	3
	14	22 Wheel low-boy	170000 GCW	1	D9	85000	1	3	3
	14	22 Wheel low-boy	85000 GVW	1			1	3	3
	14	22 Wheel low-boy	120000 GCW	1	Grader	35000	1	3	3
Every Day of Construction	1-14	Fuel/Maintenance	60000 GCW	1	Fuel	25000	1	3	42
	1-14	Fuel/Maintenance	35000 GCW	1			1	3	42
	1-14	Pickup or other light vehicle	8000 GVW	6			2	12	168
							Total Trips (One Way)		276
							Average Trips/Day		20
							Maximum Trips/Day		30

NOTE: All trips are one-way.